PART I

HISTORY AND BACKGROUND

CHAPTER I

HITLER MOVES, WEST, SOUTH, EAST!

On 7 December 1941 elements of the Imperial Japanese Navy bombed the United States naval base at Pearl Harbor, and the United States was thrust violently into World War II.

As a nation, the United States was woefully unprepared for war. Its armed forces were undermanned and poorly equipped. In fact, much of the Army's equipment, when compared with that of the other countries already in the war, was obsolete.

Although the country was taken by surprise by its sudden entry into war, the armed forces quickly expanded their operations, while United States industry geared up for what would become a massive wartime production effort.

One of the Army's most glaring weaknesses in 1941 involved its ability to collect technical intelligence. While the basic role of the fighting man had not changed over the centuries, the weapons he used had changed drastically, often with dramatic effect. A number of people in the Army's ranks knew that further technological innovations in weaponry could have equally dramatic effects on the outcome of the combat operations in which the Army was or soon would be engaged. They considered it imperative for the Army to stay abreast of the current weapon developments of our allies as well as those of the enemy powers. Ordnance Technical Intelligence, as it would become known, was not the only area of intelligence that had problems in the early stages of the war. As General Eisenhower pointed out in his book "Crusade in Europe":

> "Within the War Department a shocking deficiency that impeded all constructive planning existed in the field of Intelligence. The fault was partly within and partly without the Army. The American public has always viewed with repugnance everything that smacks of the spy: during the years between the two World Wars no funds were provided with which to establish the basic requirement of an Intelligence system -- a far-flung organization of fact finders.
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> Our one feeble gesture in this direction was the maintenance of military attaches in most foreign capitals, and since public funds were not available to meet the unusual expenses of this type of duty, only officers with independent means could normally be detailed to these posts. Usually they were estimable, socially acceptable gentlemen; few knew the essentials of Intelligence work. Results were almost completely negative and the situation was not helped by the custom of making long service as a

military attache, rather than ability, the essential qualification for appointment as head of the Intelligence Division in the War Department.

The stepchild position of G-2 in our General Staff system was emphasized in many ways. For example the number of general officers within the War Department was so limited by peacetime law that one of the principal divisions had to be headed by a colonel. This in itself would not necessarily have been serious, since it would have been far preferable to assign to the post a highly qualified colonel than a mediocre general, but the practice clearly indicated the Army's failure to emphasize the Intelligence function. This was reflected also in our schools, where, despite some technical training in battlefield reconnaissance and Intelligence, the broader phases of the work were almost completely ignored. We had few men capable of analyzing intelligently such information as did come to the notice of the War Department, and this applied particularly to what has become the very core of Intelligence research and analysis -- namely, industry.

In the first winter of the war these accumulated and glaring deficiencies were serious handicaps. Initially the Intelligence Division could not even develop a clear plan for its own organization nor could it classify the type of information it deemed essential in determining the purposes and capabilities of our enemies. The chief of the division could do little more than come to the planning and operating sections of the staff and in a rather pitiful way ask if there was anything he could do for us.

No one was more keenly aware of our shortcomings in Intelligence than General Marshall. In his search for improvement he assigned, on May 5, 1942, as head of the Intelligence Division Major General George V. Strong, a senior officer possessed of a keen mind, a driving energy, and ruthless determination.

No longer handicapped by lack of money, the Chief of Staff did everything possible to repair the neglect of many years; but no amount of money or emergency effort could rapidly establish throughout the world the essential base of observers and fact finders. However, together with General William Donovan's Office of Strategic Services, General Strong gradually began building a system that was eventually to become a vast and effective organization. Fortunately in the early days of the war the British were able to provide us, out of their prior war experience, much

vital information concerning the enemy."

The pre-war neglect of intelligence also had the effect of allowing our military equipment to become obsolete. The most candid description of our early efforts in the war came from the introduction of the 1942 book, "They Were Expendable."

> "We are a democracy, running a war. If our mistakes are concealed from us, they can never be corrected. Facts are frequently and properly withheld in a war, because the enemy would take advantage of our weaknesses if he knew them. But this story now can safely be told because the sad chapter is ended. The Japanese know just how inadequate our equipment was, because they destroyed or captured practically all of it."

Following America's involvement in World War I, "the war to end all wars," American military planners realized the impact of lethal gas warfare on military operations and decided that America could not afford to be caught short on knowledge of this aspect of war. On May 4, 1918, General Order No. 7 established Edgewood Arsenal from a part of Aberdeen Proving Ground, known as the Gunpowder Reservation, and government-leased gas manufacturing plants in five states. Chemical warfare had become a reality. In the same year, the Army Ordnance Association, later renamed the American Defense Preparedness Association, was formed as a means of promoting cooperation and understanding between the civilian defense industry and the Ordnance Corps.

During World War I, research in ballistics was pioneered by a division of Aberdeen Proving Ground's Weapons and Ammunition Proof Department. This organization would eventually become known as the Ballistics Research Laboratory. Like many other military installations, activity at this division was limited until World War II when it would be expanded rapidly and carry the brunt of ballistics research for the Allies.

During the years of 1918 and 1919, George Burling Jarrett was a young school boy and spent his summer vacation employed in a New York shipyard. Most of his paycheck was spent to purchase relics from World War I from soldiers returning from overseas.

In 1922, he traveled to Europe to explore the battlefield areas himself. He collected everything he could find related to the war and shipped it home. At the same time, Leslie A. Skinner, a veteran of World War I had entered the U.S. Military Academy and graduated from West Point in 1924. He did post-graduate work at MIT and received a Masters degree in Ordnance Engineering, but was commissioned in the Army Air Corps.

In 1927, George B. Jarrett joined the Army Ordnance Association in order to keep abreast of current developments in armament by the

United States and other nations. He was also commissioned in the U.S. Army Reserve. He continued to collect arms and equipment, and by 1930 his collection of Civil War and World War I artifacts rivaled those of most museums, and he opened his own -- the Jarrett Museum of World War I History on the Steel Pier in Atlantic City, New Jersey.

In 1932, the Chaco War erupted in South America between Bolivia and Paraguay. Bolivia had the best-armed troops, having purchased a large amount of surplus war materials from the U.S. Their tin industry provided the necessary funding. The Paraguayans on the other side were ill-equipped and little more than an invisible guerilla army. This story would later repeat itself some 35 years later in Vietnam. One of the landmark cases in United States constitutional law was the United States versus Curtis Wright Aviation which dealt with the sale of aircraft to Bolivia.

The Chaco War lasted until 1935 when Bolivian forces were driven from the field, but the political settlement of 1938 favored the Bolivians. The politics and conduct of this war are a fascinating study. The important point is that Germany, Czechoslovakia, and Russia sent military observers to study both weapons and jungle tactics. The lone American was a Captain Sharp and he was only there in 1933. The mortar and the machine gun would dominate the battlefield. Lessons learned from this experience would be put to use in European nations as they prepared for later conflicts.

In 1934, at the age of 32, Reginald V. Jones received his PhD. in physics. Jones, for some reason, was worried about Hitler's rise to power in Nazi Germany. Six years later, Jones would head up British Scientific Intelligence. Writing many years later, Jones wrote that the German perception of the British intellectuals' refusal to fight for King and country was one of the reasons that led to World War II.

In 1936, the Spanish Civil War began which lasted until 1939 when Madrid fell. The lessons learned in the Chaco War and included in European military equipment were again put to the test. Franco's Fascist forces defeated the Loyalist forces. Superimposed upon the Spanish Civil War was the communist movement. Within America, involvement was limited to arms and ammunition and the Abraham Lincoln Brigade. This was a combat unit composed of volunteers who supported the communist movement. The Russians and Germans, however, supplied a good bit of the equipment used on both sides and quite naturally sent military observers. The Germans were most interested in perfecting their dive bombing technique as well as field testing other weapons. The Russians also sent observers whose reports were studied and incorporated in military equipment design.

The Russians, who liked to portray themselves as being avant garde in military technology had begun construction of heavy tanks in 1930 assigning the project to two different teams. One team produced the TG 5 later known as the T42. The other team produced

the T35. This design was accepted for construction of a prototype which underwent trials in April 1933 and was then rushed to Moscow for the May Day parade. This was accepted for production which was to take place at the Kharkov Locomotive Factory. The best known version was the model of 1935 which had been redesigned and included a 76.2mm main gun and with secondary guns of 45mm. Production of this tank continued until 1939 with a total of 61 vehicles being produced. Based upon the experience in the Spanish Civil War, it had become obvious that the T35's 20-30mm of armor was vulnerable to the new generation of antitank guns used in Spain. In addition, the T35 had not been well thought out from either technical or operational standpoints. It's M17 gasoline engine was overworked and prone to breakdowns and fires.

In 1937, The Directorate of the Armoured and Mechanized Forces laid down plans for an "Antitank Gun Destroyer" able to withstand the fire of 37-45 mm antitank guns at point blank range or the fire of 75mm field guns at 1,200 meters. The specifications were again provided to two design teams, one led by Barykov and the other led by Kotin. The Barykov team produced the T 100 while the Kotin team produced the SMK which was renamed the KV. Two prototypes of each tank were built and underwent proving ground trials in December 1939. These trials greatly favored the KV tank, however, all four were sent to Finland for operational testing. Troop trials revealed the difficulty in dealing with reinforced bunkers with ordinary tank guns. As a result, the Commander of the Russian 7th Army, General K. Meretskov requested crash production of a howitzer tank mounting a 152 - 203mm weapon. This eventually became the KV 2 tank.

On 19 December 1939, the KV tank was accepted and initial production of 50 tanks was ordered from the Kirovski Works. The German intelligence service, although receiving reports of these tanks, simply discounted them as derivations of the T35 which was not a serious threat. There does not appear to have been anyone or organization within the German intelligence responsible for projecting future trends in equipment in the late 1930's. Available information on the German intelligence effort would tend to confirm that it, like most intelligence services of the period were more concerned with political developments than military equipment.

Unfortunately, the United States Army Ordnance Corps had gained a very poor reputation as a reslt of WW I, when they had blocked the adoption of the American designed Lewis Gun. The Ordnance Corps, Lewis felt was "a cabal of weapon making merchants and senior decision making ordnance officers," an early "old boy" network. Many other weapon makers had similar experiences in dealing with the military with the ultimate result that they too had to resort to selling the weapons overseas. The end result of this was that various manufacturing firms had marketing and sales efforts overseas and were thus more closely connected with the battlefield information that German, Russian, English, and French forces were likely to supply to their arms makers. Between the lack of an effective intelligence effort, as well as a lack of distribution to the Ordnance Department

of Technical Data, the United States had literally developed a system where the commercial enterprises knew more about weapons development than the Ordnance Corps.

In the area of the combat soldier, the Infantry and Artillery branches dominated the army as the fledgling armored force was almost non-existant. The Tank Corps, which had been disbanded after WW I had been recreated but did not have the influence of the other branches. Although the tank had played an important part in WW I, the mechanization of the armies was neglected afterwards, especially in the victorious armies of England and France. A few progressive theories on mechanization were published, notably by Col. J.F.C. Fuller of England, but they were ignored. Several German Generals also wrote extensively on the subject, but their works were not widely read in the United States. George Patton was an exception. As a result, the United States lacked a body of officers who could appreciate armor developments. Those officers who understood armor were kept busy working to develop an armor force and were not available for tours of various battles or assignment as an attache. With a limited amount of information on German tank developments available, the American effort had been to develop the M3 Lee tank which was in all probability superior to the German Panzerkampfwagen III and IV but like the Germans, there was no one concerned with anticipating future developments. Unlike the Russians, the Armor force had no one to observe the performance of the new generation of antitank weapons that had been tested in Spain.

Aviation was making rapid strides and the United States was considered by many to be the World leader in Aviation developments. In the early 1930's the German Air Force, the Luftwaffe, was equipped with American aircraft engines and propellors. The rapid expansion of the Luftwaffe under Hitler became a subject of primary concern to the American Military.

Contrary to General Eisenhower's remarks on the state of affairs in the Intelligence Division and the role of the attaches, the United States had an excellent officer serving as attache in Berlin in the person of Col. Truman Smith. In April 1936, Col. Smith began to make preparations to have Col. Charles Lindbergh, a world famous aviator and Army Reserve Colonel, visit the German Aviation industry. Lindbergh made five visits, beginning in July 1936, the second in October 1937 and the third visit in October 1938. The results of these visits and the reports prepared by Lindbergh was to call attention to the rapidly expanding role of the German Luftwaffe. Regretably the Air Intelligence effort of the War Departments Intelligence Division was looked upon as a Stepchild of Army Intelligence. It appears that one positive aspect of Lindbergh's visits was to eliminate some of the skepticism of the Intelligence Division's perception of the Luftwaffe.

Col. Smith had not been long in Berlin before he came to the conclusion that the system of reporting air intelligence which Washington was forcing Captain Koenig, the air attache, to follow

was faulty. A surprisingly small number of all reports, far fewer than reports on the expansion of the German army, were being sent to the War Department. Most of the time and energy of the assistant attache for air went into the preparation of an annual report, which, as its title implies, went forward to Washington just once a year. Between times, an occasional report was also dispatched, depicting a visit to one or another factory. Rather frequently also, Captain Koenig had to answer queries prepared in the Washington office of the Air Corps concerning technical matters. But it was only too clear to the attache that the main effort of the air section of the office went into preparation of the voluminous annual report. This was a document, prepared on a form furnished by the Air Corps; it called for a mass of statistical data on every conceivable aviation matter and was unintelligible to anyone who had not received technical aviation education. It seemed evident to the military attache that this "annual report" method had been chosen by the Air Corps and the Intelligence Division (G-2) because both headquarters in Washington lacked sufficient trained personnel to consolidate individual reports and because these offices were almost solely dependent on the Berlin attache office for information on German aviation. Such an annual report took no account of the extremely rapid development of the Luftwaffe, in which expansion could be noted almost every week.

In addition to these seeming weaknesses in the system of reporting information, no effort had hitherto been made in the Berlin office to establish systematic card index files of factories, airfields, and Luftwaffe units, nor did there exist technical data "sheets" for each of the types of airplanes which composed the Luftwaffe of 1935 or were known to be undergoing tests. As a result of this lack of card index files, it seemed to the attache that the annual reports were not accurate with respect to much of the detailed information they contained and that, in consequence, many of their conclusions were not valid. These latter often appeared to be based more on intitution than on solid facts.

By January 1, 1936, five months after arriving in Berlin, the military attache had become seriously concerned about the quantity and quality of the air intelligence being sent by his office to Washington. This concern seemed to be shared by the intelligence section of the General Staff (G-2).

Letters from the chief of the Attache Section in G-2 of the War Department, Colonel Charles Burnett, expressed dissatisfaction with the quality of the air reports of the Berlin office in contradistinction to those dealing with the German army. Personal letters received by the assistant attache for air from friends in the office of the chief of Air Corps contained remarks making light of Goering's new Luftwaffe and German technical avaiation developments, thus indicating that the Berlin office was failing in its efforts to convince Washington that the German air expansion was formidable and likely to change the balance of European power.

Perforce, the military attache could devote only a portion of his time and energy to air matters. About him was going on one of the most exciting army expansions in history, an expansion which in 1935 and 1936 was more impressive by far than that of the Luftwaffe. Trained as he was as a soldier and not an airman, it was his inclination to devote most of his efforts to matters of which he felt he was master, rather than to aviation. Nevertheless, within a few months of arrival in Berlin, the military attache, uneducated in aeronautical science as he was, felt sure that Goering planned a mighty Luftwaffe, that Germany's dependence on American equipment was but a stopgap phenomenon, and that the day was not far off when modern airplanes with powerful new engines would make their appearance in the German skies.

In October 1935, the military attache decided to accompany his assistant on a visit to one of Goering's new and modern air factories, the Henschel works at Schonefeld, 22 miles southeast of Berlin. His factory inspection left an indelible impression on Smith's mind. The Henschel works, he discovered, were large and carefully planned to reduce the destruction which hostile bombing would achieve. Each structure had its own power plant. The hanger-type factory buildings were widely spaced. On the other hand, it was noted that this ultra-modern plant was producing a dive-bomber, the Henschel (HEN 123), of an obsolete type. Smith was struck by the incongruity of an ultra-modern factory producing obsolete airplanes.

The military attache returned from this visit to the Henschel works more worried than ever about the quality of air intelligence being produced by his office. The German air industry was obviously developing rapidly, and it could be assumed that the expansion of the Luftwaffe into a great and powerful air force would not be delayed long. The very confidence the military attache felt in being able to cover the German army expansion to the satisfaction of the War Department threw into sharp relief his feeling of uncertainty as he faced the myriad technical matters involved in German aeronautical progress. He also returned with the conviction that the position of the assistant attache for air in his office ought to be filled by an officer who had intensive technical training, as well as flying experience in combat units. The former qualification Captain Koenig did not possess. Loyalty, willingness to work hard for long hours, flying ability, and social talents were not enough, in the attache's opinion, to permit Koenig to fill the job called for by the situation in Germany.

In the latter part of the winter of 1935-36, the military attache took up with the chief of the Attache Section of G-2, Colonel Charles Burnett, the question of obtaining a replacement assistant for air. He asked that an air officer be sought who possessed thorough knowledge of both airplanes and engines. Within a month Colonel Burnett replied that a search for an air attache with the qualifications regarded by Major Smith as essential would be undertaken at once, but pointed out that the Air Corps had few such

officers available and, for the moment, none to spare for an attache post. Colonel Burnett stated, however, that he hoped a suitable replacement for the assistant air attache in Germany could be located within six to eight months and that Major Smith could count on receiving a technically qualified assistant at least by early 1937.

About March 1936, the military attache directed the assistant attache for air to submit reports to the General Staff and the Air Corps on the following matters, quite apart from his required annual aviation report:

1. A report on each individual German airplane, containing all known performance data and, whenever possible, with an illustration of the plane attached.

2. A similar individual report on each known German airplane engine.

3. A special report each time a factory of the German aircraft industry was visited, which should note its location, size, special features, and degree of modernness. Furthermore, this report was to contain an estimate of both its present rate of production and potential production in case of war.

The military attache also directed that office index file cards be prepared on each of the above subjects and that these be kept up to date. Whenever new data were obtained on an airplane, airplane engine, or factory, it was to be entered on the index card and at such time as the assistant attache for air felt the previous G-2 report on the subject was out-of-date, a revised report on the same subject was to be sent to Washington. In addition, at about this time, Captain Koenig, the current assistant air attache, on his own initiative, began to maintain index file cards on German airfields.

Captain Koenig carried out these directives with loyalty and energy. At the same time, he did not neglect his required annual report. However, it could not have been easy for him to take direction from an infantry officer on matters dealing with his own area of the services. Month by month, the quality of the air reports of the Berlin office improved. Yet the technical reports on aviation prepared by the assistant attache for air showed, as before, serious gaps in his aeronautical and engineering background. The military attache was also forced to conclude, from personal letters which continued to arrive from offices in Washington, that his reports were not really convincing either the General Staff or the Air Corps of the ever more formidable nature of Goering's Luftwaffe, an arm which one day Hitler would surely use to achieve his foreign political ambitions.

Major Smith then began the process of arranging for Charles Lindbergh, a world famous aviator and Air Corps Reserve Colonel to visit Germany and tour various aviation facilities.

With the conclusion of Lingbergh's second visit to Germany, the military attache's active participation in air intelligence activities began to diminish. Some months had to pass before Major Vanaman, the new assistant air attache, after reaching Berlin, could become acquainted with his new duties and acquire an adequate background in the German air industry and the Luftwaffe. However, by December 1937, he needed no help from the military attache, and it would have been presumptuous to offer it to him. Vanaman's technical knowledge, his ability to estimate at a glance the production of any factory he visited, and above all, his prestige with the American Air Corps convinced the attache that in the future, he, himself, had better devote his energies primarily to German army expansion and to the political military aspects of Hitler's foreign policy.

Scarcely had Major Vanaman taken over air activities of the office than he began to stress in his reports that Goering's Luftwaffe was not a long-range air force in the American sense, but rather an air arm, primarily designed to support the German ground forces. He emphasized repeatedly that Germany was building hardly any four-engined bombers -- those observed being prototypes. Not a single combat group of the Luftwaffe was equipped with four-engined bombers, nor was there a single factory known to be producing more than a few prototypes. This fact revealed rather clearly one aspect of Hitler's policy: that his immediate foreign political ambitions lay close to Germany. He wanted the Reich to expand for some years to come on the European continent, and hence he could sacrifice range in his airplanes for other characteristics.

Major Vanaman proved correct in this estimate. Marshal Kesselring, in his memoirs written after the war, states that "from the very first, Hermann Goering had a clear conception of the end he had in view, 'to create an air force that would be decisive in Europe.'" Long-range, four-engined bombers were viewed by Hitler and Goering as expensive luxuries for Germany in view of such objectives.

Major Vanaman, in these first months in Berlin, also became convinced that the JU 52 bombers, which the Germans had been building in large numbers since 1933 and which were obsolete -- no matter whether judged by British, American, or German standards -- were intended to be converted into transport planes when their usefulness as bomber trainers was over. Parachute units had existed in the Luftwaffe for some time, and early in 1938, it was learned that the 22nd Division of the army had been designated as an "air landing" division. It now became reasonably clear that Germany was bent on developing air-ground warfare, although the full extent of her preparations and the revolutionary plans she was hatching were still only dimly perceived.

There are some references in the files of military attache reports from Berlin in these years indicating that this German purpose was grasped in part. It cannot be said, however, that the

military attache office in Berlin sensed the extraordinary emphasis Germany was placing on its parachute and air landing units or on its large JU 52 transport fleet. Such reolutionary operations with these units as were carried out by Germany at Rotterdam in 1940 and in Crete in 1941 were not visualized at this time. But, in justice to the Berlin military attaches it must be brought out that air-ground operations was one of the matters around which the Germans threw a veil of the tightest secrecy. Nor should it be forgotten that the attaches controlled no espionage network or had in their possession a single dollar to spend for such purposes.

Once -- and once only -- did the office of the military attache stumble on the truth. This was in the early autumn of 1935. At that time, the senior assistant military attache was Captain James C. Crockett of the Infantry, an officer possessing singularly imaginative powers, and who was, at the same time, thoroughly trained in orthodox army strategy and tactics. In 1934, he had attended, in his spare hours, lectures at the German War College (Kriegsakademie). Captain Crockett had a wide acquaintanceship in the German army. One day in 1935, he came to the military attache and reported a conversation he had had over a glass of wine with a former classmate at the War College, a man who had become a General Staff officer. In excited terms Crockett described exactly the type of operation that the Germans were to carry out in 1940 with parachute troops at Rotterdam. He added that the German General Staff was thinking of producing a revolution in warfare with their parachute units.

The attache was impressed. Crockett's enthusiasm was apt to be contagious. Yet -- in the autumn of 1935 -- Germany possessed no parachute units whatsoever. The attache, therefore, discounted Crockett's story and took the position that the idea of parachute operations on a grand scale was but a theoretical concept of the German War College; that the conversation should be reported in Washington in a routine manner; but that until Germany had organized large formations of parachutists, no undue stress should be placed upon air-ground warfare in the reports to the Intelligence Division and the Air Corps.

Before leaving Washington for Berlin, and after many conferences with officers in Air Corps headquarters, Major Vanaman had decided to place great emphasis on his Annual Air Report. Previously, the military attache had been skeptical of the value of this lengthy, statistical, and analytical compendium of all sorts of aeronautical data. Major Vanaman soon convinced him, however, that the Annual Report ought to be stressed and that the mass of data it contained was indispensable to the Air Corps. Vanaman's 1937 Air Report, therefore, was carefully prepared and systematized all the air information on hand in Berlin as had never been done previously. In the military attache's opinion, the most important of these sections in this report were those estimating the number of German combat planes on hand and the current production of the German aircraft industry. Vanaman estimated the combat planes on hand, as of December 7, 1937,

at 3,168 -- and current factory production at an annual rate of 6,000. However, he did not include in this 1937 report any estimate of potential war production, but asked the Air Corps to grant him leeway until 1938, so that he would have an opportunity to inspect more factories before having to prepare this difficult calcuation. Major Vanaman's estimate of planes on hand and current production as of the date of his report is thought by General Hanesse, the chief of the Air Ministry's Attache Section, to have been close to the actual figures Germany achieved in 1937.

The military attache, from the summer of 1936 on, had been following the course of events in Spain, insofar as he could from the Berlin, Paris, and London press. It was well known in Britain that units of the Luftwaffe were participating in the Civil War on Franco's side. Yet, no details and very few general facts about the quantity or quality of the German participation could be learned in Berlin. The strictest secrecy measures were maintained by the German government with regard to all German activities in Spain, and these measures were complied with by officers of the Luftwaffe. Occasionally, one or another Luftwaffe friend of the attache's would disappear for a number of months from Berlin and, when he again put in an appearance, would give suspiciously vague answers to questions as to his recent whereabouts. It was guessed by the attache and by Major Vanaman that these officers had been in Spain. However, the veil of secrecy could not be pierced.

It was realized that the Luftwaffe was utilizing the Spanish Civil War to test out, under combat conditions, its airplanes, pilots, gunners, and bombardiers. If the Berlin attaches had obtained accurate data on the experience gained in Spain they could have estimated accurately the battle efficiency of Goering's new Luftwaffe. These data, however, they were unable to obtain.

Another aspect of German air participation in the Spanish Civil War escaped the American attache's notice. This German participation seems to have disrupted seriously the training and expansion programs of the Luftwaffe at home. Marshal Kesselring, in his memoirs, states: "We at home were faced with every kind of difficulty as the demand for personnel and technical equipment upset our training program."

While it was recognized that the General Staff in Washington had other sources of information regarding the Spanish Civil War than those of the military attache office in Berlin, still no place in Europe compared to Berlin for obtaining exact knowledge of the qualities and defects of the participating German planes and crews. Here was another instance where the Intelligence Division in Washington placed excessive reliance on its attaches. Attaches cannot afford to let arise even a suspicion that they are engaging in espionage. To have done so in this case would have endangered the military attache's friendly relationship with the Luftwaffe and perhaps, indeed, have brought about a request for his recall. This particular Spanish situation dramatizes the necessity of our army's

having maintained constantly two parallel intelligence networks: its attache service and, quite separate from it, an espionage network.

Since his arrival in Berlin in August 1935, the military attache had tried to keep himself and his assistants aloof from the Nazi party, which was ruling Germany. He had decided not to submit to the Intelligence Division of the General Staff purely political reports about internal conditions in Germany, but rather to leave such reporting to the ambassador and his diplomatic staff. In part, but in part only, this policy of "aloofness from politics" could be maintained. Military and political matters were too closely intertwined in Nazi Germany for a strict demarcation line to be drawn.

Relations with the German Air Ministry presented few difficulties. It was staffed almost entirely by professional soldiers of the old school. A number of these were anti-Nazis. Fully half had a strong monarchist sympathy. Still others professed complete political indifference. Only a few were Nazis, such as General -- later Field Marshal -- von Reichenau, although many generals admired one or another aspect of Hitler's personality and policies.

Very different were conditions in the Luftwaffe. Hermann Goering was recognized throughout Germany as the "number-two Nazi." It was natural, therefore, that Luftwaffe officers did not oppose the political program of the ruling Nazi party. Also, the Luftwaffe lacked that hard corps of old-fashioned Prussian officers steeped in tradition, which gave a nonpolitical tone to the army. The personnel of the Luftwaffe was a heterogeneous body which had been recruited from all classes of the population. Passive Nazis were numerous. Ardent Nazis constituted a considerable proporation of the whole.

Shortly before his third visit to Germany, Col. Lindbergh wrote to Ambassador Joseph Kennedy in London and expressed his opinion of the Luftwaffe. Ambassador Kennedy promptly cabled the contents of the letter to the State Department. The cable is almost a verbatim quote of the letter and is reproduced below:

"Ambassador Kennedy's Cable to the State Department

London
September 22, 1938

Secretary of State
Washington

I venture to repeat below the substance of an interesting talk I had yesterday with Colonel Lindbergh regarding the present relative air strength of the great European powers as he sees it, which he has confirmed today in a memorandum. Lindbergh has

had unusually favorable opportunities to observe the air establishments of the countries he discusses and has in fact just returned from a trip to Russia. You may feel that this confidential expression of his personal opinion may be of interest to the President and to the War and Navy Departments.

'Without doubt the German air fleet is now stronger than that of any other country in the world. The rate of progress of German military aviation during the last several years is without parallel. I feel certain that German air strength is greater than that of all other European countries combined and that she is constantly increasing her margin of leadership. I believe that German factories are now capable of producing in the vicinity of 20,000 aircraft each year. Her actual production is difficult to estimate. The most reliable reports I have obtained vary from 500 to 800 planes per month. The quality of German design is excellent, and the extensive research facilities which have been built in that country are a guarantee of continued progress in the future. The Germans long ago establised their ability in the design, construction and operation of aircraft. I believe that they have the greatest ability of any European nation in the field of aviation. In fact, I believe that the United States is the only country in the world capable of competing with Germany in aviation. At present, however, Germany is rapidly cutting down the lead we have held in the past. In numbers of fighting planes she is already ahead of us. In time of war, her weakness would undoubtedly lie in her supply of raw materials.

'Germany now has the means of destroying London, Paris, and Praha [Prague] if she wishes to do so. England and France together have not enough modern warplanes for effective defense or counterattack. France is in a pitiful condition in the air. England is better off but her air fleet is not comparable to Germany's. France is probably now building in the vicinity of 50 planes per month; England in the vicinity of 200 first-line aircraft. I understand that France hopes to have about 2,500 first-line planes by the Spring of 1942.

'Czechoslovakia has no completely modern aircraft, except those obtained from Russia. I saw a number of Russian-built bombers on the field at Praha. The Czechoslovakians have excellent machine guns and anti-aircraft guns.

'It is not possible to estimate Russian air

strength. The Russians have copied American factories and purchased American machinery of the most modern type. If operated on American standards these factories might place Russia next to Germany in military aviation. The production is certainly much less on Russian standards. Judging by the general conditions in Russia, I would not place great confidence in the Russian air fleet. However, Russia probably has a sufficient number of planes to make her weight felt in any war she enters. Her aircraft are not the best, but their performance is good enough to be effective in modern warfare. I believe the Russian weakness lies in inefficiency and poor organization.

'German military strength now makes them inseparable from the welfare of every civilization, for they have the power either to preserve or to destroy it. For the first time in history a nation has the power either to save or to ruin the great cities of Europe. Germany has such a preponderance of war planes that she can bomb any city in Europe with comparatively little resistance. England and France are far too weak in the air to protect themselves.'

Kennedy"

Despite Ambassador Kennedy's specific request in the opening sentences, there is no evidence in the State Department files that the cable was ever shown to the War Department, nor has any copy of this cable been found in War Department files. There is also no notation on the copy in the State Department files that this cable was ever shown, as Kennedy requested, to the president. Therefore, it would seem that however wide a distribution the cable may have had within the State Department, Colonel Lindbergh's views could have exerted only a small influence on American foreign and aviation policies.

On November 9, 1938, following Lindbergh's return from Germany he wrote once more to Ambassador Kennedy, summing up his newly won impressions of German avaiation. There is no record of Ambassador Kennedy's having transmitted the contents of this new letter to Washington by either cable or letter.

Col. Lindbergh made two more visits to Germany, however, they had nothing to do with Air Intelligence but dealt with French efforts to purchase German aircraft engines.

With the observation of the Spanish civil war and the performance of their weapons, the European military returned to the drawing boards to correct any problems which had been discovered. The lessons learned from this experience would result in new weapons which did not appear until the end of WW II. One of the main weapons

that emerged in this era was the German MG 34, a weapon designed specifically to violate the intent of the Versailles Treaty without violating the provisions. Many other weapons and systems were tested by both Germany and Russia. While the MG 34 was a superior weapon, it had its defects. Developmental work began on an MG 42, a refined version as well as other small arms. Recently published information suggests that Soviet Intelligence obtained advance knowledge of German Research and Development in small arms.

The United States Army was not completely ignorant of developments in Europe but there was no formal means of transmitting important technical information to the various arsenals and design efforts. Various commercial firms, having business dealings with Europe were well informed on developments but their efforts to introduce new equipment met with much the same resistance that it had in prior conflicts. There are conflicting accounts of the Army Ordnance Corps dealings with J. Walter Christie, whose Newark, New Jersey, firm manufactured combat vehicles. In defense of the Army, the lack of an effective intelligence system precluded any definitive reports on German developments and even less on Russian developments, although there was a futile effort to block the sale of two tanks to the Soviets. Lacking a clear perception of the Threat, the American effort in tank design was limited to gradual changes in equipment that was fielded. The standard American tank was the M3 Lee tank but on the eve of WW II, American designers were working on a replacement, to be called the M4 and named the Sherman.

In 1937 a study was prepared, entitled "Technological Trends and National Policy," but it failed to foresee helicopters, jet engines, inertial navigation, nuclear weapons, rocket-powered missiles, electronic computers and cruise missiles. Military Intelligence, as such, was limited to efforts to report on fielded equipment and that which was under development. There was no such thing as Scientific and Technical Intelligence in the United States nor an understanding of what it was or designed to do. Post war investigations revealed that the German Intelligence effort had Technical Intelligence, Air Technical Intelligence and Industrial Intelligence. Information on Russian intelligence is extremely vague but it would appear that the Russians had a rather extensive intelligence effort targeted at German science and research activity. There does not appear to be any organization whose efforts were to keep the U.S. military appraised of scientific advances being made in the United States. With this lack of interest it is understandable that very little training was conducted by the military, even less training in intelligence and no training for collecting information of Scientific and Technical Intelligence value. INSERT

In 1939, Germany signed a non-aggression pact with Russia and then occupied Poland, with the attack commencing at 0445 on 1 September 1939. Within three days, Britain and France declared war on Germany. Belgium and Holland remained neutral. In Novemer 1939, Polish and French cryptanalysts begin to decode the Luftwaffe Enigma transmissions. On 8 November, two British Secret Intelligence

Service officers were lured to Venlo on the Dutch-German border on the premise that they would meet with a disaffected German General. Both officers were kidnapped and unfortunately one was carrying a list of British agents in Czechoslovakia and from this and their interrogation, the Germans were able to arrest many British agents in the occupied countries. This was a devastating loss for the British.

On 10 May, 1940, the Germans began their attack in the west. Their plans were to Leeb's Army Group C to hold the frontier opposite the Maginot Line while Rundstedt's Army Group A made the main attack, with most of the armor, through the Aredennes and Bock's Army Group B would send a secondary advance through Belgium and Holland to draw the main British and French forces north so that Rundstedt could hit their flank. Neither the Belgians nor the Dutch had given the Allies any real cooperation in planning a joint defense because they did not wish to compromise their neutrality or provoke the Germans into attacking. The Allied Plan D was consequently less well elaborated than the German scheme. It provided for the First Army Group, the BEF (British Expeditionary Force) and the French Seventh Army to advance to the line of the River Dyle and the Meuse above Namur, to be joined there by the Belgian forces and on the left to link with the Dutch. General Gamelin was the Supreme Commander, General Georges commanded the armies on the Northeast Front, General Billotte the French First Army Group and General Lord Gort the BEF. Gort had the right to appeal to the British government if he believed that his orders from the French leaders threatened the existence of his force.

In theory, the two sides were fairly evenly matched on the ground, the Germans having 136 divisions and the four Allies together 149. In tanks the Allied strength was somewhat greater and a number were of superior quality. Of course the Germans had the advantage that all their forces came under a single command and conformed to one tactical system. In the air the Germans were much stronger, with over 3,000 combat planes facing less than 2,000 of the Allies to which the British home-based bombers, about 500, could be added. Later more RAF fighters and bombers would take part in the battle, both from bases in France and England, however, most of the Allied planes were of inferior types. The German organization and command were immeasurably superior, and their tanks were concentrated efficiently in armored divisions which were almost invariably energetically, and sometimes brilliantly, led. The higher command was not always ready to accept armored innovation but both individually and collectively it was still superior to the rambling Allied arrangements. Gamelin took little real control of the operations and several of the French general officers performed inadequately. The Allied troops of all nations were often poorly equipped and poorly led at more junior levels. The tanks, especially the powerful French force, were mostly deployed in small infantry support units and were let down by their poor mobility and defeated in detail. Although the British believed in the idea of the armored division they had not yet deployed one in France. (The 1st Armored

Division was ordered to France, incomplete, on 11 May.)

The distribution of the Allied forces also left much to be desired. The strongest and best-trained units were in the force to be sent forward in to Belgium with the best parts of the small reserve in support. Bilotte's First Army Group included almost all the armored units which the French army had formed. All three of the light armored divisions and two of the three heavy armored divisions were with the force which advanced into Belgium and the infantry of the BEF and the French First Army were the best on the Allied side. The forces covering the Ardennes were weakest because the terrain in this sector was judged to be too difficult to allow a significant German attack. They had almost no reserves. The Maginot line forces were stronger. In effect, the flanks were strong and the center, where the German attack fell, was weak.

On the first day Rundstedt's forces immediately began their advance through the Ardennes with the three armored corps in the lead. Kleist had two Panzer corps under command, Guderian's and Reinhardt's and they were heading for Sedan and Montherme. Hoth's corps was making for Dinant. The advance was rapid and the little opposition, mostly French cavalry, was thrown aside.

Far more spectacular and a far greater claim on Allied attention were the efforts of Bock's Army Group B. There were parachute landings deep inside Holland which did much to paralyze Dutch resistance. German units crossed the Maas near Arnhem in sudden early-morning attacks and, more exciting still, the fort at Eban Emael was put out of action by a German airborne force which landed its gliders literally on top of it. The fort was meant to cover the crossings of the Albert Canal nearby and this was not achieved. The Luftwaffe provided powerful support to this attack.

The British and French reacted quickly to these attacks as soon as they heard of them from the Belgians. By the evening much of the Dyle line had been occupied but the troops found that there were no fortifications to compare with the positions they had prepared along the Franco-Belgian frontier during the Phony War. Some of the reserve was therefore committed to strengthen the line. Some of the advance forces of Giraud's Seventh Army made contact with the Germans in southern Holland and were roughly handled.

At the end of the day the German advance had gone almost according to plan and the Allies were acting in the manner best calculated to improve the German success. It became apparent that the Belgian and Dutch armies were going to fail to hold out long enough to receive British and French help. The main blow against the British and French had not yet fallen but it was being well prepared.

By May 11, 1940, the German offensive continued at high speed. The advance in Holland was very rapid and even more of the Ducth army was put out of action. In Belgium the Germans were approaching

the British and French positions which were strongly held. Eban Emael fell to German attacks after some fruitless resistance. Rundstedt's forces advanced nearer to the Meuse.

By May 12, 1940, the French Seventh Army advancing into Holland was engaged with the German advance near Tilburg and was thrown back. In their main armored thrust, the Germans entered Sedan without a fight. The French forces in the area retired to the left bank of the Meuse where they had substantial artillery support deployed to deny the crossing to the Germans. Other tank forces reached the Meuse farther north.

By May 13, 1940, the German Panzer divisions crossed the Meuse in two places, at Sedan and Dinant. The French troops opposing them had not prepared their positions properly and were quickly demoralized and terrorized by heavy dive-bomber attacks. At Sedan, Guderian was right at the front, urging his troops on and at Dinant, the young commander of the 7th Panzer Division, General Rommel, was also doing well. Farther north, the Germans took Liege and in Holland the defense had been totally disrupted. The advancing German Ground troops linked with the paratroops at Moerdijk. Queen Wilhelmina and the Dutch Government were taken to London. French General Giraud's Seventh Army was in full retreat.

In Norway the Allied forces started their advance toward Narvik from Harstad. The first landings on the way, at Bjerkvik 10 miles north of Narvik, were successfully carried out by French troops. In Britain, Prime Minister Churchill made the first of a famous series of inspirational speeches in a radio broadcast. He said, "I have nothing to offer you but blood, toil, tears and sweat."

By May 14, 1940, after a surrender demand had been submitted but before it had expired, Rotterdam was very heavily bombed by the Luftwaffe. The Dutch Commander in Chief, General Winkelmans, decided that he must surrender.

With the German armor pouring across the Meuse at Sedan and Dinant, French tank units in both areas, but especially at Sedan, failed to put in any concerted counter-attacks and were brushed aside. There were considerable air attacks on the German bridgeheads by both British and French bombers, but many of the attacking planes were shot down. Once across the river the Germans drove west, cutting a huge gap between Corap's Ninth and Huntziger's Second Army. Huntziger had no orders on which way to retreat and Corap's army was falling apart.

By May 15, 1940, the Dutch army capitulated at 1100 hours and General Bilotte, commanding the French First Army Group, decided to abandon the Dyle line in the face of Reichenau's attacks. His superior, General Georges, concurred with the decision and was now in fact beginning to lose his nerve. At this stage, General Gamelin, the Supreme Commander, remained oblivious and confident. The German tank forces pushed forward, urged on all the time by their commanders

who were up with the leaders and in complete control of the situation. Their momentum was maintained by this leadership. The optimistic atmosphere at French GHQ was partly dispelled by the news that Guderian's tanks had reached Montcornet less than 15 miles from Laon. Guderian was ordered to halt here but after vigorous complaints, he was allowed another day's march.

In Britain, this was a vital, symbolic day for several reasons. At crucial meetings of the Chiefs of Staff Committee and the War Cabinet, Air Marshal Dowding argued strongly against sending any more RAF fighters to France. Despite strong opposition, Dowding had his way. The decision was taken also to send the first strategic bombing raid against the Ruhr. Finally, on this day, Churchill sent the first in a long series of telegrams to Roosevelt, signing himself as Former Naval Person. He asked consistently for American aid, worked to develop a good relationship with Roosevelt and above all to bring America closer to active participation in the war. In this first message, he also presented a shopping list which included old destroyers and aircraft as well as other arms.

By May 16, 1940, the British and French forces which advanced into Belgium only a few days earlier, began to retreat to their former positions behind the line of the Scheldt. Units of Hoth's XV Panzer Corps, with Rommel's 7th Division well to the fore, had reached just east of Cambrai and to the south Guderian's forces were moving on St. Quentin. Again a halt order was issued to the German tank forces because some of the more conservative minds at army headquarters could not accept that the Panzers could advance so far without exposing their flanks. In fact, the speed of the advance had itself protected them and thrown the French into confusion. Perhaps the best indication of the German success was the conversation between Churchill, on a visit to Paris, and Gamelin. Churchill asked where the strategic reserve was and was appalled to receive the answer that there was none, or at least none left. Outside the room where this meeting took place, French government employees were beginning to burn secret files.

In the United States, President Roosevelt asked Congress to authorize the production of 50,000 military planes per year and for a $900,000,000 extraordinary credit to finance this massive operation.

By May 17, 1940, Reichenau's troops entered Brussels. Antwerp and the islands at the mouth of the Scheldt were also being abandoned but had not yet been taken by the Germans. The British and French forces in Belgium had now fallen back to the River Dendre. The Belgian government moved to Ostend. In the main German attacks, Guderian's forces, exploiting the loophole in their orders allowing reconnaissance in force, reached the Oise south of Guise. On their left flank the French 4th Armored Division led by Colonel de Gaulle sent in an attack northward from around Laon, however, the Luftwaffe attacked them fiercely and prevented any real gains.

General Gort was now worried by the growing threat to his right flank and rear areas and, therefore, formed a scratch force to defend this area. General Mason-MacFarlane was put in command. He was up till now Gort's Chief of Intelligence. Gort was criticized for weakening this important department at such a vital stage. By May 18, 1940, St. Quentin and Cambrai were taken by German Panzer units and farther north Reichenau's Sixth Army took Antwerp.

In France, President Reynaud appointed a new Cabinet in an attempt to strengthen the French conduct of the war. He himself took the Ministry of Defense, Marshal Petain became deputy prime minister and Mandel became minister of the interior. General Weygand, even older than Gamelin but far more vigourous, had been recalled from the Middle East to take over the Supreme Command. Although these changes probably strengthened Reynaud's team, especially his own new office, they turned out to have been ill-advised. Some of the new men, Petain in particular, became deeply pessimistic about the outcome of the war and would in time bring Reynaud down when he himself would have preferred to fight on.

In Britain, Tyler Kent, a clerk at the U.S. Embassy in London, and Anna Wolkoff, a Russian emigree, were arrested on spying charges. Kent had access to the correspondence between Churchill and Roosevelt, and Wolkoff had helped pass it to Germany via Italian diplomats. Kent's diplomatic immunity was waived by the United States ambassador. Wolkoff was also connected to a pro-Fascist organization, the Right Club.

By May 19, 1940, most of the German Panzer forces halted in positions between Peronne and St. Quentin to regroup but some of Guderian's troops were still pushing forward and Rommel's 7th Panzer Division made a small advance in the direction of Arras. DeGaulle's 4th Armored Division again attacked north from around Laon and made very good progress against gradually stiffening resistance but was ordered to retire before any real gains were achieved. The possibility that it would be necessary to evacuate the BEF was raised for the first time in telephone conversations between London and the commanders in the field. The government was still optimistic at this stage. The main British forces were in positions along the Scheldt.

By May 20, 1940, the German armored advance again made considerable progress. The most spectacular gains were made by Guderian's XIX Corps. Amiens was taken in the morning and in the evening Abbeville was captured. Advance units even reached the coast at Noyelles. The Germans had now driven a corridor at least 20 miles wide from the Ardennes to the Channel. The obvious need was for the British and French to cut through this corridor before its walls could be strengthened to cut off irrevocably the forces to the north. Before his dismissal, Gamelin was planning such an attack, but it had been cancelled following his sacking only to be revived now by Weygand. The delay imposed by these changes of mind prevented it from retaining even a slim chance of success.

By May 21, 1940, the German forces on the Channel coast turned their attacks to the north toward Boulogne and Calais. The Belgian forces retreated to the Lys. Prime Minister Churchill was again in Paris discussing plans for an Allied offensive and once more Weygand proposed an attempt to cut the German line to the Channel by attacks from the north and south. It was agreed that this should be attempted but in reality there was little with which to implement the plans.

By May 23, 1940, General Rundstedt, commanding Army Group A, ordered his tank forces to halt their advance. Despite this order the 2nd Panzer Division attacked Boulogne and inland the British evacuated Arras. Owing to this retreat the planned Allied counter-offensive was postponed. It was becoming clear to the British generals in France that an evacuation by sea was probably going to be necessary. By May 24, 1940, the German attacks on Boulogne continued, while farther along the coast they also attacked Calais.

The Royal Navy was active in support of the British forces in both towns and during the day and later in the night, destroyers were used to evacuate 5,000 men from Boulogne and over the next three days two light cruisers and seven destroyers were in support near Calais. There were also German attacks on the line of the Lys and around Tournai. The plans for an Allied counteroffensive depended on the Belgians being able to take over a longer section of the front but with this pressure they were not able to do so.

The partial halt of the main German armored forces already made by Rundstedt was confirmed by Hitler. They had reached the line Gravelines-Omer-Bethune. Although the ground north of here was not well suited to armored action the Allied defenses were weak. The pause, which lasted until the morning of the 27th, gave the French and British time to strengthen this position and was generally seen as being the move which made the evacuation of the BEF possible. The motives for Hitler's decision could only be guessed. Certainly the armored forces were in need of a rest. Equally, Goering was pressing for the Luftwaffe to be given a bigger share of the action and the consequent glory. There was also the possibility that Hitler was deliberately being soft on the British in the hope that they could be persuaded to come to terms in the near future. In Allied Planning, the Supreme War Council decided to end its involvement in Norway. They agreed to capture Narvik and destroy the port facilities before they would evacuate. Ironically, the airfield at Bardufoss had only just received its first complement of British aircraft and already the campaign was seeming less one-sided, showing what might have been done. The Norwegians were not yet told of the decision to leave.

By May 25, 1940, the Belgian forces were driven out of Menin by attacks of units from Army Group B. The last pockets of resistance in Boulogne were elminated and at 1700 hours Gort cancelled the preparations he had been making to join Weygand's offensive. Later in the day, Weygand in turn cancelled the whole scheme, blaming Gort for this decision. In fact, the French forces on the Somme had not

made any attacks, as had been claimed, and the French forces with the northern armies were in no condition to do so.

By May 26, 1940, the position of the Belgian army was becoming increasingly grave. It was clear that it was unable to stay in the fight for much longer. The British forces were beginning to fall back on Dunkirk and in the evening the order was issued to begin Operation Dynamo, the evacuation from Dunkirk. Admiral Ramsay, who commanded the Royal Navy forces based at Dover, was appointed to command the operation. The scope of the operation was not made clear to the local French commanders at first and they felt, with some justice, that they were being abandoned.

On May 27, 1940, the German armor resumed its attacks, trying to cut off the British and French forces around Lille. A desperate defense enabled most of them to get away to positions nearer the coast. There was also trouble nearer the coast where the Belgian resistance was becoming increasingly weak. In the Dunkirk evacuation, only a little was achieved with less than 8,000 men being landed in Britain.

By May 27-28, 1940, the Allied assault on Narvik got underway. The attacking troops were led by the French General Bethouart. The town was taken after a brisk fight, but when bad weather at the Bardufoss airfield grounded the Allied fighters, the attack was briefly held up because the ships providing bombardment support then had to fight off the German Stukas alone.

By May 28, 1940, King Leopold agreed to the surrender of the Belgian army without consulting the other Allies or his government (now in Paris). The capitulation became effective at 1100 hours and it was only by a desperately hurried redeployment of the British and French forces that the Germans were prevented from reaching Neiupport, and from there the Dunkirk beaches. A corps of the French First Army was holding out in Lille but they were cut off from the main British and French forces in the evacuation area. There was fierce fighting around Cassel and Poperinghe where Rundstedt's men again pressed forward. The evacuation at Dunkirk continued, with 17,800 men being brought off at a cost of one destroyer and several other less important vessels.

By May 29, 1940, the German forces continued to press all round the contracting Dunkirk perimeter. By the end of the day most of the remaining British troops and a large proportion of French were inside the final canal positions. The evacuation from Dunkirk and over the beaches went on while the Luftwaffe increased the strength of its attacks despite the efforts of the RAF to give protection. A further 47,310 men were evacuated but three destroyers were sunk and seven others damaged. At least 15 other vessels were sunk. The French were then beginning to allow their troops to be evacuated and sent some ships to assist. Owing to the destroyer losses and the demand for them in other operations, the Admiralty decided that the more modern types must be withdrawn from the evacuation.

With the British and French Forces driven off the Continent, the war entered a new phase, that which is referred to as the "Battle of Britain." Continuing attacks by the Luftwaffe against the English countryside began and British aircraft and pilots were severely taxed in an effort to stop the damage caused by the German bombers. This was, as Churchill put it, "Britain's Darkest Hour." Professor R. V. Jones was summoned and became head of Scientific Intelligence on Britain's Air Staff. The first of many projects that he worked on was determining the method the Germans were using to guide their bombers on to English targets.

Jones reviewed the progress made by the Germans in Radar prior to the war and consolidated all reports on the subject. Then by combining radio intercepts, air photographs and communication equipment recovered from downed aircraft a complete analysis was made of the German guidance system. One such radar existed at Bruneval and a raiding party was dispatched to capture intact the radar and whatever other equipment might relate to the radar system. In time, it was learned that the pilots flew on one beam and received signals from cross beams. Jones and his staff eventually developed a counter-measure to this sytem but because of security considerations the details were never released until the late 1970's. In the process, Jones and his staff laid the gound work for an organization that was responsible for the analysis of scientific and technical information and it's application to the war.

On August 14, 1940, Sir Henry Tizard headed a British Scientific Mission which brought to the U.S. the details of many of Britain's most advanced thinking in the areas of military equipment. Included were details on jet engines, explosives, gun turrets and a device known as a cavity magnetron, a vacuum tube that formed the basis for advanced types of radar, including the types that would be used in proximity fuzes and in the types of radar that worked on centrimetric wavelengths and proved valuable in the area of anti-submarine warfare. Official U.S. histories describe this as the most valuable cargo ever brought to this shore. Included in the shipment was a considerable amount of captured German material. In discussing this with William Woodin of Woodin Laboratory in 1982, he pointed out that out development of the electric primer was initiated by the analysis of the German hardware that we recovered from the British. This development was important for the synchronization of aircraft guns in the larger calibers.

Within England, the results of the analysis of the German threat and the weapons and tactics of war had led to the creation of an organization nicknamed "The Wheezers and Dodgers." This was a group of naval scientists in a department of the British Admiralty which had no exact counterpart in the whole complex Allied War Machine.

The Wizard War, as Sir Winston Churchill termed the ceaseless struggle for mastery between the Allied and enemy scientists, involved moves and counter-moves often "unintelligible to ordinary

folk." And for long after the war was over, a detailed description of some of those moves, which would have made them intelligible to the layman was inadvisable on security grounds.

By 1957, however, most of what was attempted and achieved by the Royal Navy's Directorate of Miscellaneous Weapon Development to give the Wheezers and Dodgers their official title was no longer on the secret list. It had remained untold only, one assumes, because D.M.W.D. was essentially a clandestine organization, its triumphs and failures unknown to all but a relatively small circle of Servicemen and civilian scientists.

The Wheezers and Dodgers were a research and development team. They were formed in the shadow of defeat in Europe, and their activities reached flood tide with the Allied landings on the coast of Normandy four years later. In those four years they were destined to tackle some of the strangest tasks in the history of warfare.

On the ground, Britain continued to suffer. By mid-September, the Italians in North Africa began an attack on the British. The British Western Desert Force of two divisions under Gen. O'Connor was forced to pull back. By late October, the Italians announced their intention to invade Greece and Albania which upset Hitler as the Italians had not kept the Germans informed in advance. Hitler, however, volunteered German troops to prevent the British from entering Greece and to keep the Rumanian oil fields away from the British. In Europe, England was almost totally dependent upon its Navy to keep shipping lanes open and on its air force to counter the German air raids.

During 1940, the war with Germany continued with serious loss for Britain and France. The war had expanded to North Africa and to Norway which quickly fell into German hands. The United States passed the neutrality act which allowed anyone to purchase arms and ammunition so long as it was paid for with cash and was shipped in the purchaser's own vessels. In effect, since the British Navy controlled the shipping lanes of the North Atlantic, this legislation precluded all but the British from buying our products. In addition, sales were to be made by commercial enterprises, rather than direct foreign aid.

By December 1940, President Roosevelt realized the gravity of the situation and outlined a proposal to aid Britain. This proposal was introduced to Congress in January and became law in March 1941. It provided that the United States would supply Britain with needed equipment but it prevented Britain from exporting any product simliar to what it was receiving in lend-lease.

Under the Lend Lease Act, the U.S. Army sent a boat load of American light tanks and other equipment and arms to Egypt for British 8th Army use. A large number of support personnel from the U.S. was sent along with the tanks. G. B. Jarrett, now a captain, was

sent to Egypt as an ammunition advisor for the British GHQ and the 8th Army. He first conducted demonstrations of the new American weapons to the British troops, but soon found a fault with our 75mm. tank gun ammunition, intended for use in the then brand new Grant Tank (U.S. M3 medium tank.) The fuses of the shells would not function properly if the target was hit at any kind of an angle. Jarrett remembered that the fuses of The World War I French 75mm. ammunition had a graze action, and learned that the French in Syria had had a supply and these depots were then in British control. Since he knew these would fit the U.S. 75mm. shells, he arranged for thousands of the French fuses to be shipped to Cairo. For this and other ammunition work he was awarded the Order of the British Empire. Working alongside of an Australian ammunition expert, he devised a way of turning down the rotating bands on captured German 7.5cm. armor-piercing shells, so that the shells could be used in the U.S. tank guns. Captured German shells were reseated in the U.S. cases. It was in this way that the British achieved some ammunition equal to that of the Germans for use in the Grant Tanks. After shipping 100 rounds of this ammunition to Aberdeen for study, Jarrett was promoted to the rank of Major.

At this point Jarrett was sent to Eritrea where he went about salvaging captured Italian small arms, machine guns and artillery. He caused British instruction manuals to be written covering the use of American weapons and their ammunition. He organized a tank school near Cairo after the first shipment of M4 medium tanks was delivered, and taught armament and maintenance procedures to the British crews. In his spare time he marked captured items for shipment back to APG which had historical and ordnance technical significance. He also acted in the capacity of a bomb disposal expert, and once, when a large shipment of 105mm. ammunition was received in damaged condition because it was badly packed in the U.S., he assisted in organizing a plant with some 5,000 natives to reclaim the precious ammunition. To check the ammunition, two spare 105mm. howitzer barrels were used. Rounds which failed to seat were taken apart, cases were straightened with wooden mallets on a mandrel, reassembled, rechecked and repacked. The ammunition was intended for the U.S. M7 self propelled Howitzer nicknamed the "Priest" by the British, and just then being introduced in Middle East by the 8th Army.

Beginning in November of 1941, the great tank battles of the desert emphasized the fact that the German 8.8cm. anti-aircraft gun being used as an AT weapon, was far superior to anything we had and that British and U.S. armor was highly inadequate. Out of 1276 allied tanks sent to Libya, 674 were damaged and 274 were totally destroyed. Somehow Major Jarrett managed to get a hold of one of the "super guns", took it apart and shipped it off to APG for study. It was actually air mailed along with 100 rounds of ammunition direct to Aberdeen from Cairo. By examining a great many destroyed and damaged tanks and assorted vehicles, Jarrett learned much about the capabilities of the German guns. He made complete reports, lavishly illustrated with photos, which he had made in his capacity

as official photographer for the U.S. mission so that the problems of inadequate armor protection could be worked out better at home.

It was becoming apparent that the conflict was taking on global proportions with Japan becoming more and more aggressive in the Pacific and the NAZI's overrunning most of Europe. There was a tremendous amount of information coming in on a wide range of topics. President Roosevelt realized the need for coherent advice and on July 11, 1941 he established the office of the Co-Ordinator of Information (COI) with William Donovan as its chief.

When he established the COI, President Roosevelt had announced that "Mr. Donovan's task will be to coordinate and correlate defense information, but his work is not intended to supersede or to duplicate or to involve any direction of or interference with the activities of the General Staff, the regular intelligence services, the Federal Bureau of Investigation, or of other existing departments and agencies." "Having stated what Colonel Donovan is not," said Blair Bolles in the October 5, 1941, Washington Star, "the White House has never bothered since then to state what Colonel Donovan is." Even before the COI was officially announced, Donovan forwarded the first of his top-secret reports to the White House for the President's eyes only. From the start, he sent these reports by messenger to Grace Tully, FDR's secretary, and she saw to it that they were handed to the President. Donovan's approach was first to create a flow of information from the Research and Analysis Section to the President and other top officers of the government, and then to concentrate on collecting and analyzing secret intelligence. Still, some of the earliest dispatches came from secret agents in the field.

The vague generalities of the Executive Order establishing the COI were deliberate: Roosevelt did not want to antagonize the nation's other intelligence services, most notably G-2 and the FBI. To silence General Strong, who carped that Wild Bill Donovan was too independent to fit in with military intelligence, Roosevelt made the COI a civilian agency in the executive branch of the government -- reporting directly to him -- and named his own son James, a Marine captain, as a liaison between Donovan and the military. Roosevelt also promised J. Edgar Hoover, cantankerous FBI chief, that Donovan would not conduct espionage operations in the United States; Nelson Rockefeller, head of the State Department's Inter-American Affairs Committee, extracted a similar promise concerning Latin America.

Within a few months of its establishment, the COI, which had started out with Donovan and seven assistants sharing one telephone in the Office of the Budget, numbered several hundred. Still, the COI was an infant in the field of intelligence; to survive, the American agency would need a helping hand from British intelligence. Whatever their shortcomings in coordinating and analyzing information, the British were experienced in espionage.

The COI got that early British help thanks to William Stephenson,

a wealthy and influential Canadian industrialist who had accompanied Donovan to London in December 1940. Stephenson, operating under the nom de guerre Intrepid, was the head of British intelligence operations in the Americas, working out of a nondescript suite of offices in New York's Rockefeller Center that was marked "British Security Coordination."

As a first step, the British furnished the COI with reams of material gathered before the War and during its early stages -- data that proved especially valuable to Donovan's young force in its formative days, when the COI had little but empty filing cabinets. Stephenson also arranged for the COI to send some of its first recruits to British intelligence's Camp X near Toronto for training as espionage agents.

The COI was set up with several divisions consisting of Research and Analysis, Research and Development, Morale Operations, Labor Division, Secret Intelligence and Special Operations.

The Research and Analysis (R&A) Division pieced together what Donovan called the raw material of strategy. Started in the early days of the COI, the R&A Division was made up largely of scholars -- geographers, cartographers, historians, political scientists, economists, psychologists, linguists, anthropologists -- recruited from the universities of America.

These academicians worked out of a cluster of nondescript Washington buildings that had in fact once housed the laboratories and guinea pigs of the National Health Institute. There they listened to Axis news broadcasts via short wave and pored over a variety of documents -- obscure farm reports, arcane technical journals, village newspapers and the like -- seeking to form an accurate picture of the enemy from a jigsaw of data. By studying European farm journals and market figures, for example, R&A statisticians determined that rumors of an impending German food shortage were false, and that Germany would have enough food to keep fighting. Other R&A experts scanned German newspaper obituary columns and tallied the number of officers killed in action. From those figures -- reckoning a constant ratio of enlisted men to officers -- they supplied American generals with a remarkably close count of Wehrmacht strength throughout the War.

Ultimately, Donovan's dons turned out tens of thousands of pages of intelligence studies. "Even in purely operational fields such as bomb targets our help was regarded as indispensable," called William L. Langer, chief of the R&A Division. "But above all, in the study of the capabilities and intentions of foreign powers, I think we went far beyond anything previously known or previously attempted anywhere else."

The Research and Development (R&D) Division was made up of scientists and inventors whose assignment was to develop unorthodox weapons, plots and schemes of a kind, Donovan remarked wryly, that

"no one expects us to originate because they are so un-American." The R&D Division scientists turned their talents to producing counterfeit currency and documents, several kinds of weapons (among them a flashless, virtually silent pistol-submachine gun) and enough varieties of explosives to delight any saboteur. One such explosive device, for example, resembled an ordinary candle; when the candle burned down by one third, the high explosive composing the remainder detonated.

The Morale Operations (MO) Division, with a staff of Madison Avenue copywriters, journalists and Hollywood screenwriters, occupied itself with developing so-called black, or covert, propaganda -- described by Donovan as "a judicious mixture of rumor and deception, with truth as a bait, to foster disunity and confusion in support of military operations." Various black-propaganda ploys undertaken by MO to subvert the enemy included distributing phony newspapers throughout Germany and mailing false death notices to the families of enemy soldiers.

The Labor Division was set up and directed by Chicago labor lawyer Arthur Goldberg, who would later become a Supreme Court Justice, and by George Pratt, General Counsel for the National Labor Relations Board. Labor's agents infiltrated numerous socialist and trade-union groups in occupied Europe and Germany to foment subversion and sabotage among men and women forced to work for the Nazis.

These operations were all important. But the heart of the OSS consisted of the Secret Intelligence (SI) and Special Operations (SO) Divisions. SI Division's job was to collect foreign intelligence and its model was England's MI-6; SO Division, modeled on England's SOE, conducted sabotage and guerrilla operations. Donovan recruited men and women from all walks of life to be SI and SO agents. Lieutenant Commander Ian Fleming of British Naval Intelligence -- later the creator of James Bond, fiction's ultimate secret agent -- advised Donovan to pick men in their forties and fifties, possessing "absolute discretion, sobriety, devotion to duty, languages and wide experience." But such staid advice did not suit Wild Bill. He preferred younger men, rakehell who were "calculatingly reckless, of disciplined daring and trained for aggressive action."

The intelligence services of the U.S. Army and U.S. Navy became part of Donovan's sources. "The United States has never been quite so innocent as it has sometimes pretended to be about spies," commented White House correspondent Jonathan Daniels. "Before World War II we had sent out some very zealous naval and military attaches, some of whom, fortunately, had done more than watch military parades and attend Embassy teas in full uniform. But when war came and Donovan began to train his men for the wonderful jobs some of them did in dangerous territory, the discovery was suddenly made that what spies got in danger was no more important than information we had collected -- or should have collected -- before the fighting began."

Donovan fumed at the shortcomings of armed forces and State Department information, but he made the best of it. "The armed services had never devoted any considerable attention to political, economic, and psychological problems," reported a Donovan aide, Wallace R. Deuel. They were primarily interested in information about the armed forces of other countries. Yet these other types of information were now urgently needed. They could only be gathered and appraised by the most highly qualified experts. The armed forces did not have enough of such experts, nor could they recruit them.

Moreover, the ideals and traditions of the services were marked by a directness of thought and conduct that were ill suited for some of the most important of all intelligence operations. A certain number of professional officers, in fact, looked down on irregular undercover warfare as a dirty business altogether unbecoming an officer and a gentleman.

Much of the intelligence the United States had been receiving from military and naval attaches also ceased by autumn 1941. "After Europe was overrun by the enemy," said Donovan, "our State Department found itself cut off from most sources of information and dependent largely upon what friendly governments chose to provide. We had only the intelligence gathered by other arms. We had no way of telling when information was planted or where rumor originated."

At least the State Department was cooperative with the COI. "Sumner Welles was then under secretary of state, Roosevelt's closest contact in Cordel Hull's rather inert State Department," recalled Ray S. Cline, who served Donovan faithfully throughout the COI's period of mushrooming growth, "and he undertook to work in reasonable harmony with COI and later with OSS. He reached an understanding with Donovan, on August 10, 1941, conceding to the new agency responsibility for the collection of economic information and other related data overseas and levying on it requirement for reports and studies on foreign countries of foreign policy interest. The coverage was not to include Latin America, where not only J. Edgar Hoover but also Nelson Rockefeller, Coordinator of Inter-American Affairs, were already active."

Donovan, the master spy, particularly valued the critical intelligence being provided during the summer of 1941 by William Stephenson, a close personal friend and the principal agent in North America of America's closest ally. As a confidential OSS paper indicated, in July 1941 "arrangements were made by Mr. Stephenson to provide the General [Donovan] with a regular flow of secret information from sources available to his own organization, including highly confidential British censorship material not normally circulated outside British government departments."

On August 9 Stephenson reported to London that Donovan's office was already functioning. He set up a Washington branch of the British Security Coordinator (BSC) to keep in constant touch with

the COI, and Donovan set up a COI office in New York too. The Foreign Information Service (FIS) opened at 270 Madison Avenue on August 1, staffed with journalists and radio broadcasters under Robert Sherwood's direction. The FIS produced special programs that were beamed overseas by American broadcasting companies and relayed by BBC transmitters. The Foreign Broadcast Monitoring Service was soon transcribing Nazi propaganda transmissions and hurrying them to Sherwood's staff. The FIS was able to put its response on the air before Goebbels's propaganda had a chance to sink in.

Reports reaching the COI from both covert and open sources were employed in preparing the broadcasts. "The facts go first to the President and head of departments," journalist Thomas M. Johnson reported. "Then such of them as are not too secret go into the second barrel of Donovan's double-barreled job, are let out over the world in the best way to aid democracy and injure dictatorship. In such a cause are needed devotion, a touch of ardent imagination, with the fundamental, the unvarnished truth. For though the bursting charge be propaganda, it must be propaganda in the true and American sense of that much misunderstood word, which really means not lies and distortion but the propagation of the faith."

James L. Wright, writing in the Buffalo Evening News, summed up Donovan's concept of the role of the FIS: "Just as Nazism seeks to undermine each country before it physically attacks it, so in Col. Donovan's judgment, the Allies must confront Nazism with a psychological offensive of their own. He believes that it can be made to reach the Rhine and beyond, that there can be a constant hammering of Adolf Hitler's home front."

Ned Buxton and Bill Donovan had also struck upon the idea of debriefing refugees from Europe as they arrived in New York, and on August 25, a small Oral Intelligence unit began operations in Manhattan.

In August Donovan asked Stephenson to make available to his staff "the services of experienced officers of his own organization to assist in laying down the framework of the COI headquarters and field establishment." Donovan's calendar of appointments and telephone calls from August 18 to America's entry into the war shows that the two men were in touch on 36 occasions. The British assistance proved invaluable as, according to OSS man Carleton Coon, the Harvard anthropologist, Donovan modeled the OSS on the British SOE, which, just two years before, Colin Gubbins had in turn modeled on the Irish Republican Army.

After the war Stephenson remarked, "If Donovan had not been able to rely upon BSC assistance, his organization could not have survived. Indeed, it is a fact that, before he had his own operational machinery in working order, which was not until several months after Pearl Harbor, he was entirely dependent on it." Stephenson claimed too much for British support during the early days of COI, but there is no denying that without the assistance of

British intelligence, the COI would have found its growth more tortuous and much slower.

British intelligence might be cooperative, but Donovan found that the British Foreign Office could be just as prickly as the U.S. Department of State. "In relation to shipping equipment to the U.S.S.R.," remembered Henry Field, the question came up about road conditions and capacities across Afghanistan. Since this was considered a "British sphere of influence," General Donovan requested the latest handbook or handbooks. He was sent a series, obviously out of date, with the statement that these were the latest available. He could not believe this. COI, London, reported the same lack of detailed information.

Just at this time General Donovan asked him to brief Mr. Mauran from Providence, who was leaving shortly for Cairo. He suggested that Mr. Mauran try to obtain the code numbers of any British handbooks on the Near East while in Cairo. He returned to Washington in about three weeks with a splendid list, including Afghanistan. Donovan then requested the latter by number from London. The cabled answer said that this handbook and others were available to COI in the British Mission on nearby Pennsylvania Avenue. Here, upon request by number, He was given the Afghanistan handbook. The keeper of this safe had been instructed not to release a handbook to anyone without the correct number. In this large safe lay many important documents now available to COI through Mr. Mauran's research in Cairo. Mr. Mauran, who died very shortly thereafter from a virus picked up in Egypt, rendered special service.

The pulling and pushing between the FBI, the ONI, G-2, the State Department, and the COI over the gathering of intelligence continued unabated. "FDR's way of operating Washington was like a boxing free-for-all," observed Turner McBaine. "Put a bunch of pugilists in the ring and let them slug it out. The winner was the last guy left standing. Donovan flourished in this environment. He rose to the top and became the confidant of FDR."

While the bureaucratic battle of Washington raged over the form and substance of American intelligence, the British agent Bickham Sweet-Escott, in London, received a message from Bill Stephenson in New York that "it was going to be a long time before Donovan's position in Washington was clearly defined." Sweet-Escott wrote after the war: "The American system of government at this point was well described by an American friend of mine, who used to say of it that 'there is a lot of noise on the stairs but it is a long time before anyone comes down.' It was a system which encouraged Great Debates about American secret activities."

Atherton Richards once remarked, "Bill Donovan's method of running an organization is like pouring molasses from a barrel onto the table. It will ooze in every direction, but eventually he'll make it into some sort of pattern."

The pattern was not always obvious to the naval commander who found himself countermanded by a corporal, since Donovan delegated authority based on ability and not rank. Nor was it evident to William Langer, who went to Washington to head Research and Analysis (R&A) and found another man in his spot. "He can be the director, and you can be the chief," Donovan said.

As did Roosevelt, Donovan often appointed men with overlapping authority and let them compete to get the job done. He assigned unimaginative aides to watch over his woolliest idea men. "A man with a plan for a bomb that he is going to steer to its target with his feet should be put to work," he said, "but somebody has to keep an eye on him."

Donovan, by his own admission never much of an organization man, refused to respect the table of organization and the chain of command established by his aides. His executives, recalled one aide, "would walk into Donovan's office with dozens of charts, charts for the budget, charts for the administration, charts for the various divisions. Donovan would glance at them, smile at them, approve them with a mild wave of the hand, and then he would have another idea, and he would forget them completely." Since many of his top aides were either corporate attorneys or executives, they struck upon the notion of organizing the COI as a holding company. Donovan burst out laughing at the very idea. He much preferred to run affairs on a person-to-person basis. The kind of organiztion that emerged sometimes seemed to be no organization at all, but it proved amazingly practical in the world of espionage and subversion. At the same time Donovan was a stickler for security.

"At the first organization meeting which I attended Colonel Donovan laid down a few basic security regulations," recalled Henry Field. "Since very few of us had any security training, each of us was to work as a small cell, communicating any details of our work within COI to the fewest possible number of people. Only the Director, Ned Buxton, and a few administrators would be kept informed of progress. The minimum of interoffice discussion was to be allowed.

"The first team of U.S. specialists in all fields was to be assembled in COI. Permission must be granted to discuss any project with anyone outside each individual cell. However, with the assemblage of such a staff, almost any question could be answered. For example, specialists on geography, geology, anthropology, oceanography, meteorology, politics, history, photography, and photointerpretation were immediately available or could be brought to Washington for immediate consultation.

"In conclusion Colonel Donovan emphasized the fact that since COI was to become the key intelligence organization for the President, foreign spies must be expected to infiltrate. He added that the best he could expect with FBI clearance and all possible unusual precautions, would be at least one brilliant spy per five

hundred personnel -- hence the cellular structure. Any unusual questions asked by a member of COI staff must be reported at once to the Security Division. Hence I never knew what my neighbors were doing; I presume this was mutual. Security officers mixed with the staff in eating places nearby, often encouraging indiscreet talk. On three occasions, I reported questioners, two of whom turned out to be security officers. As far as I know my cell members never broke security, a tribute to their loyalty and FBI and COI clearance."

By September, Donovan's COI was making striking progress in secret intelligence. General Miles of G-2, who had opposed Donovan in order to protect his own clandestine intelligence operations, now changed his mind. On September 5, he wrote to General Marshall:

> "The military and naval intelligence services have gone into the field of undercover intelligence to a limited extent. In view of the appointment of the Coordinator of Information and the work which it is understood the President desires him to undertake, it is believed that the undercover intelligence of the two services should be consolidated under the Coordinator of Information. The reasons for this are that an undercover intelligence service is much more effective if under one head rather than three and that a civilian agency, such as the Coordinator of Information, has distinct advantages over any military or naval agency in the administration of such a service."

The navy held out a little longer. Wallace B. Phillips, who commanded a Naval Intelligence unit in New York City, at first refused to turn over his operation to the COI. When Donovan implied that he might inform the President of the navy's reluctance to close up shop, Alan G. Kirk, now an admiral and chief of Naval Intelligence, decided to give in too. On October 10, Donovan was able to tell Roosevelt that, with the approval of the secretaries of war and the navy and the joint action of G-2 and ONI, "there was consolidated under the COI the undercover intelligence of the two services."

The FBI still remained hostile toward the COI. "The Abwehr gets better treatment from the FBI than we do," Donovan remarked to Allen Dulles.

There was no question in Donovan's mind that the United States was coming closer and closer to war. "One morning in late September, Donovan summoned me to his office," said Kermit Roosevelt. "Pearl Harbor was still three months away, but he was absolutely certain that somehow we would be drawn into war. I shared his feeling."

As Roosevelt was leaving, Donovan called him back. "Kim," he asked, "what do you think of happenings in Iran? That's going to be an important part of the world for us." Roosevelt recalled what occurred next:

"At that point, I must admit, I had very little to contribute on Iran. I knew roughly where it was but little more. So I said, safely but noncommittally, that 'it looks serious.' That was satisfactory for the moment. As soon as I was out of his office, I looked up Iran in an atlas and an encyclopedia. Thereafter, I kept myself better informed.

One thing I did immediately after the Donovan interrogation; in addition to consulting the atlas and encyclopedia, I visited a colleague at the Library of Congress. Ralph Bunche, later under secretary general of the United Nations, was already doing research work for the COI, and was well able to answer my questions.

Ralph was a quiet, studious-looking black gentleman who received me with appropriate gravity."

"Kim," he began, "I take it I'm to start from scratch."

Roosevelt nodded, and Bunche gave him an erudite lecture emphasizing, as Roosevelt remembered, the point, "Don't ever confuse Iranians with the Arabs. They don't like it."

When new recruits reported to the COI, they often looked forward to their first meeting with the director with considerable trepidation. The reputation of Wild Bill Donovan, dauntless hero of World War I, prepared them for a formidable, perhaps even violent individual. "I'm afraid I disappoint people," Donovan confided to the writer Thomas M. Johnson, "for really, my ideal isn't 'Wild Bill' but another Irish character called 'the real McCoy.' I prefer facts to fireworks." The truth of the matter was that Donovan also had a penchant for fireworks, and by August he was already planning to organize operational groups to fight guerrilla warfare.

"I took Bill Donovan to lunch with me at Woodley," Henry L. Stimson wrote in his diary on August 13, "and had a good talk with him about his proposed guerrillas: I think there is a good deal in this proposition, because we are likely to need that kind of fighting in any South American jungle country that we have to go into to prevent the Germans from getting a foothold."

COI reports indicated that German agents were infiltrating both Brazil and Argentina and that Allied defeat in Europe would inevitably lead to trouble in South America. Donovan was equally concerned in August about Japanese movemets in the Orient. On August 16, T.V. Soong, Chinese minister of foreign affairs, came to see him, to explain China's grim situation. Soong hoped that Donovan would use his influence with the President to obtain fighter aircraft for China. Soong described the overwhelming air assault the Japanese were making on Chungking, China's wartime capital.

Without planes the Chinese could not fight off the bombers over the city or exact retribution by bombing the bases from which the raiders came. "It is perfectly clear," Soong told Donovan, "that the purpose of this bombing is to finish the 'China Incident' before Japan moves in other directions -- by demonstrating to the people of China the difference between reality and hopes of the last fourteen months that American assistance would be effective."

Soong noted that, in light of deliveries of aircraft being made to Russia, the Chinese felt their resistance was "just a pawn in the calculations of other democratic powers. Japan is being furnished the materials with which to destroy us in order to relieve the British from attack in the south and maybe even the Russians from attack in the north. "Remember, Colonel," concluded Soong, "that we have proved that we can fight longer than any other people who are fighting on the democratic side -- that given the arms we can really finish the job. We have stuck for five years. Please help us stick now."

Donovan assigned James Roosevelt to urge the Chinese case with such Roosevelt aides as Harry L. Hopkins, and he reported to the President in detail.

In the meantime the structuring of the COI continued. The first meeting of the Board of Analysts was held at 2:40 p.m. on September 10 in James Phinney Baxter's office. Plans were discussed for two large rooms "open only to the President, the Cabinet, Colonel Donovan, and the Board of Analysts." One room was to hold a strategic map of the world, depicting the American defense posture; the other would contain graphic charts "portraying aspects of national defense."

"Mr. Baxter reported," said the minutes of the meeting, "that Colonel Donovan has noted that any secret agents sent into the field by us must be given in advance the most careful set of instructions."

The board dealt with such mundane problems as the routing of top-secret material and the decisions that "Secret material will be placed each night in the central safe, which will be time locked." The projects already underway included: "(1) a general picture of the situation in regard to Japan; (2) a study of our exposed flank in South America, in case we should be drawn into the war; (3) a study of our exposed flank in West Africa; (4) a study of the strategic distribution of Russian war industries." The meeting adjourned at 3:55 p.m. after deciding that from then on the staff would meet daily at 9:30 a.m.

Donovan continued his recruiting. On September 11, John Ford, 46 years old and at the height of his career as one of Hollywood's most talented directors, finished a film, "How Green Was My Valley," and left for Washington on the Union Pacific streamliner, ostensibly to join the U.S. Navy. When he reached Washington, Ford checked into the Carlton Hotel where, for the next four years, room 501 was to be his home.

"It was a tiny broom closet of a room," he reminisced, but this scarely mattered. Ford, in the words of his grandson Don, "had been scooped up, not by the navy but by one of the most dynamic, mysterious, and visionary men in the first half of the 20th century -- William J. 'Wild Bill' Donovan." Ford was to organize the Field Photographic branch, and he immediately sent for some of the top cameramen in Hollywood. They set up quarters and a mess and established their shop in the South Building at 25th and E. The laboratory and studio were in the basement. Ford was to report directly to Donovan. He came back from a meeting with the COI director and told his crew, "We're going to be involved in a hell of a lot more than photography." Their first assignment was to make a film report on the condition of the U.S. Atlantic fleet, which was escorting convoys from the United States to Iceland. On October 21, Ray Kellogg left for Iceland by boat to shoot the documentary. When the film was finished Donovan screened it for the President as a new type of intelligence report.

Autumn 1941 was a seminal period for the COI. Donovan arranged with the Council on Foreign Relations in New York to consider questions of national import, which he would from time to time pose, and he talked with lawyer-diplomat John Foster Dulles about organizing "a group to study and make suggestions with reference to various phases of the international situation." He persuaded the adventurous members of the Explorers Club in New York to contribute information garnered on their expeditions to odd corners of the world, any one of which could become a cockpit of war.

In 1940 Donovan had engaged the Arctic explorer Vilhjalmur Stefansson as an adviser on a proposed development of oil in the province of Alberta along the Athabasca, Slave, and Mackenzie rivers. The entire project depended upon the construction of an oil pipeline, and Donovan had attempted to get Roosevelt's approval of the undertaking, which he was confident would greatly strengthen America's military position. On October 28, 1941, Donovan wrote to Stefansson: "I would like very much to discuss with you the possiblity of the establishment of a center of Arctic studies. It does seem to me that in connection with my task it would be most desirable to have, in one place geographical and meterological information bearing on the Far North."

Stefanson, who had sizable research facilities at his disposal, readily agreed to cooperate, and Donovan went to New York to work out the plans. He was convinced that the Arctic would play a signal role in the war with Germany. If military aid was to be carried safely to the Russians at Murmansk, Allied shipping the North Atlantic would have to follow the Arctic pack ice to stay as far as possible from German submarines and bombers based in Norway.

From Donovan's point of view, probably the most valuable part of Stefansson's studies would relate to Japan, not Germany. When Hitler and Stalin signed the Nazi-Soviet Pact in August 1939, Donovan realized that the way was opened for Hitler to attack first

Poland and then the West without fear of an assault from the Soviet Union. At the same time he recognized that the pact also forced the Japanese to delay their own military adventures in Asia because the Soviet Union remained in a strong position to block them. Thus, when Hitler attacked Russia on June 22, 1941, it was apparent to Donovan that Japan was now free to move in Asia and that war with the United States would almost certainly result within the year.

Within a month after the German blitzkrieg into Russia, Japan invaded Indochina. Roosevelt warned the Japanese government against its policy of military expansion, placed an embargo on oil shipments, and froze Japanese assets in the United States. When Gen. Hideki Tojo replaced the moderate Prime Minister Prince Fumimaro Konoye in October, it confirmed Donovan's belief that before Japan would abandon plans to conquer East Asia and the South Pacific it would launch an attack on both the United States and Great Britain. Oil embargoes and frozen assets would only goad the Japanese into action.

When war came with Japan, the Aleutians and Alaska would be open to attack, and Donovan told Stefansson that a military road must be built across Canada into Alaska as soon as possible. Stefansson was to study the route. Alaskan and Aleutian weather would also be critical. The Soviet Union, said Stefanson, controlled most of the important stations for forecasting the weather of mainland Alaska, the Bering Sea, and the Aleutian Islands, as well as portions of the North Pacific. Soviet reports would also help to improve the forecasting in the Yukon Territory, British Columbia, and the U.S. Northwest. Donovan and Stefanson discussed how the Soviet Union could be persuaded to share weather information with the United States while denying it to the Japanese. "We would have to agree with the Soviet government upon some secret code, and upon changes of code as frequent as seems necessary," said Stefansson.

On November 17, Donovan reported his arrangements with Stefansson to the President. In accordance with your instructions, I have talked with Dr. Vilhjalmur Stefansson. He is ready to make available to us his services, as well as those of his staff, which would include the use of his 15,000 volume library and extensive files. His field would be all of Alaska; Canada north of 60 degrees, all of Greenland; all of Iceland; the Scandinavian countries and Finland north of 60 degrees; the shores of Hudson Bay, and Labrador as far south as Hamilton Inlet. He would also cover Okhotsk Sea, Bering Sea, Hudson Bay, the North Atlantic, and the entire Polar Sea with its islands.

Dr. Stephansson would attempt to supply any kind of information from the geographic area described, including not merely sciences like geography and oceanography, but information regarding such things as religion, language, clothing, food, economics, etc.

Donovan pressed Stefanson for answers to puzzling questions.

Stephenson wrote to him: "Yesterday you expressed interest in the double situation (a) that the Germans used glaciers for airplane landings in northern Norway and (b) that the possibility of glacier landings was apparently unknown and undreamed of by those British who were in that part of Norway." Stefansson had turned up Peter Rhodes, a Chicago Daily correspondent, who had been in northern Norway at the time and who could give Donovan information.

By the end of November, the Center of Arctic Studies was a reality, and it was to have an important influence on the conduct of the war with Japan, which was by then little more than a week away.

President Roosevelt continued to find domestic political problems blocking his path. It was certainly in America's interest to supply the Russians to help them blunt the German invasion, which was sweeping ahead on all fronts. Nevertheless, many Americans were outraged that their country should support the Red dictatorship, which to most people seemed little better than those of the Nazis and Fascists. In this instance, the Pope in Rome also feared that U.S. assistance to Russia would only strengthen Communism. Donovan's agents sought information that would help Roosevelt placate both American voters and the Pope. They found it in Russia, where Polish captives of the Soviets were forming to fight Hitler. Corroboration came from Jan Ciechanowski, Polish amabassador in Washington, in a letter to Donovan on September 27:

> "I am very glad to be able to tell you on the basis of information just received from London that the enthusiasm of the Poles in Russia actively to resume the fight against Hitlerite Germany is so great, that the Polish Army in Russia will be virtually an army of volunteers. Great numbers of Poles of military age apply daily demanding to be enrolled immediately in the Polish Forces, thus swelling the ranks of units which are being formed from our regular soldiers who had been interned in Russia.
>
> The Polish Government is confident that it will be able to put in the field very shortly an army of well over 100,000 men, provided they can be supplied with the necessary material and equipment from Great Britain and the United States. I hear that two divisions are already formed and the third is nearing completion.
>
> What will interest you especially, I am sure, is that the U.S.S.R. has -- in the same way as in the case of our army in Great Britain -- granted us full rights of an independent National Army, giving it likewise the right of opening its own schools, full cultural freedom, and freedom of worship for both Christians and Jews. We have already got our own Catholic military chaplains."

In the long tide of history, the Russian assurances proved to be illusory, but for the moment, Donovan's report on the Soviet show of tolerance of the Catholic and Jewish faiths allowed Roosevelt to send supplies to the Russians with political impunity.

The consolidation of G-2 and ONI intelligence operations under the COI was reported to the President on October 10. Donovan accompanied his memorandum on the subject with a secret intelligence plan for North Africa. His lengthy trip through the Mediterranean earlier in the year had left him convinced of the pivotal nature of the area, and in September he had put R&A to work on in-depth studies of North Africa. Now he was making plans for intelligence operations. On the same day that Donovan sent his report to Roosevelt, he established a section labeled Special Activities -- K and L Funds, which was intended to carry out espionage, subversion including sabotage, and guerrilla warfare.

To Donovan modern warfare seemed to call for three phases of softening up the enemy before an attack in force was made. First, secret intelligence was to infiltrate and discover any information that must be known in order to pave the way for the second phase, which was sabotage and subversion operations. Resistance groups and guerrilla or commando operations were to follow. All of these activities required different techniques and training, but Donovan saw them as tightly related, one preparing the way for the next. "As a concrete illustration of what can be done," Donovan told FDR, "we are now planning to deal with a very present problem in North Africa by setting up at once a wireless station in Tangier and having stationed there an assistant naval or military attache who can unify the activities of the vice-consuls [actually 12 COI agents] in North Africa and stimulate efforts in the selection of local agents of information."

On the day before he reported to the President, Donovan had appointed Lt. Col. Robert A. Solborg to head Special Operations. Solborg had been born in Warsaw, the son of a Polish general in the service of the Russian czar. He himself had served in the Russian Army. When he was seriously wounded, he was assigned to the Russian military purchasing mission in New York City. With the outbreak of the Russian Revolution, he became an American citizen by joining the U.S. Army. Later he was a military attache in Paris and then became an executive of Armco Steel Company, for which he traveled throughout Germany and North Africa. Solborg had carried out intelligence missions successfully, first for the British and then for the American G-2. Donovan ordered Solborg to organize his Washington office and then travel to London to get the advice and assistance of British SOE in establishing COI's Special Operations. He was to report directly to Donovan.

At about this same time, Donovan had to ask Roosevelt to be more specific about the role of the COI. The original order of July 11 had been kept vague on purpose. Now, on October 21, Donovan wrote to the President, "While originally we both considered it

advisable to have no directive in writing, it now seems necessary to do so to avoid misunderstanding with other departments."

Donovan had already selected Wallace B. Phillips as chief of the COI's Secret Intelligence unit. He had headed the ONI's secret intelligence and by October was already reporting to Donovan on the activities of the 12 vice-consuls in North Africa. The vice-consuls were presumably checking up on American supplies sent to the region, but actually they were observing German and Italian activities. "The main problem," Donovan said after the war, "was to take care of the intellectual side -- getting data on the railroads, tides, and any other details that would affect the getting in of arms and other military equipment."

On November 17, Donovan made Phillips director of Special Information Service, which was tantamount to heading up Secret Intelligence (SI).

Donovan also took steps to establish a COI office in London. On October 24, President Roosevelt wrote to Winston Churchill by diplomatic pouch, "Colonel Donovan tells me that he has had most helpful cooperation from the officers of His Majesty's Government who are charged with direct responsibility for your war effort. In order to facilitate the carrying out of the work of the Coordinator with respect to Europe and the occupied countries, I have authorized Colonel Donovan to send a small staff to London." Donovan already had chosen William D. Whitney to be chief of the London bureau, and Whitney was soon off to his new post.

In October and November, Donovan was a frequent caller at the White House. He breakfasted with the President, and he dined with him. Whenever he went to the White House, he took with him information of great import and also little tidbits that entertained FDR. On October 21, Donovan gave Roosevelt a Nazi map that, he explained, the British had "purloined from a German courier." The map showed South America as it would be restructred after the German conquest. Roosevelt was fascinated and a few days later made it public as proof of Hitler's baleful ambitions. That same day Donovan explained again to the President his concept for an American commando unit of some 2,500 men, talked about John Ford's movie making for the COI, and showed FDR an article from the German press entitled "The Jew- Roosevelt Names War Maker Donovan as Super-Agitator." Both men chuckled over what they considered a piece of unintended German drollery.

Some of Donovan's meetings with FDR were more significant. On November 13, he informed the President about a secret protocol to the Japanese-Indochina Treaty, and on November 17 they discussed not only Donovan's report on the Center of the Arctic Studies but also a clandestine expedition to Central Africa, ostensibly to study the great apes, but actually to observe German spies at work in the area.

Often, early riser that he was, Donovan arrived in the morning

before the President got out of bed to begin his official work day. On Friday, November 28, War Secretary Stimson had reason to complain about this. "G-2 had sent me a summary of the information in regard to the movements of the Japanese before he got up. I had some difficulty getting in because he had already given an apointment to Bill Donovan, but I persisted on it and finally got there."

Roosevelt had already heard Donovan outline the increasingly dangerous developments in the Pacific. Stimson recorded in his diary what followed: "He [Roosevelt] branched into an analysis of the situation himself as he sat there on his bed, saying there were three alternatives and only three that he could see before us. I told him I could see two. His alternatives were -- first, to do nothing; second, to make something in the nature of an ultimatum again, stating a point beyond which we would fight; third, to fight at once. I told him my only two were the last two because I did not think anyone would do nothing in this situation, and he agreed with me."

Before Stimson arrived the President had confided in Donovan that "it was difficult now to find a formula in dealing with Japan." He approved plans Donovan showed him for checking into America's West Coast defenses.

By the end of November 1941, the COI was functioning well. General Strong, soon to become head of G-2, thought perhaps it was working too well, and he began to make political moves to block its growth. On December 3, he succeeded in winning White House approval for a Joint Army and Navy Intelligence Committee, which was to receive Donovan's reports. Donovan was to serve on the committee. The idea was to prevent the free-wheeling Donovan from consolidating his position as America's master spy. Julius C. Holmes, who became the executive secretary for the committee, later observed, "The Military Intelligence leaders all looked on Donovan like the fox in the hen house who was intent on usurping their 'hens' in pursuit of intelligence for someone's organization other than their own." Obligingly enough, Donovan at first sat in with the committee, but he continued to send his reports directly to FDR and to the British when he felt it served America's interests.

American naval cryptographers had solved the cipher machine that the Japanese used to encipher their diplomatic communications. The resulting intercepts were given the code name Magic. Washington knew that the Japanese were planning a major assault somewhere in the Pacific, but when the intercepts indicated that a huge striking force of carriers had set sail for a secret destination, the U.S. Navy assumed that it was bound for the Dutch East Indies. The navy, complacent in its overwhelming strength, did not alert either its commanders at Pearl Harbor or Manila, for surely the Japanese would not dare to risk complete disaster in a head-on collision with U.S. might.

The COI was now firmly established as President Roosevelt's eyes

and ears to the world, but the friction between the COI and the already established services continued. The COI was later designated the Office of Strategic Services in 1942. Their basic charter was collection of economic and political data as well as psychological data. Strategic intelligence, pertaining as it does to the capabilites, vulnerabilities, and probable courses of action of foreign nations, covers much the same ground as national intelligence in that both types are commonly addressed to the top officials charged with formulating and executing national policy. In the strictest sense of the term, however, strategic intelligence can be conducted on the departmental or other level without being offered, like national intelligence, as the coordinated view of the intelligence community. Nevertheless OSS was a lineal ancestor of CIA and so a landmark in the development of the community for producing national inteligence. OSS made a lasting impact by the stimulus it gave to the use of scholarly techniques in intelligence analysis, although the popular literature has centered on the organization's more dramatic "special operations," such as the support of guerrilla activities behind enemy lines. OSS recruited academicians by the hundreds, many of whom served as officials in successor intelligence to encompass the organization and activities of the national intelligence community.

OSS did not effect the interagency coordination required to dignify its analyses with the designation of national intelligence. The synthesis of intelligence during the war was rather centered in the Joint Intelligence Committee (JIC) of the Joint Chiefs of Staff. OSS was represented on the JIC along with the Department of State, the Foreign Economic Administration, and the military services. It is questionable whether even the centralized intelligence performed under the JIC could strictly be called national intelligence, since its purpose was to support the requirements of the Joint Chiefs. Joint collection groups, staffed by civilians and military officers, were set up in the various military theaters. The joint effort was also successful in bringing out a good compendium of data on terrain, targets, population, and other items of basic intelligence in the JANIS (Joint Army-Navy Intelligence Studies) compendiums. But no fully effective mechanism was evolved for the production of composite intelligence estimates on such issues as the enemy's staying powers or the need to bring the USSR into the war against Japan, and policymakers drew on individual or departmental analyses for background on these vital issues of the day.

In the early war planning for North African operations, American officers had fortunate access to ISIS (Inter-Service Intelligence Studies), the coordinated basic-intelligence studies of the British. It became apparent that a similar effort was needed for Pacific operations, and, at the President's direction, the Joint Chiefs of Staff created a Joint Intelligence Study Publishing Board to produce the so-called JANIS (Joint Army-Navy Intelligence Studies). The JANIS volumes provided officials and intelligence research analysts toward the end of the war with detailed information on the historical, geographic, political, economic, military, and

sociological backgrounds of the areas studied.

The JANIS volumes were a wartime stopgap. It was widely realized that basic intelligence must be produced in peacetime and be kept revised and ready for use in a national emergency. In addition the qualified character of the postwar peace heightened the general receptivity to a basic-intelligence effort that would serve nonmilitary operations such as propaganda, foreign-aid planning, and economic warfare. (In 1948 the National Security Council authorized publication of a basic-intelligence series called the National Intelligence Survey (NIS).)

In the area of economic warfare, economic pressures on the enemy during war (embargo, preclusive buying, and freezing of funds, for example) constitute a standard supplement to military attacks. Economic warfare, in addition, is also applied in situations short of formal war in order to reduce the capabilities of unfriendly nations for aggression.

Economic intelligence has had a close historical relationship to economic warfare. In Britain, the Ministry of Economic Warfare served as the economic-intelligence agency at the beginning of World War II. In the United States the newly created Board of Economic Warfare was charged with responsibility for economic intelligence. Experience has demonstrated the essentiality of accurate economic intelligence in the choice and in the enforcement of economic-warfare measures.

1. Shipping controls. Navicerts, ship's warrants, and restrictions on the bunkering of vessels are intended to block cargoes (including those leaving or destined for neutral ports) shipped to or by an unfriendly country. Economic intelligence, often obtained from clandestine sources, is necessary to determine whether cargoes are being shipped on behalf of unfriendly interests. Navy vessels may be signaled to intercept ships on the basis of information provided by economic intelligence.

2. Blacklists. Merchants in neutral countries discovered to be doing business with unfriendly countries may be black-listed, in which case exports to them and other business dealings are banned. Economic intelligence is responsible for the compilation of dossiers, which give the names of merchant firms, their nominal officers, the actual ownership, connections with other companies, records of suspect transactions, and other pertinent information.

3. Export controls. In war an embargo is invariably imposed on all shipments to the enemy. In other periods of international tension, export controls are imposed on selected items. Economic intelligence is called on to assist in the selection of products whose export would be to the strategic advantage of unfriendly countries. This may involve a determination of those countries' legitimate civilian requirements, so that operating officials may impose quantitative controls on exports of the selected items in

excess of those requirements.

4. Freezing of funds. When dollar assets of a foreign country are frozen, American banks are directed to permit no transactions in accounts owned by that country or its nationals. Economic intelligence may provide information to show that certain firms have a beneficial interest in accounts apparently owned by others. Swiss businessmen, operating in behalf of Germans, were the ostensible owners of sizable American dollar accounts in World War II.

5. Sequestration of property. Enemy nations may seek to cloak their ownership of properties, securities, and other assets abroad. Again, economic intelligence may give information showing the true ownership of these assets.

6. Preclusive buying. This operation involves the purchase of items for the sole purpose of preventing their procurement by the enemy. The decision to undertake this expensive operation depends on a determination by economic intelligence that the product is in short supply and is extremely vital for enemy war production. Preclusive buying of wolfram and ball bearings limited the availability of these products to the Germans in World War II.

In a completely separate area of National Defense, President Roosevelt established the National Defense Research Council to coordinate research on military equipment. In August 1940, realizing the possibility that Britain might be invaded, Sir Henry Tizard headed a British scientific mission to the United States, carrying with him details of all of Britain's most advanced thinking in several vital fields. There were ideas on jet engines, explosives, gun turrets and above all a little device called the cavity magnetron. This tube was vital for the development of more advanced types of radar, including the versions used in proximity fuses later and the types working on centimetric wavelengths which were vital at sea in the U-Boat war. The U.S. Official History described this collection as the 'most valuable cargo ever brought to our shores.'

By February 1941, the Germans had found it necessary to assist the Italians in North Africa and General Rommel was sent to North Africa. Rommel, despite orders not to attack, began to attack. The German/Italian forces attacked on three axis, heading toward Cairo. During much of 1941, the Germans pushed the British back toward Egypt with towns such as BENGHAZI, TOBRUK and El Alemein falling to the Germans. Throughout much of the campaign in North Africa, Rommel's forces were hampered by a lack of supplies. British intelligence was intercepting his transmissions and was aware of all the shipping schedules with the result that they were able to sink a considerable amount of his resupply effort. To some degree, the Africa Corps survived by making maximum use of captured supplies, including British Tanks.

Following the battle at Arras in 1940, the Panzer columns had continued as planned with the conquest of France. Technical

Intelligence type units of the German Army conducted a detailed exploitation of the British Matilda tanks that were captured as well as French tanks. The German high command was impressed with the armor on these tanks and wanted a heavier tank than their PzKpfw IV to spearhead future attacks.

Work on heavy tank development had been underway since 1937, but when the Germans encountered the Russian T-34 and KV 1 Tanks, they realized at once the need for newer tanks. The immediate need was for antitank weapons which resulted in a hybrid vehicle, the Marder, a German tank chassis mounting captured Soviet guns. (For convenience, I have reserved Chapter II for a detailed discussion of antitank weapons.) Of more importance was the development of heavy tanks. Based on experience in France in 1940, the Germans began planning for a heavy tank and preliminary designs were being worked on, however, these were modified because of experience in Russia. In early 1942, the German Army specified the tank was to have a gun capable of penetrating 100mm of armor at 1500 meters. The gun advocated was the 8.8cm Flak 36, however, the German Ordnance Department was in favor of a smaller caliber weapon on the order of 6cm or 7.5cm. By utilizing a smaller caliber, the total size and therefore the weight could be reduced. While the performance capabilities of the Flak 36 was known, the smaller gun had yet to be developed. As a result, the German Ordnance issued two specifications. The one given to Henschel was designated VK3601 for a 36/40 ton tank with a tapered bore weapon. The specification given to Porsch was VK4501 and called for an 8.8cm gun. Separate turrets for both were ordered from the Krupp Works at Essen. Because of a shortage of tungsten steel essential for taper bore guns, it was decided to stop all production of these guns and only seven of the VK 3601 prototypes were produced.

In order to allow Henschel to produce a tank with the requisite fire power, it was decided to utilize the turret produced for the VK 4501 on the VK 3601 as well. The sides and rear of this turret were formed from a single plate of armor 82mm thick and bent like a horseshoe and with a ring diameter of 185cm. As the VK 3601 had a ring diameter of 165 cm, Henschel had to alter the chasis, which was done by widening the hull above the tracks. Because of the chassis alteration, the heavier gun and turret, the designation was changed to VK 4501 (H). This new projected vehicle had the same main components, transmission, final drive and road wheels as developd for the VK 3601. Two versions of the tank were contemplated. The VK 4501 (H) with the Krupp Turret mounting the 8.8cm KwK36 gun and the VK 4501 (H2) which was to have the Rheinmettal designed turret mounting the 75 cm KwK42 (L/70) gun, but these were never produced.

By the middle of 1941, Henschel had prepared for production of 60 vehicles, but even before a prototype was finished, they had increased their preparations to cover another 1300. The first prototypes would not be ready for trials until the 20th of April 1942.

Since the C.O.I. was still in the process of getting organized,

the collection of information on foreign armed forces was left to the military and their systems were not very sophisticated. There was no system for collection of foreign material and no means of performing any sort of analysis of the equipment. The various military services were, however, watching developments in Europe as well as in the Orient where Japan was becoming the dominant power.

Within the Army, the Ordnance Corps, in conjunction with the Armored force, was working to develop newer tanks and other equipment. The standard American tank of the period was the M3 Lee tank which proved to be an adequate match for the fielded German tanks of the early 1930's. Preliminary designs were under consideration for light tanks, as well as heavy tanks, but none were produced. Working in almost complete isolation from the reality of the battlefield, engineers at the tank arsenal had little information on the performance of German tanks or Russian tanks and no information on research in these areas.

There was no such organization as a foreign intelligence office at the Detroit tank arsenal so there is little use to dwell on what might have been done, if. . .! In March 1941, design work on a replacement of the M3 Lee was begun and the prototypes were ready in September of 1941. This tank was to have a 75mm gun and would have been a match for the German Panzerkampfwagen IV, which was the most advanced tank that had been seen to date.

Since German and Russian developments in World War II would have a great impact on future events, it is necessary to examine in some detail the German campaign in Russia. The German Army onslaught against the Soviet Union was one of the bloodiest campaigns in history. Russian military battle deaths alone are estimated at 7,000,000. German losses were considerably less. Most historians will agree that the turning point in the war was the battle of Stalingrad in which the entire German Sixth Army was sacrificed.

At 0300 on 22 June 1941, Germany attacked the Soviet Union in Operation Barbarossa. The plan called for a 5-month campaign whose objective was the destruction of the bulk of the Red Army in the west to prevent its withdrawal into the interior, then to pursue the retreating Russians to the Volga River along three axes. Army Group North would advance toward Leningrad, Army Group Center would advance toward Moscow, and Army Group South would advance toward Stalingrad and the Caucasus.

The seizure of Leningrad in the north would effectively turn the Baltic Sea into a German "lake" and neutralize the Soviet Baltic Fleet. The capture of Moscow would destroy the seat of communist governement and political power. The drive toward Stalingrad would acquire for Hitler badly needed wheat and coal from the Ukraine, oil from the Caucasus, and the industrial complexes of the Donets Basin.

Hitler's generals were of the opinion that the main thrust should be toward Moscow as it was the center of the Russian railroad

system and, given its political significance, would be defended by the best Soviet formations. The destruction of the Russian forces around Moscow would be disastrous for the Communists. As it turned out, Hitler's wishes were not those of his generals. The capture of Stalingrad became the focus of his attention.

Despite the massive preparations spread over many months and the numerous indications that Stalin received from many sources, the Soviet forces were taken almost completely by surprise and lost heavily in the first encounters. The Germans had assembled almost 140 of their own divisions including 17 Panzer and 13 motorized units. Army Group North, commanded by Field Marshal Leeb, had 26 divisions and included two infantry armies and Hoeppner's Fourth Panzer Group. Field Marshal Bock led the largest German force, Army Group Center, with 51 divisions in two infantry armies and Gudrian's Second and Hoth's Third Panzer Groups. Army Group South was led by Field Marshal Runstedt and included 41 German divisions in three armies and one Panzer Group as well as 14 Rumanian and two Hungarian divisions. German units from Norway in General Falkenhorst's Norway Army joined the attack in alliance with the 21 divisions of the Finnish army who were keen to regain the territory lost to the USSR in 1940. There were more German units in general reserve and others allocated for security duties in captured territory. Altogether, the Germans deployed over 3,000,000 men, 7,100 guns and 3,300 tanks.

Each army group had support from a complete Luftflotte. The total strength was 2,770 aircraft, almost the same as in France but now spread over a much larger front. Of the 3,300 tanks deployed in the attack, only 1,400 are PZKW III or IV types. This was a rather greater proportion of high-grade machines than in 1940 but Hitler's wish to have many of them armed with better guns had not been met. The increase in the number of Panzer divisions compared with 1940 had been achieved by a reorganization made in September 1940, when tank establishment was halved so that the number of divisions could be doubled. The strongest Panzer division in May 1940 had 300 anks; now the strongest had 199. The new Panzer divisions had made considerable demands on scarce supplies of other vehicles also. As well as the tank force there was a significant number of assault guns (250), mustered in special infantry-support battalions. The assault guns were formidable machines but they were administered and commanded by the artillery rather than the Panzer arm and came to compete with the true tanks for scarce production resources.

The logistic preparations for Barbarossa were particularly difficult for the German High Command. It was only possible to assemble a bare sufficiency of motor transport by using German, French and other captured types, which, of course, caused many problems with spares and maintenance. The captured vehicles, especially the French were found to be notably unreliable. In addition to the motor transport, the forces moving into the USSR employed 625,000 horses. A further difficulty for the Germans was that the Soviet railroad system runs on a different gauge and must be converted if German rolling stock was to be used in captured areas.

The Soviet forces also had their problems. Out of a total Red Army strength of over 230 divisions, about 170 were in the western part of the Soviet Union and 134, 32 of them armored, are with the formations facing the Germans. The total Soviet tank strength was around 24,000 machines but only a quarter of these were in running order. The Red Air Force had about 8,000 aircraft facing the Germans but, again, many were obsolete or in poor repair. In all classes of equipment the most modern Soviet designs were simple and durable and at least as good as the German equivalent. There were important gaps in the German's information about Soviet strength and equipment. They underestimated badly the manpower the Soviets had available and took too little account of the speed with which the Soviets could prepare new army and militia units. They also believed that the Soviets had a total of 10,000 tanks and they had no real information about the superior T34 and KV1 tanks, of which there were 1,475 of these in the various armored divisions. The KV type was almost invulnerable to the German tank guns.

However, the considerable Soviet resources were less formidable than their extent suggested. Following the purges of the late 1930s a large part of the remaining senior leadership of the Red Army had been made up from the 'Cavalry Army' clique, old associates of Stalin not always distinguished for their military talents. Marshal Budenny typifies this group, perhaps owing his position to being one of Stalin's favorite drinking companions.

The Winter War with Finland had exposed many weaknesses within the Red Army and led to many changes. Some, like the re-creation of the mechanized corps in September 1940, were undoubtedly sensible but others were wasteful. All the changes, sensible or not, were made in an atmosphee of haste which made assimilating them more difficult. Training was also poor and some of the tank drivers and mechanics had about an hour's instruction altogether on their new T34's and KV1's. Soviet deployment was also very weak. Some units which are supposedly part of the front line are as much as 200 miles away in barracks or on training grounds. Other formations, Tenth Army of the Western Front is the best example, are too far forward in dangerously exposed salients. Plans were under way to bring reinforcements from the units deployed in the Far East but these have not yet become effective. Thus, despite Soviet manpower resources and useful stocks of equipment, the weakness of their tactical system, training and deployment meant that they could hardly be worse placed.

Marshal Timoshekno was Commissar for Defense and General Zhukov was Chief of the General Staff. In the line from north to south were Kuznetsov's Northwest Front. Pavlov's West Front, Kirponos' Southwest Front and Tyulenev's South Front. The balance of forces differed from the Germans in showing a slight preponderance in the south. Kuznetsov, Pavlov and Kirponos were all replaced early in the campaign.

The German plan, as mentioned, was for an advance by all three

army groups. Leeb was to go for Leningrad. Bock for Smolensk and Rundstedt for Kiev. Army Group Center was to be prepared to give support to the flanks of the thrust rather than to press toward Moscow after Smolensk. This decision was Hitler's own and is generally regarded by later military critics as unsound. Equally controversial was the timing of the attack. Since then it has often been argued that despite errors in Hitler's direction of the campaign, the main reason why the German army did not reach Moscow and win the war in the autumn and early winter was the weather and that, if Barbarossa had been begun earlier in the year, Moscow would have fallen. However, it is by no means certain that even with a few weeks' grace the Germans would have been able to finish off their Moscow attack. Also, it is almost certain that Barbarossa could not have been started any earlier.

The real causes of delay were that the winter of 1940 and spring of 1941 was partiularly wet, flooding the rivers of Poland and softening the ground. Even in early June the Bug was well over its banks in many places on the front of Army Group Center. It should not be forgotten also that any delay in the starting date meant that the Germans could add tanks and trucks to their units. All this discussion is somewhat academic. The Germans were in no particular hurry because they believed that they could win in a matter of weeks, and foreign military opinion agreed with them. The Red Army proved everyone wrong.

On the first day of the attack almost everything went the German way. The attack began at 0300 hours with advances on the ground and simultaneous air strikes. The Luftwaffe began its operations very early in order to be over the Soviet bases exactly at zero hour. By noon the Soviet Air Force had lost around 1,200 planes. The land battle was equally successful. Army Group North's Panzer spearhead advanced 40 miles during the day and Army Group Center captured most of the Bug bridges intact. During the first four days Manstein's LVI Panzer Corps with Army Group North advanced 185 miles; Guderian's Panzer Group made 270 miles in the first week. Other forces did equally well. One setback for Army Group Center was that, although they won control of the town of Brest Litovsk, they were not able to take the medieval citadel or use the communications network centering there for several days.

After initial successes in the summer of 1941, the offensive ground to a halt in the winter, having failed to achieve any of its objectives. On 6 December 1941, the Russians launched a major counteroffensive. The attack slowly pushed the Germans back but ran down in late February 1942, because the German divisions were able to contain the Soviet breakthrough attempts. But the cost in German men and material was high. Both sides had been exhausted in the winter campaign and the spring thaw and mud enforced a general truce until May. But, Hitler badly needed the Caucasus oil to pursue his aims and decided to launch a summer offensive toward Stalingrad.

The German Army of 1942, which was to launch this attack, was

inferior to the German force that had attacked Russia the summer before. Army Group South had received the only replacements. But, many of its formations consisted of German satellite forces from Italy, Romania, and Hungary, all of questionable reliability. Furthermore, German industry had failed to adequately replace the material losses from the previous winter campaign.

The Army Group South plan called for destroying the Russian forces in the bend of the Don River followed by the seizure of the oil fields and the capture of Stalingrad (map 1). Phase one of the operation cost the Russians 240,000 men and 1,249 tanks. Another 100,000 Russians were lost at Sevastapol on the Black Sea. The poor showing of the Russians up to that point convinced Hitler that his combined operation, Stalingrad and the Caucasus, would meet little opposition despite the fact that the Russians expected them to attack in this area.

The second phase began on 30 June, with the Sixth Army commanded by General Friedrich Paulus advancing along the Don River in the direction of Stalingrad and linking up with the Fourth Panzer Army on 7 July. Army Group South was now reorganized into Army Groups A and B. Army Group A was commanded by Field Marshal Wilhelm List and was comprised of the Fourteenth Panzer Army, the First Panzer Army and the Seventeenth Army. Army Group B was commanded by Field Marshal Fedor von Bock and was comprised of the German Second and Sixth Armies, the Fourth Panzer Army, the Romanian Third and Fourth Armies, the Italian Eighth Army and the Hungarian Second Army.

Phase three began on 9 July with the attack of Army Group A. The attack was a success with many Russian soldiers deserting and Russian units breaking up. Phase four began on 13 July when Hitler ordered Army Group A to turn south toward the Caucasus and cross the Don east of Rostov. The Fourth Panzer Army, minus a panzer corps, wax diverted from support of the Sixth Army to support Army Group A's drive to the Caucasus. The Sixth along with the remaining panzer corps from the Fourth Panzer Army was left alone to continue the drive on Stalingrad.

The Sixth Army reached the Volga in September but was not in possession of the city, though its fall was expected. These expectations were not realized. Instead, the Germans found themselves slowly bleeding to death with few replacements coming to the front. The Russians, however, were able to bring up fresh forces from east of the Volga.

In the battle for the city, Stalingrad was reduced to rubble. The siege lasted 66 days. The fighting was hand-to-hand, house-to-house, and day-to-day, with neither side scoring a decisive victory. As the battle for the city was taking place, the Red Army was planning a counteroffensive to secure the Dneiper River line and to cut off Army Group A in the Caucasus.

The Russian counter-offensive was planned in three phases. Phase

one was to be the annihilation of the Sixth Army by attacks against the Romanian-held sectors on the flanks of the Sixth Army. Phase two was to be the overrunning of the Italian Eighth Army and then advancing to the mouth of the Don. This would cut off the retreat of Army Group A except by the Kerch Narrows in the Sea of Azov. Phase three was to be the destruction of the Hungarians around Kortoyok, thus opening up the road to the Dneiper River.

At 0720 on 19 November, Russian artillery fire deluged the Romanian positions and by 0850 Rusian infantry surged out of the Serafimovich bridgehead. The Romanian Third Army held until noon but the Russians broke through with cavalry and tanks and headed for Kalach. On 20 November, the Russians struck the Romanian Fourth Army which panicked. The Russians broke through, trapping elements of the Fourth Panzer Army. The northern arm reached Kalach on the 21st. By the 23rd the trap was closed and the Sixth Army was encircled (map 3).

As the Stalingrad trap was closing, General von Seydlitz, commanding LI Corps of the Sixth Army, worked out, in conjunction with the Sixth Army's Chief of Staff, a plan for a breakout in southwesterly direction. He held a conference with General Heitz, commanding VIII Corps; General Strecher, commanding XI Corps; and General Hube, commanding XIV Panzer Corps. All of the generals were of the opinion that a breakout should be effected immediately and Paulus agreed.

Sixth Army then issued the "Flower Order" effective on Hitler's permission. This plan was a three phase breakout that had a 10-to-1 chance of success.

- Troops would be withdrawn from the perimeter and massed in waves.
- The first breakout wave would have 130 tanks, armored reconnaissance vehicles, combat vehicles of the 3rd and 29th Motorized Divisions, and 17,000 combat troops.
- The second wave would have 4,000 men.

General von Weichs, commanding Army Group B, also believed it necessary to evacuate the Stalingrad position and ordered Paulus to fight his way out and, if necessary, abandon his heavy equipment. It still remained to be seen what Hitler's decision would be.

At 0015, 24 November, General Paulus wired Hitler for permission to break out.

At OKH, some 1,400-1,500 miles from the scene, General Zeitzler, recently appointed Chief of the German General Staff, was constantly attempting to convince Hitler of the need to evacuate Stalingrad. Engaging in many heated conversations, many of them in the middle of the night, Zeitzler almost convinced Hitler to allow

the breakout. He even took the initiative and told von Weichs, and Paulus to be prepared. The order never came because Air Reichs Marshall Goering promised Hitler that the Luftwaffe would supply Stalingrad by air if Paulus could maintain control of the three airfields at Stalingrad. Goering believed that 500 tons per day (less than was needed) could be supplied by the Luftwaffe but this was impossible, a fact which was not evident when Hitler made his decision. Hitler's intention was that the Sixth Army would stand fast. He intended to supply them by airlift and send relief forces as soon as possible. In the meantime, he designated them "Fortress Stalingrad."

The situation at the front was critical, the Russians having pushed 23 divisions through the Romanian Third Army and had 23 more advancing towards the Cir River. Soviet troops in Stalingrad and to the north of the city were being reinforced from across the Volga. To meet the threat, the Germans reinforced the Don Army Group under Field Marshal von Manstein.

Army Group Don was to consist of the Sixth Army with 22 divisions, remnants of the Fourth Panzer Army, and the Romanian Third and Fourth Armies. The Sixth Army was surrounded, low on food, fuel, and ammunition and had little hope of replenishing anything. The Sixth Army was surrounded, low on food, fuel, and ammunition and had little hope of replenishing anything. The Sixth Army holding "Fortress Stalingrad," through subordinate to HQ Army Group Don "on paper," had come under the direct control of the OKH (German High Command; i.e., Hitler).

The Germans fought off the Russians through the early days of December but their semicircle in the city was constantly shrinking. In an attempt to save the Sixth Army, the Fourth Panzer Army under the code name "Winter Tempest" attacked from the south in the direction of Stalingrad on 12 December to link up with and relieve the beleagured forces in the city. This attack was to cover 62 miles. Originally the plan called for two relief attacks, but due to the difficulty of bringing up reinforcements, this was abondoned. By the 19th, the 4th Panzer Army stalled 30 miles short of the Sixth Army.

Sensing the gravity of the situation and acting on his own, von Manstein ordered Paulus to prepare to break out. General Paulus refused, claiming his now depleted fuel supplies would permit an advance of only 20 miles, 10 miles short of a link up.

Back at Hitler's headquarters, General Zeitzler was again trying to convince Hitler of the necessity of breaking out of Stalingrad. Hitler finally agreed, providing that the Volga River line could still be held. Word was then received that the Sixth Army lacked sufficient fuel for the proposed breakout. When Hitler learned of the problem, he ordered Paulus to remain in the city since he did not want the stranded tanks to become standing targets in the middle of the steppes.

Conditions within the city were growing worse because the promised 500 tons of supplies per day were not being flown in. Two hundred and seventy-eight transport planes were lost in December attempting to land at the three airfields that were subject to constant artillery fire. Combined with difficult flying conditions were administrative blunders. One such mistake resulted in the delivery of one ton of marjoram (a food seasoning), ten cases of pickles, fifteen typewriters, and a dozen cases of contraceptives.

Most of the artillery and transport horses had been converted to meat and soup. Finally, dogs, cats, and even mice and rats disappeared from the streets.

Elsewhere on the front, the Russians had pushed the Germans back and were preparing for the final annilihation of the Sixth Army. In an attempt to prevent unnecessary slaughter, General Rokossovsky, Commander-in-Chief of the Russian Don Front, sent Paulus a message pointing out that he was surrounded, was unable to receive adequate supplies and could not possibly expect to effect a breakout. Rokossovsky called for an immediate cessation of hostilities and promised safety, medical treatment, and food for all who surrendered.

Hitler immediately replied that the Sixth Army was to stand fast, holding to the last man and the last round of ammunition. ("Kampfen bis zum letzten Mann und bis zur letsten Patrone," the message said.)

The Soviet plan of attack to destroy the Sixth Army was to break up the large pocket holding the city into several smaller ones, which they would destroy piecemeal. On 10 January, a 2-hour artillery barrage signalled the approaching attack. At noon the Russians attacked, but due to stiff German resistance, the main aim of splitting the large pocket failed. By 22 January, the German airlift ceased to operate after the airfields had fallen into Russian hands (minimal supplies continued to be delivered by parachute). Paulus' hope for adequate resupply had vanished and he radioed Hitler for permission to breakout in organized groups to the south. This was again refused and by 25 January, the Germans were split into two pockets and three days later into three pockets; the XI Corps holding the northern factory area, VIII and LI Corps holding the center pocket, and non-descript remnants holding the area around Paulus' headquarters.

On 31 January 1943, LI Corps could no longer resist and the central pocket surrendered. In the basement of the Univermag Department Store, Paulus, newly promoted by Hitler to the grade of Field Marshal, surrendered to the Russian generals. On 2 February, the Russians shelled the tractor factory. Russian tanks arrived but were not fired upon since all German equipment had been destroyed and the positions vacated. At 1115, XI Corps radioed the Supreme Command that they had held to the last man. The city of Stalingrad and the Sixth Army were lost to the Germans.

Paulus had his first chance to breakout when the Russian pincers first closed about him on 23 November. Had Paulus withdrawn his forces from the city immediately and attacked westward he might have saved his army from eventual defeat. A decision such as this would of course have to be based on an estimate that the situation would get worse as time went on.

On 24 November, after the Russian pincers first isolated the Sixth Army, the conditions were ripe for a breakout. Paulus and his subordinate commanders had planned for it, and issued the "Flower Order." Army Group B had ordered him to break out. Yet, in the face of the Russian onslaught, Paulus requested OKH for permission to execute the operation. Also, General Zeitzler at OKH, had taken the initiative and alerted Army Group B and Paulus to prepare to execute the plan. Permission was denied and by 19 December, the situation within the encirclement had steadily deterioriated and Paulus was faced with what was to be his last chance to save the Sixth Army. He would link up with the Fourth Panzer Army or hold the city to the last man and the last round!

Paulus' offensive power lay in his tanks, approximately 100 of which were still serviceable. Their fuel supplies would carry them only 20 miles, 10 miles short of the relief forces. It was estimated that 4,000 tons of fuel would be required for the 30-mile thrust and it was impossible to wait until this tonnage could be obtained. The Germans hoped that the thrust would relieve the pressure on the Fourth Panzer Army, which possibly would be able to advance the necessary 10 miles. The fact remains that Paulus did not attempt the breakout and the Germans lost four corps headquarters, 13 infantry divisions, a rifle (Jaeger) division, a Croatian regiment, three Panzer divisions, and three motorized divisions, as well as the equipment.

With the German Forces stopped in Russia and an entire army trapped and lost at Stalingrad, German morale was quite low. In Africa, Rommel was still making headway against the British but American Lend Lease supplies had begun to arrive. Along with these supplies, a number of American advisors came along. Among them was Captain George Jarrett. Several other Americans were part of the effort, to include a young enlisted man named Barnes. (Two wars later, Barnes would serve as the SGT Major of the Technical Intelligence effort.) In November 1942, American troops arrived in North Africa, landing in three locations as part of "Operation Torch."

One of the most significant enemy vehicles to be encountered by the allies during the war was the German Tiger tank, which first saw action against the Russians. "Tiger" was an evocative name amongst those Allied fighting troops who met this German tank in action during World War II, although this may be difficult for others to understand.

As previously mentioned, it was a logical development of the

earlier Pz Kpfw III and IV, the Henschel-designed and produced Tiger Model H, as it was originally known, or Model E (Sd Kfz 181) as it eventually became accepted into the German Army Ordnance vocabulary, represented a quantum jump in fire power and protection over its predecessors whilst possessing tactical mobility comparable to them. It was developed in competition with a vehicle designed by Dr. Ing. h. c. Ferdinand Porsche, to meet a requirement stated in 1941. Design started in late 1941, and the first prototype was produced in time for a competitive demonstration at Rastenburg on Hitler's birthday, 20 April 1942. The Henschel designed version proved superior, to Hitler's Chagrin, as Porsche was a favorite of his and 90 Porsche vehicles had already been ordered on his instructions.

As a result of this demonstration and subsequent trials at Haustenbeck and Kummersdorf proving grounds, it was selected for production, which started in August 1942. The vehicle was of conventional design, following that of its predecessors in having a hull divided into a driver's hull machine-gunner's compartment in front, a central fighting compartment, upon which was mounted the turret and which housed the gunner, loader and tank commander, and an engine compartment at the rear. The hull height was increased, basically by the use of a suspension system using transverse torsion bars, as with the Pz Kpfw III, but additionally by the use of a front-mounted gearbox and final drive which necessitated a drive shaft connecting the engine and gearbox lying above the torsion bars and below the turret floor.

The armour arrangement also was conventional for the time, made up of mainly vertical plates except for the stepped hull front and the slightly under-cut tail plate. Where it differed dramatically from its predecessors and contemporaries was in the size of its main armament, which, both in calibre (8.8cm) and barrel length (56 calibres), greatly exceeded anything previously mounted on a tank in a fully rotating turret. In addition, with its four inch thick frontal armour and thicknesses elsewhere in proportion, with plates inter-locked as well as welded, it presented a target impenetrable frontally at virtually point-blank range to any Allied tank or antitank weapon then in service. The awe-inspiring dimensions and performance of the gun, together with the equally awe-inspiring dimensions of the vehicle needed to carry it, together with its ammunition, its crew and an engine and fuel capacity large enough to give the 56-ton vehicle the required tactical mobility, made a profound and never-to-be-forgotten impression on these Allied troops unlucky enough to meet it in action. This impression was all the greater because of the apparent invulnerability of the tank to the Allied weapons available at the time to be used against it.

The Porsch version which was known in the factory as "TIGER" ceased to exist as a main battle tank and the 90 that were under construction were converted to the Panzer Jaeger "Elefant." Actual production of the Henschel model began in August 1942 with 12 units a month by November 1942 and the maximum output of 104 units in April 1944.

As with the British Mark I tanks in September 1916 and again with the Churchill in the Dieppe Raid of August 1942, the Pz Kpfw Tiger Ausf H was prematurely introduced, at Hitler's behest, on the eastern front in the autumn of 1942. A detachment of only four pre-production tanks of 502nd Heavy Tank Battalion, accompanied by support and recovery vehicles and some technicians from the firms of Henschel and Maybach, entrained at Fallingbostel on the 23rd and detrained in the Leningrad area, on the 19 August 1942. None of the vehicles got into action, having to be destroyed on site by their crews when they broke down, due mainly to engine and transmission problems. The destroyed hulks were left behind for Soviet Intelligence personnel to study at their leisure, while the crews and engineers returned to Fallingsbostel. Some lessons had been learned and some ideas for improvement of the vehicle reliability had been gained and were incorporated in later vehicles, but the morale of the 501st and 502nd Heavy Tank Battalions, both then at Fallingbostel familiarizing themselves with the Tiger as it came off production, suffered a needless lowering as a result of this premature operation. Exchange of technical intelligence information between the Soviet and British Armies was never good during World War II, so that British information concerning the Tiger was at this time limited to gleanings from captured documents and POW interrogations. It was thus not until after the 'Torch' landings in North Africa in November 1942, that the British and United States Armies encountered Tiger. It was a salutary experience, especially for those tank battalions of the British 21st and 25th Army Tank Brigades equipped with the then supposedly invincible Churchill III and IV.

In the area of medium tanks, the Germans had encountered the Russian tanks which were superior to the Germans and work was begun to rectify this situation. Infantry anti-tank weapons were hastily developed and are discussed in detail in the next chapter. In the area of tanks, a new medium tank was developed called the PANTHER.

The Panther Tank, more correctly designated, PanzerKampfwagen V (sd.kfz171) was the last major tank designed by the Germans and put in production. As the German Army invaded Russia, they encountered the KV 1 tanks and the T-34 tanks which were superior to the German tanks of the period. Captured T 34s were sent to the rear where a detailed analysis of their features was made. At the same time, the German Generals remarked that Germany should simply copy the T34. As a result, the German Army ordered a new tank designed specifically to fight the T34. Specifications were given to both M.A.N. and Daimler Benz. The tank was to weigh 35 tons, have a speed of 60km/hr, mount a 75mm gun with 60mm of armor in the front hull, 35mm in the rear and 100mm at the gun mantlet. It was to be equipped with a Maybach HL210 V 12 engine. In May 1942, one month after the first prototypes of the TIGER were undergoing trials, the M.A.N. version was chosen without waiting for completion of a prototype tank. There were two important changes. First, in order to meet the military requirements, considerably more weight was needed and the military required a change from the HL 210 engine to the HL 230. To accommodate this

engine, a better gearing system was required but mass production was begun in November 1942 without this needed change, which resulted in frequent gear malfunctions and related troubles. Since the Panther Tank was accepted for production before the TIGER, the Panther was designated Panzer Kampfwagon V and the Tiger was designated Panzer Kampfwagon VI, a fact which probably confused intelligence personnel in the initial stages.

Of prime importance in discussing this tank was that it's basic design was derived from the Russian T34 which had been captured in 1941 and sent rearward. It had the long sloping glacis plate of the T34, inward sloping sides above the track level, a turret mounting a long 7.5cm gun and interleaved road wheels sprung on transverse torsion bars. The Panther, as with other German tanks went through numerous design changes once production started with variations from A through G entering the conflict. The Panther became the main battle tank of the German Army, however, it was the TIGER which created the most impact because of its surprise appearance early in the conflict. One thousand three hundred fifty Tiger tanks were produced as opposed to 6,283 Panther tanks. Production figures vary, depending upon which source is consulted.

Numerous studies have been made on why the Germans were eventually defeated, but one prime factor was that their industry had not geared up for wartime production until too late. The constant redesign of their main battle tanks tied up a considerable number of engineers, required considerable re-tooling of their production plants and as a result, there were never enough tanks to replace combat losses. In contrast, the Russians and Americans picked one basic design and kept it throughout the war, making minor changes as needed. It was unfortunate that in the United States the pre-war intelligence effort was non-existant for if there had been a better system for analysis of foreign technology, the basic design of American tanks would not have have needed such a radical change to compete with the tanks fielded at the end of the war.

Within the United States, December 7th, 1941 had come and gone and America was fully involved in the War. Most of 1942 was spent in stemming the tide of Japanese expansion with the Battle of the Coral Sea and the Battle of Midway. By August 1942, the American Forces were beginning to start their island hopping campaign starting with the landings on Guadalcanal. With the successful landing of combat troops on Japanese held islands, Americans were able to examine Japanese weapons in some detail.

As 1942 drew to an end the United States prepared for its first land invasion in the European Theater. From their earliest meetings after the declaration of war Roosevelt and Churchill realized the limitations set on both. Although they wanted to take the war as quickly as possible to the enemy the means of doing so was the subject of much debate. Many views were expressed, including an invasion of northern Europe, but considerable preparation would have to be made before such an operation could take place. The area

which appeared most advantageous for initial American ground involvement was North Africa. There the British had been fighting a seesaw war with the Germans for control of this strategic Mediterranean region. Churchill and Roosevelt agreed that to introduce American Ground infantry to war in North Africa would be economical in men, time and materiel. North Africa was also a likely area for Allied success.

As the months of 1942 rolled by and the United States began to mobilize, Allied Intelligence made known several facts which led to the decision to invade North Africa. The capabilities of Field Marshal Erwin Rommel and his Afrika Korps were becoming legendary and from the aspects of terrain and weather North Africa presented many problems. Yet as the Russian Front absorbed German troops it became increasingly evident that Hitler saw North Africa as a mere sideshow, sending as little as possible in front line equipment to that region. Both Britain and the United States saw the landings in North Africa as a means to bring France into the Allied camp once again. Morocco and Algeria were held by French forces and if these areas could be liberated it was believed that the French forces would put themselves under Allied command with the promise that they would soon participate in the liberation of France itself. It was thought that the French in North Africa sought only an excuse to unite with the Allies and that Vichy control would disintegrate once the Allies demonstrated their ability to defeat the Germans in Africa. Churchill also saw the need to open the Mediterranean to Allied shipping so that the long voyage around the Cape could be eliminated.

As time went on after the Arcadia Conference Roosevelt became more convinced of a North African invasion, but some American commanders held a less optimistic view. Members of the Joint Chiefs of Staff, particularly General Marshall, saw the North African landings as a waste of American resources and effort which, if undertaken at all, should be nothing more than a secondary operation. These men were concerned lest the North African operation deplete the stockpiles being made in anticipation of the European invasion. The U.S. Chiefs of Staff might have been against the idea, but a majority of the Allied Combined Chiefs of Staff were very much in favor of the North Africa operation.

By April 1942 American industry was demonstrating its ability to provide adequate supplies and materiel for the eventual invasion of France. The success of this mobilization, code named Bolero, proved that supplementary equipment and supplies could easily be diverted to North Africa. Added to this was the assessment that it would be at least 1943, if not 1944, before the Allies' manpower pool was sufficient for a European invasion. There seemed little doubt that the North Africa invasion would receive high priority in spite of the objections raised in the American command structure. At one point the Joint Chiefs of Staff even suggested that Roosevelt shelve the North Africa issue and funnel all available resources to the Pacific. However, by July 1942 Roosevelt had made his decision

and ordered the Joint Chiefs of Staff to make preparations for the execution of Operation Torch, the invasion of North Africa.

In his book, "Crusade in Europe," General Eisenhower remarked that at the very least it was clear to the Chiefs of Staff that no significant invasion of western Europe was possible in 1942. They kept General Marshall informed of their developing conclusions, primarily through verbal communications carried by trusted staff officers. In mid-July 1942, General Marshall and Admiral King came to London to meet with the British Chiefs of Staff. They were to discuss problems arising out of realization that a very considerable period must elapse before a full-blooded, decisive operation could be undertaken against the coasts of northwest Europe. They had to reckon with these factors:

> The agreed-upon major strategical operation to be carried out jointly by Great Britain and the United States could not be put into effect, because of lack of forces and equipment, before late 1943 at the earliest, and, since the fall of the year would be a most unpropitious time to begin such a campaign, the prospective D-day, in the absence of some unforeseen, radical change in the situation, might be postponed until the spring of 1944.
>
> Russia was insistently demanding an offensive move by Great Britain and the United States during 1942, and there was a lively fear that unless such a move was undertaken the gravest consequences might ensue on the Russian front.
>
> The phychological reaction in the United States and Great Britain and in all the occupied countries of Europe might be little short of disastrous if positive action of some kind were not undertaken during 1942.
>
> Whatever was attempted in 1942 would necessarily be on a much smaller scale than the contemplated invasion of Europe and, so far as possible, it should not seriously cut into the production and preparatory program then getting under way to make possible the final major operation.
>
> The President had specifically ordered the United Chiefs of Staff to launch some kind of offensive ground action in the European zone in 1942.

One of the major aspects of the war, was the destruction of the German industrial base. This would be accomplished by a naval blockade chocking off the supply of raw materials and an air bombardment to destroy the German factories. The U.S. Army Air Forces believed in daylight bombing with the heavily defended Fortress type of bomber as the backbone of the organization. Each of these planes

carried ten .50-caliber machine guns for defense. We believed that, in suitable close formations permitting concentration of a terrific fire power, they could proceed well outside of the area in which they could be protected by their own fighters and could carry out daylight bombing operations without undue losses.

Prime Minister Churchill was convinced that this view was false and that the United States was merely wasting its effort and resources in making the attempt. General Spaatz knew, of course, that the United States was already developing long-range fighters which would become available by the time his Eighth Air Force could reach its scheduled strength. However, for some months his forces would have to employ the P-39 and P-40 fighters, which had a very limited operational radius, roughly about three hundred miles. The Prime Minister urged us to give up the whole idea of daylight bombing and start training our crews for night work. British air experience at that time was far greater than ours. Following hard upon the Battle of Britain in 1940, they had begun laboriously to build up a bomber force that could strike deep into the heart of Germany. Their experience had driven them to bomb only at night; otherwise they suffered unsupportable losses. The British stagered their first 1,000-plane raid in an attack against Cologne on the night of May 30-31, 1942. Losses amounted to 42 planes.

The British bombers could not, in daylight, have undertaken such an operation except with prohibitive losses. We believed that this was due to the fact that they were designed for range and weight lifting at the expense of speed and defensive fire power. The British fighter called the Spitfire was handicapped by very short range, although in other respects it was one of the finest then in existence. While acknowledging the superior defensive power of our Fortress formations, the British still held that unless we quickly turned to night bombing our losses would be prohibitive and our effort futile.

The arguments on this point were long, with neither side convinced. It was granted by all that daylight precision bombing, if successful, would be far superior to night area bombing in ton-for-ton effect. Consequently, discussions centered exclusively around the one point of feasibility. General Spaatz and General Eishenhower were supported in our position by the United States Chiefs of Staff and the U.S. officers insisted that our system should first be thoroughly and completely tested before anything could lead us to deviate from it.

In the final outcome, months later, both sides were proved to be partially right. When U.S. heavy bombers first began operating in formation outside fighter range, the volume of their defensive fire so astonished the enemy that for a period they enjoyed a considerable degree of immunity. Gradually, however, the Germans devised new tactics and methods and began to use his fighters in large concentrations against U.S. units. The percentage of losses began to mount rapidly. On June 13, 1943, the U.S. Eighth Air Force

attacked Kiel with 76 planes, without fighter support, and lost 22. A later raid by 291 planes suffered a loss of 60. With each plane shot down went also a minimum of ten officers and men. In the face of such percentage losses it became certain that but for the mass production of the long-range efficient fighter the U.S. would have had to modify their bombing program and could have proceeded into Germany itself only under cover of darkness or bad weather.

But in the initial arguments these experiences still belonged to the future. A great factor in General Eisenhower's calculations was the degree of dependence placed upon the operation of the precision bomber in preparing the way for a ground invasion of France.

This was the keynote of the invasion plan. Unless accurate daylight bombing was feasible, he believed, large-scale invasion of the Continent would be exceedingly risky. Therefore they maintained that even if the U.S. could carry on precision bombing only to the extreme range of their fighters, they must continue to develop the United States forces on that basis, so as to have available the great force that would be needed to carry out the preparatory work in the areas selected for invasion.

The upshot was that the United States Air Forces stuck to their program of precision bombing, while the British Bomber Force continued to concentrate on increasing the efficiency of night bomber operations. While the question was raised again, on the highest levels, at the Casablanca Conference in January 1943, the result was merely to confirm this earlier decision.

The end result was a five phase bombing campaign as depicted on the map beginning in December 1942 and continuing eastward until finally all of the German industrial effort was subjected to attack. In the initial phases, the work of the air attache in the 1930's provided the basis for selecting targets. Current intelligence operations on the continent combined with other information would provide the intelligence that would establish priority targets. In any case, it would be several months before the effects of the bombing would show up in a degradation of combat forces.

In August 1942 it was decided that Lieutenant General Dwight D. Eisenhower would command Operation Torch. To accomplish his task Eisenhower created Allied Forces Headquarters (AFHQ) combining British and American planners and staff in an invasion planning committee. In this way both British and American objectives could be given equal consideration and compromises made. Eisenhower quickly discovered that compromise would be a major factor in the planning of Torch. The British wanted their invasion force to land in Algeria, somewhere near Bone, so that they might rapidly deploy eastward into Tunisia. If Tunisia was secured the Germans would be unable to use it as an exit point to Sicily. The American staff was concerned with the possibility of Spanish intervention in the theater, or that Spain might open its airfields to the Luftwaffe.

This could jeopardize not only the invasion itself, but also the naval resupply of the ground forces in Algeria. The American strategy called for an invasion further west in Morocco.

A complicating factor was the delicate issue of the French administrations and forces in Morocco, Algeria and Tunisia. If the French should side with the Germans and offer heavy resistance, it could create severe repercussions on the morale of the Allied forces. Eisenhower realized that the American people believed in the destruction of the Axis dictators and in lifting the "yoke of oppression" from occupied European nations. If French forces in North Africa remained unwaveringly loyal to the puppet Vichy government and stood against the invasion, the moral justification of the Allied war effort would be in serious doubt.

In an attempt to avoid this possibility, secret negotiations were held with the Vichy politicians and commanders in the area. These ngotiations had little success in the unstable political atmosphere. AFHQ went on with its planning in spite of this dilemma. It was finally decided that three invasion task forces, the Western, Center and Eastern Task Forces, would strike in three separate locations. The Western Task Force was strictly an American naval and ground operation and would sail directly from the United States. Eastern Task Force was a composite British and American operation, from which the British First Army would deploy into Tunisia while the American forces secured their immediate invasion areas.

Western Task Force, commanded by Major General George Patton, was to attack Morocco with the Main effort centered around Casablanca. Center Task Force, commanded by Major General Lloyd Fredendall, would land in Algeria and concentrate its drive on Oran. Eastern Task Force, under the overall command of Major General Charles W. Ryder, was to seize Algiers then swing east into Tunisia. Each of the task forces would work independently of the others. Even their landing times were different, as determined by the local tides. The objectives of the invasion forces were much the same. Each had a major city which was to be seized as rapidly as possible. Port facilities which could provide future disembarkation sites for supplies were to be secured. Airfields were to be taken quickly to provide bases for RAF and USAAF support aircraft waiting in Gibralter. Naval support for the landings was to be provided by both the Royal Navy and U.S. Navy.

Operation Torch got underway on 8 November 1942. When elements of Patton's Western Task Force landed between 0400 and 0600 hours, they were surprised by the reception afforded them. American troops had been told that pro-Allied officers in Morocco would seize control and give clearance for the landings. Patton and his staff were given a less optimistic account of the situation, but they would not know the actual state of affairs until the men hit the beach.

The Eastern Assault Force was initially under General Ryder of the 34th Division. Their task was to assault the Port of Algiers and ensure that Algeria fell into Allied hands. It was here that British troops would take part in the landings in the form of commandos and one brigade of the British 78th Division. Once the united assault was successfully completed, the force was designated the British First Army under General Sir Kenneth Anderson was to race five hundred miles eastward to capture the Port of Tunis to prevent its falling into German hands.

As General Eisenhower pointed out in "Crusade in Europe," the minimum objective of the North African invasion was to seize the main ports between Casablanca and Algiers, denying their use to the Axis as bases for submarines, and from them to operate eastward toward the British desert forces. The successful action of the first few days assured attainment of the minimum object and we immediately turned all our attention to the greater mission assigned us of cooperating with General Sir Harold R. L. G. Alexander's forces, then twelve hundred miles away at the opposite end of the Mediterranean. Between us we would destroy all Axis forces in northern Africa and reopen the sea for the use of Allied shipping.

On October 23, in Egypt, General Alexander had launched the British Eighth Army, under General Sir Bernard L. Montgomery, in an assault on the enemy lines at El Alamein, and within two weeks the enemy was in headlong flight to the westward, hotly pursued by the victorious British. If we could advance to the Axis line of communications, we could assure that the brilliant tactical victory of the Eighth Army would result in even greater strategic gain.

British air and sea forces based on Egypt and Malta denied the Axis any practicable and dependable line of communications crossing the Mediterranean east of Tripoli, while our own position, occupying French North Africa west of Bone, imposed a western limit upon the sea areas that the Axis could use. Thus there were available to Hitler and Mussolini only the ports lying between Bone in Tunisia and Tripoli in northwest Libya, from which to support Rommel. Every advance by the Allies from either flank would tend to squeeze the Axis channel of supplies with continuation of this process eventual strangulation would result.

By far the most important of the African ports then available to the Axis were Bizerte and Tunis, with the secondary ones of Sfax and Gabes lying farther to the southward. Tripoli itself, while a good enough port, required Axis vessels to pass almost under the guns of Malta, where the British air forces were growing sufficiently strong to inflict severe loss. Obviously, if the ports of Tunis and Bizerte could be taken quickly further reinforcements of the Axis armies in Africa would be almost impossible and their destruction would be expedited. Therefore, the main strategic purpose was the speedy capture of northern Tunisia. This guided every move made -- military, economic, political. Through success and disappointment, through every incident and accident, through every difficulty

that habitually dogs the footsteps of soldiers in the field, this single objective was constantly held before all eyes, in the certainty that its attainment would constitute the end of the Axis in Africa.

The first move was made in mid-November while the allies were still in Algiers urging Darlan to order the French to cease fighting our troops and to cooperate with us. General Anderson's British First Army had been organized for the specific purpose of undertaking the campaign to the eastward, using Algiers as an initial base. He was directed to proceed with the operation as planned, and to exert every effort to capture Bizerte and Tunis with the least possible delay. However, he was beset with very great difficulties.

The first of these was the overall weakness of his force. Lack of shipping had prevented us from bringing along the strength that could have solved the problem quickly and expeditiously. Consequently, General Anderson's plans had to be based upon speed and boldness rather than upon numbers. The second difficulty was the Allies great shortage in motor equipment, which was rendered all the more serious because of the very poor quality of the single-line railway running eastward from Algiers to Tunis, a distance as great as from New York to Cleveland. The third major problem was the weather. Unseasonable rains soon overtook them and since none of the scattered air strips that they had hoped to use boasted of a paved runway, small air forces were handicapped and for days at a stretch were rendered almost completely helpless. The enemy was far better situated, since their large fields at Bizerte and Tunis were suitable for operations in all kinds of weather. The next disadvantage was the proximity of the Tunisia area to the Axis forces in Sicily and in Italy. The day after the Allies began their landings in northwest Africa the Axis started pouring troops into Tunisia, and they were reinforcing rapidly.

General Anderson started his troops eastward by land and sea and in a series of rapid movements took the ports of Djidjelli, Philippeville, and Bone, at the same time moving farther inland to seize the towns of Setif and Constantine. Axis air and submarine action both took a constant toll of shipping and caused material damage in the small harbors the Allies were able to seize, but there was never any hesitation on the part of the Navy, under Admiral Cunningham, fully to support the operations, nor on the part of General Anderson to continue his advance in spite of these threats. From the general region of Bone and Constantine the British First Army kept pushing eastward through Souk-Ahras and Souk-el-Arba, where they made the first contacts with Axis ground forces.

On November 23rd, General Eisenhower began an inspection of front-line troops and facilities. Upon his arrival in Algiers he found that previously issued orders to support Anderson's British army with whatever American contingents could be brought up to him from the Oran area were not clearly understood nor vigorously executed. In the office was Brigadier General Lunsford E. Oliver,

commander of Combat Command B, a portion of the U.S. 1st Armored Division. He had made a reconnaissance to the front, had determined that railway communications were inadequate to get him to the battle area promptly, and was seeking permission to march a part of his command in half-tracks over the seven hundred miles between Oran and Souk-el-Arba. The staff officer to whom he was appealing was well informed as to the characteristics of the half-track and refused permission on the ground that the march would consume half of the useful life of the vehicle!

The young staff officer was not to blame for this extraordinary attitude. He had been trained assiduously, through years of peace, in the eternal need for economy, for avoiding waste. Peacetime training was possible, as he well knew, only when the cost would be inconsequential. He had not yet accepted the essential harshness of war; he did not realize that the word is synonymous with waste, nor did he understand that every positive action requires expenditure. The problem is to determine how, in space and time, to expend assets so as to achieve the maximum in results. When this has been determined, then assets must be spent with a lavish hand, particularly when the cost can be measured in the saving of lives.

General Oliver's insistence, his desire to get to the battle, his pleading to take on a grueling march rather than to accept the easy solution with himself entirely absolved of responsibility, all impressed Eisenhower greatly. Within five minutes he was on his way with the orders he sought. Going further forward, General Eisenhower and General Clark located General Anderson beyond Souk-Ahras and considerable evidence of incessant and hard fighting. Troops and commanders were not experienced, but the boldness, courage, and stamina of General Anderson's forces could not have been exceeded by the most battle-wise veterans. Physical conditions were almost unendurable. The mud deepened daily, confining all operations to the roads, long stretches of which practically disintegrated. Winter cold was already descending upon the Tunisian highlands. The bringing up of supplies and ammunition was a Herculean task. In spite of all this, and in spite of Anderson's lack of strength -- his whole force numbered only about three brigades of infantry and a brigade of obsolescent tanks -- he pushed on through Souk-el-Khemis, Beja, and finally reached a point from which he could look down into the outskirts of Tunis. Day by day, following the first contact, fighting grew more bitter, more stubborn, more difficult, and the enemy was more rapidly reinforced than were our own troops.

The gamble was great but the prize was such a glittering one Eisenhower abandoned caution in an effort to bring up to General Anderson every available fighting man in the theater. There still existed the fear that the German might thrust air forces down across the Pyrenees into Spain, to attack from the rear. Nevertheless, as a beginning, the American air forces were directed to move as far to the eastward as possible to join in the air battle in support of General Anderson and to assist in cutting Axis sea communications between Tunis and Italy. This was a definite change from the precon-

ceived plan to retain the United States air forces in the western end of the Mediterranean. The move brought them into close proximity to the British air forces and created a need for daily coordination.

All during late November and early December the piecemeal process of reinforcing the eastern lines, principally by American troops, went on. Because of the critical nature of the day-by-day fighting and the lack of transport, they could not wait to bring up any large unit as an entity nor could they wait to assemble such units before committing them to action. If they should fail to take Tunis, they would suffer severely for this procedure, but General Anderson was given positive orders to use everything possible to gain his objective before the increasingly bad weather and the Axis reinforcements should compel them to settle down to a long winter campaign in such uninviting and inhospitable circumstances.

From Oran they brought up elements of the U.S. 1st Armored Division and part of the 1st Infantry Division. The U.S. 34th Division was distributed along the line of communication to protect critical points and to make sure of the security of the vast areas in which they were otherwise completely defenseless. They could use Allied troops for this purpose only on the most vital points, and as the enemy quickly resorted to a system of sabotage by night landing of paratroopers, they were forced to rely on French contingents to protect hundreds of culverts, bridges, tunnels, and similar places where a few determined men could have inflicted almost decisive damage upon their lines of communication.

Courage, resourcefulness, and endurance, though daily displayed in overwhelming measure, could not completely overcome the combination of enemy, weather, and terrain. In early December the enemy was strong enough in mechanized units to begin local but sharp counterattacks and they were forced back from their most forward positions in front of Tunis.

The first German Tiger unit to be sent to North Africa was 501st Heavy Tank Battalion, with an establishment of three tank companies, a HQ/supply company and a workshop company. Due to shortage of Tigers, however, only two tank companies were formed, each organized into four troops (each of two Tigers and two Pz Kpfw III) and a Headquarters troop of two Tigers. The battalion entrained at Fallingbostel on 10 November and started to cross to Tunis from Reggio di Calabria on 20 November 1942. By the beginning of January 1943 the complete battalion was in Tunisia and was then deployed to the Pont du Fahs-Zaghouan area. It was first in action in the early hours of 18 January and early tank casualties were all due to mines or mechanical breakdown. As it was strict OKW policy that Tiger casualties, if not recoverable, should be blown up, the Allies gained little technical information concerning the Tiger from such wrecks at this stage or for some weeks afterwards.

As soon as the Allies ceased attacking, the situation in northern

Tunisia turned bleak for them, even from a defensive standpoint. Through a blunder during a local withdrawal, they had lost the bulk of the equipment of Combat Command B, of the U.S. 1st Armored Division. The 18th Infantry of the U.S. 1st Infantry Division took severe losses, and practically an entire battalion of a fine British regiment was wiped out. General Anderson soon thought he would have to give up Medjezel-Bab, a road center and a junction point with the French forces on his right. Since this spot was the key to resumption of the offensive when they should get the necessary strength, Eisenhower forbade this move -- assuming personal responsibility for the fate of its garrison and the effect of its possible capture upon the safety of the command.

The Allies were still attempting to mount an attack of their own. Work continued twenty-four hours a day to build up the strength that they believed would, with some temporary improvement in the weather, give the Allies a good fighting chance to capture northeastern Tunisia before all operations were hopelessly bogged down. December 24th was chosen as the date for their final and most ambitious attack. Their chief hope for success lay in their temporary advantage in artillery, which was relatively great, but reports from the Tunisian front were discouraging; the weather, instead of improving, continued to deteriorate. Prospects for mounting another attack grew darker.

As early as the middle of November the French forces in Tunisia had cast their lot with the Allies and were maintaining a precarious hold on the hilly masses stretching to the southward from Tunis, where their total lack of modern equipment did not so badly expose them to destruction. With the giving up of their plan for immediate capture of Tunis, the line that they selected for defense was one that would cover the forward airfields located at Thelepte, Youks-les-Bains, and Souk-el-Arba. As long as these fields were in their possession they could, with their growing air forces, constantly pound away, at least in decent weather, at Axis communications. They would be in perfect position to resume the assault once conditions of weather and terrain and their growing strength permitted. For the rest of the winter, therefore, their defensive plan embraced the covering of these forward areas. Without them they would be forced back into the Bone-Constantine region and would be faced in the following spring with the problem of fighting their way forward, without suitable air support, through difficult mountainous areas at the cost of great numbers of lives.

Up to this time the only flank protection they had been able to establish in all the great region stretching from Tebessa southward to Gafsa had been provided by scattered French irregulars reinforced and inspired by a small United States parachute detachment. But with the cessation of their attacks in the north the enemy was immediately enabled, behind the coastal mountain barrier, to concentrate their troops at will. It was unreasonable to assume that they would fail to realize their great weakness in the Tebessa region; it was likely that they would quickly strike us a damaging blow unless

we took prompt measures to prevent it.

To provide the necessary protection the II Corps Headquarters, under General Fredendall, was brought up from Oran and directed to take station in the Tebessa region. To it was assigned the U.S. 1st Armored Division,by this time largely brought up to strength, even though some of its equipment was already of an obsolete type. Logistics staffs opposed Eisenhower's purpose of concentrating a full corps east of Tebessa. They wailed that their miserable communications could not maintain more than an armored division and one additional regiment. But, convinced that the enemy would soon take advantage of their obvious weakness there, Eisenhower nevertheless ordered the concentration of the corps of four divisions to begin and told the logistics people they would have to find a way to supply it.

The U.S. 1st Infantry Division was to be assigned to this corps as quickly as it could be assembled from its scattered positions on the front and brought into this sector. The U.S. 9th Division, less the 39th Regimental combat team which had participated in the Algiers assault, was gradually transferred eastward from the Casablanca area and was to go under command of II Corps when the movement could be completed. The 34th Division received similar orders, its duties in the line of communication to be taken over by the French.

The instructions given to the American II Corps were to provide a strategic flank guard for the main forces in the north. Fredendall was directed to hold the mountain passes with light infantry detachments and to concentrate the assembled 1st Armored Division in rear of the infantry outposts, ready to attack in force any hostile column that might attempt to move through the mountains toward our line of communications. General Fredendall was further authorized, upon completion of the assembly of his corps, to undertake offensive action in the direction of Sfax or Gabes in an effort to sever Rommel's line of communications with Tunisia.

The picture, then, when General Anderson took over the entire battle front, was that of a long tenuous line stretching from Bizerte to Gafsa, with units badly mixed and with no local reserves. To support this long front there was nothing available until the American II Corps could be fully concentrated in the Tebessa region and until additional troops from England should be able to perform a similar service in the northern Tunisia area. The process of sorting out units and providing the mobile reserves started before Christmas but received a bad setback when the French forces gave way in mid-January and American units had to rush in to close the gaps. The French defeat could not be traced to any lack of gallantry or courage; it was merely the total lack of modern equipment, a deficiency we were struggling to correct.

The remainder of the month of January and early February were employed in haste to get the battle line properly organized, to

improve airfields, and to bring up reinforcements, both in men and in supplies. A succession of relatively small enemy attacks along the front prevented full realization of their plan to assemble their larger units into proper formations. This was particularly serious in its effect upon the U.S. 1st Armored Division, which the army commander thought necessary to use in relatively small packets along a considerable portion of his front.

Eisenhower was still concerned that both Anderson and Fredendall should clearly understand that his intentions in southern Tunisia were, temporarily, defensive and that our dispositions were made so as to insure our own safety and to secure the forward air fields. On Janury 18th, Eisenhower flew to Constantine, where he held a conference with Generals Anderson, Fredendall, and Juin, and a number of staff officers. He again instructed Anderson to hold as much of the II Corps as possible in mobile reserve, especially the U.S. 1st Armored Division. He reiterated, also, that defenses in the southern sector should be perfected. He told the conference that what he had learned at Casablanca concerning the speed of Alexander's westward advance across the desert merely emphasized the need for the Allies to protect themselves effectively in the area of eventual junction of the two forces. Small raids and minor tactical action were to be encouraged, but no moves were to be made that could throw them off balance.

In early February they received information that the enemy was preparing for a more ambitious counterattack against their lines than any he had yet attempted. To provide additional strength for this counterattack, some of Rommel's forces were hurried back from Tripoli to join Von Arnim and Messe in Tunisia. Their early information was that the attack was to be expected through the pass at Fondouk. Watchfullness was of course indicated everywhere and it became more than ever important that our mobile reserves, particularly our armored elements, be kept well concentrated in order to meet the coming attack, no matter through which of the several available passes it might be launched.

The most dangerous area was that held by the American II Corps, stretching throughout a long line from Gafsa on the south to approximately Fondouk on the left. As quickly as possible after conferences in Algiers with various individuals who had previously attended, the Second Corps Headquarters had established itself in a deep and almost inaccessible ravine, a few miles east of Tebessa. It was a long way from the battle front, but, considering the length of the lines and the paucity of roads, it was probably as good a site for the main headquarters as was available. When Eisenhower reached the headquarters there was a din of hammers and drills. Upon inquiring as to the cause, Eisenhower learned that the corps engineers were engaged in tunneling into the sides of the ravine to provide safe quarters for the staff. Eisenhower quietly asked whether the engineers had first assisted in preparing front-line defenses but a young staff officer, apparently astonished at his ignorance, said, "Oh, the divisions have their own engineers for

that!" It was the only time, during the war, that Eisenhower ever saw a divisional or higher headquarters so concerned over its own safety that it dug itself underground shelters.

In company with Lieutenant Colonel Russell F. (Red) Akers, one of Fredendall's staff officers, Eisenhower promptly started on an all-night inspection of the front lines. At that time the II Corps consisted of the U.S. 1st Armored Division, the 1st Infantry Division, with the U.S. 34th Division assembling in the area. The 9th Division was under orders to join when it could come up.

Eisenhower found a number of things that were disturbing. The first of these was a certain complacency, illustrated by an unconscionable delay in perfecting defensive positions in the passes. Lack of training and experience on the part of commanders was responsible. At one point where mine fields were not yet planted the excuse was given that the defending infantry had been present in the area only two days. The commander explained, with an air of pride, that he had prepared a map for his mine defense and would start next day to put out the mines. Experience in north Tunisia had been that the enemy was able to prepare a strong defensive position ready to resist counterattack within two hours after his arrival on the spot. The enemy's invariable practice upon capture of a hill or other feature was to plant his mines instantly, install his machine guns, and locate troops in nearby reserve where they could operate effectively against any force that we might send against them. These tactical lessons had apparently been ignored by commanders, even by those who had been in the theater for three months. Eisenhower gave orders for immediate correction.

But by far the most serious defect was the fact that the U.S. 1st Armored Division was still not properly concentrated to permit its employment as a unit. At the moment General Anderson had such meager reserves throughout his long line that he felt compelled to station half the division near Fondouk, where he expected the main enemy attack to fall, and he held this force in army reserve by keeping in his own hands the authority to commit it to action. The remainder was scattered in small detachments to the southward throughout the II Corps front. As a result the 1st Armored Division commander, Major General Orlando Ward, had nothing left under his own command except minor detachments of light tanks.

During the night Eisenhower visited along the front between Maknassy and Faid Pass. Near the latter place he decorated an American officer for gallantry only two or three hours before the German attack fell upon the positions outside the pass at Sidi-Bou-Zid.

Brigadier General Paul McD. Robinett was commanding an armored unit in the valley near Fondouk. He was sure that there would be no attack at that point, and pointed out on the map the distance to which his reconnaissance patrols had penetrated. He said he had reported those facts several times to his superiors. Eisenhower was

convinced of the accuracy of his report and told him he would take the matter up the next day with the corps and army commanders.

Were the Krauts coming? They were. Two whole battle groups of the German 10th Panzer Division were advancing on the positions of McQuillan's CCA, with the massive sixty-ton Tigers of the 501st Heavy Detachment in the lead already rumbling through the Faid Pass, driving all before them. The handful of infantry and the artillerymen that Colonel Waters had dug in up there were reeling back, abandoning their positions, even their cannon, in their unreasoning panic. Nothing, it seemed, could possibly stop those lumbering steel monsters that had appeared so suddenly and frighteningly out of the flying sand. "Tigers!" The panic-stricken cry was flung from mouth to mouth. "The Tigers are coming!"

Waters, watching the scarlet stabs of flame from up ahead, was as steadfast now as on that day three months before when he had first met the "first team." He ordered fifteen of his Honeys forward, to block and delay the Germans. It was a futile gesture. The ugly, over-tall Honeys with their 37mm. "popguns" were no match for the German tanks with their 75s and 88mms. One after another the Honeys were knocked out of action, without being able to make the slightest impression on the Mark IVs and Tigers, their shells bouncing off the Germans' thick steelhide only to bury themselves harmlessly in the hillside.

Suddenly the Messerschmitts arrived, howling in at ground-level, machine guns chattering, cannon thumping, snarling in tight turns as they shot up the rear areas. The sand storm had died down and visibility was improving by the minute; yet only four solitary American planes appeared to take up the challenge presented by the numerous yellow-nosed enemy fighters.

As more and more German tanks appeared to both his front and flank, Waters realized his own danger. He started to withdraw his command post -- a jeep and a White half-track -- further up the slope of the Djebel. Below him he counted more than eighty German vehicles milling about, sixty of them tanks. He was surrounded. But still he did not give into the hysteria that seemed to prevail all around him. He phoned the CCA's CP and told them his position. "Don't worry about me," he added. "We'll be all right. You get on with the war..." Even as he spoke, the young tank colonel could see some Arabs approaching the stationary German panzers and pointing up at his position -- and he didn't need a crystal ball to know what they were telling the Germans.

It was nearly five hours since the German attack had begun. At long last General McQuillan was reacting. He ordered Colonel Hightower, commanding the 2nd Battalion of the 1st Armored Regiment, into the offensive. He was to stop the rot before the panic got out of hand. Colonel Hightower, who would one day command an army himself, rolled bravely into battle for the very first time. Almost immediately he realized he was outnumbered. He radioed McQuillan

that the best he could do was delay the Germans; nothing more.

Now the unequal slogging match commenced. The Shermans rumbled forward into the murk and fog of war, their 75s spitting fire. The Mark IVs and Tigers took up the challenge. The solid AP shot zipped flatly across the desert, a bright, burning white blur, toward the outgunned Americans. Already the German gunners had discovered the fatal weakness of the Sherman. One single shot just glancing off its rear sprocket would turn the thirty-ton American tank into a blazing coffin; its engine was thinly armored and gasoline-burning. No wonder the American tank crews had nicknamed it bitterly "the Ronson" -- it burst into flames as easily as a cigarette lighter.

Although during the morning frequent and, as it later turned out, very accurate reports were submitted by the American troops to General Anderson concerning the strength and direction of the German attack through Faid, these reports were discounted by the Army and AFHQ Intelligence divisions as the exaggeration of green, untried troops. The belief that the main attack was still to come through Fondouk persisted, both at Army headquarters and, as Eisenhower later learned, in the G-2 Division at AFHQ. The G-2 error was serious. After the battle Eisenhower replaced the head of his Intelligence organization at AFHQ. The result of this misconception was that the penetration gained a tremendous headway before General Anderson could understand what was actually taking place.

Realizing by nightfall that reinforcements in men and equipment would be needed quickly and urgently, Eisenhower hastened back to headquarters to hurry them forward. During the withdrawal the Americans fought a series of ineffective, though gallant, delaying actions on the way back towards Kasserine Pass, a spot clearly indicated as one to be strongly held. But there was a local lack of appreciation of exactly what was happening and the troops assigned were neither numerous enough nor skillful enough to hold that strong position. The enemy armor pushed on through the hastily constructed defense in the pass. Finally, however, in spite of surprise and relatively large losses, Allied troops rallied in good fashion and fell back to cover the important center of Tebessa and the routes leading northward from Kasserine toward Le Kef.

Forward airfields at Thelepte had to be temporarily abandoned but the air force pulled out with no loss of personnel or machines and with immaterial losses in fuel and other supplies. Just behind Tebessa was the field of Youks-les-Bains, and it was therefore doubly important for the II Corps to hold this center of communications. Father to the north it had to resist a German penetration in the direction of Thala, toward Le Kef. The 34th Division was in position on the northern flank and, in spite of its long period of inactivity and dispersion, did good work in the defense. To help stop the enemy's northward thrust, British artillery and tanks were rushed down from the north, where the enemy had somewhat thinned his lines in order to secure the strength for the Kasserine offensive. The artillery of the U.S. 9th Division also participated effectively

in this action. By the evening of the twenty-first it was apparent that the enemy had stretched himself to the limit and his supply was becoming difficult. More than this, his line of communications ran through the vulnerable Kasserine Gap and his troops to the west of that point were becoming precariously exposed to attack by any forces we could bring up. The enemy's advance, by the twenty-second, was completely stalled.

In writing about the disaster at Kasserine, General Eisenhower said that, "Technically, our embarrassment resulted from four principal causes. The first and vastly most important of these was the inescapable conditions resulting from failure in our long-shot gamble to capture Tunis quickly. This gamble had been made on my personal orders. Afterward, dispersed units could not quickly be brought together and prepared for the hostile reactions we were certain would follow. Had I been willing, at the end of November, to admit temporary failure and pass to the defensive, no attack against us could have achieved even temporary success.

The second major reason was faulty work by Intelligence agencies. Staffs were too prone to take one isolated piece of intelligence in which they implicitly believed and to shut their eyes to any contrary possibility. They decided that the German attack was to come through Fondouk, and although we had reconnaissance units in the Ousseltia Valley, near Fondouk, who insisted the German was not concentrating in that area, the Intelligence section blindly persisted in its conviction. This caused the army commander to make faulty dispositions.

The third reason was the failure to comprehend clearly the capabilities of the enemy and the best measures for meeting them. The situation on the II Corps front called for the holding of mountain passes with light reconnaissance and delaying elements, with the strongest possible mobile reserves immediately in rear to strike swiftly and in strength at any penetration of the mountain barrier. Instructions for the general nature of the defense were positive in this regard but local fears, and again faulty intelligence, led to a dispersion of the mobile reserves that rendered them ineffective when the attack came.

A fourth cause was greeness, particularly among commanders. The American divisions involved had not had the benefit of the intensive training programs instituted in the United States following the actual outbreak of the war. They were mainly divisions that had been quickly shipped to the United Kingdom, and since transportation facilities had not yet acquired

their later efficiency, they had been separated from their organic equipment for long periods. Training, during a major part of 1942, was for them a practical impossibility. Commanders and troops showed the effects of this, and although there was no lack of gallantry and fortitude, their initial effectiveness did not compare with that of the American divisions later brought into action after a full year's intensive training."

From the close of the Kasserine battle the Allies' position steadily improved in a number of ways. First, as a result of the battle the entire American II Corps of four divisions was finally concentrated in the Tebessa region. There it could form a solid link between the Allied forces in northern Tunisia and the advancing Eighth Army, coming from the desert. Troops, commanders, and staffs gained a vast measure of battle wisdom that remained with them always.

Moreover, as a result of splendid action in Washington, an extra shipment of 5,400 trucks had been brought into the theater. This shipment immeasurably improved our transport and supply situation and had a profound effect in all later operations. It was accomplished under circumstances that should give pause to those people who picture the War and Navy Departments as a mass of entangling red tape. The shipment demanded a special convoy at a time when both merchant shipping and escort vessels were at a premium. General Somervell happened to be visiting General Eisenhower's headquarters and General Eisenhower explained to him their urgent need for this equipment. He said he could be loading it out of American ports within three days, providing the Navy Department could furnish the escorts. General Eisenhower sent a query to Admiral King, then in Casablanca, and within a matter of hours had from him a simple "Yes." The trucks began arriving in Africa in less than three weeks after the initial request.

The tremendous value of this shipment appeared in an increased ability to supply the needs of the battle front and even more in our ability to transfer troops rapidly from one portion of the front to another. The later move of the entire U.S. II Corps from the Tebessa region to northern Tunisia would have been completely impossible without the presence of these additional trucks. At the same time our railway engineers, under the leadership of Brigadier General Carl Gray, were working miracles in improving the decrepit French line leading to the front. When we went into North Africa the railway could daily deliver a maximum of 900 tons of supplies. By introducing Yankee energy and modern American methods of operation Gray increased the daily tonnage to 3,000, and this before he received a single extra engine or boxcar from the United States.

Another particularly pleasing development was the steadily growing strength and efficiency of our air forces, and the construction of suitable operating fields and bases. Still another was the speed with which the British forces in the desert opened up and began

using the port in Tripoli, only recently captured. We now had definite assurance that the advance of the Eighth Army would not be stopped, as it had been so often stopped before, by lack of supplies.

Another advantage that accrued to the Allies during this period was the opportunity for establishing their whole system of command on a sound and permanent basis in accordance with the arrangements made at winter conditions of weather and terrain in the desert were much better than those in the north, and the Eighth Army, under General Montgomery, was able to continue its advance to the westward with the purpose of making junction with the right of our forces in Tunisia. It was foreseen that General Montgomery's principal battle to achieve this result would take place on the Mareth Line, a defensive position that had previously been constructed by the French along the Tunisian border and in which we now expected the Axis to make a determined defense. To assist General Montgomery in this battle, General Alexander ordered the American II Corps to concentrate the bulk of its location so as to draw off as much of Rommel's forces as possible from the Eighth Army front. This maneuver had the desired effect, since Rommel could not afford to expose his line of communications and was forced to use a considerable portion of his strength to protect himself against this threat."

In January, 1943, a seven man Ordnance team went to Cairo, and later sent home over 3,000 tons of assorted captured equipment for study. This team was the start of the Ordnance Technical Intelligence Teams that were later sent to all theaters of the war. Major George Jarrett had been promoted to Lt. Col. and sent back to the states to take charge of the Foreigh Materiel Branch for the testing of captured enemy equipment which had been set up at Aberdeen. Upon his arrival in the United States, he found that no action had been taken on developing a delayed action fuse for the AP ammunition, and that the 100 rounds of German ammunition had not been tested upon arrival from Cairo. Jarrett raised the kind of hell that was so characteristic of him. Rank meant nothing to him and sacred cows were meant for slaying. Beginning with the Chief of Ordnance and working his way down from the top, backed by pure fact, he brought the "wrath of God" down upon those derelicts. This was the type of action he was so very capable of. Soon after, work began on testing and on the development of the new munition types. American tankers quickly received the needed improved equipment to continue the offensives. But a whole year had been wasted through negligence, at the time.

With the rapid build-up in Allied strength the Germans planned to augment their Tiger strength in Tunisia with the newly-formed 504th Heavy Tank Battalion, in February 1943. However, due to delays in vehicle deliveries from production and the consequent delaying effect upon crew and unit training with the vehicle, it was not until 27 February that the first tanks left Fallingbostel. By this time Allied air and naval supremacy in the Mediterranean made movement between Italy and Tunisia chancy. The battalion was organized similarly to 501st Heavy Tank Battalion, but it was decided that

only No. 1 Company, together with parts of the HQ and Workshop Companies, would be sent to Tunisia, the remainder of the battalion including No. 2 Tank Company remaining in Sicily. The commander of 504th on arrival in Tunisia also assumed command of the remnants of 501st Heavy Tank Battalion, and the combined unit moved along the coast road to Sousse and then via El Djem and Sfax, to the Maknassy Pass area, reaching it on 19 March, with the aim of preventing the Allied advance to the sea. The combined unit remained in this area for approximately 10 days, in which time their 12 or so remaining Tigers accounted for 44 Allied tanks. They then moved into the area of the Panzer Grenadier Division Hermann Goering around Medjez-el-Bab at the end of March 1943.

By this time the Allied re-grouping for their final assault on Tunis was about to start, following the British Eighth Army advance to Enfidaville and the capture of Kairouan. Preparations were complete by 18 April and the offensive was opened by Eighth Army on 19 April 1943. First Army's 5th Corps was scheduled to start its series of attacks, on Longstop Hill and Peter's Corner, on 21 April, but, on the night of 20-21 April, a force of the Hermann Goering Jager Regiment together with four Tigers and five Pz Kpfw III and IV tanks of 504th and 501st Heavy Tank Battalion, put in a spoiling attack against the British 1st Infantry and 4th Mixed Divisions.

This attack caused confusion. Then, having achieved their aim, the German force retired to defensive positions to await the expected British counter-attack. This duly took place in the afternoon of 21 April, the units involved being 48th Battalion Royal Tank Regiment, which was a unit of 21st Army Tank Brigade and equipped with Churchills, and a battalion of infantry, 1st/6th Battalion East Surreys. "A" Squadron of 48th RTR attacked on one axis with two troops (3rd and 4th), and the infantry attacked on a different one in a classic example of how not to carry out an infantry/tank attack. The Tigers and supporting Pz Kpfw III and IV tanks knocked out the leading Churchills of 3rd and 4th Troops almost immediately, but a lucky shot from one of the 4th Troop tanks struck the Tiger's superstructure front plate and the lower edge of the gun mantlet, glanced off on to the turret ring and jammed the turret. Unable to traverse the gun, and with the tank commander wounded by another 6-pdr shot which ricocheted off the left hand turret lifting boss, the crew abandoned the vehicle. The Pz Kpfw IV and two Pz Kpfw IIIs which had been supporting the Tiger were also abandoned as the Germans withdrew, and an examination of the battlefield next day revealed that, at last, a virtually intact and relatively undamaged Tiger had fallen into British hands.

After a preliminary examination by British Technical Intelligence personnel, an initial report was signalled to MI 10, the branch responsible for technical intelligence on enemy equipment in the War Office in London. The vehicle was recovered by 21st Army Tank Brigade Workshops, who, after the ending of the North African Campaign in May 1943 set about replacing damaged components from captured stocks and the remains of other vehicles. Such repairs and

replacements were minimal, being limited virtually to the freeing of the turret and the replacement of turret hatches, one smoke grenade discharger cup and the odd road wheel. The stowage was brought up to its full complement, the First Army shield and the 21st Army Tank Brigade diabolo were painted on the front vertical plate and the rear track guards, and the vehicle was then put on display in the Tunis area prior to being shipped to UK for detailed examination and testing.

In October 1943 the Tiger arrived in UK and was sent to the School of Tank Technology (STT), a wing of the Military College of Science then located at Chertsey in Surrey, next door to the Ministry of Supply's Department of Tank Design (DTD) and Fighting Vehicle Proving Establishment (FVPE). It was complete with its full quota of stowage, a considerable quantity of spare components, stocks of AP and HE ammunition, wide (operational) and narrow (rail travel) tracks and its waterproofing equipment and snorkel for underwater travel. STT had the task of that time of carrying out the examination of, and reporting on all captured enemy AFVs received in UK and acting as a holding depot for these vehicles. It was their collection of enemy and Allied vehicles which formed the basis of the postwar Bovington Tank Museum.

After STT had issued a brief Preliminary Examination Report in November 1943 which included its chassis number (250122), turret number (230639) and DTD Project Number (3016), the vehicle was sent up to London later that month for display with other interesting captured equipment on Horse Guards Parade. After being thus displayed, the vehicle returned to Chertsey for detailed testing, stripping and examination by STT. This took place during December 1943 and January 1944, during which month the first installment of the final examination report, covering the general description of the vehicle, was issued. The introduction to this report stated, in part:

> "The Tiger is outstanding, being the heaviest AFV in general service, scaling approximately 56 tons in battle order. Its main armament is an 8.8 cm gun, whilst its heaviest armour (on the front vertical plate) is 102 mm. Another feature of outstanding tactical interest is its deep wading facilities... to a depth of 15 feet. Its size and weight, impose tactical disadvantages, the most outstanding being the restriction on transportation due to its width, and its limited radius of action, due to heavy fuel consumption."

Subsequent installments of the report covered the armament, power plant, fighting arrangements, stowage and special devices and equipment such as that for deep wading. The last installment was issued in September 1944, by which time the vehicle had undergone automotive and wading trials at FVPE and gunnery firing trials at the AFV School Experimental Wing at Lulworth in Dorset. By this time interest in this vehicle had been superceded by the necessity

to examine the report on the various models of the Panther Tank, the Tiger Model B, and various SP guns which had by then been encountered, and captured, in Italy and NW Europe.

Although the Allies had known about the existence of the Tiger tank for some months, the delay in returning the vehicle to the School of Tank Technology meant that any useful technical data could not be incorporated into newer tank designs. The Americans, however, had begun work to redesign their light tank, the M5 Stuart. British experience with the Stuart light tank in North Africa showed that its 37mm. main armament was inadequate for tank vs. tank warfare. Experiments with installing a 75mm. gun in the M5 version of the Stuart showed such a tank was possible, but extremely limited stowage coupled with thin armor and dated design made this version undesirable. In April 1943 the Ordnance Department working with Cadillac (producers of the M5) began design of an all new light tank incorporating all the lessons learned from previous experience.

The new tank designated M24 and named the Chaffee retained the twin Cadillac engines and Hydra-matic transmission which had proven so successful in the M5. The engine compartment layout was borrowed from the experimental T7 tank which had much better engine access than the M5. The hull armor was kept down to 25mm. maximum thickness, to keep the weight down, but it was angled to provide superior protection. The dated vertical volute suspension was replaced by a torsion bar suspension with large road wheels similar to those used on the German Panther tank and Soviet T-34. This offered a smoother ride and better cross country performance than the antiquated bogie systems used on most American tanks. Ironically, this type of suspension originated with the American designer J. Walter Christie whose designs were rejected by the Ordnance Department during the 1930s. The gun was an adaption of the 75mm. heavy aircraft cannon used in the B-25 Mitchell gunship.

The first two pilot models were delivered in October 1943. The Ordnance Department was so pleased with the new tank that they immediately ordered 1,000 vehicles. This order was later raised to 5,000. By the end of World War II over 4,400 Chaffees had been built. The M24 served for the last year of the war and remained the standard U.S. light tank for many years afterwards, serving in the Korean war and being built in several specialized versions.

A tank which received much publicity in the Allied press in 1941-42 was the American M6 heavy tank. Sometimes shown crushing motor cars, the 50-ton M6 was of spectacular appearance and, for its time, was a powerful tank.

Called for in 1940 as a heavy tank to complement the M3 Medium, the first pilot model, out of several designed to test alternative forms of hull construction, transmission and power unit, was completed at the end of 1941. This model, T-1E2, had a cast hull and a torque converter transmission and was later standardized as Heavy Tank M6. The T-1E3, which appeared slightly later, had a welded

hull but was otherwise similar, and was standardized as M-6A1. The third to appear, T-1E1, was ready in 1943 -- this model had electric transmission and a cast hull. It was usually known later as M-6A2.

All models of this heavy tank were powered by a Wright G-200 radial nine-cyliner air-cooled engine of 800 b.h.p. which gave a maximum speed of about 22 m.p.h. The main armament (inspired by the successful German use of an anti-aircraft gun in the Tiger tank) consisted of a 3-inch gun (a modified anti-aircraft gun) with a coaxial 37mm. gun in the turret. (The T-1E2 had also a 0.30-inch Browning machine-gun in a separate cupola on top and a 0.50-inch machine-gun on a high-angle mounting at the right rear of the turret.) Two 0.50-inch machine-guns were mounted in the front hull plate under the control of the co-driver and the driver was responsible for two (later one) fixed machine-guns. Armor was at a maximum of 100mm. and a crew of six was carried.

Because of disagreement over the need for a heavy tank, the large orders originally envisaged were reduced drastically to one hundred and fifteen in September 1942 and then cancelled altogether at the end of the year, although there were subsequent experiments with 90mm. and 105mm. guns.

Consequently, no more than forty of all variants of the M6 series, including prototypes, were built. Apart from propaganda purposes, however, the program had involved useful work, which was not wasted, on armor design, gun stabilizers and power traverse, horizontal volute spring suspension and transmissions, as all these features of the M6 were used in various later light and medium tanks.

Following the abandonment of heavy tanks in the U.S.A., attention was turned to the problem of mounting a 90mm. gun in a medium tank. A series of experimental tanks was built between 1942 and 1944, trying out various suspension systems, transmissions and other components as well as various guns, including the 90mm. This series culminated in the T-26E1 completed in January 1944. This tank with some modifications, including a muzzle brake on the 90mm. gun and increased ammunition stowage, became the T-26E3. By this time the need for a better gun than the 76mm., the best weapon fitted to M4 Medium tanks, was recognized following combat experience in Normandy. There was, therefore, a demand for a 90mm. gun tank but the T-26E3, now reclassified as a heavy tank was not yet considered battleworthy as it had been insufficiently tested. Twenty tanks out of the first batch to be built were, however, shipped to Europe for field trials and in January 1945 were now declared battleworthy. Allotted to the 3rd and 9th Armored Divisions of the U.S. First Army, the tanks were named the General Pershing and standardized as M26. Production was by now well under way and 200 had been issued by the end of the war in Europe, although most arrived at the front too late to see action. Some that did -- at Remagen on the Rhine -- were some of the original Pershings issued to the 9th Armored Division.

The M26 weighed 46 (U.S.) tons. Besides the 90mm. gun (53 calibres long) it had a coaxial 0.30-inches. Browning machine-gun and another Browning in a ball-mounting in the hull glacis plate and a 0.50-inch anti-aircraft machine-gun on the turret top. The crew of five were protected by armor at a maximum of 102mm. The M26's engine was a Ford Model GAF eight cylinder V-form type of 500 b.h.p. and the transmission was Torquematic with three forward speeds, with the track drive from rear sprockets. Suspension was of the torsion bar type and a maximum speed of 30 m.p.h. could be attained. Although arriving too late to see much action in World War II, the Pershing was the direct ancestor of a long line of post-war U.S. medium tanks.

It had taken the United States almost two years to gear up for the war from an industrial standpoint and the mainstay of the Armored forces remained the M4 Sherman tank. Based partly upon the exploitation of captured German ammunition, a 76mm. gun system was installed. This was not due to any formal aspect of the intelligence system. The intelligence operations of the period were more concerned with providing information to policymakers and military planners. Modern military strategy addresses itself only in part to direct destruction of opposing armies. To weaken the economic base of the enemy has become a primary design in the prosecution of wars. Long-range bombers have to seek out the most important targets in the enemy's economy. Ground forces press toward key industrial centers. Naval vessels cut off essential imports. When war comes, economic intelligence is called on to play a central role in support of the military effort.

The importance of economic intelligence in wartime has grown as the technology of war has enhanced capabilities to reach behind the front lines. The airplane brought war to the factories, and economic intelligence has had to supply the most profitable targets. This has necessitated the compilation of target dossiers -- files of factories, refineries, and other installations, with the number of employees, types of products, and other pertinent information. Varying orders of priority have had to be given the targets, the highest obviously going to those whose destruction would cause the most serious damage to the enemy's war effort. The factors entering into the determination of priorities are several. Are substitutes available? If so, destruction of the plant is not so damaging as it would otherwise be. Are stockpiles available to be drawn on while a plant is being repaired? Or will foreign sources of supply make up for bomb losses? If so, again the plant is not so choice a target. What is the position of the target in the industrial process? Destruction of a spark-plug factory will not ordinarily affect motor-vehicle production so directly as would destruction of the auto plant itself. What is the position with respect to excess capacity? Where factories are not fully utilized, increased production in one will readily make up for the destruction of another.

When the wrong targets are bombed, the losses to the enemy may be matched by compensating benefits. The British air bombardment of

Hamburg in the summer of 1943 laid waste a third of the city, but the industrial plants escaped serious damage. The result was the end of a serious labor shortage in the city as store clerks, garage attendants, shopkeepers, and others turned from their bombed-out places of employment to the war industries. War production in Hamburg quickly returned to normal.

Apart from its direct support of military operations, economic intelligence in wartime must make its contributions to recurrent strategic estimates designed to inform the Nation's top officials how well the enemy is doing, how long he may be expected to hold out, and what negotiation appeals he may be most responsive to. The subjects of economic inteligence here are pretty much the same as those described in the preceding section -- manpower, industrial production, stockpile reserves, trade, finance, and gross national product. The methods of collection and analysis remain much the same, too, although published statistics may be less accessible in wartime. On the other hand, other sources of information, e.g., aerial photographs, may become more freely available. One of the sources that proved particularly informative in World War II was that of factory markings on captured industrial equipment.

Markings are the name plates, the inspection stamps, the serial numbers that are stamped or molded on metal or rubber or other materials. Markings analysis may reveal the producers, the time and place of manufacture, operating characteristics, quantities produced, and capacities. In World War II, markings analysis served especially well to correct erroneous estimates of enemy production made by other methods.

By studying the serial numbers and other markings on some 13,000 German tires, economic-intelligence officers were able to calculate the number of tires manufactured each month by the major German tire manufacturers. A study of the mold numbers on the tires showed the number of molds that the producers had used, and, with a knowledge of the capacity of a single mold, permitted a calculation of each German manufacturer's production capacity. Markings on the tires, which showed the percentage of rubber used, enabled intelligence officers, to determine how the Germans were using their crude rubber stocks. The calculations of airplane-tire production permitted a check on estimates of aircraft production.

Analysis of serial numbers on German tanks revealed that earlier calculations of German tank production were far over the mark. Serial numbers indicated that 1942 production was 3,400, as compared to the 18,000 previously accepted. Markings on gearboxes, tank guns, radiators, turret motors, bogie wheels, and other components provided additional data to serve as independent checks on the calculations of tank output.

Among the other German products subjected to markings analysis were motor vehicles, guns, ammunition, flying bombs, and rockets. Comparison with official German data, which became available after the

armistice, confirmed the high reliability of estimates derived from markings analysis.

The office of the Assistant Chief of Air Staff, Intelligence of the U.S. Army Air Force began publishing "IMPACT," a monthly magzine that was limited to 10,000 copies and was sent to operations officers, intelligence personnel and flyers. IMPACT was published from April 1943 until September 1945. In the same month, the Ordnance Bomb Disposal School began to publish a semi-monthly series called "Bomb Disposal Technical Information" which was based on the detailed exploitation of captured Ordnance Material. In the same month, the War department published a series of Training Manuals designated "E Series" or TME 9-____, which dealt with the use of captured weapons. These manuals were classified "RESTRICTED," a security designation in use at the time. To keep the general public and the common soldier informed, The Military Service Publishing Company published a book called "BASIC MANUAL OF MILITARY SMALL ARMS" compiled by W. H. B. Smith. This book became the basic format for the book "SMALL ARMS OF THE WORLD" a classic which was updated many times as new small arms were recovered. The Military Service Publishing Company also published "IDENTIFICATION" which dealt with the World Military, Naval and Air uniforms.

In May of 1943, the Military Intelligence Service published book #14 in the Special Series which was designed to be an identification, use, and maintenance handbook for commanders fighting in the European Theater who would have occasion to capture and, if logistics or the fortunes of war demanded it, utilize German infantry weapons. By December of 1943, #19 of the Series was published dealing with Japanese weapons. Both series were classified confidential and were not declassified until the late 1960's.

Further exploitation of the captured material led to the production of numerous training aids and devices. Comet Metal Products Co., Inc. of Richmond, New York, began production of a series of TME 350 "Authentic Scale Models of TANKS of the World" with a scale of 1:108. Other firms manufactured wooden aircraft models. The most ambitious item that was used for training was a wooden crate containing replicas of Japanese mines that were being used in the Pacific.

Based upon the work done by George Jarrett and the original Ordnance Technical Intelligence team sent to Cairo, the Foreign Material Branch had an extensive collection of captured enemy material. The detailed exploitation of the material was conducted and the results were furnished to both research and development organizations as well as to the War Departments Military Intelligence Service.

In the area of Research and Development, the National Defense Research Council, had been assigned the task of coordinating defense research which was primarily directed at various civilian institutions, such as M.I.T. as well as other institutions. The first

positive program that resulted in new equipment for the troops was in the area of gas mask development. The chief gas mask problem, the Chemical Warfare Service felt, was not the faceblank but better absorbents and filters for the canister. The possibility of meeting with new axis toxic agents and the development of war gases by the U.S. made it desirable to find better canister materials. The first attack on the problem was the absorbents, and NDRC contracts were set up for fundamental studies at the University of Illinois, Johns Hopkins University and at Northwestern University.

Whetlerite, a copper impregnated, activated charcoal, was the absorbent then used in the M9A1 canister. Mixed with 20 percent soda lime, this filling removed such standard gases as chloropicrin, phosgene, mustard, and lewisite. It furnished only a fair degree of protection against hydrogen cyanide and cyanogen chloride, a degree thought particularly dangerous in the case of hydrogen cyanide because glass grenades containing this agent had been found among captured Japanese munitions. Initial studies at Northwestern University confirmed the British finding that the addition of silver to the charcoal in the canister greatly improved protection against phosgene and hydrogen cyanide, and the CWS adopted this new composite whetlerite early in 1942. Studies later that year indicated that soda lime, included in the canister since World War I to assist in the adsorption of volatile acid gases such as phosgene and hydrogen cyanide, was no longer needed and it was removed.

The NDRC meanwhile tackled the problem of increasing the cyanogen chloride absorbing power of canisters to meet the possibility that the CWS might adopt this substance as an agent. Research at Northwestern University led to the addition of chromium to the silver and copper already in the charcoal, a measure which considerably improved the cyanogen chloride protection of the canister, even under the severest semitropical weather conditions that could be simulated in the laboratory. The service adopted this third type of charcoal (Type ASC) in July 1943 and incorporated it in the M9A2 canister. Shortly thereafter, scientists developed highly satisfactory wood and coal charcoals as substitutes for the unobtainable coconut charcoal used before the war. As a result, the charcoal and its impregnites in the 1943-44 canister gave the United States an absorbent considered better than those in either the German or Japanese canisters.

The second phase of canister improvement involved filters, incorporated to remove solid toxic particles breathed into the gas mask canister. The filter paper in all canisters in 1940 consisted of a cellulose fiber mat known as alpha web, which had recently been improved by impregnating it with fine carbon particles. This filter assured substantial protection against toxic smokes, such as adamsite, but it increased the resistance to air flow and it offered only limited protection against liquid particles. The development of new mechanical smoke generators necessitated further work on the filter, because fine oil particles of the smoke deteriorated the impregnated paper. Gas mask experts tested rock wool, fiber glass,

and other materials as paper substitutes, and finally found that asbestos, a material in British, German, Japanese, and Russian filters, added to the alpha web made the canister safe against minute droplets of oil.

The CWS-MIT Development Laboratory, in cooperation with industrial paper companies and Arthur D. Little, Inc., produced three types of asbestos bearing paper, each of increasing effectiveness. After 1942 they were used successively in place of the carbon-impregnated filter paper in the M9A2 and M10A1 canisters. Further research led to the substitution for the asbestos of a paper fiber made from esparto grass, obtained from Morocco. The new fiber had less air resistance in the canister while it maintained a filtering capacity comparable to asbestos. The service further improved this filter material by treating it with dimethyl silicane, which rendered the paper highly water repellent -- a useful property when troops had to ford streams while carrying the gas mask.

The M2 type service mask was, from the point of view of the technical staff of CWS, an excellent product. Anticipating that gas would be used in the war, the service had designed a mask that would provide troops with the most complete protection possible against gas attack. The mask was rugged and efficient, but it was heavy (weighing almost five pounds with its steel box canister), bulky, inconvenient, and therefore unsuited to the combat requirements of World War II. Troops in training in 1940 and 1941 wore the mask unwillingly and only for gas exercices, leaving it behind on combat maneuvers. When the War Department insisted that the mask be worn in all exercises, the ground arms reacted at once. The design had to be changed if troops were to fight effectively while wearing it.

The requirement established in January 1942 for a lighter and less cumbersome mask for combat troops resulted in the development of the light-weight service gas mask. With a smaller, rounded canister, a shorter hose and a simpler carrier, this mask weighed 3-1/2 pounds, yet because of better absorbents and new filter materials, it provided almost the same, though not as prolonged, protection as the heavyweight service mask. One shortcoming of the new mask was the increased breathing resistance, caused principally by the smaller canister. Nevertheless, when Cavalry, Infantry, and Armored Force Boards, as well as Airbone Command tests of the new mask were completed, the Army Ground Forces recommended that the mask be issued as quickly as possible.

The mobility of modern warfare, its jungle operations, and particularly the increase in amphibious operations brought demands from the theather commanders and the Army Ground Forces for an even lighter and more compact gas mask, and especially for one that could be waterproofed. The requirement suggested a snout type mask such as was used by German assault troops. This type would not have an awkward hosetube, would weigh less than 2-1/2 pounds, be waterproof or carried in a waterproof carrier, offer the same protection as the lightweight service mask, and not interfere with the soldier's firing

in a prone position.

The problem was turned over to the CWS-MIT Development Laboratory. In a series of tests of experimental models by the 544th Engineers of the 4th Amphibian Brigade in combat exercises at Camp Edwards, it appeared that a cheek-mounted canister gas mask of the type used by the British, rather than a snout type, would provide the least interference with combat activities. Technicians therefore modified the lightweight service mask faceblank by boring a hole in the left cavity and fitting the canister rigidly to the cheek of the blank. A new aluminum M11 canister, adapted from the German design and two-thirds lighter than the previous steel canister, had a water-repellent smoke filter and a wide, deep bed of charcoal. It was much lighter, yet it provided almost as much protection as the lightweight service mask canister. Finally, they made a waterproof carrier for the mask from butyl rubber-coated cotton duck. Its multiple folding closure made the entire contents of the carrier watertight. It was later reported that in mishaps during amphibious operations, the bouyance provided by this carrier saved the lives of a number of soldiers. The assembled units, weighing three pounds, were standardized as the M5-11-7 combat gas mask in July 1944, after production had already started. Over half a million of the combat masks were produced, and this was the mask which was issued to certain assault elements for the invasion of Normandy and which was carried ashore in later amphibious operations.

Among a number of special masks developed before the war was the optical gas mask, standardized in 1939. This mask, originally requested by the Navy and later by AGF for Signal, Coast Artillery, and Anti-aircraft personnel using aircraft warning and fire control instruments, contained small, optically ground lenses for instrument observation and a diaphragm for speech transmission. The poor fit and bulkiness of this mask led to a lighter model designed at the CWS-MIT Laboratory for use by the Coast Artillery and standardized in January 1944. The Chemical Warfare Board found the mask satisfactory, but the Armored Board in a later test did not consider it wholly acceptable and further development was abandoned. As the AGF reported in August 1945, "no existing gas mask is entirely satisfactory for use by armed personnel who are required to employ optical instruments in the performance of their assigned duties."

The diaphragm gas mask was a special mask first designed for the Armored Force and produced in January 1941. By means of a thin vibrating diaphragm element in the facepiece of this mask, somewhat better speech transmission was possible than in the service mask. Yet this mask had certain deficiencies. At a conference on 23 March 1943 the facts were brought out that the mask was unnecessarily burdensome, that it might make the wearer an easier object of sniper fire, that its voice transmission qualities were only slightly better than the standard service mask, and, above all, that it seemed impossible to turn out a diaphragm with an assurance that it would remain gas tight. After a review of this mask by using arms and services in June 1943, when the critical components, complex

manufacture, and slight acoustical proprties of the mask were pointed out, the Signal Corps. Army Air Forces, Armored Force, Cavalry, and Infantry rejected it. The CWS stopped production and apportioned existing stocks among the Field Artillery, Coast Artillery, and Anti-aircraft Artillery, who still wanted a diaphragm mask. When in 1945 requests continued for a better speech mask, the CWS developed a new lightweight diaphragm gas mask, having improved acoustical properties. It was intended to replace earlier diaphragm masks carried by tank crews and by radio and telegraph operators. The war ended before it could be put into production.

Another special mask, first requested in 1940 and again by the Chief Surgeon, ETO, in 1944 was the headwound mask, for soldiers in field hospitals with head, face, jaw, or neck injuries. It consisted of a vinylite hood with a wide, transparent vinylite eyepiece, an M11 canister, and a vinylite carrier. Although the CWS did not solve completely the problem of obtaining a gas tight seal for patients with neck wounds, it nevertheless standardized the mask at the request of the SGO in August 1944 and supplied them to the theaters. Continuing work resulted in a much better neck seal on this mask, but since the danger of gas warfare receded the improved model was destined only for limited procurement.

The CWS first planned a civilian gas mask in 1937. By 1940 the service had decided that the design of the Zapon-type mask, as it was called, was not satisfactory, and had replaced it by another of rubberized fabric. At the request of the Office of Civilian Defense, the service redesigned this gas mask with its snout-type canister in five sizes for civilian use and obtained permission to produce it with laminated and, later, sheet rubber facepieces, to eliminate the uncomfortable chin seam of the fabric model. With the growing shortage of rubber, the CWS-MIT Laboratory worked out a process for manufacturing faceblanks from impregnated felt. The CWS produced large numbers of this type of civilian gas mask under experimental contract before closing the program. Other civilian masks included the Mickey Mouse mask for children, designed by Walt Disney, and the infant protector, a pliofilm respirator for children too young to be fitted with a mask.

On the basis of World War I experience, the CWS had devised gas masks for horses and mules, as well as leggings, capes, eyeshields (since the horse gas mask did not cover the eyes), and other protective equipment. The mask was in the process of standardization early in 1943 when the mechanization-minded AGF cancelled all requirements for horse protective equipment. Late in 1944, as the 10th Mountain Division prepared to go overseas with its complement of horses and mules, AGF reversed the order. Subsequently, the service standardized capes and eyeshields for the Mountain Division animal trains. It also designed masks for the dogs used on security patrols and for messenger work overseas, and a baglike mask to protect Signal Corps pigeons.

Estimates of the relative value of American, Japanese, and German

gas masks varied somewhat with the specimen and the examiner, but on the whole scientists felt that the U.S. masks, despite their weight, discomfort, poor vision, and other disadvantages, were "probably the best worn by any army." The Japanese Army masks, though lighter, more compact, and well constructed, would not stand the wear and tear of American masks, and the canister gave somewhat less protection, particularly against hydrogen cyanide and cyanogen chloride. One model of Japanese non-combatant mask was superior in material, workmanship, and protection to the American counterpart, but other models were inferior. The Japanese had specialized masks, including a Navy diaphragm and a horse mask.

In his "History of German Chemical Warfare in World War II," General Lieutenant Herman Ochsner, wrote that the American mask "was highly effective in protection against gas and in that respect would meet even the highest demands." But it was too heavy for the German Army, which favored a compact model with a drumlike canister fastened directly to the mask. The early German canister gave lower protection than the American, although it was improved later in the war. The Germans had gas masks for non-combatants, headwound casualties, horses, dogs, and pigeons.

A German detector kit, comparable to CWS model M9, contained tubes of reagents and a small hand pump to force air through the tubes. The Japanese also had detector kits, a number of which were captured during the war. One of these, tested at the CWS-MIT Laboratory late in 1943, was larger and heavier than the CWS model M9, had no reagent for nitrogen mustard, gave uneven results, and allowed misleading interpretations of tests owing to the faintness of some reactions. On the other hand, a naval-type detector examined shortly thereafter, although also without a test for nitrogen mustard, compared favorably with the M9 in design, simplicity, and effectiveness of operation, and had several good points that were considered for possible inclusion in later American models.

In the area of military intelligence activity, a detailed document was prepared by the War Department's Military Intelligence Service which was No. 16 in the Special Series on enemy weapons. This report was titled, "ENEMY CAPABILITIES FOR CHEMICAL WARFARE" and published on 15 July 1943.

There had been a sufficient change in the German military and its equipment to warrant an updating of the prior manual on the German Army. The Military Intelligence Service had by this time established a Training Center at Camp Ritchie, Maryland. It was recognized that there was a need for a ready reference manual for intelligence personnel in a combat zone. By April 9, 1943 the War Department had published a Handbook on German Army Identification. This was in a sense a form of quartermaster technical intelligence as it described the uniforms and insignae as well as some of the field gear that would be encountered. While it did not give specific technical details of the manufacture of the equipment, it did provide one with the capability of distinguishing between a mountain

soldier, a tank soldier and an infantry soldier, etc.

Combat experience in North Africa as well as the collection of a considerable amount of Italian equipment provided the necessity as well as the data base for the production of a handbook on the Italian Army. This handbook was prepared in the Theater of operations. In May 1943, the Army Map Service Produced a "HANDBOOK ON THE ITALIAN ARMY (Provisional Copy). This copy was done from stencils and very few copies survived the war. Generally the Italians did not have the industrial base to support a large army nor the research and development effort that the Germans had, hence their equipment was not of the same caliber as the German. Generally there was little in the Italian inventory that was worth further study.

By 1 September 1943, TM-E 30-451, HANDBOOK ON GERMAN MILITARY FORCES was published. Within the War Department's Intelligence Division a new element, The Dissemination Unit, had assumed the responsibility for this manual. The manual, while it contained technical details of German weapons and equipment, did not have the detailed technical information that prior manuals on specific weapons had nor did it have any information on possible future developments in weapons, other than to mention the possibility of heavier tanks. No mention was made of the Panther tank. Recognizing from the start, that such a handbook would become obsolete almost as soon as it was printed, the Military Intelligence Service also began publication of "Intelligence Bulletin" designed for junior officers and based upon POW interrogations and captured material. The Air Corps also began publication of a series, "IMPACT" which was distributed to pilots and operations officers. While these manuals and pamphlets did an excellent job of keeping the forces informed about enemy developments from a worldwide data base, there was still a time delay factor that was crucial. As a result of both the time delay and lack of coordination, there was an effort by the troops in the field to generate their own manuals. Many were prepared by the local G2 sections and printed locally, usually in England. Surviving copies are scarce and too numerous to begin to discuss.

Recognizing the need for better training, the military began development of newer training material. Hard rubber models of aircraft began to replace the wooden models of airplanes in service. By November 1943, FM 30-40, which had appeared in January 1943 as "MILITARY INTELLIGENCE IDENTIFICATION OF UNITED STATES ARMORED VEHICLES" was re-done as "RECOGNITION" and contained pictures of 110 vehicles. The effectiveness of these items in training depended upon the unit doing the training as well as the availability of the material. Unfortunately, the Germans were fielding new equipment faster than the Allies could update their manuals.

Returning to the battlefields of North Africa the Allied campaign was drawing to a close and on the 10th of May, 1943, the last organized Axis resistance in Tunisia was overcome and German and Italian forces began to surrender. The Italian government pro-

moted General Messe to Field Marshal in the hopes that he would continue to resist, but by the 13th of May, he surrendered the remaining forces. A total of 250,000 troops, more than half of them German, had been removed from the conflict.

Many years after the African Campaign, General Eisenhower wrote about the period just after the disaster at Kasserine that, "I had a personal interview with Alexander to insist upon the employment of the entire II Corps, as a unit. For this I had several reasons. In the first place, the bulk of the ground forces required by the Allies to defeat Germany would have to come from the United States. The need for battle training on a large scale was evident. Secondly, in all its prior battles the corps had been compelled to fight in small packets; never had it had a chance to exert its power as a unit. Thirdly, the morale of the corps had improved markedly since March 1 and it had a right to prove its own effectiveness as well as the quality of American arms."

Eisenhower's comments about American arms referred to the combined arms fighting forces, rather than the hardware. Unfortunately, this was one important aspect of the Army that was lost upon many people for many years. At a higher level Allied planning came from a series of conferences, the forerunner of the current Summit Conference. The best known of these conferences were at Casablanca in January 1943 and at Yalta in 1945. Of lesser fame was the conference that took place from 12 to 25 May 1943 in Washington when Roosevelt and Churchill met in Washington for the "Trident" Conference. The Americans came to this better prepared for detailed argument than they had been in the past and were determined to get a firm commitment by the British to a cross-Channel invasion. The British felt that their commitment to this had never been in doubt and that the American insistence in planning so formally so far ahead would deprive the Allies of any strategic flexibility, especially in the Mediterranean. The invasion of Sicily had already been agreed but the British wanted to be able to exploit this on the Italian mainland and perhaps also to act in the Balkans. The Americans felt that this was motivated by dubious postwar political aims and their Chiefs of Staff were opposed on strategic grounds as well. Admiral King had always wanted and striven for priority to be given to the Pacific, and Marshall was worried about doing anything which might detract from the cross-Channel operation which he believed was essential.

From the British point of view a major complaint was that despite the agreed Germany-first policy, the Americans had committed a larger share of their army and air force to the Pacific as well as the bulk of their navy. The British felt that the shortage of shipping which was the major limiting factor for European operations could be put down to this. (In fact an important contributory element of this shortage was the decision taken at Casablanca in January to give priority to the building of escorts for the Battle of the Atlantic and not to landing craft.)

Compromises were reached on all headings. The Americans did not have to accept any real limitations on their Pacific operations and the British got a provisional agreement to exploit any Italian successes. Perhaps the most significant decision taken by the conference was to set a target date for D-Day -- 1 May 1944. The British General Morgan, was appointed to prepare plans for the invasion. He was given the designation COSSAC (Chief of Staff to the Supreme Allied Commander).

On the eastern front, Russian counterattacks had driven the German forces westward and only a decisive counterattack against the Russians would have stopped their further advance. This operation was code-named "Zitadelle" or Citadel in English. The German armies in Russia were preparing for a massive offensive to reverse the disaster of Stalingrad. The finest divisions of both the Wehrmacht and the Waffen SS were gathered in an enormous concentration of men and armor. Armed with the latest tanks, their morale high, they expected to be unstoppable, even if the Russians were ready. But "Whenever I think of this attack," said Hitler, "my stomach turns over" -- and his queasiness was understandable. For now, in the spring of 1943, both he and his generals knew that only a decisive victory over the Red Army could ease the relentless, threatening pressure on the Eastern Front.

The cracks in the wall of the Axis domination were becoming ever more numerous and more apparent. The Allies were beginning to overcome the efforts of the U-boats. Italy was in a more parlous state than ever before. Japan's advances in Burma and the southwest Pacific had been stopped, and were going into reverse. The bombing of German industrial centers was disrupting essential war supplies. The hit-and-miss methods of the Red Air Force were being offset by increasing numbers of planes and the increasing skill of the Russian air crews. And the threat of a Second Front kept many German divisions tied up in Europe, reducing the possibility of any major effort on the Russian front.

Then, in March, came Field Marshal von Manstein's great victory at Kharkov for Army Group South and it seemed for a moment as if the tide was turning. But it was a short-lived hope. The victory, so far as the restoration of the German initiative was concerned, was incomplete. A great Russian-held salient remained -- a bulge roughly semi-circular in shape, driven some 75 miles westward into the German lines at Kursk, with its base measuring more than 100 miles from north to south. Within the salient were said to be a million men, and armaments in proportion. Clearly, a pincer movement thrown across the base of the salient would cut off and destroy the forces contained in it and considerably weaken the total power of the Soviet army, and von Manstein planned such a movement to clinch his victory.

As so often before, however, the weather took hand. The spring thaw turned vast tracts of frozen ground to mud; rivers rose, swamps appeared, ruined villages were mirrored in the desolation of floods.

There was nothing von Manstein could do but withdraw his armor to save it from getting bogged down, and leave the infantry in possession while a plan was worked out. But there was a catch: the longer the Germans remained purely on the defensive, the sooner there would be an attempt by the Russians to widen the salient and breach the German front completely.

At a time when speed and decisiveness of action could have produced results, the Germans vacillated. Hitler changed his mind. His generals feuded among themselves. And there were conflicting interpretations of the demands of the situation in Europe. Even the promise of a new assault on the Don and an advance towards Moscow after the salient had been pinched out could not bring the Fuehrer to decide. Tanks and other heavy assault weapons -- particularly the Tigers and Panthers -- were not reaching the army in the expected numbers. It was 11 April before the semblance of a design was arrived at, and it was in essence the same plan that von Manstein had been unable to fulfill after Kharkov. It was indeed the obvious plan -- and its obviousness was now appreciated equally by the Russians, who made haste to improve their defenses round Kursk. Any chance of surprise had been lost. Now, the only possibility lay in an assault so tremendous that no defenders could resist it.

Such an attack meant risking far more armor than the Germans could afford to lose, and if infantry support was to be forthcoming for the tanks, it also meant imprudently weakening the front both north and south of the salient.

Hitler was himself caught in a pincer movement of commitment. On the one hand, he had the conflicting views of his advisers as to the possibility of success. Field Marshal von Kluge, the Army Group Center commander, and Generals Keitel and Zeitzer of the Army General Staff, were in favor; Colonel-general Guderian, the Inspector-General of Armored Troops and, by this time, von Manstein himself were equally strong against. On the other hand here was the assurance of Speer, Minister of Production, that the necessary tanks would be available. And the certainty that without a German offensive the whole weight of the Soviet forces would come crashing against the over-stretched Wehrmacht.

While Hitler hesitated, General Vatutin and the Red Army went ahead -- not merely with defenses as impenetrable as they could be made, but also with the preparation of a large-scale counter-attack. The news filtered back to Hitler in intelligence reports and alarming air photographs that indicated the withdrawal of the Russian mobile forces from the area west of Kursk in obvious preparation for a counter-attack. But at last, on 10 May, Hitler gave his consent to the plan -- it was to be called Operation Zitadelle -- emphasizing his underlying reluctance with the words "It must not fail."

The forces were decided. Colonel-General Model's 9th Army with seven Panzer, two Panzergrenadier, and nine infantry divisions was to

attack from the north. Colonel-General Hoth's 4th Panzer Army, with them Panzer, one Panzergranadier and seven infantry divisions would sweep up from the south. The two arms of the pincher would meet east of Kursk, thus enclosing the salient and cutting off hugh Russian forces. But, although the plan and deployment were decided, Hitler continued to hesitate.

Knowing that the Russians were building up their defenses, he postponed the first mooted date for the start of Zitadelle from 13 June until the beginning of July so that an extra couple of battalions of Panthers could be sped off the production line and allotted to Model's northern pincher. The opening of what was to become known -- justifiably -- as the greatest tank battle in history was finally fixed for 1500 on 4 July, despite continued proposals for abandonment from von Kluge, von Manstein and Guderian.

Opposing the 36 German divisions was a force of 11 Russian armies, including the crack 6th and 7th Guards armies that had fought so well at Stalingrad and the 1st Tank army. Each Russian "army" corresponded approximately with a German corps in size. In terms of manpower there was little to choose between the conflicting forces, but the Russians had reinforced the north corner of the salient, which would bear the brunt of Model's attack, with thickly sown mine fields -- so dense that, according to Marshal Rokossovski, who was the joint commander on the Kursk front with Vatutin, "you could not have put one of Goering's medals between them." There were 2,200 anti-tank and 2,500 anti-personnel mines per mile of the defensive, four times the density at Stalingrad. In addition, there were no fewer than 20,000 guns of various kinds, including 6,000 76.2mm. anti-tank guns and more than 900 Katyusha rocket launchers. For attack they had the famous T34 tank -- one of the best armored vehicles to be produced during the war -- with its long-range 76mm. gun and great reliability.

The German attacking force was largely based on the new Panther D, a fine tank in many ways but with numerous technical faults caused by hasty production. The Germans still had considerable superiority in the air, as was to be proved by the squadrons of Stuka dive bombers, but if the opposing forces were fairly matched, there were other factors that would determine the course of the battle -- not the least the lost element of surprise, which had been frittered away in argument and indecision.

The ground over which the battle was to be fought was reasonably good for tank warfare. Kursk lies in the basins of the Don and Dneiper rivers and the countryside which surrounds it and formed the salient is characterized by low hills and wide-ranging plains of fertile arable land. The ground is watered by numerous brooks and tributary rivers -- one of them, the Pena, being a swift stream running between steep banks. Cornfields stretch for unbroken miles across the landscape. Such roads as there are, are for the most part sandy cart-tracks that become unusable by wheeled traffic during heavy rain. Numerous scattered villages lay in the shallow valleys

and small thickets bristle on the low hills. To the north of the village of Beresowka there is a thickly wooded area, roughly circular in shape and some four miles in diameter.

Along the southern front of the salient Hoth's 4th Panzer army was lined up along a slight curve extending some 30 miles from west to east. First the 3rd and 11th Panzer divisions and the Gross Deutschland division (a Panzergrenadier unit with a high complement of tanks under 48 Panzer Corps); then the three SS divisions, Leibstandarte Adolf Hitler, Totenkopf (Death's Head) and Das Rech in the SS Panzer Corps; and on the right wing the 6th, 19th and 7th Panzer divisions of three Panzer Corps. There had been the closest cooperation between ground and air forces and the utmost care had been taken to get the huge force of tanks into position under cover of darkness. "Morale," according to Model, "was high" -- and was raised even higher by a message from the Fuehrer:

"Soldiers of the Reicht!

> This day you are to take part in an offensive of such importance that the whole future of the war may depend on its outcome. More than anything else, your victory will show the whole world that resistance to the power of the German army is hopeless."

Unfortunately, the message arrived during a four-hour intense artillery bombardment from the Russians which confirmed that the defenders were well aware that the attack was about to be launched. The intensity of the bombardment inevitably had its effect on the striking power of the attackers, but the attack began as planned at 1500 after a return bombardment by German artillery and some devastating strikes on the forward Russian lines by dive-bombing Stukas.

By 1900, advance infantry and grenadiers of the three divisions on the German left flank of the southern pincer had thrust into the Russian forward line at Luchanino, Alexejewka and Sawidowka -- three villages only lightly held by the defenders. The ease with which they were taken was characteristic of the tactic, much used by the Russians throughout the battle of Kursk, of luring the attackers into a position that subsequently proved to be untenable.

Model's northern pincers managed to break into the salient on a 15-mile front and 47th Panzer Corps pushed forward about five miles during the next 30 hours, but at a great cost in hugh Porsche Ferdinand (or Elefant) assault tanks. These lacked machine-guns and, as Guderian had warned long before, quickly proved vulnerable. As their escorting light tanks were knocked out, they found themselves at the mercy of infantry who dashed out from slit trenches and directed flame-throwers into the engine louvres, thus, setting the fuel systems alight and forcing the crews to either be roasted alive or to bail out into captivity. The Model thrust was to gain only five more miles to the south and west during the next week. Engineers who tried, under covering fire, to clear lanes through the

minefields found that this only aided the Russians, who deftly scored many hits with rockets and 76mm. guns as the tanks passed through.

In the south, Hoth's forces gained ground by advance detachments of infantry and grenadiers, but only at great cost. During the night, the defenders withdrew and the front line was shelled throughout its length. Paul Hausser, commander of the three SS divisions Leibstandarte, Totenkopf and Das Reich, wrote afterwards: "Again and again we showed this weakness of tactics that made us insist on holding ground that had been too easily gained. Having chased Ivan out, we should have withdrawn ourselves and let him bombard the place out of existence. Then we could have moved the armor forward relatively safely."

This lack of imagination, which was characteristic of German planning, in this particular case, won an undeserved reward. During the night a cloudburst caused an immediate overflowing of the Pena and its tributary streams and turned the ground into an impassable morass. But for this, all the tanks would have been moved up into the line of bombardment. Even as it was, the losses were considerable because of the difficulty of taking up camouflaged positions, so that when daylight illuminated the swamped valleys the Red Air Force easily picked out the stranded tanks and attacked.

Luftwaffe Stukas attacked too and had considerable success in demolishing Russian artillery batteries, but as one pilot, Hans Rudel, has recorded, "The Russian guns were almost as numerous as their mines, and the camouflage was masterly ... you had to assume that every corpse was a gun battery and dive down to tree top level... four times our of five you found you scored a hit on a 76... if it didn't get you first."

This success, however, did little to neutralize the trouble that faced the tanks on the morning of 5 July. The whole of 48 Panzer Corps -- 3rd and 11th Panzer divisions and Gross Deutschland -- were ordered to move up from the bombarded villages to the next Russian line of defense and capture Ssyrzew Ssyrzewo, which lay beyond the Pena River, and wheel round to the northwest to capture the wood at Beresowka and the three small hills that lay beyond it. The floods from the cloudburst, however, made this impossible without the aid of engineers to bridge the river and the flooded cornfields on either side of it, and the engineers were continually harassed by snipers and Soviet planes. As the grey day advanced, the dense formation of tanks along 48 Corps' entire front was seen to be extremely vulnerable -- many of them bogged down because they had approached too near the swamp ground round the Pena, and all of them on open ground that made them easy prey for aerial attack.

The three SS divisions on 48 Corps' right were more fortunate. The ground over which they attacked was slightly higher and much of it was outside the cloudburst area, so that the hazard of swampy ground was considerably reduced. Sepp Deitrich of SS Leibstandarte,

a commander of great skill and daring, forced his tanks forward some seven miles during the day, knocking out 27 T34s in his advance. By late afternoon his patrols reported the village of Gremutshy clear of enemy, but Dietrich was not to be caught in the lure of a deserted objective. He halted his tanks, got them hull down in folds in the ground and saw that they were well camouflaged. His cunning was rewarded. At sunset the bombardment of Gremutshy began and continued till midnight. Then the whole of the Liebstandarte moved forward -- without having lost a single tank in the baited trap. Gremutshy had being reduced to a smoking ruin by shelling. Its thatched cottages still blazed fiercely and dust rose in clouds from the rubble as, in the moonlight, Dietrich's tanks skirted the razed village and got into position for a dawn attack.

Dietrich supposed, rightly, that the Russians believed their bombardments had disabled or destroyed many German tanks and that they were, therefore, unprepared for the attack. But, since surprise was of the essence, there was no time for such refinements as the clearing of minefields and there were a good many casualties as SS Liebstandarte pressed on. But by mid-day the huge Panthers, which were impervious to 76mm. fire except at point-blank range, had penetrated the Russian defensive positions south of Werchopenje and were making for Hill 260 a mile south of Nowosselowka -- one of the objectives that had been unattained by 48 Corps. Their losses had been heavy, however -- as much from breakdowns as from Russian attacks. The day ended with stalemate on that middle section of Fourth Panzer Army's front.

It was in fact only on the third day, 7 July, that any real success was achieved by the southern pincer. By that time the sun had dried out the swampy ground and the battlefield presented a different, though equally desolate, appearance: miles of devasted cornfields, hundreds of burnt out tanks of both sides, and the bodies of the dead already smelling obscenely in the heat. A soldier's diary records, "One man had been caught by a bomb blast while squatting in a ditch with his trousers down. It seemed the ultimate in humiliation." The minefields had created great devastation and the blackened flesh and bones of those who had been blown up were strewn grotesquely over the battlefield.

By this time, the Russians had moved back into the ruins of Gremutshy in preparation for a counter-attack. While they were forming up for this, 48 Panzer Corps launched their delayed attempt to make their two-pronged wheel to the northwest. They caught the enemy by surprise, broke through on both sides of Ssyrzew in great force and caused havoc among the assembling Seventh Guards Army, which fled in disorder to shelter behind Hill 243 beyond Werchopenje, losing 70 tanks and artillery pieces in the carefully timed and aimed German barrage.

With the ground clear before them, Gross Deutschland now gained momentum and wheeled round to Ssyrzewo with only the most minor casualties. The Russians seemed for the moment nonplussed. But by

afternoon they had recovered and launched their counter-attack on Ssyrzewo. It resulted in a head-on collision in which t00 tanks simply faced each other and went on firing until, after several hours, the reverberation of guns along the steep banks of the Pena diminished and night fell on the still-blazing hulks.

No ground had been gained by either side, and it became clearer than ever that the chief characteristic of the Battle of Kursk -- which town, though less than 40 miles to the north, remained to the Germans as remote as the moon -- was the huge wastage of men and arms in a fight that lacked any subtlety of direction. Mass was posed against mass in a conflict that, in theory, should have been brief and sharply decisive, but in five days showed no sign of reaching a climax.

Dietrich, one of Hitler's oldest friends, said in one of his rare criticisms of the Fuehrer, "Perhaps the feeling of failure had permeated the troops on the Russian front since Karkov. Not to be able to clinch the victory then was a bad thing. Then Hitler's uncertainty was a sign. The conflict between the top commanders was another. There were personal feuds. Kluge and Guderian hated each other; they nearly came to blows once. Hitler's intuition was always right, and he should have allowed it to overcome the pressure of the generals who wanted Zitadelle to go on for their share of the glory. Also, the way the Russians poured men and machines into the fray was absolutely unlimited. They simply had a disregard for numbers. It didn't matter to them that they were losing a million. Another million were packed behind them ready to be fed into the battle machine."

It was true, although it could hardly be said that Hitler was sparing in this expenditure of men and machines either. But his was the expenditure of desparation, and the Russian High Command knew this very well. Viewing the battle in retrospect Stalin declared to the Supreme Soviet: "We were an immovable mass against which the Fascists tried to pitch an irresistible force. A scientific impossibility in any case. But they were out-maneuvered by our generals also. They never had a chance."

That was untrue. There was a number of occasions when Russian tactics were as unimaginative as the Germans', and many more when the jaws of the pincer seemed to be closing. But it was always a piecemeal closure by isolated units, never a concerted forward movement. The shoulder-to-shoulder positioning of Hoth's entire Fourth Panzer Army within a 30-mile front had packed a punch that could hardly have failed. Yet it was a punch that was weakened by circumstances that should have been anticipated. Such simple devices as the lure of the abandoned village were overlooked, and the enemy's ability to contain Model's northern force in, so to speak a salient within a salient was not appreciated. This last factor dealt the death blow to the whole operation. With every absortive attempt Model made to press southward it became increasingly difficult for Hoth to link up with him. "The Russians have

learnt a lot since 1941," he told Manstein, "They are no longer peasants with simple minds. They have learnt the art of warfare from us."

Wherever they had learnt it, their knowledge was nowhere more apparent that in the intense fighting that took place around the railway junction of Orel, north of the salient. The Russian Third Army had forced its way forward with the object of encircling Model's Ninth Army in a sweep to the southwest. In that objective it failed, but it did keep most of Model's infantry and artillery engaged in defense instead of attack. The German infantry was thus unable to lend support to the southward armored thrusts that were meant to link-up with the Fourth Panzer Army on the heights east of Kursk. For three continuous days and nights from 9 to 11 July, Orel in the north and Gelgorod in the south -- where the Seventh Guards Army was attempting a similar tactic split the SS divisions from their supporting battle group 48 Panzer Corps -- were subjected to bombardment after bombardment. "It was a continual earthquake," one eye witness put it, "The ground just split asunder and any tank on the move would tip into the fissure."

Yet another blow was delivered by the Red Air Force which succeeded in bombing the German supply base at Poltava and destroying the railway line to Kharkov, making lengthy and delaying engineering work necessary. There was no doubt that, whether newly learnt or not, the art of warfare was much in evidence in the Russian plans and tactics.

By the time both German pincers had been fighting uninterruptedly for a week, they were showing signs of exhaustion. A shortage of supplies and ammunition caused by the cutting off of the railhead, was also making itself felt. But on the left flank of the southern pincer they managed to drive the enemy off the main road from Rakowo to Kruglik and head for the Beresowka forest. Once that objective was attained there was a good chance of capturing Hill 247 with the help of the northwest sweep of the SS division or the right flank, which was intended to wheel round from Hill 260 south of Nowessolowka and make a synchronized attack on Hill 247 from the east.

During the night of 9 July the 3rd Panzer Division entered the village of Beresowka from the west, much reduced in numbers -- at least a third of its heavy tanks lay burnt out on the battlefield -- but tenaciously holding on to every inch of ground it had fought for up the Kruglik road. Help was on its way in the form of one regiment of SS Leibstandarte that was making its way unopposed across open country from Werchopenje. Rudolf von Ribbentrop, son of German Minister, was in command and reported later that he had got to within half a mile of the woods north of the village when a strong Russian counterattack met them. "Russian tanks of all sizes came streaming out of the forest and fanned out to meet us," he said. "Visibility was bad because of the cornfields, but there was a battle royal and we shot up two of their big mobile guns before the

Luftwaffe came in to help."

As one of the pilots described it: "In the first attack four tanks exploded under the hammer blows of my cannon; by evening, after four more sorties, the total rises to twelve. The evil spell is broken, and in the Stuka we possess a weapon which can speedily be employed everywhere and is capable of dealing successfully with the formidable numbers of Soviet tanks."

This was wishful thinking on his part, however. Nothing could deal wholly successfully with the hugh number of Soviet tanks. On every section of the battlefield those that were destroyed or immobilized were replaced with seeming magical rapidity. Supplies were endless "and appeared from nowhere," as Manstein told Hitler at a conference at the Fuehrer's headquarters on 12 July. By that time the railhead at Poltava was operating again, but there were no endless supplies coming from Germany. The enormous force of fighting vehicles with which Manstein and Kluge had opened the battle to close the Kursk salient had been depleted by more than half. There was continual activity at the repair shops to get into some sort of fighting order those tanks -- especially Panthers and Tigers -- that had been retrieved from the battlefield. An equally continual effort was made to overcome the successes of the Soviet aircraft in attacking the ammunition trains for which every German tank still left in the field was desperately waiting.

It was now being proved only too clearly that Hitler had indeed put in hazard far more armor than he could afford to lose. Although no resolution of the Kursk conflict could yet be seen, developments in Europe were calling for a speedy conclusion of the offensive and the transfer of forces to the western theater for, by 12 July, the Allies had landed in Sicily.

The climax to the battle of Kursk was reached during the two days 12 to 14 July, although it amounted to only the fadeaway ending of a battle of attrition. For nine days, the two contestants had been slugging at one another like heavyweights swinging giant blows that consistently failed to achieve the knockout.

Early on the morning of 12 July, Hoth summoned his corps commanders and planned for a breakthrough before the Russians could intensify their defenses between Kruglik and Nowosselowka and build up their forces for a big push southward. He had received intelligence reports indicating that the extreme southern tip of Army Group South's fortified line along the Donetz and Mius rivers, between Taganrog and Stalino, was under the threat of a Russian attack. "We shall be needed there," he told Hausser, commander of the SS Corps. "Let us finish the issue at Kursk once and for all."

Brave words. His armored strength consisted now of only 600 operative tanks to spearhead the attack. Every man in Fourth Army was suffering from battle exhaustion, and ammunition was at a premium. In contrast, Vatutin had new machines, including the new

85mm. SU85 self-propelled gun, and men fresh to the front. He also had the entire Fifth Armored Army in reserve and ready for action. It was not difficult to see where the advantage lay. This climatic action came to be known as "The Death Ride of Fourth Panzer Army."

"It's a fine day for a joy ride," Sepp Dietrich said loconically to the driver of his command tank. "It won't rain." Nor did it. It was a day of intense dry heat. The interiors of the tanks were like ovens despite the air induction systems and fan coolers. The high speed traffic of heavy vehicles over the sandy roads threw up clouds of dust that made it virtually impossible for the Luftwaffe to pick out their targets. On one occasion, according to Dietrich, a T34 and a Panther collided head on as they rolled through the dust. "Ivan had broken through our anti-tank screen and his progeny were streaming like rats all over the battlefield..."

The "all over" certainly suited the situation. The Fifth Armored Army had come charging into action with all the zest of experienced troops who had waited too long in reserve positions. As the spearhead of the SS Panzer Corps rolled towards Prokhorovka it met the full force of this fresh and eager force. Slightly outnumbered, but with more heavy tanks, Hausser's exhausted tank crews met their match. The thick dust prevented the Tigers from making full use of their superior range, and many fell prey to the T34s. The battlefield was littered with burning wrecks -- more than 300 tanks were lost by each side. But it was the Germans who could least afford such heavy losses. The onslaught of the Panzers was over. By evening the Russians had recaptured Berezowka and cut off 3rd Panzer Division and a large wedge of Gross Deutschland that had forced its way through the woods to the rescue.

For the Germans, the battle was clearly lost. All the open country between Belgorod, where Seventh Guards Army had broken through as far as the rear echelons of the SS Corps, and Orel to the north was possessed by the Russians. Only isolated pockets of Germans were evident in the villages. From the three hills so fiercely fought for and now relinquished by the Germans, the Russians had a straight line of fire down on to the irrepressible attackers, whose commanders were continually reminding themselves of the Fuehrer's words: "It must not fail." Nevertheless it did fail. The immediate cause of failure, or anyway of termination, was the Fuehrer's own order, relayed through Manstein and radio link to Army Group South's headquarters: "Operation Zitadella is cancelled forthwith."

It is of course impossible to stop a raging battle instantaneously unless both sides are given the same order. A withdrawal meant fighting a rearguard action, and it was two weeks before Hoth's forces got themselves back to their original positions on the starting line -- with further considerable losses. In the north, Model's Ninth Army, having advanced so little, had correspondingly little to cover in retreat. The situation at Orel was still critical, however, and Manstein had to order two Panzer divisions

north to help deal with this threat. He sent two more to the south, where the Taganrog-Stalino sector was also being increasingly threatened.

During the whole of the operation, from H-hour to cancellation, the advances made by the two jaws of the pincer, collectively or by individual units, had never reduced the breach across the base of the salient to less than 60 miles. Twenty Panzer divisions, the pride and joy of the Wehrmacht, had been bled white, and although on the credit side could be counted the huge number of Russian prisoners and the vast booty and destruction of the battlefield it was only too clear that with Allied assistance the Russians could afford losses on this colossal scale far more easily than the Germans could.

The Death Ride of the Fourth Panzer Army signalled the approaching end of the German struggle for Russia. By December, the reconstituted Ninth and Fourth Panzer Armies had been pushed back to, and beyond, the Dneiper. The whole of the Eastern Front from Nevel on the north to Kirovograd in the south reflected the turning of the tide, for it had been subjected to unremitting Soviet attacks against the weakening power of Hitler's armies. Now, not even a stalemate could be achieved. The Kursk gambit had been played and failed.

One little discussed aspect of the Russian success was the supply of American equipment provided through Lend-Lease. Large amounts of motor transport were provided to the Russians as well as communication equipment. A little discussed fact, however, was the fact that the American Merchant Marine crews that were delivering the supplies, sabotaged many of the trucks by removing vital components, a fact that did not endear the U.S. to the Russians. The U.S. mission to Russia which worked out the details of Lend-Lease shipments also arranged for the Russians to give us several of their combat vehicles. The U.S. received a T34 tank, KV1 heavy tank, an SU76 Assault Gun and one other vehicle. These were obtained with the promise that there would be no testing of them in the United States. Several years later, U.S. forces would encounter these weapons in Korea.

INSERT GEN Dean Lend Lease

Another Soviet weapon which made its debut at Kursk was the IS-152 which accounted for numerous TIGERS and PANTHERS. The emergence of the IS-152 had its origins in the work of Soviet technical intelligence exploitation of the captured TIGER tanks.

By 1942 Soviet brigade commanders were having difficulties using their assortment of tanks in a cohesive fashion. The continued up-armoring of the KV diminished its effective cross-country speed so much that it could not keep up with the fleet T34s and T60 light tanks. While the KV had been universally popular in 1941 because of its armor advantages, by 1942 the Germans were introducing new guns and ammunition to deal with it, and its vices were becoming more evident. In June 1942, for example, Lt. Col. Strogiy, who commanded a tank brigade fighting on the Kerch Peninsula, reported

to STAVKA that his KVs had been penetrated by a new German round using the shaped-charge principle. Several of the top Soviet tank commanders were questioned about their views on Soviet armored equipment by STAVKA.

General Pavel Rotmistrov, who began the war as a Colonel commanding the 8th Tank Bdg. and ended the war in charge of the Soviet armored forces replied: "The difficulty is that while there isn't much difference in speed between the light [T60] and medium [T34] on the roads, when moving cross-country the light tanks are quickly left behind. The heavy tank [KV] is already behind and often crushed local bridges which cut off units following behind. Under battlefield conditions, that too often meant that the T34 alone arrived; the light tanks had difficulty fighting the German tanks anyway and the KVs were still delayed in the rear. It was also difficult to command these companies as they sometimes were equipped with different types of radios or none at all."

Rotmistrov's opinions were not universally shared, and he sent a team of engineers from Tankograd to visit one of his battalions attached to the 7th Tank Corps commanded by Col. I. A. Vovochenko. The crews belittled the complaints, and an old-timer who had driven tractors at an agricultural station before the war quipped, "After running those damn old tractors, well, the KV... that's class!"

The problem of the slow KVs not being able to keep up with the other tanks was most seriously felt in the newly raised "tank corps." The tank corps were in fact divisional-sized formations with two tank brigades and a brigade of motorized infantry plus support elements. Until a technical solution could be developed it was decided to pull most of the KVs out of the mixed tank brigades and form them into independent heavy tank regiments for use by army commanders in assault and infantry support missions; formed in October 1942 these units had 21 KV-1s each, divided into four platoons. But clearly design improvements were desparately needed.

The SKB-2 design team was in a quandry. On the one hand, the troops in the field wanted a faster, heavier tank. They also wanted the thick armor retained or improved in view of the appearance of new German tank guns and ammunition such as the shaped-charge rounds and the tungsten-cored AP rounds. On the other hand, the industrial representatives at the GKO (Central Defense Committee headed by Stalin) were reluctant to introduce a new, more powerful engine since it would badly upset production at a time when tanks were desparately needed on the Stalingrad front.

The design team had not been idle. While much of their effort had been redirected towards manufacturing improvements, a number of new design initiatives had been undertaken. In many respects, the KV-3 would have been the ideal solution if it had entered production in 1942 as planned; however, it required a new powerplant. One example of these new designs to reach production was the KV-8 flame-thrower tank, which saw service in small numbers.

A stop-gap solution was the KV-1S (s:skorostnyi=speedy), a lightened version of the KV-1 Model 1942 of which 1,370 were built between August 1942 and April 1943. A smaller, thinner turret of better ballistic shape featured an improved layout, the commander being relieved of his role as loader and given an all-round vision cupola behind the gunner's station. Other changes were 75mm. hull armor, reduced applique armor, lightweight wheels, a steamlined engine deck and new periscopes. The KV-1S was rushed to the new independent heavy tank regiments; some were also used by regular tank brigades, due to their improved speed. Among the first units so equipped were those earmarked for the Stalingrad counter-offensive; the best-known of these was the 121st Tank Bde. of the 62nd Army, later granted the title 27th Guards Tank Bde. for its performance in that campaign.

The Kotin team's approach was not universally popular among tankers; many expected to encounter new German designs which would require better Soviet tank armament. At a meeting with Stalin in September 1942, General M. E. Kastukov -- who commanded the first Soviet tank brigade to be granted the "Guards" title, for service at Mtensk before Moscow in October 1941 -- was asked for his opinion of the quality of Soviet tanks, and replied: "The T34 fulfills all our hopes and had proven itself in combat. But the KV heavy tank... the soldiers don't like it... It is very heavy and clumsy and not very agile. It surmounts obstacles with great difficulty. It often damages bridges and becomes involved in other accidents. More to the point, it is equipped with the same 76mm. gun as the T34. This raises the question, to what extent is it superior to the T34? If the KV had a more potent gun or one of greater caliber, then it might be possible to excuse its weight and other shortcomings."

Kastukov's views were remarkably prescient: in January 1943, the Red Army had captured a new Tiger E near Leningrad. Heavily armored and armed with a derivative of the 88mm. Flak gun, it could not be penetrated by the Soviet 76.2mm. gun of the T34, KV-1S and SU-76 Suka tank destroyer. Clearly, the technical advantage enjoyed by the Soviets since June 1941 was about to disappear.

Various heavy tank designs were underway under the designation KV-13, but none were sufficiently developed; as a temporary antidote to the Tiger, the GKO, therefore, ordered on 4 January 1943 that the SKB-2 team begin urgent work on a heavy SP gun. Kotin and L. Troyanov began work on two projects. The KV-12S planned 203mm. howitzer lacked the range to engage the "88", but the ML-20 152mm. gun-howitzer of the KV-14 was more promising. The prototype -- a simple fixed superstructure on a KV-1S chassis -- was built in only 25 days; trials went smoothly, and on 4 February the GKO ordered Red Army adoption of the design as the SI-152 (SI:Samokhodnaya Ustanovka = self-propelled mount). Planned KV-1S construction was reduced in favor of the new tank destroyer, and assembly of the first SU-152 began on 1 March 1943.

The Kursk-Orel battles of summer 1943 marked the swansong of the

KV's; of 3,400 Soviet tanks on the Central Front, only 205 were "heavies," and of these at least one regiment were Lend-Lease Churchills. Production of heavy tanks dropped sharply in 1943-45 KV-1S's were built that year, compared to 2,553 in 1942, an obvious acknowledgement of the tank's shortcomings. The experience of the 2nd Bn., 181st Tank Bde., 18th Tank Corps near Petrovka illustrates the changed fortunes of the KV. Captain P. Skrypin's battalion attacked a Panzer unit in hilly terrain, but was badly torn up by the long-range guns of the static Tigers. Ordering his KV-1S forward on an evasive course in a successful attempt to rally his shaken unit, Skrypin hit one Tiger at least three times. His KV was then hit twice, killing the loader and badly wounding Skrypin, who was dragged from the smoldering wreck by the driver and operator while the gunner remained at his post. The 76.2mm. gun was unable to cripple an approaching Tiger, however, the gunner died from a third "88" hit. To protect Skrypin where he lay wounded in a shell-hole, the driver returned to the burning KV and rammed the Tiger, whereupon the ammunition stowage exploded with shattering effect.

The SU-152 fared better at Kursk. A heavy SP regiment with 12 guns -- later raised to its full strength of 21 -- was committed by High Command Reserve; in three weeks of combat it claimed 12 Tigers and seven Elefants, giving rise to the SU-152's unofficial nickname of Zvierboy -- Animal Hunter!

The inadequacy of the 76.2mm. ZIS-5 gun was now painfully obvious; at Kursk many Soviet tanks were gutted by Tiger and Panther units at over 1,000 meters, and the key engagement at Projhorovka was won only by getting to point-blank range -- sometimes only 300m -- by clever use of terrain.

For the accelerated development of a new heavy tank the SKB-2 team was split. The Factory No. 100 team lead by Kotin came up with a radically new vehicle dubbed the "IS." A prototype IS-1 or IS-85, was shown to Stalin in August 1942. It had a thickly-armored, large diameter turret mounting the new D-5T 85mm. gun designed by the Peterov bureau; an uprated version of the same engine as the KV and T34; and a new planetary transmission which cured the problems suffered by the KV. The running gear was similar to that of the KV, but the hull was radically redesigned, incorporating the cast front evolved during the KV-13 program. The improved turret layout of the KV-1S was retained, but the fifth crewman (the radio operator) was eliminated to save space. The IS-1 tank evolved into the IS-3 version and later the T10, but these were not seen in great numbers in the latter stages of WW II.

The Russian Army continued its assault against NAZI Germany while the Allied Forces continued up the Italian Peninsula, and then began a second front in France in June 1944.

Strategic bombing of German factories and research facilities was beginning to have its effect on German production as was so dramatically pointed out at Kursk. Hitler was feeling the pressure

and in the summer of 1943, with his German armies bogged down in the vastness of Russia and his cities blazing under the night attacks of the Royal Air Force, Adolf Hitler turned to Germany's scientists for a decisive means of victory. Germany had the best aircraft and rocket-designers in the world, but until 1943 their talents had been ignored -- Nazi Germany's existing war machine was sufficient to win the war, it once had been thought.

Now Hitler ordered a crash program of weapons development that would redress Germany's increasingly unfavorable military position. But the German dictator didn't really favor new jet and rocket-propelled aircraft that possibly could sweep the skies over France when the Allies at last invaded Continental Europe. Hitler instead demanded that his technicians give him Vergultungswaffen -- vengeance weapons that would allow Nazi Germany to retaliate against the British bombing campaign with an overwhelming barrage of destruction.

German science came through with appropriately fearsome weapons. Ever since the 1930s, the German Army had been experimenting with large rockets. By 1942, the German Army had developed the A-4, a 12-ton rocket with a one-ton warhead and a range of 200 miles. At the same time, the Luftwaffe had been working on its own project, a small "flying bomb," also with a one-ton payload. Once the word was given, testing and production of these devices -- subsequently and respectively to be known as V-2 and V-1 (V was for vengeance) -- went into high gear.

The British had a secret weapon at work, too, however -- their unmatched intelligence apparatus. And the Englishman first confronted by the menace of Hitler's proposed V-weapons was Dr. R. V. Jones, now serving in a dual capacity as Assistant Director of Intelligence (Science) on the Air Staff and as Scientific Advisor to MI-6, the British Secret Intelligence Service (SIS). Jones thus was strategically positioned at the center of an intelligence web that had as one source the traditional HUMINT -- intelligence derived from prisoners of war or spies. At the beginning of the war, HUMINT had been negligible, but in the course of the conflict, the British had captured plenty of Germans to interrogate, while resistance groups springing up throughout occupied Europe also proved valuable intelligence assets.

Jones and his colleagues had two more powerful collection assets in their intelligence arsenal: photographic reconnaisance (PHOTINT) and the interception of enemy radio signals (SIGINT). Stripped-down RAF Spitfires and twin-engined Mosquitos made daring reconnaissance missions deep into occupied Europe; the film footage in their cameras was analyzed at the interservice Central Processing Unit at Medmenham. German radio traffic was intercepted by special signal units all around the periphery of the Continent and analyzed at the Government Code and Cypher School in temporary huts at the secluded manor of Bletchley Park, the legendary "Station X."

The Germans coded much of their high-level traffic on the Enigma,

a three-rotored electromechanical cipher device which mathematically afforded 1,570,000 ways of encrypting each letter in a message. The Germans believed the Enigma afforded impenetrable security. The cryptanalysts at Bletchley Park knew better. The decrypts obtained at Bletchley Park gave Prime Minister Winston Churchill his "most secret source" -- they provided British intelligence with an unmatched window into Nazi Germany.

The first intimations that Nazi Germany might be developing exotic secret weapons had crossed Jones' desk in 1939. Implausibly, they came in the form of a seven-page letter that had been mailed to the British naval attache in Norway. Written in excellent German, the letter discussed a wide range of German technical developments, and in particular described on-going experiments with long-range rockets. It also mentioned that the island of Peenemunde in the Baltic was being used as an experimental station for rocket-powered gliders. The letter was so informative that intelligence analysts at first were inclined to disbelieve it. For obvious reasons, the writer had chosen not to sign his name, and it seemed incredible that one person would know so much about so many technical secrets.

The "Oslo letter," as it was known, was almost forgotten until the winter of 1942, when Jones began to hear reports from SIS sources on the Continent of dreadful new weapons under development. Additional reports were also received from prisoners-of-war. However, the reports were conflicting, and sometimes absurd. In March 1943, however, more substantial information came in. General Ritter von Thoma, captured in North Africa, was now a guest of His Majesty's Government at a special interrogation center for high-level enemy personnel. As a good German general, von Thoma was naturally reticent about what his country was doing. When put into a cell with another high-ranking German officer, however, von Thoma was more loquacious, British monitors heard him say that "no progress whatsoever can have been made in this rocket business" -- He then went on to mention that he had seen rocket tests at the German artillery test center at Kummersdorf.

This was fascinating -- von Thoma, openly critical of Hitler's do-or-die instructions to his Afrika Korps -- was the nearest thing to the horse's mouth the British were likely to get. However, he still did not provide British intelligence the exact nature of the new enemy weapons. Jones decided to have reconnaissance flights sent over Peenemunde -- the name had cropped up again in reports -- and to have British SIGINT look for German radar that might be tracking experimental flights.

Meanwhile, British Military Intelligence, also with access to the von Thoma interview, had passed the information on to the Chief of Staff and the War Cabinet. A special committee was set up under Duncan Sandys, the Joint Parliamentary Secretary to the Ministry of Supply, to evaluate related intelligence and to propose counter-measures. Sandys' committee engaged in vigorous debate. Some of its scientific advisers maintained that such rockets as had been

described would be impracticable (meaning that they hadn't figured out how to build such things themselves). Professor Lindemann, Winston Churchill's personal science advisor, insisted that what the Germans must really be working on was a pilotless bomb, which would be much cheaper and closer to the state-of-the-art than a long-range rocket. Lindemann was partially right: the Germans were working on a pilotless bomb, but since that was a Luftwaffe project (it had wings), the German Army insisted on developing its own weapon.

The truth about the rocket could only be derived from hard intelligence on what the Germans were doing, not from London-based speculations. Fortunately, the Nazis were using drafted foreign labor at Peenemunde, and this labor pool produced detailed intelligence reports for the SIS. Photoreconnaissance at first was inconclusive, partially because the interpreters at Medmenham did not know what to look for -- British scientists had assumed that a 100-foot projector would be needed to launch a rocket, and no such things appeared in the photographs. Finally, in June 1943, Jones picked out a 35-foot cylinder on a railway truck. The existence of the V-2 rocket thus was confirmed -- and hearteningly, there was only one of them, a point indicating the weapon was still in a test phase.

This was enough for the decision-makers. On the night of August 17-18, 1943, Pennemunde was heavily bombed, with the bomb patterns precisely selected to destroy installations and kill technicians. It succeeded. Peenemunde was abandoned, causing a possibly crucial two-month delay in the V-2 development program. Future rocket production was moved underground; the rocket-testing operation was shifted to Blizna in Poland, 170 miles south of Warsaw, where it would be out of range of the RAF. Unfortunately, the bombing had an unintended side-effect: the bombs also hit the slave labor camp which had been furnishing the SIS with intelligence reports -- no reports from this source ever came in again.

Meanwhile, British intelligence had begun to collect information on Hitler's other vengeance weapon. A member of the Danish resistance sent in a photo of a flying object that had crashed on the island of Bornholm. It was not a rocket, but some kind of pilotless plane. Around the same time, an SIS source in the Nazi armament ministry indicated that the Germans were working on not one, but two secret weapons: a rocket and a pilotless bomb. This revelation clarified the reason why previous reports on secret weapons had been so apparently contradictory. SIGINT soon began to give indications of the V-1: a mysterious special unit, Flakzielgaraet 76, was mentioned in German radio communications, and then German radar units were overheard monitoring the low-level flights of some type of unidentified object. Its reported speed indicated it could not be a supersonic rocket, but rather some kind of aircraft. Finally, in November, V-1 itself appeared on the steroscopic lenses of the Medmenham photo analysts: a tiny cruciform shape on a ramp at Zempin, ten miles from Peenemunde.

The discovery of the ramp gave British intelligence a new insight into other developments. By the fall of 1943, the French Resistance had noted that the Germans were constructing unusual facilities all along the Cotentin peninsula and the Pas de Calais. Some of them were huge concrete bunkers, but most consisted of a complex of nine buildings (three of which looked like enormous skis tipped on their sides), together with a ramp pointing towards London. These reports were corroborated by photo reconnaissance. The "ski sites," as they were called, had not initially been associated with the flying-bomb threat. British scientists had first assumed that pilotless aircraft would take off from runways like the regular models. Again, they had not thought like their enemies: the V-1 "Buzz Bomb" used jet assistance to take off along a track. Discovery of the ramp at Zempin (and others belatedly found when interpreters took a fresh look at the old photos of Peenemunde) forced a fast reassessment of these sites.

From December 1943 to March 1944, British and American air forces pulverized the "ski sites" and the other new facilities in France -- as it turned out, most of the latter had been intended to store V-2's; one was designed to house an experimental (and unsuccessful) long-range gun. Up to a point, the bombardment was successful. The Germans abandoned all the sites. They did not abandon their plans, however. Vengeance weapons thereafter were stored in caves. Less obvious facilities for launching V-1's were improvised, and it turned out that the massive concrete forts Hitler had ordered as V-2 launch sites were not needed. The rocket could be tansported on a prime mover and fired from any patch of asphalt.

However, British intelligence and German miscalculation had provided the Allies with precious time. In his book Crusade for Europe, General Dwight D. Eisenhower later speculated that if the V-weapons had been unleashed against the crowded British ports prior to D-Day, it might not have been possible to bring about the Normandy invasion. But they were not. The special Luftwaffe regiment assigned to fire the V-1 was not able to get a weapon into the air until a week after Normandy.

The original intent had been to blast London with thousands of tons of high explosives in a single day. In the event, Flakregiment 155(W) launched exactly ten V-1s on June 13, 1944 and only four hit London. And, forewarned by good intelligence, the British were prepared. They had had six months to prepare an elaborate system of anti-aircraft defenses -- fighters, AA guns, and barrage balloons -- with which to counter the robot bomb. Vengeance still had its day -- working from sites that stretched in a vast arc around London, the Germans built up their rate of fire, and more than a quarter of the 8,600 V-1s they launched during the summer of 1944 impacted on the Greater London target.

Even at this stage, though, British intelligence was able to limit the damage. Many a German agent in Britain was securely under the control of MI-5, the British Secret Security Service, and their

misleading reports on where the robot bombs were hitting deceived the Nazis in their aiming.

When the Germans finally deployed V-2, there was no defense, a fact of which British intelligence was all too painfully aware. Blizna was not out of range of British intelligence. There was an active and productive Polish Underground, and the German Enigma still provided useful decrypts. By the time the first V-2 fell, Jones gradually had built up a complete picture of its performance characteristics. British officers had been allowed to inspect a weapon that had gone astray in Sweden, and the Underground had contributed physical evidence: a Polish patriot carried fragments of a V-2 in a sack on his bicycle for 200 miles and hand-delivered it to an enterprising British intelligence party that dared to land behind enemy lines.

In 1943, however, there were no countermeasures available that could stop a supersonic rocket. Still, the day would be saved. Thanks to the time gained by the British through the bombing of Peenemunde (and time lost by the Germans due to production delays -- 65,000 modifications had to be made in the original design), the first V-2 could not be fired against England until September 8, 1944.

The United States Military-Scientific community was also monitoring German developments which until 1943 had been limited to an analysis of captured material. The military had begun to print Technical Manuals on Enemy equipment but with the publication of "Basic Manual of Military Small Arms" this aspect of intelligence was now firmly established as a means of keeping the troops informed about fielded equipment. There was, however, very little being done in the way of attempting to identify future weapons which might appear on the battlefield. Once this gap in our knowledge had been recognized, the War Department, with the cooperation of the Navy Department and the Office of Scientific Research and Development, organized the Alsos Mission in November, 1943.

The organization of a mission which could achieve the object set forth had to be different in several respects from any other intelligence unit in existence at that time within the armed forces of the United States or Great Britain. First, it should include in its personnel individuals capable of extracting scientific information in detail from persons interrogated; second, it should include individuals having a rather broad background knowledge of the research program and interests of the United Nations, and where possible, of enemy nations; third, it should include personnel with a general knowledge of enemy equipment; and, fourth, it should be prepared to seek out not only military technical personnel and laboratories, but also civilian scientists and research laboratories and institutions. It was thus expected that its activities would supplement, not overlap or interfere with, the intelligence units in the field, and such actually proved to be the case.

The mission consisted of the following scientific personnel:

Major William P. Allis, AUS War Department; Lt. Commander Bruce S. Old, USNR Navy Department; Dr. James E. Fisk, Office of Scientific Research and Development; and Dr. John R. Johnson, Office of Scientific Research and Development. Lt. Colonel Boris T. Pash, MI, representing G2, War Department, was placed in command of the mission. He selected an executive officer, Captain W. B. Stanard, Infantry, four interpreters, and four Counter Intelligence Corps agents to complete his staff.

Prior to departure of the mission, letters of introduction were obtained from the Honorable Secretary of War, the Assistant Chief of Staff, G2, and the Coordinator of Research and Development, Navy Department. These letters later proved invaluable in establishing relationships in the field of operations. The mission assembled at Allied Force Headquarters, Algiers 14 December 1943 and began operations immediately. Credentials were presented to Major General W. B. Smith, USA, Chief of Staff; to General D. D. Eisenhower, USA, Commander-in-Chief, Allied Force Headquarters, Algiers; Major General K. W. D. Strong, GS, Assistant Chief of Staff, G2; and Vice-Admiral H. K. Hewitt, USN, Commander-in-Chief, United States Navy North African Waters. The complete cooperation of all the aforementioned commands in furthering the mission was obtained. Colonel T. E. Roderick, GSC, Deputy Assistant Chief of Staff, G2, was delegated as the liaison through whom the mission would work at Allied Force Headquarters, Algiers.

The mission departed for Italy 17 December 1943 and established headquarters in Naples. The mission interviewed many Italian Ordnance officers, scientific and engineering personnel. It was found that Italy had many war research projects but lacked the organized and coherent effort necessary to carry them through to completion. Germany, on the other hand, mobilized its scientists effectively and engaged them in a tremendous research program that had produced important results and was continuing actively. In general, the Italians knew few details about German war research, but gave willingly what information they had. The report presented a summary account of the information gathered by the Alsos Mission from Italian sources. Recommendations were made concerning future missions of this type.

The final report of this mission was prepared by March 1944 and copies were provided to the G2 War Department, the Technical Advisor of the Secretary of War, the Secretary of the Navy's Coordinator of Research and Development, the Office of Scientific Research and Development, Naval Intelligence National Advisory Committee for Aeronautics, the War Department Liaison Officers with the NDRC and Allied Force Headquarters in Algiers, the latter being a courtesy to the headquarters which had supported the mission.

Several months prior to release of the final report, work had begun on preparations for a cross-channel invasion from England, landing on the Normandy coastline of France. To confuse the Germans as to the true location and timing of the operation, the code name

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"Neptune" was chosen.

General Eisenhower arrived in London on January 13th and established what was officially coded the Supreme Headquarters, Allied Expeditionary Force (SHAEF). General Eisenhower and his staff became involved in developing the general strategy for operations on the continent, air and naval support, as well as logistic support during and after the invasion. Key considerations included the destruction of the German industrial base centered in the Ruhr and Saar areas. Also of prime importance was destruction of Germany's oil production capacity for without fuel, the German war machine would grind to a halt.

While British Intelligence continued to locate and develop an understanding of the capabilities of new, unfielded weapons, the SOE and OSS continued to prepare to operate guerrilla warfare in the interior of France in support of the landings. British commanders who had been conducting coastal raids continued to raid the coast line and gather data and equipment that was used by the Germans in their coastal defense. In secluded parts of England full scale mock ups of these positions were constructed and used to develop new methods of breaking obstacles. In the United States, at an air base in Florida, a life-size replica of a V1 rocket launching site was constructed and American pilots practiced bombing these sites.

The American combat forces that were to make up the invasion force were assembled in England and placed under the control of the 1st U.S. Army. The official report of operations prepared by 1st U.S.Army in August 1944 indicates that for seven months before D-Day, in Bristol and in London, the G2 Section of the 1st U.S. Army had one major mission: to know the enemy, his strength, dispositions, capabilities and intentions in the Cherbourg Peninsula and to put that information in the hands of those who could make use of it. All other work -- training, preparation for operations in the field -- was secondary.

During the planning period the G2 Section was made up of 15 officers and 21 enlisted men. For the operation "Neptune" no less than 16 intelligence teams were attached. The intelligence gathered by the G2 Section was published in various forms -- plans, estimates, overlays, defense overprints.

During the period immediately preceding the invasion, the Order of Battle Section, made up of 2 officers and 3 enlisted men, was responsible for keeping army and lower echelon intelligence sections informed on the organization, composition, disposition and commanders of enemy formations in France and in the Low Countries. It also prepared OB maps and kept files of reports and information to be used in the field.

The OB Section moved into the field in two parts. The section chief and his assistant landed in France on 7 June, the balance of the section, consisting of NCOs with office equipment and files,

landed on 12 June. Once established in France the OB Section concentrated on information on enemy units in contact or of immediate concern. Periodic OB reports were prepared listing changes, new identifications, armament and movements of enemy formations.

The following main files were kept:

1. Card file on all units in contact or expected, including history, commander, composition and dates of identification.

2. File of enemy personalities.

3. List of Field Post Numbers.

4. File of periodic reports and estimates both from higher headquarters and lower echelons.

5. File on translated and evaluated enemy documents of OB interest.

6. Worksheets on enemy units containing detailed information on composition, history, strength, morale, etc.

7. Miscellaneous OB data.

The main sources of OB information were: Intelligence Summaries and reports from higher headquarters (U.S. and Allied); reports submitted by corps and division G-2 sections; PW interrogations; captured maps and documents; special reports of agents in the field; information as gathered from all units and sections in contact with the enemy; and information from enemy broadcasts and press.

A senior officer in the G-2 Section exercised general supervision over prisoner of war interrogation in the First U.S. Army. He appointed an officer interrogator from one of the four Army PWI teams as chief interrogator and administrator for all PW interrogation personnel at the army cage. Each PWI team consisted of two officers and four enlisted men. Of the four army teams, two were loaned for the assault phase to V and VII Corps for the purpose of operating in the beach cages. The two interrogation teams on loan to V and VII Corps for manning the beach cages moved forward to divisions and were not immediately available when First Army Hq Advance Echelon came ashore. The one officer and two EM moving with the advance echelon went ashore at the V Corps beach on 8 June and began processing prisoners in the beach cage, reporting to G-2 Section, V Corps, and once daily by liaison to First Army. As soon as overland communications were established with VII Corps beach, on or about 16 June, interrogation personnel began processing prisoners in that beach cage, reporting in daily to Hq First Army. The two army interrogation teams operated in separate cages at the V and VII Corps beaches until the fall of Cherbourg, at which time both V and VII Corps returned the interrogation teams that had been loaned to them. At that time army interrogation personnel had its regular complement of four teams, comprising eight officers and 16 enlisted

men. These teams operated in two or more cages until the establishment of a single army cage at St. Jean-de-Daye on or about 1 August. With the establishment of a single army cage, team identity was disregarded except for administrative purposes.

Prisoners were evacuated directly from division cages or collecting points to army enclosure. Normally prisoners reached the army cage within 24 hours of capture. Upon arrival at the army enclosure, prisoners were searched immediately. They were then sent to the interrogation section of the enclosure, where they were separated by units and assigned specific areas to await interrogation. During this segregation a head count by unit was taken for use by the Order of Battle Section of G-2. At this point, the chief interrogator assigned an interrogator to each enemy unit represented and actual interrogation began. At the conclusion of this assignment, the interrogator prepared a consolidated report. If a prisoner of special interest was encountered an individual report was written. Occasionally prisoners of high rank or extraordinary interest would be held for interrogation by the AC of S, G-2, or senior officers of the G-2 Section.

During the period 8 June - 1 August 69,650 prisoners were processed. Except during the period of the capture of Cherbourg, when the number of prisoners ran into many thousands daily, all prisoners were interrogated. Experience demonstrated that six interrogators could effectively process 200-259 prisoners every 24 hours.

The information gathered from prisoners was a chief source of intelligence on enemy order of battle, morale, intentions, weapons including V-1, and all other matters of importance concerning the enemy. An overwhelming number of the prisoners talked willingly. German officers, at first reluctant to talk, supplied valuable information after the invasion gathered force. In general, the morale of prisoners deteriorated week by week and the PW cages of First U.S. Army provided a sorry picture of Hitler's "Master Race".

The Army Signal Intelligence Service (S.I.S.) provided intelligence to the Army G-2 by interception and analysis of enemy radio transmissions. An organization consisting of four radio intelligence companies operated under the technical direction of the Army S.I.S. to produce a composite picture of enemy radio activities on the army front. Of the four companies, the 113th Signal Radio Intelligence Company was assigned to Headquarters First U.S. Army. The 113th Signal R.I. Co. manned 24 intercept watches and six direction finder stations. The other three companies, the 3250th, 3251st and 3252nd Signal Service Companies, were assigned to army and attached to V, VII and XIX Corps respectively. Each of the companies contained an analysis section capable of processing low grade German traffic.

Each company was controlled operationally by its respective G-2. The technical control by the Army S.I.S. was maintained through

a subsection consisting of three officers and three enlisted men who operated at the Army Signal Radio Intelligence Company. Two of these officers were British. This subsection continuously coordinated the analysis activities of all four companies and was the focal point through which all results were passed to G-2 of army. Technical control was exercised over the Army S.I.S. by Hq 21 Army Group, since augmentation of the limited picture of army with the panoramic picture of higher headquarters was essential in the complex business of analyzing German traffic. Lateral liaison with the S.I.S. of flanking armies and Air Corps Sections was maintained in order that a complete picture of the enemy's radio activity could be provided G-2's of army and corps.

Within a few days after D Day it was obvious that the enemy had put down most of his thoughts on paper. The flow of documents from corps to Army G-2 began to be overwhelming -- from 250 lbs. to 1,000 lbs. and more daily -- and the Army Document Team, originally scheduled to arrive in France on 6 July arrived, on request, on 20 June. The Document Team was made up of one officer and four NCO's, all trained in German, enemy order of battle and in the exploitation of documents.

Through close cooperation with corps, the majority of documents reached army not later than 48 hours after capture. Documents of tactical or strategic value to the G-2 and other sections were immediately disseminated and whenever necessary an extract or a translation of the document was made. These translations appeared almost daily in the G-2 Periodic Report. Documents of importance to higher echelons were evacuated to the 2q Army Group Document Section and to SHAEF Document Section, Forward Echelon. Documents of no value at all were destroyed.

Occasionally, at the request of corps, the team went forward to help process large batches of captured documents. In this manner the document section was active in Cherbourg, La Haye-du-Puits, St. Lo and Coutances.

During the first stage of the invasion the documents captured had been written with typical German thoroughness. Official papers were neatly typed and each document followed German Army regulations. Private letters captured welcomed the start of the invasion as the opportunity the Germans had been waiting for to bring about final victory. A notable change took place after the fall of Cherbourg. The documents revealed that the Germans were less sure of themselves and also less security-minded. Captured mail bags contained letters which had been delayed for many days for lack of personnel and transportation facilities. There was no longer any talk of an early victory. At best there was hope for a miracle or the personal hope to come out of the war alive. Letters from Germany clearly reflected the effects of our bombings, complained about long working hours and lack of food, and were gloomy in their outlook for the future.

The rapid advance during the latter part of July produced reports and orders, frequently handwritten, showing organizational and moral disintegration of the German forces. There were warnings and threats about the consequences of desertion and about giving information to the enemy after capture. Official reports about combat experiences in France never mentioned the word victory. The necessity of saving weapons, ammunition, and equipment was stressed. Air Reconnaissance, which had produced a great deal of information at theater and national level, did not get the same priority in organizing 1st Army G-2 section. Although the G-2 Air Section as such was not organized until 21 June, the importance of aerial photography and visual observation was recognized early as one of the most, if not the most, important source of information of the enemy. Two major types of aerial reconnaissance were available to First Army: Visual Reconnaissance (Tac R) and Photo Reconnaissance (PR).

On 23 May an officer from the G-2 Section was sent to Middle Wallop Airfield, England, as G-2 representative with the IX Tactical Air Command to coordinate all matters pertaining to aerial reconnaissance during the initial phase of operation "Neptune". This officer was later aided by an officer assistant from the G-2 Section, an artillery officer to handle requests for long range fire adjustment and two clerks from the Army Photo Interpretation Detachment, which was stationed at the airfield. From these, a section was organized to process all requests for photographic and visual reconnaissance and to furnish the results to the army and its subordinate units. The section operated from a photo interpreter's truck parked adjacent to the Operations Office of the 67th Reconnaissance Group. This group consisted of the 107, 109, 12 and 15 Tac/R Squadrons and the 30th PR Squadron. The 107, 109 and 30 Squadrons were to fly missions for First Army. The 12 and 15 Squadrons were to support 21 Army Group. All requests for missions were made to the Director of Reconnaissance, IX Tactical Air Command.

A plan for visual reconnaissance covering all main roads under enemy control as far south as a line Granville-Vire was drawn up prior to D Day. With the advance of our forces after D Day Tac/R missions flew deeper into enemy territory. Although the number of Tac/R missions varied, approximately 40 planned and request missions were flown daily.

During the first week of operations, when communications with army and corps G-2's on the continent were difficult, the G-2 representative at Middle Wallop planned daily reconnaissance, based on developments in the field, and requested additional missions as the situation required. Later, with the improvement of cross-channel communication, the G-2 representative at Middle Wallop coordinated requests from army, corps and divisions. In mid-June the G-2 representative at Middle Wallop moved to the Army C P on the Continent to prepare for the transfer of all operations to France. The rest of the section followed at the end of the month when the first squadrons were based in France.

For operation COBRA on the 25th of July, a new plan for aerial reconnaissance was drawn up which provided for 10 missions for artillery fire adjustment and hourly reconnaissance of the main and secondary roads into the breakthrough area in addition to 20 missions on call by corps leadings or army.

To handle the large number of photographic prints produced by the PR Squadron and to obtain intelligence from these prints as quickly as possible, the First U.S. Army Photo Interpretation Detachment (APID) was organized. This detachment consisted of a basic organization of 2 officers and 35 EM, plus 9 attached photographic interpretation teams. APID made first and second phase interpretations of all prints received and disseminated intelligence derived to army, corps and divisions. It also distributed prints to the appropriate units.

Until 29 June, when APID was established on the Continent, delivery of photography to the beachhead was made by the following methods: Naval Dispatch Letter Service which ran power boats from Portsmouth Harbor to the far shore; 30th Photo Reconnaissance Squadron of 67th Reconnaissance Group which flew photography to advanced landing strips on the far shore; and C-47 cargo airplane of Hq. IX TAC which flew 2 courier trips a day.

Before operations were transferred to the Continent, all immediate intelligence gained from Tac/R and PR was sent to army, corps and divisions by the following means: a radio broadcast every two hours; facsimile radio transmission of photographic and also of written reports; and radio telephone.

After Tac/R and PR were fully established on the Continent intelligence was disseminated by teletype and telephone from the airfield and from the G-2 Air. Thus, the formal organization of the combat intelligence system was established and would continue throughout the rest of the war. The basic concept was an organic G-2 section supplemented as needed by teams of intelligence specialists, operating as low as the combat command (regimental level). As in the past, the emphasis in the intelligence effort was upward and rearward. Dissemination of information to the troops was rare. In most cases the results of the intelligence community came back down to the troops as an operation order or plan. There was little emphasis placed upon troop training and little thought given to the use of captured equipment, either for intelligence or for training.

One officer who served with the 79th Infantry Division and landed at Normandy wrote that, "As far as I can recall, we received very little, if any, pre-invasion training regarding German weapons and equipment. Most prominent in my memory are several short sessions on aircraft recognition. Nearly everything we learned we picked up on the battlefield through experience. The Bn. S-2 and his intelligence platoon may have received special training in that regard; it seems logical, but I don't really know. I don't recall

having heard one word about what to do with captured weapons. If they weren't easily portable and worthy of being kept as souvenirs, we just considered them part of the after-action debris and let it go at that. I don't recall any instance when either Bn. S-2 or Regtl. S-2 ever brought up the subject or exhibited any interest in captured weapons.

As I said above, we picked up our knowledge of German weapons through experience. The most notable of these, as far as our outfit was concerned, was the 88, the Miniwerfer, the "potato masher," the "burp gun," the Tiger Royal tank, the "Bouncing Betsy" anti-personnel mine, and, above all, smokeless powder. The German rifles, MGs, standard artillery and mortars, mines, etc. we more or less expected mainly because they were consonant with what we had and we expected to encounter, roughly, the same thing. The ones I mentioned were surprises and, as in the case of most surprises in combat, usually costly. In all honesty, I don't know how much we could have done about them even after we knew, but at least we could have been wary.

Just a few examples. Crossing the Ay River on a night attack in the breakout from Normandy, we ran into Bouncing Betsey's for the first time. Since they were bursting about shoulder height, our first reaction was that we were getting air or tree bursts from some type of mortar... and we hit the ground with some troops landing on Bouncing Betsy's still in the ground and detonating them. By the time we realized what we were up against, my company had taken one of its worst casualty lickings of the war. (We passed the word back that when you heard a click, to freeze, and quickly crouch as low as you could... then the Bouncing Betsy would burst upward and outward over your head.)

Across the Seine River at Mantes Gasicourt, 40 miles north of Paris, in August, 1944, the Germans counterattacked with a force of infantrymen and tanks from Holland. We had just some 1,500 yards between our lines and the river to our rear... and had to hold. The tanks were what we called Tiger Royals, and it was the first time we had encountered them. The Engineers had managed to throw up a bridge and get a tank destroyer outfit across to us, but head on with those Tiger Royals they had just as well been using pea shooters. And the Bn.'s AT Platoon, with I believe 37mm. guns at the time, didn't have a chance. We were in the edge of a woods and the only thing that slowed them down was cleaning out the German infantry that accompanied them. The battle raged for a couple of days, and what eventually backed those Tiger Royals off was some excellent support from our Tactical Air Force... though our tank destroyers did manage to disable a few tanks with flank shots. I know none of the infantrymen were prepared for those Tiger Royals (one man I had outposting our line about 25 yards down a road to our front came back in during the night attack and said when two rocket launcher rounds bounced off the nose of that tank to his front he decided it was time to leave... and I damn well didn't blame him), and, from their actions, I suspect the same was true of the tank destroyers. The word came down that the Tiger Royal was a new German tank which had been un-

been unveilded for the first time during our Seine River fracas. I don't know whether or not that is true, but they were a surprise to us.

Once the invasion force was established on the beachhead and had begun to expand, the Germans launched the first of their new V1 rockets. Forwarned, the British press immediately released drawings and plans of the weapons to avoid panic among their people. The rocket attacks were very effective in producing damage to London but would have been more effective if launched against the channel ports. The only effective means of stopping them was overrunning and capturing the launching sites. As the combat elements advanced across Europe other new weapons were encountered which in most cases came as a technological surprise to the troops.

In the combat zone, as the allied forces gained a larger beach head armor units were brought ashore and allied tactics began to resemble the German blitzkrieg, with armored spearheads leading the advance and infantry troops in close support followed by an ever expanding logistic tail stretching back through France, England and across the Atlantic Ocean. Among the first Armored units to land in Normandy was the 3rd Armored Division. The operation of the division's intelligence system is typical of all the combat units in the theater.

> "Beginning in Normandy in the division CP, in going into bivouac, would coil - make a circle as in Indian fighting - with the general's vehicle in the center. We did not have any specially fitted vehicles for a command post center, but our G-2 halftrack was altered, thanks to Col. Andrew Barr, G-2 and a sparse dedicated group of EM (we were under an old T/O, although a heavy armored division, one of two), so that the configuration was thus: behind the driver's seat was a map table with flat shelves beneath for map storage. Behind the front passenger's seat was a table with a typewriter in which, normally, was the G-2 Journal, with a fixed stool facing the typewriter. The bows supporting the canvas top were raised so that one could stand upright and the canvas lengthened. The interior of the canvas was painted white to reflect light. A Tiny Tim generator was installed under the hood of the vehicle so we would have light for preparing the midnight G-2 Periodic Report. Back of the typist chair, hanging from the bows, was a situation map. There were bench seats on either side of the back, except that in the left back corner was a safe for classified papers, topped by a field telephone with connection leading to butterfly nuts just outside, to which the signal corps men would connect telephone wires when we stopped."

All G sections also had blackout tents and we tried having a central war room tent in Normandy, but it did not work out and became

the gathering point for liaison officers, as there was a situation map maintained there, but not as up-to-date as that of G-3 (LTC Wesley A. Sweat). Really close relations were maintained by G-2 with G-3 and by G-3 with the C/S and CG. After the 3rd Armored crossed the Seine and were moving pretty fast at times we would continue on the road after nightfall and, on stopping, just pull over to the side of the road, in column. The telephones would be hooked up and messengers come from the message center.

After crossing the Belgium border the division began putting HQ CP in houses, selected by the G-2, LTC Jack Boulger, and this continued until the end of the war. Of necessity the planning would depend on the house plan. However, the central idea was to get the general - MG Maurice Rose - and C/S, Col. John A. Smith, Jr., and G-3 and G-2 close together. At the Prymn estate - Walfriede Haus - just outside Stolberg, Germany, where they were longer than another place, G-3 and G-2 were in a large living room on the second floor, with the general and C/S each having smaller corner rooms adjoining, access to which was gained by the large living room. G-1 and G-4 were elsewhere. The message center was on the ground floor just inside the entrance. There was a separate room for liaison officers, hosted by the chemical warfare officer, who had nothing else to do.

Getting back to G-2 operations, the order of battle team of Captain Milton Giffler was integrated into our G-2 operations and we also got valuable input from the POW interrogation teams, plus documents, and - when stationary - excellent interpretation of air photos from Captain Felix DeLeo and his team.

The 3rd Armored Division's primary fighting forces were the two combat commands A and B and a reserve command. The operation of the combat command S2's was best described by Major (Col.) William Castille, the S2. Third Armored Division was one of only two "heavy" armored divisions in the European Theatre. (Two tactical head quarters - CCA and CCB, two "big tank regiments, one large armored infantry regiments, lots of artillery, engineers, reconnaissance, signal - "the works".) As a consequence - we had great flexibility in forming up "task forces" for varying tactical situations.

3rd Armored Division's first combat actions in Normandy, France, were as combat commands. CCR, attached to 29th Infantry Division - June 29-31, 1944, and CCB, attached to 30th Infantry Division - July 9-15, 1944. Immediately after these initial combat actions - CCB got a new commander - Col. (later General) Truman E. Boudinot. He proved to be an aggressive, imaginative commander and directed his staff to "sort out" discrepancies, analyze and modify procedures; re-plan our command post layout and make equipment modifications. "Get busy and lets get organized for our next combat action. We have about ten days."

First off - it was apparent that the 33rd Armored Regimental Commander, and his staff - would head up a major task force of CCB

in the majority of tactical situations. So - the regimental S2 became S2/S3 and joined the regimental S3 section. I fell heir to the regimental staff (minus the S1) and; got the regimental S2 half-track. We "insulated" the General's command vehicles and the CCB - S3 section, to maximize attention to Combat Operations.

Major Castille went on to indicate that the Combat Command S2 section was further divided into two sections:

CCB - S2 (section one) - In addition to "enemy intelligence" this section maintained a large concise S2/S3 CCB situation map, provided drafting services and map preparation. We provided what we called "navigation responsibility; i.e., "Where are we?", communications with G2 (key wireless), and with CCB units (FM radio). In addition - this section provided a "waiting room" - assembly room - briefing room for task force commanders. Key staff officers. We usually arranged for the General to "meet the press" here.

CCB - S2 (section two) - This section was responsible for map supply and distribution for all troops under CCB command. It maintained communications with the staff of task forces (key wireless) and monitored the CCB command channels to task force commanders (FM radio). We "acquired" a fine multi-band radio receiver and charged one man to monitor news broadcasts (BBC, et al) from which was prepared a "Big Picture of the European War." He typed up a paragraph of highlights of the days news (this was a big hit with task force commanders). This section provided a "waiting" room for liaison officers, press people, vistors. I used this as my meeting room with specialty teams (CIC, 1PW, MPs).

In discussing the physical layout of the Combat Command's S2 section, Major Castille indicated that:

> "Tentage for the two half-tracks was fabricated in such a way as to provide a "lean-to" shelter - fastened to the right side of the half-track. This shelter could be enclosed at the sides for black-out conditions or inclement weather.
>
> We obtained a 2-wheel, 1/2 ton trailer - and hitched this to the CCB - S/2 half-track. We installed a small working desk and place for reference manuals, files, and periodic reports. This was to be my office - but was seldom used. Instead - its' principle use was to carry the large map boards, work tables and chairs, tentage and administrative pharaphernalia - while on the move. This gave us clear space, within the two half-tracks, to work on the moves, while at the same time having several soldiers "on the alert" with individual and vehicle weapons.
>
> After we crossed the Seine below Paris, we began using permanent buildings (houses) instead of tentage.

Half-tracks were driven - close up - with electrical lines and communication lines extended thru a window, door, or "a convenient man-made hole in the wall!"

The rapidity of the allied advance was controlled by many factors of which the enemy situation was first consideration but even more important was the logistical situation. Keeping supplies rolling off American production lines, across the Atlantic Ocean and into the theater had been difficult as German submarines still plied the Atlantic. As the allied were preparing to launch the cross channel invasion in June, a month earlier, in the middle of May 1944 United States Navy task group 22.3 known as a "hunter-killer" group sailed from Norfolk, Virginia to look for submarines. The task force was commanded by Captain Daniel V. Gallery, USN, (now a Rear Admiral) and comprised the escort carrier Guadalcanal, and five destroyer escorts under Commander F.S. Hall, USN: the Phillsbury, Pope, Flaherty, Chatelain and the Jenks. Their destination was a known U-boat rendezvous area near the Canary Islands.

Although the primary mission of the group was to find and destroy enemy submarines, Captain Gallery had long considered the possibilities of a daring plan -- to capture a U-boat alive. Such a prize would be of inestimable value to the Allies, not because of the U-boat itself but because of the equipment and documents it might yield. Standard tactics in dealing with U-boats called for sinking them as expeditiously and efficiently as depth charges, bombs and armour piercing ammunition could accomplish. But Gallery reasoned that if the U-boat could be forced to the surface, it might be possible to get some men aboard her under certain conditions. Since such an opportunity had seemed possible with a U-boat previously brought to the surface and sunk, he decided to prepare for it.

As the task group proceeded, a boarding party was organized aboard each ship and rehearsed in a role that few ever expected to materialize. After cruising almost as far south as Freetown, Sierra Leone, the task group headed north for Casablanca. About 150 miles off the coast of Rio De Oro, Africa (Latitude 21-30N, Longitude 19-20W) they encountered the U-505.

It was Sunday, June 4, at 1109 when the Chatelain reported sonar contact on an object 800 yards away on her starboard bow. Although sonar contacts are frequent and do not always mean submarines, the Chatelain turned toward the object immediately and prepared to attack.

But in the brief moments required to identify the contact definitely as a submarine, the Chatelain had come so close that her depth charges would not sink fast enough to intercept the U-boat. So she held her fire and opened the range to set up the attack. Turning back, she closed and fired her "hedgehog" (ahead-thrown depth charges which explode on contact only) battery. Regaining sonar contact after a momentary loss due to the short range, the

Chatelain passed beyond the submarine and swung around toward it to make a second attack with depth charges.

When the Chatelain's first contact had been evaluated as a U-boat, the Guadalcanal had sent two "Wildcat" fighter planes over to have a look, and now as the Chatelain heeled over in her tight turn, the planes sighted the submerged U-boat and fired their machine guns into the water to mark the submarine's position.

The Chatelain steadied up on her bearing and moved in swiftly for the kill. A full pattern of depth charges set for a 60 foot target exploded in the water around the U-boat. As their detonations threw geysers of spray into the air, a large oil slick spread on the water and the fighter planes overhead radioed jubilantly "You struck oil! Sub is surfacing." Just six and one-half minutes after the Chatelain's first attack, the U-boat was on the surface, a wounded but still formidable enemy.

Gallery's plan for capturing her alive now moved into its first phase. As the submarine broke the surface only 700 yards away from the Chatelain, the escort opened fire with all guns that would bear and swept the U-boat's decks. The Pillsbury and Jenks, which had also closed in and the two "Wildcats" overhead also added to the intense barrage which was directed -- not at sinking the U-boat, but to keep her crew from manning its deck guns. For that reason, the guns had been loaded with anti-personnel rather than armour piercing ammunition.

Believing that his U-boat had been mortally damaged by the Chatelain's depth charges and sinking was imminent, the commanding officer of the U-505 had brought his ship to the surface to permit the crew to escape. As the partially-submerged U-505 circled to the right, because of a jammed rudder, at a speed near seven knots on her electric motors, the crew went over the side.

Seeing the U-boat turning toward him, the commanding officer of the Chatelain quickly fired a single torpedo at the submarine in order to forestall what appeared to be an attack. The torpedo passed ahead of the U-505 which now appeared to be completely abandoned. The "cease fire" was now given and the Pillsbury's boarding party was ordered away. The Chatelain and the Jenks meanwhile, began to pick up the U-boat's crew.

When Lieutenant Albert L. David, USN, and his eight-man boarding party caught up to the still circling sub, they found only one man topside, and he was dead (the only fatality). The Lieutenant and his party now tumbled quickly down the hatch from the conning tower. Their hurried examination found the U-boat completely deserted. But there was water in the control room and more coming in through an opened eight-inch sea strainer. Engineer's mate Zenon B. Lukosius found the cover lying nearby and quickly putting it into place, secured it. (In their haste to abandon ship this was the only valve the Germans had opened, and this one only partially.)

Meanwhile, under the direction of Lt. David, the other men were snatching the code book and whatever documents they could find and passed them up topside to be put into the motor whaleboat, not knowing how long the submarine might remain afloat. The engine room was checked and a hasty search was made for booby traps. The sub's motors were now stopped but as she lost way, the U-505 settled dangerously low in the water. So the motors were hastily set to full speed ahead again. But time was fast running out as the sub was running on her batteries which were already low. In order to keep her afloat she would have to be towed.

The Pillsbury now came alongside to take it in tow but as she maneuvered in as close as the rough seas permitted the U-505's bow hydroplane (concealed beneath the water line) smashed into the thin side of the escort and flooded two forward compartments so she was forced to haul clear and make emergency repairs.

The Guadalcanal's boarding party, under Commander Earl Trosino, USNR, had now arrived on the sub and temporary salvage measures were completed. The Guadalcanal stood in to take up the tow and as the carrier took up the slack in the tow-line the U-505's engines were again cut. A cheer went up as the submarine sluggishly rose when the Guadalcanal picked up speed.

As the task group formed up and headed with their still partly submerged prize for Dakar, the nearest friendly port on the African coast, orders were received to proceed to Bermuda instead. Dakar was full of spies and the German high command would shortly have learned of the U-505's capture. To keep the secret, the Guadalcanal started on the 1,700 miles to Bermuda with hardly enough fuel for the trip. After three days of towing the still partially-submerged U-boat, the fleet tug Abnaki arrived to take over the tow and the tanker Kennebec to provide the much-needed fuel.

On June 19, the U-505 was brought into Port Royal Bay, Bermuda. It was one of the most valued prizes of the war. For the U-505 gave the Allies the secret to the radio code used by the Germans in directing their U-boat operations.

Two days after the U-505 was captured, Allied troops landed on the beaches of Normandy. The importance of providing a continuous flow of reinforcements, food, and supplies, safe from the menace of the U-boats was more vital than ever, once Allied forces had been committed to the mainland of Europe. Another prize found on the U-505 were several torpedoes of a new type, a formidable weapon in undersea warfare. For this capture of an enemy war vessel on the high seas, task group 22.3 received the Presidential Unit Citation.

American combat operations in the European Theater have been covered in many volumes, both official versions and from private sources. The politics of the war have also been adquately covered so it would serve little purpose to spend very much time discussing the operations, other than the major events. The rapid advance of

American and British forces placed a tremendous strain on the logistic lifeline of the fighting forces. As Allied and American forces advanced across France, penetrated the Seigfried Line, and drove on toward the heart of Germany, Intelligence Operations continued; but, as enemy material was captured, there arose the problems of what to do with it, and how to handle it at the unit level.

The advent of World War II lead to the activation of several technical intelligence detachments which were called Enemy Equipment Units. As a result, Enemy Equipment Intelligence service teams were quickly established to provide a service to the front line troops. These teams operated all over and with little guidance or coordination other than broad guidance to collect captured material. The detailed history of these teams is non-existant but the indications are that they were designed to be branch material and operate under the guidance of the theater special staff officer. The largest number of the teams was supplied by the Ordnance Corps and a special staff section in SHAEF was established with Col. Holger Toftoy as Chief of Ordnance Technical Intelligence.

Because of the success of Allied forces, extensive quantities of material were captured and problems arose concerning the classification control, storage, protection, and disposal of this material. New support units, consisting of ammunition maintenance, quartermaster, and bomb disposal elements, were created to handle these problems. Effective use of such foreign weapons and equipment was dependent upon education of the troops in their use and persuading the troops to use initiative in applying the materiel in tactical situations. Among the many junior officers who entered the U.S. Army in the closing days of World War II was Rudolph Nottrodt, a native of Erfurt, Germany, who had emigrated from Germany at the age of 15. Settling in Chicago, he studied mechanical engineering and business administration. He became an American citizen in May 1940 and in April 1944 he entered the U.S. Army and was initially assigned to American forces in Italy. Among his duties were conducting classes on the various captured German weapons.

The U.S. Army's technical intelligence effort in the European Theatre enjoyed some successes and was aided by the vigorous TI effort mounted by the British against the Germans and Italians. In the summer of 1944 the 1st Army Technical Intelligence Team debriefed personnel in a battalion of the 2nd Armored Division which had suffered 51% personnel losses and 70% equipment losses at the hands of German Panther tank battalions. The team also analyzed the hulks of damaged American and German tanks. Based upon these debriefings and inspections the team developed a list of vulnerabilities for both the American and German tanks. This lead to development of the booklet entitled, "How to Kill a Panther", which was utilized in the subsequent operations of the 1st Army's tank units and which was credited for the increased losses which the Americans inflicted on German tank units. Another factor leading to an increase in the number of Panthers destroyed was the development

of a 76mm. (HVAP) artillery shell which was capable of penetrating the armor of the Panther tank. This shell was reverse-engineered from existing German 76mm. shells by TI analysts. Similarly, German technology was used to increase the firing capacity of the U.S. 155mm. howitzer from 300 to 1,800 rounds. TI assets were also used to ascertain if the enemy would be able to counter new American weapons under development. The most spectacular example of this use of TI was in June, 1944, when the TI team dubbed "Lightning A" captured a leading German scientist at the University of Strasbourg 65 kilometers behind enemy lines. This scientist, who was deeply involved in the Axis efforts to develop an atomic weapon, revealed under interrogation that the Axis powers did not have an operational atomic weapon. In addition, the operation netted information on the development of new types of German torpedoes, jet engine development, biological warfare plans of the Germans, and the German defense plans for the Rhine.

The best known example of the use of captured material took place during the spectacular exploits of General George Patton's Third Army during its drive across Europe. This very aggressiveness threatened to stall their progress because they often outdistanced their supply troops. By the fall and early winter of 1944, General Patton's Third Army was faced with a stringent ammunition shortage, but his drive was able to continue because his units renovated and used serviceable captured artillery. On November 2, 1944, the 20th Corps was employing 39 captured artillery pieces, including four 76.2-mm Soviet guns, ten 88-mm German guns, eight 100-mm fortress guns, six 105-mm howitzers, two 122-mm Soviet guns, six 150-mm German howitzers, and three 155-mm French howitzers.

Up to that date, 20th Corps had fired 30,820 rounds of captured ammunition weighing 660 tons and valued at $702,391. For the week ending October 29, 80 percent of the artillery ammunition fired by the 20th Corps had been captured from the Germans. The Soviet and French weapons had been seized by the Germans earlier in the war and were recaptured by the Third Army. Use of these guns and ammunition occurred at a critical time during the campaign. That General Patton's troops were able to use the equipment is a tribute to U.S. technical intelligence units. This capability showed a vigorous technical intelligence and troop education program.

It is questionable if Col. Toftoy, the Chief of Ordnance Technical Intelligence, was privileged to be on the distribution list for high level communications and reports on scientific research conducted in the allied nations, a fact that limited his ability to advise the SHAEF G2 on the subject of new weapons systems. As it became known in the post war era, between 1936 and 1943, German scientists perfected two death-dealing weapons -- the V-1, or flying bomb, and the V-2, or rocket, the brainchild of Wernher von Braun -- but the munitions chiefs were frustrated by Hitler's changing demands. In Peenemunde, the experimental test station, moreover, a divisive rivalry developed between the Luftwaffe, supervising the V-1, and the SS-controlled V-2 program

under the direction of Hans Kammler, the man also responsible for the gas chambers at Auschwitz.

The Allies continued to amass information, even after the V-2 testing ground was transferred to Poland and the factory to Camp Dora, a subcamp of Buchenwald hidden in the Harz Mountains where concentration camp prisoners were used as slave labor. Within Dora, resistance forces organized to sabotage production and security. Meanwhile, undercover agents raced to recover fragments of fired missiles, and succeeded in actually seizing two misfired weapons, which they dismantled and packed off to London.

By mid-November 1944, American and British forces had entered Germany and were approaching the Rhine River. November also marked the beginning of what was to become a major intelligence failure in the combat intelligence area. The Research and Analysis branch of the OSS had been more concerned with strategic intelligence matters and were becoming more and more influential. George Kennan, the U.S. Ambassador in Russia had received some of their products and began asking for more reports. Rather than restricting R&A personnel to the Washington, D.C. area, the OSS established R&A branches overseas. By September 1944, 31 R&A personnel were in Paris. Unfortunately the SHAEF G2 refused to allow R&A personnel to participate directly in P.O.W. interrogations. By August 1944, R&A gave up trying and decided that the best route was to indoctrinate some of the G2 interrogators and hope that they would do a better job. The military's distrust of the OSS as the "New Outfit in Town" permeated the entire command structure. President Roosevelt was coming up for re-election and there was pressure in Washington to scale back on wartime expenditures. As a result the OSS was preparing reduced manning tables. Bureaucratic controversy still existed between the FBI, the State Department, as well as the JCS. In the field, where the effects of OSS operations was more quickly realized, attitudes were beginning to change.

OSS Bern, under Allen Dulles, was another highly active post that produced a wide range of valuable information despite its worries about Soviet intentions. Dulles appears to have been the most cautious of the OSS outpost chiefs stationed in neutral countries, for there are no indications in the available records that he authorized any foolhardy forays at this time. He was, however, accustomed to giving his subordinates much latitude, usually sizing up a possible intelligence contact only once before turning over the actual operation to one of his subordinates. Since some of those who worked for Dulles (especially Guido von Schultze Gaevernitz) had numerous European contacts and were inclined to be bold, this system secured much information in the short run. But later it would also offer temptations for political adventure when Germany began to disintegrate.

In 1943-44, Dulles's natural caution kept matters well under control. Although he did not pass over all unorthodox sources of information -- he held long consultations with Carl Jung to secure

insight into psychological warfare techniques for use in Germany -- the OSS representative in Bern was not inclined to take chances. He was a conservative lawyer, prudent businessman, and staunch Republican. To counter those who have portrayed him as an O.S.S.-C.I.A. ideological prophet and superspy, it is instructive to look at the handful of messages he received from his brother John Foster during this period to get a sense of his background. John Foster's letters are chilly, formal documents having nothing to do with espionage, ideological issues, or national policy. All John Foster was concerned about in 1943-44 was getting Allen back to New York as soon as possible to pull his oar in the family law firm.

It is also useful to remember that even though Allen Dulles's reports carried a measure of extra weight in Washington because of his earlier career in the foreign service and his close connections with the top OSS leadership, American officialdom was not hanging on his every word. Some important people seem not even to know that he was serving as the OSS man in Bern. In January 1944, after Dulles had been reporting from his Swiss post for fourteen months, General John Hilldring, the chief of the Civil Affairs Division of the War Department, asked the State Department if it could perhaps enlighten him on "the present whereabouts of Mr. Allen W. Dulles."

Though he was not the wonder worker of later myth, Dulles was a solid and highly effective outpost chief. Extensive Order-of-Battle information went to Washington from Bern in 1943-44. Technical information on the Wehrmacht was also dispatched, including reports on German aircraft defenses, submarine production, and developmental work on the V-1 flying bomb and the V-2 rockets. Once again, caution is in order regarding the significance of the V-1 and V-2 material uncovered by Dulles's office, for even though it was important, similar information was obtained from other sources. No single source discovered Hitler's secret weapons; by collecting various pieces, the Allies put together a quite accurate jigsaw picture of the V-1 and V-2, but as late as winter 1944, they were still uncertain of the aiming mechanism used on Hitler's rocket weapon.

A number of the early reports on Germany's ability to conduct gas and bacteriological warfare came from Bern. Since the Germans ultimately did not use either of these weapons, one might contend that Dulles and his staff alarmed Washington unnecessarily. Indeed, the J.C.S. staff expended much energy investigating the questions raised by Dulles's reports. However, it was the OSS representative's job to provide Washington with information on any matter of possible military value. It was not up to him to decide whether Hitler, fearing mass retaliation, would ultimately draw back from use of either of these nightmare weapons.

In the opinion of OSS Washington, some of the reports sent from Bern pegged German armament production too high and also tended to overestimate the damage inflicted by Allied air raids. On occasion, Dulles's prognosis of Hitler's intentions went astray; for

instance, on the very eve of the massive and disastrous attack on Kursk that sealed the fate of the German Army in the East, he predicted that the Fuhrer would not attempt any "large-scale offensive against Russia."

Yet in information gathering, Dulles's drawbacks were offset by his far more substantial accomplishments; in securing the services of a German Foreign Office official named Fritz Kolbe (cover-named George Wood), he scored the most significant Allied secret agent triumph of the war. From August 1943 to mid-1944, Kolbe made a series of trips to Switzerland, bringing with him hundreds of microfilm copies of secret German Foreign Office documents. Since much of this material (OSS code named the Kolbe documents the Kappa or Boston series) concerned Germany's cooperation with its allies and satellites, it contained information of great military and political value, and as even Kim Philby acknowledged, it was very useful in filling out Ultra decrypts.

On one occasion in April 1944, when reporting to Washington on the breadth and depth of the Kolbe documents, Dulles remarked that they showed "a picture" of Germany's imminent doom and final downfall." This observation was immediately challenged by members of the American army staff in Washington, with one colonel noting that it "would be extremely unwise...from a military point of view" to assume that Germany was finished. With the issue put thus, Dulles quickly backed off, emphasizing that he had not meant that Germany would disintegrate forthwith. Such incidents illustrate the difficulty of Dulles's task in providing Washington with a picture of German morale that would be both accurate and reliable throughout the shifting conditions of combat. Dulles's estimates of the mood in Germany went up and down, as indeed did German morale. In the aftermath of the Hamburg raids in October 1943, for instance, the OSS representative declared that with two more such cataclysms Germany might crack (after the war, Albert Speer said the same thing). By and large, however, he accurately grasped that, the war and the Nazi regime being what they were, these "stubbornly obedient people" no longer had morale "as we normally use the term," but "tired, discouraged, disillusioned, bewildered" merely trudged on because they could "see no alternative other than to continue their struggle."

Dulles did not always gauge successfully what Hitler, his Nazi Party lieutenants, and the German army leaders were actually doing. Some of his reports on the Fuhrer's methods of planning and conducting military operations were indeed accurate, but he also fell victim to the same tales of Hitler's madness and of the Prussian officers' efforts to make him a figurehead that had beguiled the British since the first days of the war. Despite such errors, Dulles's overall reporting on Germany was judicious, providing OSS Washington with its most complete picture of conditions in the Third Reich.

OSS reports on Europe and the Mediterranean area ranged over

subjects as diverse as living conditions in Naples and Arab discontent in Algiers, but most reports examined conditions in France and Germany. The reports on France focused on two major issues: the possibility of a communist drive for power and concern over the undemocratic character of de Gaulle's Provisional government. The majority of OSS reports on France in the summer of 1944 tended to de-emphasize the communist danger. Allen Dulles was nervous about the French Communists in the early fall of 1944, but even he concluded by the end of November that they had "overplayed" their hand and were weaker than they had been during the summer.

Regarding de Gaulle, OSS representatives, including Dulles, sent in many dispatches pointing to chinks in the French general's armor. In June, Donovan even suggested that de Gaulle not be recognized as head of the government but be given a military command under Eisenhower -- a suggestion that struck the State Department's H. Freeman Matthews "as a pure pipe dream." However, not all OSS opposed de Gaulle (although such tendencies surely existed), and Donovan did not always pander to President Roosevelt's deep dislike of the French General. There were OSS men in R&A and other branches who strongly supported de Gaulle, and the comprehensive report on the Franch resistence prepared by OSS in mid-July (and just classified by C.I.A.) expressed confidence in de Gaulle's commitment to democracy and observed that the best way to weaken the Communists' was to recognize de Gaulle's Provisional government. OSS sent this report to the president, and on at least one other occasion, Donovan urged Roosevelt to try to find some common ground with the French General.

In contrast to its French reporting, the flow of OSS intelligence on Germany in the summer and early fall of 1944 naturally leaned heavily toward such military matters as order-of-battle information, V-1s and V-2s, and the effects of allied air raids. On German military issues, as for the majority of other issues, the single most important OSS station was Bern, where Dulles had as his disposal the documents obtained from Fritz Kolbe. The Kolbe reports contained highly useful information regarding German knowledge of the accuracy and effect of their V-2 attacks on London. To prevent the Germans from refining their aiming apparatus, the Allied were anxious to keep Berlin in the dark regarding the effect of the V-2 campaign, and the Kolbe material was highly esteemed by the J.C.S. and the British. Without forgetting that the Allies also gained relevant information on this matter from other high-level sources such as Ultra, it is clear that OSS dispatches played a significant role in combating the rockets and flying bombs.

A broad range of less specifically military OSS reports on Germany also reached Washington during the summer of 1944. Many of these concerned German morale and the relative position of Hitler and the generals, while from Kolbe Dulles was able to secure data regarding Japan and the German satellites. On occasion, the accuracy of statements contained in some of these OSS reports was challenged by other intelligence organizations, but Donovan's people unquestionably

uncovered German intelligence pearls in this period.

Because of his connections with the German resistance, Dulles was in a good position to report on the 20 July attempt to assassinate Hitler. Prior to the actual bomb attempt, Dulles and other OSS officials had sent Washington generally cautious reports regarding German opposition. Dulles had urged Washington to offer hope to considerate treatment to those who tried to overthrow the Nazis but had warned that the Goerdeler-Beck circle was staunchly anti-Communist and anti-Russian. The Bern representative, like most American and Soviet observers, was skeptical about all German resistance movements. After holding secret talks with resistance spokesman Adam von Trott zu Solz during June, American officials in Stockholm were so suspicious and so confused that they thought von Trott was "possibly a Nazi propagandist."

In the area of OSS sponsored operations in support of the military, the final stage of the Italian campaign was the most dramatic European demonstration of what O.S.S.-S.O.E.-assisted resistance units could accomplish in tactical support of the Allied armies. A postwar Anglo-American military appraisal concluded that in April alone, the resistance in northern Italy liberated 125 cities and towns, killed 3,000 Germans, and accepted the surrender of 81,000 more. Even if one questions the precision of such calculations, which, given the nature of resistance warfare, can at best be approximations, there is little doubt that in the final advance, the Italian underground functioned as an effective "fourth arm" along with the air, sea, and land forces of the Allies.

One might object that this triumph was offset by the failure of Field Marshal Alexander's command to make effective tactical use of the resistance potential in neighboring Austria. Yet even though it is true that Alexander was given military responsibility for resistance activity in Austria, and a handful of supplies were sent in during late 1944, A.F.H.Q. decided by January 1945 that "indigenous resistance in Austria was negligible" and the winter weather made the landing of subversive support missions too risky. Alexander concluded that an Austrian resistance would not be operational soon enough, so he ignored it as a possible tactical support force. A.F.H.Q. authorities maintained loose contact with dissident Austrians through Bern and Caserta solely because they might prove helpful in dealing with such potential problems as Nazi underground activity in the occupation period. So the resistance "failure" in Austria, like that in Germany, does not disprove the general rule that when an Anglo-American military command in Europe agreed to close tactical liaison with a broad popular resistance force linked to O.S.S.-S.O.E., the Allies reaped huge military benefits.

On the strategic level, intelligence had begun to piece together the German work on nuclear weapons. (See The Wizard War by R. V. Jones.) November 1944 marked the beginning of what was to become a major intelligence failure in the combat area. Furthermore, there is a hint in the available records that the reverse may

also have been true and that refusal to affect tactical resistance liaison could have dire consequences. In December 1944, every Allied army under S.H.A.E.F. and A.F.H.Q. except one had a special force unit coordinating with the resistance. Only the American First Army refused to have such a unit, which was therefore withdrawn and assigned to Twelfth Army Group. During the many later postmortems on the failure of First Army intelligence, which allowed Hitler's offensive to achieve complete surprise in the Bulge, no notice seems to have been taken of this fact. Perhaps the First Army was just unlucky, but it seems at least possible that if members of the resistance in eastern Belgium had been kept on the job and tightly coordinated with First Army, Hitler would have found it much more difficult to perpetrate his coup in the Bulge in December 1944.

In December 1944, General Eisenhower attempted to assemble sufficient forces for the autum offensive by thinning Allied forces in the rugged Ardennes region. This fitted in perfectly with German plans, for as early as July, they had begun to think of a counter-offensive on the western front designed to regain the initiative and compel the Allies to settle for a negotiated peace. Over the protest of his generals who thought the plan too ambitious, Hitler directed an attack by the Sixth SS Panzer Army, Fifth Panzer Army, and the Seventh Army through the Ardennes toward Antwerp. These armies were carefully withdrawn from the front to hidden rear areas, brought up to strength and re-equipped for the operation. During the operation they hoped to cut off and annihilate the British 21st Army Group and the U.S. First and Ninth Armies north of the Ardennes.

Under cover of inclement weather, the Germans concentrated their forces in the forest of the Eifel region, opposite the Ardennes. Before daylight on 16 December, the Germans attacked at five places along a 70-mile sector. The element of surprise was great, heightened by a disregard of the terrain in selecting points for the attack, particularly in using armored forces in areas not considered good for tank warfare. The attacks in many areas initially appeared light and were originally viewed by the Americans as possible reconnaissance in force.

It was not until the second day that the attack was recognized by U.S. Headquarters to be an all-out counter-offensive. German airborne troops had been dropped behind American lines and the Luftwaffe, on 1 January 1945, was making its greatest effort since Normandy, by conducting a large scale attack on Allied airfields in Belgium and Holland.

In most areas German gains were rapid, for the American divisions were either inexperienced or seriously understrength from previous fighting. Yet troubles developed for the Germans from the first. Cut off and surrounded, small U.S. units continued to fight stubbornly. At St. Vith, American troops held out for eight days to deny a critical road center. To the southwest at Bastogne, where an armored detachment served as a blocking force, General Eisenhower

rushed an airborne division which never relinquished that communications center. The Germans, denied vital roads and hampered by air attacks, fell a few miles short of their first objective, the Meuse River. The result of more than a month of hard fighting cost the Americans some 75,000 casualties and the Germans some 80,000 to 100,000 casualties. By the end of January, 1945, U.S. units had retaken all ground they had lost. The end of the war in Europe was in sight.

A logical question arose after the battle as to why the Americans were completely surprised by this large German counter-offensive. The answer is rather astonishing. The following are weekly intelligence summaries from U.S. Army units prior to the German offensive.

a. "There is further evidence of withdrawal of Panzer divisions from the line for rest and refitting and of enemy intentions to build up a strategic reserve of armored forces in the general area of Munster and Paderborn. This armored reserve, given sufficient time, say until 1 December, could probably become a powerful striking force of Panzer divisions." Remember the actual battle began on 16 December so our intelligence gave us the general time frame of the attack.

b. "The enemy is manning the West Wall with hastily formed battle groups from units retreating from France, from reconstituted battalions, and from the interior of Germany. A large part of the Panzer force has been withdrawn for complete rest and refitting. The enemy's most likely and serious capabilities would now appear to be a counterattack with strong forces of Panzer reserve against any Allied breakthrough in the Ninth or First Army sectors." This intelligence summary gave us the general location to expect a German counterattack.

c. "Tactical reconnaissance late in the week showed what appeared to be heavy troop movements into the northern part of the First U.S. Army's sector."

d. "The most important enemy capability relates to the employment of Sixth Panzer Army particularly as it may be supported by a large fighter force. German fighters had not put in a large-scale appearance since the Marseberg raid by the Eighth Air Force and their recent inactivity may perhaps be explained by preparation for heavy support of ground forces." A new indication is brought to light about the enemy's lack of activity.

e. The intelligence summary dated 16 December (the day of the attack) stated, "the enemy is at present fighting a defensive campaign on all fronts; his situation is such that he cannot stage major offensive operations. Furthermore, he has not the transport or the petrol that would be necessary for mobile operations, nor could his tanks compete with ours in the mobile battle. The enemy is in a bad way; he has had a tremendous battering and has lost

heavily in men and equipment. However, we cannot relax, or have a 'stand still,' so as to allow his time to recover. There will be difficulties caused by mud, cold, lack of air support during the winter months." The intelligence officers of the American units involved in the Battle of the Bulge failed to reevaluate and interpret early enemy intelligence received in October and November. Had this previous intelligence and the intelligence for the month of December been studied along with the enemy's order of battle, the coming counter-attack could have possibly been thwarted by an Allied offensive.

Another point of interest in the study of the Ardennes fight concerns a more subtle, but very human and little known factor. Lt. Gen. (Courtney H.) Hodges, then Commander, First U.S. Army, relieved his G2 in late November because of that officer's insistence that the Germans were, in fact, in an offensive build-up posture. Small wonder that his replacement and the VIII Corps G2 lowered the counterattack capability in the order of priority. This, taken with the fact that the Allied Airborne Army Intelligence Officer was also relieved just before Market Garden the previous September (for steadfastly sticking to the notion that the Germans had armor in the British objective area), must have made for an interesting professional climate for intelligence officers that fall and winter.

Although it is discussed in more detail in numerous books, one of the key factors in the U.S. Forces being surprised was that the intelligence effort had grown almost completely dependent upon one source of information, the ULTRA communications intercepts. The Germans, especially the Army, were relying more heavily on secure telephone communication and as a result, the ULTRA system did not produce any indication of the impending attack.

On December 26, the day that the British and Americans halted the German offensive short of the Meuse River, Donovan had dinner with Churchill at Chequers. There was much to discuss concerning the peace, which now seemed only months away.

After he had conferred with OSS London, Donovan flew off on what had become an almost routine inspection of OSS bases in the Mediterranean and Asia. Since he now had his own C-54, which could fly at 210 miles per hour, Donovan was able to include more destinations than before in a given number of days. The Department of State had asked him to assess the Russian losses in the war for the President's information at the Yalta Conference, scheduled to take place on February 4. In Cairo Donovan checked agent sources. The Air Transport Command had asked that he also gather information about conditions along the routes that the President's C-54, "The Sacred Cow", and other delegates to the conference would take.

At the same time, the State Department pointedly did not ask Donovan for intelligence informaton that might have proved critical at Yalta. Donovan had been forbidden to send agents into Manchuria to find out the truth about the Japanese Kwantung Army, which had

occupied the province since 1931. "It is terribly easy to go wrong, to make a mistake in high policy because of an intelligence slip-up," said Donovan after the war.

At the Yalta Conference which took place from 4 to 11 February 1945 and was the most important summit conference of the war, Roosevelt, Churchill and Stalin and their senior military and political advisors met to discuss the future. It was now clear to all, based upon the intelligence estimates, that the war in Europe had been won but both Britain and the U.S. believed that they have much still to do to defeat Japan. Because of this Mr. Roosevelt wanted from Stalin a pledge that Russia would enter the Pacific war. At that time the crack Kwantung Army of 750,000 troops was believed by the U.S. chiefs of staff to be based at the Manchurian arsenal. With our own forces about to close with the Japanese on the home islands and, in conjunction with the Chinese, on the continent of Asia, the U.S. high command was anxious to have the Kwantung Army engaged simultaneously by the Russians and thus be drawn away from our proposed battlegrounds. To win the Russians to this plan, Mr. Roosevelt bid high. Did he bid too high? Many scholars of this period feel that because of Roosevelt's illness, his negotiating powers and judgement were weakened and Stalin was able to obtain the promise of territorial concessions in Sakhalin and the Kurile Islands in return for a promise to declare war on Japan within two months of the end of the war in Europe.

The appearance of the USSR as a partner of the Chinese in Manchuria was largely brought about by an American policy decision growing out of a fatal gap in intelligence. The bargain struck at Yalta was based upon intelligence which we know now was incomplete. The truth about the Kwantung Army is that the best troops had been drawn off to reinforce the Philippines and Okinawa, leaving behind mostly green recruits. When the Russians did in fact invade Manchuria they found a paper army.

The postwar borders of the countries of eastern Europe were also largely determined at the Yalta meeting. The most notable changes were in the position of Poland, with the whole country being effectively moved westward at the insistence of the Soviets. Stalin gave assurances that elections would be held in eastern Europe and that non-Communist parties would not be forbidden or persecuted; however, the Western powers would not be able to supervise any such elections and they will never take place in a form regarded by the West as free or democratic. The arrangements for the division of Germany into occupation zones for each of the major powers are confirmed and defined. In reality the arrangements for Europe, however distasteful for liberal western opinion, only reflect the predominant share the USSR has played in the defeat of Germany. For the war against Japan the British and American eagerness to bring the Soviets in is also easy to understand, bearing in mind the fanatical resistance of the Japanese garrisons yet fought and the large Japanese forces thought to be in Manchuria and China. The establishment of a United Nations Organization was also discussed, and it was agreed that the

preliminary meetings to create the organization should be held in April in San Francisco. It was already clear that the Soviets would lead the other great powers in insisting that they be granted veto powers in votes on major issues.

By February 1945, the allied offensive in Europe continued toward the heart of Germany. On January 27, 1945 with the Russian forces closing in on Berlin, the first refugee caravans reached the outskirts of Berlin with stories of the brutal behavior of the Red Army, and a wave of terror swept through the city. Many citizens, however, still had faith in Goebbels' promise that wonder weapons would save Germany at the last moment. Fortunately for the Allies, the V-2 had not been ready for wide use until the previous fall, otherwise the Allied invasion of France, according to General Eisenhower, "might have been written off." But now V-2s were causing havoc in London, Antwerp and Leige.

One of the men responsible for creating these Wunderwaffen, General-major (Brigadier General) Walter Dornberger, was holding a conference in Berlin. He had just been entrusted with the job of producing a missile that would unerringly destroy any plane attempting to attack Germany, and bring an end to Allied air superiority. The ten members of "Working Staff Dornberger," after reviewing the many experiments made in this field -- from nonguided anti-aircraft rockets to remote-controlled missiles for launching from gound or air -- concluded that their only chance for success was to concentrate on a few projects. They agreed to retain only four guided anti-aircraft rockets: Professor Wagner's "Butterfly"; a similar rocket capable of supersonic speed; Dr. Kramer's X-4, a missile to be fired from a plane; and the "Waterfall," the large radio-controlled rocket being developed at Peenemunde. The Dornberger group further agreed that all factories, technical institutes and development centers involved in production of these weapons would have to be moved inside Germany, as far from the battle areas as possible. Peenemunde, on the Baltic, for example, might be overrun by Zhukov within a few weeks.

At the mouth of the Oder, ninety-five air miles to the north, Dr. Wernher von Braun, the technical director of the Peenemunde rocket station, was holding a secret meeting with his chief assistants. Together they had developed the A-4, a rocket they regarded as the first step to space flight. But Hitler saw it as a long-range weapon and Goebbels had renamed it the V-2, Vengeance Weapon-2.

Braun explained to his assistants that he had called the meeting because of conflicting orders received that day -- both from SS officials. SS-Obergruppenfuhrer (Lieutenant General) Dr. Hans Kammler, named special commissioner of the project by Himmler, had sent a teletype directing that the rocketeers be moved to central Germany, while Himmler himself, as commander of Army Group Vistula, had dispatched a message ordering all of Braun's engineers to join the Volkssturm, the People's Army so that they could help defend the

area from the approaching Red Army.

"Germany has lost the war," Dr. von Braun continued, "but let us not forget that it was our team that first succeeded in reaching outer space...We have suffered many hardships because of our faith in the great peacetime future of the rocket. Now we have an obligation. Each of the conquering powers will want our knowledge. The question we must answer is: To what country shall we entrust our heritage?"

A suggestion that they stay and turn themselves over to the Russians was emphatically rejected; they finally voted unanimously to surrender to the U.S. Army. The first step was to obey Kammler's order and evacuate to the west. There was no time to lose; preparations for the move would take more than two weeks and they could already hear the faint rumble of Zhukov's artillery to the south.

By March 9, 1945, American forces had succeeded in seizing the Ludendorff Bridge at Remagen and had established a bridgehead on the east bank. The Remagen bridgehead had expanded more than ten miles eastward and patrols of the 9th Division were approaching their objective, the Frankfurt-Cologne Autobahn. Despite air and artillery attacks, the Ludendorff Bridge still stood, and in desperation the Germans brought up a huge tank-mounted 540-mm. gun, the "Karl Howitzer." This monster, weighing 132 tons, fired a 4,400-lb. shell. After a few rounds that failed to hit the bridge, it had to be pulled back for repairs. Twelve supersonic V-2s were launched from Holland. They landed in a scattered pattern, with only one causing any appreciable damage when it hit a house 300 yards east of the bridge, killing three Americans.

The bridge was being jolted as much by reverberations from nearby American anti-aircraft batteries and 8-inch howitzers as from German shells. At three o'clock in the afternoon on March 17, engineers were ready to weld a huge plate over the almost severed arch. Once that was in place, the bridge would be secure. Lieutenant Colonel Clayton Rust, commander of the 276th Engineer Combat Battalion, was in the center of the bridge checking the progress of the work when he heard a sharp report, like a rifle shot. As he looked up he heard another, and saw part of the structure break off. Before he could give the alarm, the bridge trembled and dust rose from the wooden planking. The workers dropped their tools and dashed for the nearest shore. Rust started to run back toward the Remagen side as the center span vibrated, then slowly sank toward the river, dragging the two truss spans off the abutments with a penetrating metallic shriek. The entire bridge plunged into the Rhine. Rust and many of his men were swept downstream to the treadway bridge, where they were pulled to safety. But twenty-eight were killed outright or drowned.

Allied Forces continued to advance across Germany, the Americans and British from the west and the Russians from the east. If an incredible reversal of German fortune was coming, it seemed

most unlikely on the western front. Early in the morning of April 11 a spearhead of Hodges' First Army, Combat Command B of the 3rd Armored Division, was rapidly converging on Nordhausen, in central Germany -- site of the new assembly plant for V1s, V2s, and other new weapons.

Von Braun, who was recovering from a serious automobile accident -- his torso and left arm were still encased in a huge cast -- heard a report on Easter Sunday that U.S. tanks were only a few miles to the south. He was afraid the SS would follow the Fuhrer's "scorched earth" policy and destroy the tons of precious V-2 documents and blueprints. They had to be saved.

Von Braun instructed his personal aide, Dieter Huzel, and Bernhard Tessmann, chief designer of the Peenemunde test facilities, to hide the documents in a safe place. "Probably the best possiblity is an old mine or cave, something of that sort. Other than that I have no specific thoughts. There is just no time to lose."

It took three Opel trucks to carry fourteen tons of papers. The little convoy headed north on April 3 toward the nearby Harz Mountains, famed for its spas and rich in mines. Tessmann and Huzel looked desperately all day long for a suitable hiding place, and finally found an abandoned iron mine in the isolated village of Dornten. Thirty-six hours later all the documents had been hauled by a small locomotive into the heart of the mine and hand-carried into the powder magazine.

Mission accomplished, thought the exhausted Huzel. The following day he returned with his partner and dynamited the gallery leading to the magazine. Later the elderly caretaker carefully exploded another charge, completely sealing off the mine. Only Tessmann, Huzel and the caretaker knew the exact location of the invaluable papers. And the caretaker had no idea what they were.

On April 10, work in the great underground V-2 factory at Nordhausen had stopped. The rocket specialists, engineers and workers -- 4,500 of them -- scattered to their homes and the slave workers were returned to the nearby concentration camp. Already 500 specialists had been sent about 300 air miles to the south, to Oberammergau -- home of the Passion Play -- by SS General Hans Kammler, special commissioner for the V-weapon program, in his private train, the Vengeance Express.

The next morning, April 11, Task Force Welborn of the 3rd Armored Division approached Nordhausen from the north as Task Force Lovelady came in from the south. Both commanders had been alerted by Intelligence to "expect something a little unusual in the Nordhausen area." They thought at first this meant the town's concentration camp, where about 5,000 decayed bodies were lying in the open and in the barracks. But several miles northwest of Nordhausen, in the foothills of the Harz, they ran into other prisoners in dirty striped pajamas who told them there was "some-

thing fantastic" inside the mountain.

The two commanders peered into a large tunnel and saw freight cars and trucks loaded with long, slender finned missiles. With Major William Castille, the combat command's intelligence officer, they walked into the bowels of the mountain, where they found a complex factory. To Castille it was "a magician's cave." V-1 and V-2 parts were laid out in orderly rows, and precision machinery stood in apparently perfect working order.

In reflecting back on the experience after forty years, Major Castille provided the best description of both the role of an armored task force and the intelligence support at the ground level. As Castille pointed out:

> "During the first ten days in April, 1945, we were really "on the move." We had captured Paderborn (Germany's Armored Force School). There was a vast storehouse of intelligence data here that I would have relished the task of trying to "sort-it-all-out." But -- we were a "front line unit", in contact with enemy forces, and; contrary to some perceptions -- there were fierce battles with "last-ditch-standers."
>
> There were an increasing number of "alerts" from Division G-2. Reminders to interrogators -- any mention of "heavy water", talk of unusual factories, strange freight cargo, etc. Such "alerts" were given to our Task Force commanders. Intelligence data was pouring in to me from our supporting specialty teams (CIC, IPW, MPs). During the fast moving tactical situation, I wasn't getting much sleep. I had "acquired" a jeep -- and was chasing down "leads" jumping about among the advancing units, and; then trying to do my S-2 "office work" (combat intelligence), in my half-track -- at night -- on the move.
>
> I recall getting a more specific "lead" from Division G-2 on April 10th -- "expect the unusual" in the Nordhausen-Sangerhorn-Eiselben area.
>
> It was now April 11th. I was with "the main body" of our CCB command vehicles. Lt. Col. William B. Lovelady's Task Force was approaching Nordhausen from the south. Col. John Welbourn's Task Force was approaching from the north. Brigadier General Truman E. Boudinot was in his "advance CP" (jeep and radio) pushing them on.
>
> About 8:00 a.m. I received a message by our S-2 wireless (key) from Col. Welbourn's S-3. "Come quick" -- "a big mainline railroad track leads right into a big hill. Lots of railroad cars all loaded with STUFF."

I was there within the half-hour. Col. Welbourn and I walked into a "tunnel-like" entrance which immediately opened up into large chambers. It was a very elaborate factory layout. I recognized precision machine tools, complicated assemblies, etc. This was a massive, sophisticated, "high-tech" operation. It was very obvious that we had discovered something very special (THE UNUSUAL).

Unfortunately for me, my "visit" was cut short by a very terse message from General Boudinot -- "Report immediately to my advance CP." On my way to meet the General I saw several huge "sky-rocket" looking objects loaded on special rail cars, and; later two jet aircraft in a hanger where the doors had been "blown-out."

When I walked up to General Boudinot, sitting in his jeep, I started to tell him about the fabulous "FIND" but was cut short, blessed out for not being on TAP. I never saw him before this or after this in such a RAGE. He was blessing-out everyone insight. He issued a command -- "Follow me" and shot off in a cloud of dust. With two other members of his staff, we jumped into a jeep and raced after him.

Well, the basis of the General's mood was soon apparent as we arrived at the "slave extermination camp", CASERNE-BOELCKE or "Nordhausen-Hell-Hole." All troops present were affected by what we saw and witnessed. This story of horror has been told in the greatest of detail. My point here is that all thoughts of the mine, the factory, the V-2s "went out the window." All hands went to work on a multi-number of immediate tasks. "Brass" and "press" from higher headquarters were arriving by the jeep and truck loads.

About mid-afternoon I left the scene and went back to our CCB "main" command post where I "fired off" messages to Division G-2. Later that evening I was called to General Boudinots command vehicle where he told me that Col. Welborn had discovered a lone German worker in the mine (factory). This man was being interviewed by the press at a nearby house. He considered this to be highly inappropriate, unprofessional, and ordered that this man be taken to Division G-2 for proper "debriefing." Needless to say, I had the "survivor" on his way, escorted by our Division Liaison Officer, followed by the "press."

That night, General Boudinot had a short staff meeting and explained that troops were being assigned to take over the "hell hole" and "the factory." Our mission was to destroy the enemy. "We are moving out

now", and we were back in combat by midnight.

April 12th we were in combat. You live it hour-by-hour. With the gore, the smell, the noise ever present. I must tell you that I did not comprehend the full impact and importance of the "MINE" at Nordhausen. Later I was told that Col. Andrew Barr, Division G-2, had been in immediate contact with "higher headquarters" and that a Col. Holgar Toftoy, Chief of Ordnance Technical Intelligence, back in Paris, was estatic about the MINE/FACTORY, was fully aware of its significance, and had gone into full scale action.

As with many of us, with Germany's surrender in early May we dropped a curtain on all past events. It was back home -- to civilian life."

As subsequent events would demonstrate, there was a considerable lapse of time between the reporting of the capture and the arrival of a technical intelligence team to evacuate the material. Had there been a technical intelligence element with the Division, work could have begun within days, rather than weeks.

When Colonel Holgar Toftoy, Chief of Ordnance Technical Intelligence in Paris, learned of the amazing find he began organizing "Special Mission V-2." Its job was to evacuate 100 complete V-2s and ship them to the White Sands Proving Ground in New Mexico. But no one had bothered to tell Toftoy that the Nordhausen area would be in the Soviet zone once the war was over, and he proceeded at a routine pace.

About forty-five air miles to the southeast, a Patton armored spearhead finally rolled into Weimar. On the hill overlooking the city, the tension for the prisoners of Buchenwald was almost unsupportable. Liberation was only minutes away. At noon all SS men were ordered to leave. To Petr Zenkl, former Lord Mayor of Prague, the departure of the panicky Nazis was the most welcome sight of his life. As the last truck rolled away, the prisoners disarmed the hapless sentries who had been left behind, and seized the watchtowers. Then they hung out a white flag of welcome near the main gate. That afternoon U.S. tanks pushed up the hill and entered the camp.

The Big Three had agreed on the terms of surrender not long after D-Day. Following Yalta, however, these terms were revised in a second instrument of surrender, to include the dismemberment of Germany. The American ambassador in London, John Winant, feared that the existence of these two different documents might cause confusion and phoned Gen. Walter "Beetle" Smith at Rheims to remind him of possible complicatons. Smith said he didn't even have an authorized copy of the second surrender document. Moreover, the Big Three and France had not yet delegated SHAEF the power to sign it. More concerned than ever, Winant phoned the State Department in

Washington and urged that the necessary authorization to sign be cabled to SHAEF at once.

Early on the 2nd of May 1945 two German officers led an armed unit up to a salt mine near Bad Ischl, not far from Berchtesgaden, where the finest art objects from the Vienna Kunsthistorisches Museum and the Osterreichische Galerie were stored. They claimed that Baldur von Schirach had ordered them to save the most valuable objects from the approaching Russians; then threatened to shoot any-anyone who objected.

They selected 184 valuable paintings -- including five Rembrandts, two Durers, eight Brueghels, nine Titians, and seven Velazquez' -- as well as forty-nine bags of tapestries and several boxes of sculpture, and drove off with them in two trucks toward Switzerland.

The little convoy stopped several hours later at the Goldener Lowe, an inn in a small Tyrolean village. They hid the works of art in the cellar of an adjoining guest house and told the unhappy occupant -- his name was God -- that it was now his personal responsibility to save Austria's treasures from the Russians.

As the two Allied fronts drew closer together there was a scramble between East and West for art treasures, gold, military weapons and scientists. An American MFA&A (Monuments, Fine Arts and Archives) lieutenant discovered the cellar hideaway at the Goldener Lowe and fellow officers found Goring's fabulous art treasure in nearby Berchtesgaden. Many masterpieces were still in crates at the railroad station but even more were stored in freight cars at a siding.

Other American specialist were picking up more than their share of German scientists. In a cloak-and-dagger episode straight out of fiction, Father Sampson, an Army chaplain, was persuaded by a U.S. captain, who suddenly turned up at Stalag IIA, to help him smuggle a noted German fuse expert from the next city through the Russian lines. To get a pass for the entire party at the final Soviet check point, the priest was forced to match vodka, glass for glass, with the local Russian commandant. He barely accomplished his mission and staggered off to freedom.

The most clandestine of these operations was brought to a successful conclusion, largely through the persistence and derring-do of Colonel Boris Pash, who had headed the ALSOS Mission. His special task force struck out in advance of combat troops and captured an experimental uranium pile in the Black Forest, as well as three noted physicists involved in Germany's atomic program.

But America's prize acquisition was a windfall. Dr. Wernher von Braun and his leading V-2 scientists had decided France and England could not afford a major rocket program, and voluntarily surrendered to the U.S. 44th Division. Almost as important was the

recovery of the fourteen tons of V-2 documents hidden in the Dornten iron mine by Tessmann and Huzel.

Despite a slow start, Colonel Holgar Toftoy's "Special Mission V-2," under Major James Hamill, also succeeded in its mission. One hundred complete V-2s from Nordhausen were evacuated only hours before the Russians occupied the area. Hamill had been ordered to remove the rockets "without making it obvious that we had looted the place," yet, curiously, was not even told that Nordhausen would be in the Soviet zone. Consequently it never occurred to him to destroy the remaining rockets.

Lieutenant Colonel Vladimir Yurasov arrived at Nordhausen soon after Hamill's departure. He was there to evacuate a cement plant to the Soviet Union and only by accident discovered the remaining V-2s in the great tunnel. "It's strange," remarked his chauffer, Nikolai. "This was the most secret German weapon, and the American's left it for us. Americans are not bad fellows, but somehow too trusting." Later Yurasov escorted a fellow colonel through the cave. He laughed, incredulous. "The Americans gave us this! But in five or ten years they will cry. Imagine when our rockets fly across the ocean!"

It was later learned that, the 500 top guided missile scientists and technicians that were taken to an area south of Munich by the German SS troops was for their liquidation to prevent their capture by Allied forces. However, events moved so swiftly that time ran out before the Nazis could carry out their plan.

By April 19, 1945, the Russian high command announced that the Russian drive on Berlin had begun. By April 28, 1945, elements of the First U.S. Army had linked up with the Russians at TORGAU. In Berlin, Hitler committed suicide on April 30th and Admiral Doenitz was placed in charge. German forces surrendered on May 7th and victory in Europe was declared.

Shorlty after V-E Day, Magnus von Braun, brother of Professor von Braun, was sent as an emissary to contact the American authorities and inform them that a large number of the Peenemuende scientists and technicians who had scattered to the four winds after the collapse of the Nazi regime, were living in small villages throughout the Alps.

This was the beginning of "Operation Overcast" which was renamed "Operation Paperclip." The American authorities, realizing the progress that had been made by German scientists in the field of guided missiles, saw a chance to gain from their experience and start not from scratch but from where the Germans left off. Approximately 150 of the best scientists and technicians were rounded up and, after preliminary interrogation and background investigations by U.S. intelligence agencies, were offered five-year contracts to come to the United States and work for Uncle Sam. In turn, we promised to provide housing for their families, who had to remain in

Germany until arrangements could be made to bring them to the United States at a later date. The United States also guaranteed to protect their families from die-hard Nazis who considered them traitors for agreeing to work for a former enemy.

The first group of seven guided missile scientists signed by contract under "Operation Paperclip" arrived at Fort Strong, New York, on September 20, 1945, and from there were taken to Aberdeen Proving Ground, Maryland. Here in the tightly guarded Industrial Area, in the midst of secret military developments of all kinds, but always with a GI escort, these scientists carried on the work begun for Hitler at Peenemuende.

The research at Aberdeen was concerned with the processing of German guided missile documents captured by our U.S. military forces. Here these men scanned thousands of documents, all of them stamped "GEHEIM," the equivalent of our "SECRET." It is impossible to estimate in man-hours and dollars the amount of time and money saved by having had these scientists and technicians available to assist us in segregating, cataloging, evaluating, and translating over 40 tons of documents. It was great, for often at a glance they could classify a document as important or trivial. Such speed was possible because often these men were working with documents they themselves wrote or helped compile. So their importance to us was easily understandable, for this material arrived hastily packed and without segregation.

Some of the documents that were found would pack drama by themselves even if they had not been important to the development of ordnance materiel. As an example, there were several files that were scorched by flames and blackened by smoke, which testified to the damage done to the installation; the most graphic of the pictures were those of the burial of the 815 employees killed in the 1943 raid.

The purpose of the project at APG was to provide Fort Bliss and White Sands Proving Ground, where an additional 120 German scientists and technicians had arrived in the meantime and were working on the actual development and testing of guided missiles, as well as other ordnance and civilian research agencies, with documents or translations thereof.

"Operation Paperclip" came to a fitting conclusion with the naturalization of the first group of over 50 German scientists and technicians on November 11, 1954, in Birmingham, Alabama. Among those brought to the United States in December 1945, was Arthur Rudolph. He had been the production manager at Camp Dora, a sub camp of Nordhausen, and in the United States he spent two years rebuilding the V-2 systems at White Sands Proving Ground. He was also loaned to the British to assist their testing of captured V-2 weapons. Between 1951 and 1962, he served as manager and technical director of the Redstone Missile Weapons System and project director of the Pershing System. In 1965, he was made director of the Saturn

5 progam that carried the Appollo astronauts to the moon. In 1984, he was forced to depart the United States because of allegations of war crimes committed while at Nordhausen.

As a result of experience to date, in both the Pacific and European theaters, an updated FM 30-15 was published by the War Department in June 1945. Titled "EXAMINATION OF ENEMY PERSONNEL, REPATRIATES, CIVILIANS, DOCUMENTS AND MATERIAL" it provided guidance for all personnel on these topics. In addition to the normal range of intelligence activity, the section on Captured Material provided a concise statement on the objectives; a. prompt development of effective countermeasures and countertactics, b. prompt exploitation of new ideas for our own benefit, c. speed in providing literature and other aids to assist in training of troops in the use and maintenance of enemy equipment when captured in sufficient quantities. The section also contained the chart reproduced on the opposite page which explained these teams relationship to the combat troops, the intelligence system and to service troops. Unfortunately, coming out in June 1945, it was of little interest to the troops in Europe.

In the closing days of the war, several additional technical manuals were produced. TME 30-451 "Handbook on German Military Forces," originally published in 1941 and was updated in September 1943, was updated again on March 15, 1945 and contained excellent photos and descriptions of German war material. This manual had ten chapters: The German Military System; Organization of the Field Forces; Other Military and Auxiliary Organizations; Tactics; Fortifications and Defenses; Supply Evacuation and Movements; Weapons; Equipment; Uniforms, Insignia and Individual Equipment; and The German Air Force. The manual was classified RESTRICTED. This manual did little for the combat soldier during the closing days of the war, but provided a basic understanding for later dealings with defeated Germans. It would also become the basic format for later manuals on the aggressor and opposing forces. A similar manual on the Japanese Army was also published and updated.

Technical Intelligence analysis of the Arms industry of Japan in the postwar period revealed that the Japanese were not as innovative as their European allies, Germany and Italy. Japanese weapons were for the most part copied from European developed systems. Because of the nature of the war in the Pacific, the major Japanese effort went into naval and air forces and their Army did not receive the same priority as did the armies of the European nations. As a result of the nature of the Pacific War, the U.S. Navy and Air corps were the primary combat elements and it is beyond the scope of this book to discuss in detail Naval and Air strategy and combat but it is important to discuss the technical intelligence operations which supported the planners. As in Europe, the OSS played an important role in the enemy rear areas while the military intelligence organizations kept the JCS informed of troop movements, etc. Supporting the military intelligence were the T.A.I.U. (Technical Air Intelligence Unit), the U.S. Navy's M.E.I.U. (Mobile Explosive Investigation

Units), and the U.S. Army's 5250th Technical Intelligence Company.

America's entry into the war was precipitated by the Japanese attack on Pearl Harbor as mentioned earlier. While American Intelligence prior to Pearl Harbor had been effective in keeping track of Japanese politics, expansion plans and raw material requirements, there was little effort expended to keep a close watch on the Japanese arms industry. Since Japanese arms were copied from European designs, there was little research and development to track during the pre-war period. Naval intelligence, being concerned with the size and capability of warships as well as port and harbor facilities were well prepared at the outset of the war with maps, charts and recognition guides. Naval Aviation was still in its early stages and Naval Aviation advocates had to compete with "Battleship Sailors." The Army Air Corps, on the other hand, were fortunate that any aircraft they developed would be useful almost anywhere, Europe or Asia.

Japan had, however, made considerable strides in aviation, which enabled the Japanese Navy to launch its attack on Pearl Harbor in December 1941. Ironically, the United States, more than any other nation, was responsible for awakening Japan from her ancient isolation and sending her on her reckless quest for power and dominion. Unwelcome though Commodore Matthew C. Perry and his group which included William Jordan Howard were when their four warships dropped anchor in Yedo (now Tokyo) Bay in July 1853, his visit served to stir the dreams of empire that were soon to arouse the island people of Japan. Thus began, after more than 200 years of strict seclusion, a sudden exposure to Western ideas, production techniques, and military systems. In the short space of 88 years, Japan turned herself from a feudal state into a nation with an army and a navy trained and equipped to rival those of the great European powers.

Prodded by her militaristic leaders, Japan launched an attack on China. The Sino-Japanese War (1894-1895) gave victorious Nippon possession of Formosa (Taiwan) and the Pescadores. A few years later the Russo-Japanese War (1904-1905) broke out over rival claims in Korea and Manchuria. Russia was brought down in defeat, with Japan acquiring the southern half of Sakhalin Island and Port Arthur. (Russia's lease of Kwantung Peninsula, in the southern part of Liaotung Peninsula, Manchuria, was taken over by Japan in 1905 and renewed in 1915.) The Japanese continued their expansion by annexing Korea in 1910. Japan entered World War I on the side of the Allies in 1914. She occupied numerous German colonies in the Far East and later, as a member of the League of Nations, was given a mandate over the Carolina, Marshall, and Marianas islands, with the exception of Guam (ceded to the United States by Spain in 1898).

Anti-Western feelings within Japan became intensified when, at the Washington Naval Conference in 1921-1922, the Japanese Government agreed to keep her Navy smaller than those of Great Britain and the United States in a 5-5-3 ratio. Two years later the United States

passed an immigration act barring Japanese and certain other nationalities. For some time a master plan had been evolving to give Japan domination of Southeast Asia and the islands of the western half of the Pacific. This meant the removal of all western influence. The Greater Asia Co-Prosperity Sphere, as the territory was called, extended from the Kurile Islands southeast to the Marshall Islands, west to Netherlands East Indies (now Republic of Indonesia), and in a great curve to India.

In 1931, the Japanese overran Manchuria, later turning it into the puppet state of Manchukuo. Condemned by the League of Nations for her act, Japan resigned her membership. Clashes with the Chinese blazed into warfare in 1937, in which Peiping (now Peking), Shanghai, Nanking, Hankow, Canton, and the important rail center of Tungshan (now Suchow) were captured. These developments were carefully noted by the United States State Department as well as others but there was little coordination between the State Department and the Military as these developments did not relate strictly to military forces. The State Department did prepare several studies on the situation in Asia, presumably for their own use. State Department studies suggested as early as 1938 that an American oil embargo -- far from discouraging Japanese militarism -- would probably prompt Japan to go to war.

In February 1939, Japan sized Hainan Island, and after the fall of France in 1940, her troops moved into northern Indochina with the permission of Vichy France. She occupied the entire country in midsummer of 1941. The ultimate objective was the seizure of the rich Southern Resources Area. Thus, in 1941, as the United States applied a series of increasingly severe sanctions on petroleum exports, there was every reason to expect the worst. Japan had stockpiled enough oil to wage war for two years. With the spigot turned off, however, and domestic production sufficient to supply less than a tenth of even peacetime needs, every day that Japan postponed attack increased the likelihood of eventual defeat.

The rich oil fields in the Dutch East Indies beckoned as a prize that could make Japan independent of foreign suppliers. But the price of taking them was high -- war not only with the Netherlands (already occupied by Germany and not a very formidable foe), but with Great Britain and America as well. To increase their chance of winning such a conflict and of assuring their economic independence, the Japanese felt they had to act fast and do what they could to neutralize American naval power in the Pacific. The fairly predictable result was the raid on Pearl Harbor.

Just as Great Britain had made great strides in breaking the German Enigma codes, American Code Breakers had succeeded in breaking Japanese codes, however, lacking a formal intelligence program on the ground this information was useful only to political and diplomatic planners.

One of the most important developments in the pre-war years had

been the cavity-magnetron tube which the British invented and perfected having gotten a great deal of information from the Germans before the War. This tube allowed the development of radar, a means of using "radio waves" to detect incoming aircraft. It was not until the British mission under Sir Henry Tizard brought the cavity magnetron to the U.S. that the Signal Corps was able to develop effective radars. As such, they were still too new for U.S. personnel in Hawaii to understand their value. The perception of the threat in Pearl Harbor was not the same as in Washington. Lack of communication, lack of a viable intelligence effort, and lack of appreciation for the application of new technology to warfare were contributing factors (for a more detailed discussion, one is directed to Adm. Layton's book, "And I Was There") in our failure to detect the Japanese fleet which set sail for Hawaii. Just prior to the bombing of Pearl Harbor, the U.S. Military was becoming increasingly aware of the possibility of hostile action by the Japanese. In his memoirs, Admiral Layton, then on Admiral Spruance's Intelligence Staff, outlined the details of the intelligence failure. In the appendix, he included an extract of a secret plan which called for Strategic bombing of Japan by bombers under the control of Gen. McArthur. At lease someone considered war with Japan possible!

American volunteers in China had been flying combat against the Japanese and their new ZERO fighter plan but the details of the aircraft were never transmitted to the aviation industry in America. Although the plane had been used in China as early as mid 1940, allied knowledge of Japanese aviation was so limited that the Zero's performance came as a surprise when the war began and it was not until 1942/43 when the U.S. Navy's Grumman Hellcat, Vought Corsair and the Army's P38 lightening went into service that American aircraft could dominate the Zero in high altitude aerial combat.

On December 7, 1941, the Japanese fleet consisting of six aircraft carriers with 414 airplanes, two battleships, three cruisers, nine destroyers, and three submarines launched an air attack on the Pearl Harbor Navy Yard and the Naval Air Station at Kaneoke Bay on the island of Oahu. This attack was quickly followed by the invasion of Thailand and Malaya. The islands of Guam and Wake Island were overrun. Air attacks were made on Manila, Shanghai, Singapore, and Hong Kong. By December 10, 1941, resistance in Thailand ceased and a treaty of alliance was signed between Thailand and Japan. On December 11, 1941, Japanese troops went ashore on Luzon, the northern island of the Philippines and overame an outnumbered force. At Corregidor, an island fortress in Manila Bay, and on nearby Bataan Peninsula, the last defenders of the Phillippines made their stand, holding out until May 6, 1942.

The invasion of Malaya, by itself, was not a significant event conducted in isolation from the rest of Japan's strategic plan, but was one aspect of the plan to gain control of Malaya's tin and rubber and to serve as a stepping-stone to Java's oil. The planning of the invasion had been under way for quite some time but it was not

until the 2nd of November that General Tomoyuki Yamashita was recalled from Manchuria to lead the invasion that was to gain him his nickname, the "Tiger of Malaya." General Yamashita pushed on to victory in Singapore after which he was deeply involved with restoration of the damage. He also insisted on decent treatment of British prisoners of war, primarily because he believed that Japan would face a day of reckoning as soon as the United States harnessed its mighty industrial potential to the war effort. General Yamashita was also developing a plan for the invasion of Australia when "backroom manipulations" caused his transfer to Manchukuo on the Russian border, which was considered by most to be a backwater command where all he would do was train troops.

Japanese ground and air forces were now spread out over much of Southeast Asia and were totally dependent upon supplies from the homeland and the protection of the sea lanes by their navy. Japanese plans for futher expansion south were stopped at the Battle of the Coral Sea in May 1942, and eastward expansion was stopped at the Battle of Midway in June 1942. Midway marked the turning point in the Pacific and, following that battle, American forces began the drive toward the Japanese home islands. In August, 1942, American Marines landed on Guadalcanal. My father, Lt. Kenneth P. Howard (USNR), landed the first wave ashore. From Guadalcanal, Allied forces pushed on to New Guinea in January 1943, Tarawa in November 1943, the Philippean Sea in June 1944, Saipan in July 1944, Leyte Gulf in October 1944, and Iwo Jima in February 1945.

The national level intelligence effort discussed earlier in this chapter also provided information and intelligence on the Japanese. In the area of combat intelligence, all the traditional methods of radio intercept, air photography, prisioner interrogation, etc. were used with varying degrees of success. Since the war in the Pacific was primarily a naval war, extensive use was made of coast watchers, men who operated in remote island locations, sometimes enemy held, and reported the movements of Japanese ships. Since is is not my purpose to discuss in depth the intelligence operations against the Japanese, I will say very little about the subject and concentrate on the technical intelligence efforts.

In the early phases of the war, the pre-war neglect of the intelligence effort was also felt in the Pacific. It was not until the landings on Guadalcanal that American ground troops began offensive operations and captured material could be examined. Combined with the fact that it was not until 1943 that the Foreign Material Branch was established at Aberdeen Proving Ground, it is not too surprising that very little was accomplished. 1942 and 1943 could be considered a period when we began learning what scientific and technical intelligence was, what value captured material had for economic intelligence and how to make use of the information on the ground.

The European theater was only half of America's Second World War,

and, to gain a clear picture of how OSS evolved, it is necessary to make a rapid survey of Donovan's organization in Asia during the middle phase of the conflict. In contrast to Europe, most OSS efforts in Asia continued to meet with frustration throughout 1943 and the first half of 1944. The attempt to create serious resistance movements against the Japanese by building on exile groups within the United States had made little progress. Syngman Rhee's Free Korean movement was anathema to the State Department, and consequently, Donovan's men were compelled to keep it at arm's length. The Free Thai Army found more favor with the diplomats and was pushed vigorously by OSS, but with deep political divisions among the Thais and the Nationalist Chinese government showing extreme coolness to the Thai advance party in Chunking, the enterprise barely had moved off point zero by the middle of 1944.

OSS efforts to find some action in the South Pacific during this period also failed. An operational plan for the whole Pacific region and a specific one for the South Pacific were routinely shot down by Adm. Chester Nimitz, General Douglas MacArthur, and the JCS in June and July 1943. Despite the high hopes raised in OSS headquarters by a MacArthur invitation to Donovan to visit the area in the spring of 1944, the meeting between the two old warriors did not gain OSS operational access to the theater. Donovan's subsequent attempt to coax Admiral Nimitz into conceding a role to OSS also had meager results. Aside from authorizing the visit of an OSS expert on special weapons to his command area and requesting Donovan's help in securing twenty trained underwater demolition experts, Nimitz joined MacArthur in refusing to allow OSS into the Pacific.

Such rejection was difficult for Donovan, but there was perhaps some consolation in the fact that he was not alone in failing to get his organization into the Pacific sanctuary. The Office of War Information was similarly frustrated by MacArthur's rejection of its propaganda programs, and its director, Sherwood, was highly irritated by MacArthur's arrogance. Even British intelligence organizations were formally barred by MacArthur's command from operating in the area, and consequently, some rather remarkable tales circulated in London about events there. So severe was the information blackout that M.I. 6 was forced to fall back on one of its oldest methods for discreetly securing information from "troubled" areas. In November 1943, the editor of the London Times, Barrington Ward, agreed to let M.I. 6 use the Times correspondent in Australia, Ian Morrison, as an unpaid observer to keep an eye on MacArthur and his doings. Henceforth, from this and whatever other sources the British could work in Australia, London acquired a somewhat better picture of southwest Pacific developments. But in an atmosphere of inter-Allied secrecy and cloak-and-dagger espionage, considerable distrust remained.

Donovan's inability to operate in the southwest Pacific could not even be rectified by this kind of traditional espionage -- spying on one's own army is even worse than spying on an ally's --

and probably more in sorrow than in anger, the general was forced to accept defeat in his 1944 campaign to play a part in the Pacific theater. As in the first phase of the conflict, OSS could only work on the mainland in Asia, and Detachment 101 in Burma still led the way. As late as fall 1943, Eifler's group consisted of only twenty-five Americans, but along with the Kachins, it was carrying on a bruising guerrilla war against the Japanese in northern Burma. As their successes mounted and the day approached for launching General Stilwell's long-prepared campaign to reopen the Burma Road into China, the importance of Detachment 101's actions loomed larger. During the last half of 1943, however, all OSS activities in India and Southeast Asia, including Detachment 101, were caught in the middle of a British-American ping-pong game for control of Asia covert operations.

Beginning in March 1943, the British and American Chiefs of Staff exchanged volleys on the form of supervision required for OSS in India, Burma, Thailand, and Indochina. The most delicate areas for the British were obviously India and Burma; for the Americans, control of their own intelligence activities, authority over Detachment 101, and a desire not to appear "imperialist" were paramount. When in March the Americans asked Britain to approve the expansion of OSS in India, London replied that in exchange Britain wanted a supervisorial right over all OSS operations on the sub-continent, including OSS intelligence and Detachment 101. Donovan protested this proposal in a memorandum to the American Chiefs. He argued that the British should not control S.I. anywhere and stressed that in the original OSS-SOE agreements of June 1942, Burma had been designated a shared resistance-support area. In his usual pithy way, the United States theater commander, General Stilwell, told the Joint Chiefs that he had a low opinion of SOE, a high opinion of Detachment 101, and declared that he would rather have OSS withdrawn from India altogether than share control of it with the British. On 14 May 1943, the United States Deputy Chiefs of Staff followed these recommendations, deciding that Detachment 101 should stay under Stilwell and that the British should be granted no control over American intelligence.

Britain hung very tough, although it was militarily weak in the area and needed American military support and assistance from some OSS special services, such as Japanese language specialists. On 5 May 1943, London demanded that all reports produced by OSS in India (even those of R&A) be shown to British officials before their dispatch to Washington. At the end of May, replying to the American chiefs' rejection of complete British control of OSS operations in India, the British Chiefs proposed the establishment of an Anglo-American JIC in India, with a mixed intelligence staff from the two countries. The American Chiefs of Staff immediately queried Stilwell on this proposal, and while awaiting his reply put a freeze on the transport of all OSS, OWI, and related personnel destined for India and Southeast Asia. On 6 June, Stilwell replied that he found all the British suggestions "objectionable" because he believed that Britain tended "to make intelligence fit policy" and that by pooling

intelligence with the British "all information would cease to be unbiased and impartial." The American commander also worried that the Chinese would protest an Anglo-American merger by putting a freeze on all information from Chinese sources.

Caught between the British obsession to dominate their allies in India and Stilwell's belief that to have a chance to operate effectively in China he had to keep free of Britain, the JCS hammered out a compromise in which "liaison" rather than pooling would be used to link up Anglo-American intelligence on the sub-continent. Stilwell was somewhat less than enthusiastic about the idea, characterizing it as analogous to "piling Ossa on Pelion" when "Delhi is already full of Ossas sitting on committees." But if it would break the deadlock, he declared it would be "acceptable if the War Department wants it."

Donovan was ready to agree to any arrangement that would give him some measure of autonomy. He had prepared grandiose plans for continental operations in Asia and had managed to get a new OSS chief to Delhi before the JCS instituted its temporary freeze on new personnel. In early August, he negotiated a revised agreement for S.O. operations in Southeast Asia with SOE that allowed both organizations to go into all areas from Burma to Sumatra, with SOE supervising missions out of India and Australia; and OSS , those out of China. The implementation of this agreement was left hanging fire, however, until the bigger question of general British supervision of OSS operations and American intelligence in India was settled.

In early August, the British responded with yet another scheme that would have given Britain a veto over all operations from India and provided for an "exchange of personnel" between the intelligence staffs of the two countries. Stilwell predictably registered his opposition to both ideas and the JCS concluded that it should put forth a further compromise. At the Quebec conference in 1943, Roosevelt had just agreed to Churchill's suggestion that an independent Southeast Asia Command (S.E.A.C.) be established under the command of Adm. Lord Louis Mountbatten with Stilwell serving as his deputy in charge of the American China-Burma-India Theater (C.B.I.). Although the jurisdictional line between S.E.A.C. and C.B.I. was at best hazy in Southeast Asia, Mountbatten would henceforth be acting as supreme Allied commander and would have formal authority over all British and American forces in the theater. This development seems to have calmed most of London's worry about American anti-imperialist indiscretions in India. It also made it easier for the J.C.S. to present a compromise to Stilwell, once it was definitely established that the American general would have command in China, which he desired. In early September 1943, the deal was made. Stilwell received absolute control over Detachment 101, the intelligence services of both Britain and the United States kept their operational integrity in China and India, and while Mountbatten controlled all special operations from Indian territory Stilwell did the same from China.

Fortunately for the allies, Japan did not have as extensive a Scientific organization nor a Research and Development effort as the Germans. The lack of an extensive Scientific and Technical Intelligence effort in the Pacific was not as critical to stopping the Japanese as it had been in stopping the Germans.

In the area of material procurement for the military, anything that was developed to counter German weapons, would be sufficient to counter whatever the Japanese might field. Thus, intelligence in the Pacific was more concerned with a change in Japanese tactics, than with new weapons entering the conflict. One item that was procured just for the Pacific was a Japanese Mine Warfare kit which consisted of the major Japanese mines and grenades which allied troops might expect to encounter. Other than the availability of this item of issue, there was no formal training program established on foreign weapons.

It was not until 1944 that the 5250th Technical Intelligence Company was activated in the Pacific Theatre. The 5250th Technical Intelligence Company exercised command and control over the 59 technical intelligence teams working in the Pacific Theatre, and operated the first technical intelligence center, which was established in Japan following World War II. This commpany kept the Pacific Theatre Commander informed on the latest developments in Japanese weapons and technology. Some of the TI successes of this company include the dismantling, evacuation, reassembly, and utilization of captured Japanese artillery, and the adaptation of Japanese cold weather uniforms for use in the Northern Pacific Theatre. This intelligence was garnered not only from the company's roving TI teams but also from coordination effected between the company and civilian intelligence agencies.

Technical Intelligence operations carried out by the naval forces were under the control of the MEIU's -- Mobile Explosive Investigation Units. As a defensive measure, the U.S. Navy organized and trained a limited number of personnel in bomb disposal prior to America's entry into the war. Soon after America's entry into the war, the allied nations took up the offensive on nearly all fronts. It was discovered that mine and bomb disposal personnel were essential to offensive operations. This was especially true in the Pacific Ocean area where operations were conducted on small atolls and islands.

Both the commander of the Air Forces and Central Pacific and the commander of the Fifth Amphibious Force wrote letters pointing out the absolute necessity for mine and bomb disposal personnel in the assault phase of operations in the Pacific. They proposed the establishment of a pool of mine and bomb disposal personnel to augment assault forces. This pool was to conserve the limited number of personnel available and to maintain high operational efficiency. The chief of naval operations proposed the establishment of MEIU #4.

In addition to disposal in the assault and garrison phase of

operations, they would also analyze enemy explosive ordnance and malfunctioning U.S. and Allied ordnance and disseminate reports, instruct advance base personnel in booby traps, land mines, and other anti-personnel devices employed by the enemy and provide refresher training for Navy and Marine bomb disposal personnel.

The commander in chief of the Pacific accepted the proposal and MEIU #4 was formed and placed under administrative command of COM SERVRON SIX, later being placed under the administrative command of the Commander Minecraft, U.S. Pacific Fleet. On June 4, 1944, all Mine and Bomb Disposal personnel were attached to MEIU #4.

The list of operations and the type of work performed in each operation are too numerous to discuss in detail. In general, these personnel cleared beaches and road blocks, cleared airfield of land mines and unexploded ordnance, searched captured areas for mines and booby traps, performed the checking and clearing of caves and ammo dumps, participated in base defense, dived on sunken ships, cleared anchorages and harbors, and removed unexploded bombs and projectiles on amphibious craft.

In addition to the combat operations mentioned, MEIU personnel were also involved in the collection of intelligence. Diving on sunken enemy ships produced charts on Japanese mine fields, shipping lanes, plans, etc. Lt. (JG) P.A. Cramer dove on a Japanese ship at Okinawa and recovered charts showing Japanese mine fields in the home islands. This information was transmitted to CINCPAC and other interested commands. The recovery of both underwater ordnance as well as new weapons and subsequent shipment to various training, intelligence, and research centers was carried out by the MEIU.

Enemy sweep gear that was recovered was sent to the rear to assist our own mine forces. Fragment identification was conducted which enabled our forces ashore and afloat to determine the type of weapon, range, and potential strength of the enemy. This augmented photo interpretation of enemy positions. Enemy suicide weapons such as the BAKA bomb or suicide boat were discovered. Reports were prepared and disseminated to all services so that proper identification and alertness could be observed.

During the various operations, MEIU personnel rendered safe or disposed of 15,000,000 pounds of unexploded ordnance, thus contributing to the safety of our forces and speeding up the progress of the war.

The intelligence reporting system developed by the MEIU resulted in the production of 82 reports which were distributed to 1,000 various activities to include the British Army, Navy, and Air Force. In addition to intelligence reports, they prepared publications on particular ordnance problems for distribution and prepared over 100 articles for publication in "Weekly Intelligence."

In addition, the MEIU instituted several training programs.

These included refresher instruction for MEIU personnel and Marine Corps bomb disposal personnel. The casualty rate among Army bomb disposal personnel had been increasing at a rapid rate, so refresher training was conducted for them. Training for Navy Advance Base personnel was conducted and 125,000 personnel received training in recognition of unexploded ordnance. Approximately 75,000 seabees received training in land mine detection. In addition, several thousand Army personnel received training on land mines and booby traps. Amphibious force personnel were trained on what to do if an unexploded bomb or projectile landed aboard ship. Miscellaneous training was also conducted for intelligence officers of JICPAC, G2 officers of all Marine divisions, mine sweeping officers, fleet gunnery officers, and mine disposal officers attached to underwater demolition teams.

The MEIU also conducted research and operational intelligence. Some of the projects that were worked on were development of a fuse for jettisonable napalm gas tanks, development of propaganda bombs, simulation tests of our weapons' effectiveness against beach obstacles anticipated to be on Iwo Jima, development of improvised explosive charges to be used against suicide swimmers, development of a target rocket to simulate a suicide plane for target practice, development of a scuttling charge for PT boats, development of an underwater signaling device to provide aircraft with a means to give a friendly signal to submarines, as well as many other projects.

There were an average of 75 officers and 85 enlisted men in the unit with the vast majority of personnel operating in forward areas. The main center of operations was at Pearl Harbor, and personnel for the unit were obtained from the mine and bomb disposal schools in the Washington, D.C. area. The officer in charge of MEIU #4 was Commander O R. Cross, Jr., USNR.

There were a total of four MEIU's. No. 1 operated in the Southwest Pacific, and Nos. 2 and 3 operated in the Mediterranean and European theaters, and as of September 1945, had been decommissioned. MEIU No. 4 was making preparations to assist occupation forces and technical missions in the Japanese empire.

One of the Army students at the mines and booby trap course was John Barber, a Harvard graduate originally sent to Tank Destroyer OCS but commissioned as a Field Artillery officer. John had wanted to be involved in battlefield investigation of enemy weapons but could not obtain approval from the professor of Military Science and Tactics. Lt. Barber was the assistant executive and motor office of C Battery of the 428th Armored Field Artillery Batallion. The unit deployed to the Pacific in January 1945, and in March Lt. Barber attended the class on mines and booby traps. The class lasted one week and the final exam was a beach landing effort using live ordnance. They had to clear the way for LCTs and LCI. Lt. Barber was the only officer in the course and was the pathfinder. Some of the information he gained in the course would prove useful when the 428th was assigned to protect a perimeter around 8th Army HQ in

Tacloban, right on Leyte Gulf. One of his sergeants found a trip wire, and together they deactivated a booby-trapped paymaster's chest with thousands of yen in it!

The other aspect of technical intelligence gathering in the pacific was the Technical Air Intelligence. In an article by Robert Mikesh, it was pointed out that: "The Germans fought for Hitler, the Japanese fought for their Emperor, and the Americans fought for souvenirs." This was the comment most often repeated by members of the Technical Air Intelligence Units, whose first responsibility was to keep GI's away from captured enemy equipment. Americans have a fetish for souvenirs even though, once acquired, their interest level quickly dissipates, and the hardest battles fought by TAIU personnel was often the cordoning off of captured Japanese aircraft. For even the most insignificant and often minor bits and pieces of these machines could provide vital intelligence information.

For example: Metal identification nameplates, especially those from Japanese aircraft with their exotic oriental markings, were the first to disappear. They made ideal souvenirs to send in a letter to the folks back home. Yet, the data they revealed to intelligence teams was used in determining production rates and locations of key factories. Most importantly, this was often the only means of serial identification for a given aircraft, and once this was gone, the identity and related background of the airplane could no longer be traced.

Specially trained intelligence officers and teams were sent into the combat zones to gather this type of obscure technical information. They were also cautioned about the type of destructive souveniring they would encounter. Thus, whenever it seemed appropriate, they posted guards to not only protect this valued material from again falling into enemy hands, but to keep inquisitive GIs at bay until all the necessary information could be extracted from the equipment, or the material itself could be safely moved to guarded areas for further evaluation.

Intelligence teams and the intelligence gathering system in the Pacific theater was a responsibility shared by the U.S. Navy, Army Air Forces, and members of the RAF. In order to reduce duplication of this effort, small teams made up from a mix of these services included specialists in airframes, engines, radios, instruments, a photographer, and natives for heavy labor. Although these teams operated independently while in the field, they usually attached themselves to ground combat units and moved into newly captured territory with them. Upon finding evidence of Japanese equipment, a quick study was made to discover any manufacturing changes made that would be different from earlier equipment. Even if the captured design was not of a new type, it could still be valuable, for it might reveal substitution in materials or techniques which would indicate shortages of vital resources. The elimination of certain flight equipment such as radios, for instance, might indicate a lack of supplies or an effort to lighten the aircraft for better perform-

ance. These were questions to be answered, for this could reveal vital information about the enemy; his fighting strategy or production limitations.

Technical data of this type was sent in the form of messages, special reports, photographs, and sketches to the Technical Air Intelligence Center through the Theater TAI Unit. The enemy equipment that was considered to have further intelligence value was then sent as quickly as possible to the TAI Center at the Anacostia Naval Air Station in Washington, D.C.

While the war was in progress, one of the most lucrative areas for discovering samples of Japanese aircraft was on Luzon, the main island in the Philippines. On January 9, 1945, Allied forces made their initial landing on this island at Lingayen Gulf and began their southward push toward Manilla. Two days after the initial landings, the TAIU advance party was ashore, steadily following the infantry, examining and gathering data on newly discovered aircraft.

At Lingayen airfield near the invasion point, a battered twin-engine Japanese Army Mitsubishi Ki.67 "Peggy" bomber was carefully gone over and photographed. This airplane, one of several uncovered, held special interest, for not only was it a relatively new heavy bomber, but special conversions had been made to a number of them for the type of attack that would later be termed kamikaze. As early as the fall of 1944, American naval forces had experienced kamikaze or suicidal air attacks upon their ships. In October 1944, U.S. sailors reported that Japanese pilots had attempted from the outset to crash-dive their bomb-laden aircraft on U.S. surface vessels. When the cruiser Nashville received direct hits from diving planes, it became apparent that the Japanese had developed a new and disturbing attack strategy.

The idea of sacrificing pilots in explosive-laden aircraft was formulated by Vice-Admiral Takijiro Onishi, commander of Japanese air forces in the Philippines. His decimated and outnumbered air arm could not provide adequate air cover for Japan's few remaining carriers, but if launched in mass suicide attacks and concentrated against American carriers, it might be able to sink or at least immobilize enough of them and prevent them from launching their planes.

After the twin debacles of Leyte Gulf and the Battle of the Philippine Sea, it became apparent that Onishi's only chance to achieve some sort of stand off in the air was to concentrate on these suicide attacks. In the Japanese warrior's code, this fighting to the last, refusal to surrender and throwing oneself upon the enemy rather than be taken prisoner, had been seen since the very beginning of the island fighting on New Guinea and in the Solomons. Just as surrounded and outnumbered Japanese infantrymen charged overwhelmingly superior gun positions in last-ditch banzai charges, so could outnumbered Japanese airmen crash their planes into American ships in aerial banzai assaults.

When members of the Technical Air Intelligence Units examined the newly captured Ki.67 "Peggys" on Luzon, they saw more than just the latest Japanese bomber. These "Peggys" were loaded with explosives. Gun positions were faired over and a special probe was fitted to the nose to act as a detonator for 6,400 pounds of TNT. After the war, it was learned that these modifications had taken place at Tachikawa, where the Japanese feverishly worked to transform their latest and best aircraft into "special" attack machines.

The importance of TAI's find on Luzon could mean only one thing, not only were the Japanese considering suicide tactics, but they were heavily engaged in modifying their aircraft to carry out such missions. On April 1, 1945, when an invasion force borne by 1,300 Allied ships attacked Okinawa, massive kamikaze attacks sank 34 U.S. ships and damaged 288 more, including 36 carriers. Two thousand sailors were killed, but as devastating as the 82 day attack had been, they were not totally unexpected, due to the discoveries and evaluations made by the Technical Air Intelligence Units on Luzon three months before. Furthermore, the enemy had paid a terrible price for his suicidal courage, losing at least 2,000 planes and pilots.

In addition to the new Ki.67 "Peggy," which was fast enough at 330 mph to fly without escort and, in some models, was fitted with a 75mm cannon or a 1,760 pound torpedo and was so successful that it was one of the few Japanese aircraft to be used by both the Army and the Navy, the TAI units made a number of other significant finds.

The first Kawanishi N1K2 "George II" was recovered on Tarlac airstrip, halfway to the initial objective of Clark Field, on the outskirts of Manilla. Although it was impossible to salvage, it provided the first accurate data concerning this new, high performance Japanese Navy land-based interceptor. Although it was known that this mid-wing adaptation of an earlier seaplane fighter did exist,very few had been reported or recognized in combat. Furthermore, even though this model had been in production for well over a year before its capture on Luzon, the airplane was slow entering combat due to problems with the engine and weakness in its landing gear. "Georges" were first encountered during the initial Allied campaigns to reoccupy the Philippines. Reports made by Allied pilots that engaged them in combat showed high regard for the nimble, well-armed fighter, the long expected replacement for the aging Zero fighter.

On January 29, 1945, despite fierce resistance, Clark Field was once again in American hands. It had been under Japanese control for three years and its recapture had its rewards in many forms. For the Technical Air Intelligence Unit, Clark Field held a dazzling assortment of Japan's first line operations aircraft. It seemed that the Japanese had left a sampling of nearly every type of Army and Navy first line aircraft behind in their hasty retreat. Included were such prime examples as "Oscar" 3, "Tojo" 2, "George" II, plus the twin-engine fighters; "Nick" 1 and "Irving" II. These

were the first to be inspected in near or complete condition. The base perimeter of Clark sprawled in all directions from the main flight line area. Located in out of the way places were other lucrative finds, such as the carrier-based "Jill" 12 dive bomber, the latest reconnaissance version of "Dinah," plus a nearly undamaged "Betty" 22, to name a few. Over 200 new aircraft engines, many radio transmitters and receivers, in addition to several months' supply of ammunition were confiscated. One flyable and fueled "Betty" discovered there was being carefully guarded in a secure area of the base as fighting raged nearby. In the heat of battle, a close support airstrike was called for. An overzealous American fighter pilot, spotting the airplane on the ground, strafed it and set it on fire, completely gutting it.

Fully aware that this incident could be repeated, the TAI Unit wasted no time in establishing a designated secure area from which to operate. They selected a secluded a southern corner of the base, out of easy sight of prying eyes and the reach of tempted hands. Team members selected several of the best examples of each model and had guards stationed on them with direct orders that no one was to be allowed near these aircraft unless accompanied by members of the unit. As quickly as arrangements could be made, the designated airplanes were towed to the TAIU grounds, well away from the bivouac area of the relentless souvenir hunters.

There was little need for the TAIU to move further southward in search of other equipment; they had all they could handle at Clark. Since the tempo of the war had picked up immensely, it was decided that fight evaluations of these airplanes would be accomplished at Clark rather than trying to cope with the delays of sending them to the TAIC at Anacostia.

Reports arrived at Clark that a flyable Nakajima Ki.84 "Frank" 1 had been discovered at the nearby Mabalocat West Air Field. No time was lost in recovering this most advanced Japanese Army fighter, perhaps their best production fighter of the war. The first "Frank" had been found on the Valencia airstrip, Leyte, and although it was badly demolished, it still furnished enough information from which an accurate drawing could be made and enabled preliminary performance data to be computed. This Nakajima Ki.84 Hayate (Gale) with its more than 1,800 horsepower engine could better the speed of the P-51D and P-47D at 20,000 ft. Therefore, to flight test this "Frank" and compare it more closely with Allied fighters held the highest priority.

In the pilot evaluation report that evolved on "Frank," it was pointed out that while the cockpit layout, in general, was good, visibility was restricted due to the narrow canopy and the rearward placement of the cockpit well behind the leading edge of the wing. Taxiing and ground handling were marginal due to poor brakes and the difficulty in getting the tail wheel to caster. Takeoff was normal with little tendency to swing. As the tail came up, the poor ground

visibility was greatly improved.

Control forces in flight were not heavy; however, no extended climbs at high power were made due to a new engine having been installed in the airplane. Handling and control of this airplane was exceptional at all speeds from stall to 270 mph. Elevator control was heavy at all speeds and the rudder was mushy at low speeds, not becoming satisfactory until 300 mph and above. Rolls, Immelmans, and turns were executed with ease at normal speed, but at 300 mph the ailerons became too heavy for good maneuvering. Pilots liked the good landing characteristics which were enhanced by the long travel of the landing gear struts.

The next find in Japanese fighter aircraft occurred when American forces regained control of Manilla. Although this did not prove as lucrative in terms of numbers of aircraft as did that at Clark Field, the first Mitsubishi J1M "Jack" interceptor was recovered here. It was found on Dewey Boulevard (now renamed Roxas Blvd.), a main artery of the city that the hardpressed Japanese had used as a makeshift airstrip. Complete drawings of this Mitsubishi interceptor were developed and other data was obtained, after which it was disassembled and transported to Clark.

The existance of "Jack," or Raiden (Thunderbolt), was known for a long time, and it was expected to be encountered long before the Allies reached the Philippines. Yet, like so many advanced Japanese designs, it too was slow to be fully deployed into combat due to engine development problems.

The work in preparing "Jack" for flight by the Americans was not an easy task. This one-of-a-kind airplane taxed American ingenuity to the fullest. The chubby interceptor had been stripped of most of its instruments and engine accessories. Without Japanese supplies on hand, similar parts from other aircraft had to serve as substitutes. Despite these handicaps, the "Jack" was completed as quickly as possible and made ready for flight.

Its evaluation report showed that pilots liked its taxiing and ground handling qualities. They felt its visibility was good, a quality that had plagued the Japanese in the early stages of this airplane's development. This high wing-loaded fighter left the ground at 100 mph with a high climb angle and rate. Control of the airplane was good at all speeds up to an including 325 mph. Rolls, immelmans, and turns were executed with ease at normal speeds, although the ailerons were heavy at all operating speeds and this prevented the airplane from rolling as rapidly as the P51. The elevators were very light and it was felt that the fighter could be easily damaged through rough handling by the pilot. In all tests performed against the P-51, the Mustang was judged the better fighter and a foe to be reckoned with.

In all, about thirteen types of Japanese aircraft underwent evaluation at Clark Field by the Technical Air Intelligence Unit.

Priority testing was given to the fighter aircraft, although many had been encountered from the early stages of the war. These were the latest models however, and the need to discover their most current innovations was still very important. In addition to evaluating "Frank" I, "Jack" II, and "George" II, which has already been described, flight testing was also accomplished with "Tojo" II and "Nick" I.

The greatest number of any single type found at Clark were twin engined Kawasaki Ki.45 "Nick" heavy fighters, 38 of which were day fighters. An additional 10 were night fighter versions with twin 20mm cannon mounted obliquely behind the pilot.

Other Japanese airplanes flown by the TAIU crews at Clark included the Navy carrier-based bomber Nakajima B6N2 "Jill" 12 and the Aichi D4Y3 "Judy" 33, along with he twin-engine "Betty" 22 (Mitsubishi G4M2), the backbone of the Navy's land-based bomber force throughout the war. Also flown were the high performance twin-engine Army reconnaissance Ki.46III "Dina," the small twin-engine trainer/transport "Hickory," along with the transport "Tabby" 22, a license production Douglas DC-3.

The end of the war finally arrived on August 15, 1945. What had started out as a rumor that Japan had capitulated was finally confirmed by nightfall for the men at Clark. This not only brought about good reason for celebrating, but renewed activity for the 129 team members of the TAIU. They immediately began planning for he move onto the main islands of Japan. It was essential that they be among the first to arrive in Japan in order to proceed American troops and prevent them from stripping aircraft before their intelligence gathering work was completed.

Another consideration was to initiate a plan to cover what equipment and materials, be it aircraft, engines, armament, or other related assemblies, were to be confiscated for Allied use and inspection. A query on this point was sent to their Washington headquarters. The question was a difficult one to answer until the actual objects of interest could be seen. However, time lost in decision making after their arrival on Japanese soil could jeopardize the safety of the airplanes that would eventually be acquired. To bridge the gap, the men at Clark established their own basic list of worthwhile items. It was based upon the knowledge they had aleady gained of Japan's various production aircraft types as well as those under development.

Team members of the TAIU anticipated that the list of aircraft would be expanded as unexpected aircraft were located. Four of each type, if available, would be the intended quantity. This would provide one aircraft each for the Army Air Force, U.S. Navy, RAF, and one spare. With this proposal sent to Washington, the reply was in full agreement, which set their planning action into motion. Eventually, it became a Supreme Command Allied Pacific (SCAP) directive, AG45201, dated September 12, 1945, that ordered the Japanese govern-

ment to assemble various types of Army and Navy aircraft to be sent to the United States.

With the cessation of hostile activities throughout the large expanse of the Pacific and Asia, the dispersed elements of the Technical Air Intelligence network; namely POA (Pacific Ocean Area), SEA (Southeast Asia), China, India, along with SWPA (Southwest Pacific Area) were now consolidated. This allowed their total effort to be concentrated on the Japanese home islands under one central command. Initially these units would unite on Okinawa in preparation for the move to Japan. As it worked out, only the SWPA Unit actually got to Japan.

The TAI Units quickly gathered their equipment and packed it for the move. Most of the heavy equipment at Clark was trucked to an awaiting LST for the move to Okinawa. The remaining equipment and advance teams were flown to Okinawa, leaving behind the many Japanese airplanes the unit had been working on for so many months, preparatory to further flight evaluation. At first glance, this seemed quite a loss of hundreds of man hours the mechanics had expended in making selected airplanes flyable, but a greater treasure awaited.

Only one of these enemy aircraft left behind survived for any appreciable time. It was an "Oscar" 2 that was placed on a pylon and mounted outside base operations at Clark. For a number of years this was a landmark to the many transients who moved through this busy Pacific crossroads. In time the war trophy was relocated to the Air Material Area on Clark, away from the mainstream of base activity. The airplane remained in good condition and a point of interest to base personnel, but amidst cries of protest, it was taken down from its perch in 1960. The Base Commander ordered it scrapped, even though organizations on the base were anxious to give it the care it deserved. Regrettably their efforts failed.

Meanwhile, on Okinawa, all available troop transports of the Far East Air Force had been mobilized for the mammouth air operations that would begin the occupation of Japan. Aircraft in greatest quantity were Curtiss C-46 Commandos, the largest twin-engine aircraft of the war, along with dozens of C-47 Skytrains and larger four-engined C-54 Skymasters. The initial target date for the move to Japan was postponed from August 26 to August 28 because of a typhoon in the area. Then the weather improved, te greatest aerial movement during the Pacific war was begun.

At Atsugi airfield, 25 miles southwest of the center of Tokyo, countless Japanese planes dotted the field, stripped of their propellers. This was by Japanese decree as a precaution against their own air force personnel who protested the surrender. The first American formations flying from Okinawa were not expected until 0900, but half an hour earlier, a twin-engine aircraft appeared in the skies from the south. It was the first of an endless string of C-46 transports. The plane circled Atsugi and then made its approach

from the south, touching down on an undamaged section of the runway at 0828. It was followed by fifteen others.

From the lead plane debarked a U.S. Army Colonel, who was in command of the advance party. Waiting automobiles transported him and his staff to the Japanese reception group at the edge of the field. Procedures that had been worked out with Japanese surrender envoys, who had gone to General MacArthur's headquarters in Manilla on the night of August 19, were beginning to take effect.

While this initial conference on Japanese soil was taking place, soldiers debarked from the transports coming on to the field every few moments, unloading jeeps before forming exploratory parties. A second flight of fifteen C-54s landed at 1100. These planes, carrying a total of 30 officers and 120 men wearing full combat equipment, were escorted by ten carrier-based F6F Hellcats.

The Japanese were amazed at the efficiency with which these Navy fighters, landing on the grass, quickly folded their wings "like cicadas," even while taxiing to their parking positions. The Japanese made no attempt to conceal the degree to which they were impressed by the speed with which the Americans motorized themselves and investigated the entire field area. Their amazement was outspoken when within forty-five minutes after the first aircraft had touched down, portable Signal Corps transmitters were on the air establishing communications with the base they had departed on Okinawa. The last planes of the group brought in fuel, lubricants, and maintenance equipment. This made the intrepid advanced unit self-sustaining until the anticipated arrival two days later of the main airborne force which constituted the first of the Occupation troops for Japan.

After the runway and base support facilities had been repaired by Japanese labor, the base was ready for operation. By the end of the first day of transporting the actual Occupation Forces to Japan, 4,200 troops and 123 aircraft had completed the move from Okinawa. Among those arriving at Atsugi were investigative team members of the Technical Air Intelligence Unit. Day after day the transports shuttled more troops and support equipment into Atsugi. From there, they fanned out over the countryside to take control of their predesignated areas. By September 4, American forces had control of all the major airfields in the Kanto Plain area in and around Tokyo. In concert with this operation, one team landed on Kyushu, while another moved into Korea.

The airfield for the TAIU to establish as their base of operations was Narimasu, which was situated at the northwest edge of Tokyo. From this airfield, up until this time, Nakajima Ki.44 "Tojos" of the 70th Fighter Group had desperately waged a losing effort to defend the city from attacks by B-29s. To the thousands of U.S. Forces that were later stationed in the Tokyo area, this airfield site became better known as the Grant Heights Housing Facility, when after a few short months all flying was suspended and

American style houses were constructed and covered the entire flying field. This became home for U.S. Army and Air Force personnel and their dependents until it closed in the mid-1960s.

To provide the most rapid and practical means for members of the TAIU to inspect the many Japanese airfields, the unit had three Grumman TBM Avengers assigned to them. Although TAI teams were made up of Army, Navy and RAF members, it was not uncommon for Army pilots to fly these Avengers to these various airfields for inspection trips. One Corsair pilot, while patrolling over Japan, joined up smartly on the wing of one of these lumbering Avengers. His relaxed expression slowly turned to complete bewilderment when he recognized the Army uniforms on the crewmen of this Navy aircraft. The Army pilot, not wishing to pass up a golden opportunity in this unusual situation, raised the microphone to his mouth and with great deliberation announced smugly: "We stole it!"

During these early days of the occupation, TAIU teams departed their base at Narimasu airfield first thing in the morning and flew to preplanned inspections of outlying airfields. After an aerial survey of the area, the Grumman TBM would land and its team of one officer, one translator/interpretor, and one photographer would look over the local Japanese aircraft and other equipment for any unusual technology. Also being sought were the best flying examples of a new aircraft that were to be flown to Yokosuka. Once these items were located, guards were posted to ensure they remained safe until such time that they could be flown away. For the airplanes that remained, most of which had been rendered unflyable, "clean-up" was begun. Bulldozers heaped them into twisted piles of junk and they were set ablaze.

Of the many ferry flights that were required to move nearly a hundred airplanes, all were flown by Japanese pilots. The cooperation given by the Japanese to the Americans was reflected by unquestioning obedience in compliance with their Emperor's wishes. The Japanese military forces, although in the process of being systematically demobilized, were still a functioning organization and managed most of the details in preparing the selected airplanes for flight to the collecting point at Yokosuka. Some eager American pilots tried very hard to be included among those ferrying these Japanese planes, but since the responsibility for safety and the effective movement of these aricraft had been placed in the hands of the Japanese military, Japanese officers insisted that only their own experienced pilots fly the planes until the delivery was completed.

Procedures for these ferry missions that took place on previously arranged dates called for the TAIU team members to fly to the departure base in their TBM early in the morning of that day. This contingent functioned as the coordinating body and control tower for the departure. When the prearranged fighter escort arrived overhead, this signaled that it was clear for the Japanese airplanes to take off. After becoming airborne, they were to remain

in the airfield flight pattern and make two practice approaches to the runway. If everything functioned properly, the airplanes would proceed on a direct route to Yokosuka with the Avenger containing the TAIU team leading the way. In the event that a Japanese aircraft experienced any mechanical difficulty that would prevent it from safely making the flight, it would land at an alternate aircraft with crew already standing by would take its place.

Upon reaching the Oppama Airfield, at Yokosuka, the TBM pilot made contact with the tower to announce the arrival of the Japanese planes. The Avenger would land, leading the Japanese airplanes, and the escorting fighters would proceed back to their home base.

This type of operation worked well until one day the escorting fighters did not show up. The story of this incident is remembered well by Theodore T. Brundage, who was an Army Air Corps Captain at the time and in charge of the gathering of many of these airplanes. Ted Brundage had joined the TAIU (SWPA) at Clark in May 1945 as the unit commander and moved with them to Japan. On this occasion, Brundage was supervising the movement of three Kawanish "George" 21 fighters with one spare from Himeji airfield in central Honshu.

"We waited and waited for the P-38s to show up," he recalls, "but nothing happened. As the day progressed, we had to do something. Since the Japanese had been cooperating fully in all these operations, we decided to make the flight without the fighter escort. Just to make sure that the Japanese understood who was in charge, we rotated the gun turret of our Grumman Avenger while we were preparing to take off, just to make this point clear. Thinking back now, the Japanese must have thought this to be a feeble and needless act to flex this single .50 caliber machine gun as a threat to these fast and nimble fighters. On the other hand, we all were in a strange country, in the midst of our former enemy, and had cause to be a bit apprehensive as to what might happen. The flight went very well, and from then on we dispensed with having fighter escort for these ferry flights, which solved much of the coordination effort."

According to a news clipping account taken from a November 1945 edition of the "Stars and Stripes," the armed forces overseas newspaper, "there were three planes lost in the entire operation and they were due to accident. One accident involved a Japanese plan and a Navy Corsair, but it was a taxiing mishap of minor importance."

In the years following this mustering of Japanese aircraft at Yokosuka for their shipment to the United States, a committee of Japanese historians have made many attempts at locating or reconstructing an inventory of the airplanes that these shipments included. Lists were found that showed which airplanes were desired for shipment, along with Japanese estimates and an Air Materiel Command Catalogue of Foreign Equipment dated March 10, 1946, that listed only those aircraft that could be made available for selected industrial study. None of these were an accurate inventory of the air-

craft actually sent to the United States.

While preparing this coverage about the TAIU activities in the Pacific, Ted Brundage produced a treasure-trove of material and photographs that make up much of this account. Among his possessions he had retained the original lists of Japanese Army and Navy aircraft that were gathered and sent to the United States. These lists were on the typical Japanese tissue writing paper, prepared primarily in English by a Japanese who at times, in desperation for the proper English word, had to resort to writing it in Japanese. Not only did these inventories show the airfields from which most of these aircraft had come, but serial numbers were also included for some.

What adjustments were made to these listings between the time they were developed in October and the boat departures in November and December of 1945 must remain an open issue. These lists show a total of 145 aircraft that were being readied to be ferried or moved for the subsequent voyage to the United States, yet according to Ted Brundage, who retained these original lists and shared much of the responsibility for the gathering of these aircraft, he recalls the final figure to be 108 airplanes. Both figures seem reasonable, and it is apparent that a full accounting will always remain an estimate.

It is known that one or more of the small-sized aircraft carriers encountered severe storms while making the eastward crossing of the Pacific. An unconfirmed report tells of some airplanes breaking loose from their moorings on one carrier deck as rough seas rolled the ship. In an attempt to prevent damage to the ship and other equipment, orders were given to cut many airplanes loose, allowing them to be tossed into the sea. That order, however, was countermanded before all were lost. This may account for the mystery of the disappearance of several types said to have been sent to the U.S.

Three aircraft carriers were involved with this postwar move of Japanese airplanes to America. The first boat load to leave was on the USS Barnes (CVE-20), which departed on November 16, 1945, followed that same month by the USS Core (CVE-13). A previously unidentified carrier, the USS Bogue (CVE-9), was the last of the three to depart Japan, which was the day after Christmas, arriving at Alameda Naval Base on January 8, 1946. Most, if not all, of its deck cargo of Japanese aircraft continued with the ship through the Panama Canal to its destination at Newark. Among the aircraft loaded there was Japan's only surviving four-engine land based bomber, the Nakajima G3N1 "Rita."

The story of these aircraft after they reached the United States is another subject, about which little has been recorded. Once it was learned that Japanese technology used in designing and building these airplanes had little to offer for improving postwar American aircraft designs, interest quickly vanished. Several of the airplanes found their way to U.S. Government bond drive circuits, and some were used temporarily for display as war trophies.

For the most part, the majority were scrapped and never flown or utilized during their brief existence in the United States. Several were set aside for museums.

In the realm of intelligence analysis, the TAIU's efforts had to be combined with other forms of intelligence collection to produce any worthwhile result. A case study on the role of Signal Intelligence was prepared in August 1944 by Col. Alfred McCormack who was in charge of the Army's SIGINT Operations during the war.

31 Aug 1944

"MEMORANDUM FOR THE CHIEF, MIS:

Subject: A Case Study in Intelligence

1. The purposes of this memorandum are:

a. To illustrate what kind of intelligence research is involved in Ultra;

b. To show how erroneous is the view, which keeps cropping up in MIS, that there are two separate kinds and sources of intelligence, Ultra and non-Ultra;

c. To demonstrate again why top-flight talent is required for the fact-finding work which is the foundation of all intelligence production.

2. The research problem in the case was: Are the Japanese manufacturing aircraft in Manchuria and, if so, what types and what components?

3. Evidence bearing on the problem as of 1 Apr 44 was:

a. Evidence pro: Pre-war evidence of the existence of something called the "Manchuria Aircraft Company."

b. Evidence con: The Technical Air Intelligence Unit, after examining 30,000 name-plates from combat aircraft, had not identified a single plane or component as having been manufactured in Manchuria. It was considered possible that training planes might be manufactured in Manchuria, but there was no evidence on the point.

4. In April a study of Ultra items revealed a "Manchuria Air Depot" which was originating messages at Mukden. Traffic of this Depot was assembled with

a view to determining where it fitted into the Japanese air picture. Sufficient evidence was collected to establish a flow of a type of plane called "Type 2 Single Engine Advanced Trainer" out of the Mukden Depot to points in Manchuria, China, Formosa, the Philippines, Malaya and Java, and even Japan. This led to the tentative conclusion that the planes going out of the Depot had been manufactured in Manchuria and not in Japan, since Mukden was off the air routes from Japan to most of the delivery areas, and since neither trainer planes manufactured in Japan, nor planes assembled at Mukden out of components shipped from Japan, would be likely to be flowing back from Manchuria to training units in Japan.

5. The next problem was to determine whether the engines for these planes were manufactured in Manchuria or shipped from Japan. A study was made of traffic relating to shipments from Japan to Manchuria; it was determined that propellers, landing gear and other components were being shipped, but the traffic contained no references to engines. From this fact it was concluded that the engines were being manufactured locally.

6. The next problems were:

a. To obtain information about the Type 2 Single Engine Advanced trainer, about which nothing was known except its name, and to determine the rate of production of these planes in Manchuria;

b. To locate the factory or factories where they were being made; and

c. To locate the Manchuria Air Depot.

7. With respect to the number of planes being manufactured, evidence was assembled to show that in a period of 25 days in May, the Manchuria Air Depot was to deliver 105 planes to its 2 principal customers; and this, plus a request for tail wheels (including a reference to salvaged wheels and to future needs of 140 per month) was thought to indicate a current monthly output of around 150 aircraft. Subsequent traffic is expected to furnish more evidence on this point.

8. The location of the factory and depot was accomplished (and Type 2 SEAT's were identified as the only planes involved) by interpretation of the

first aerial photos of the Mukden area; but the point to be made here is that the photos would have told us nothing but for the painstaking and imaginative work done before the photo reconnaissance occurred.

9. The story is a striking example of the synthesis of intelligence from many sources and of the importance of imaginative "detective work" in this kind of activity.

10. The story commenced with obscure messages employing an abbreviation "Man-Pi" -- "Man" probably for Manchuria, "Pi" for some unknown word. A study of these messages suggested that Man-Pi was a manufacturer of aircraft, almost certainly in Manchuria. But no available compilation of factory or company names threw any light on the meaning of the abbreviation. Neither A-2 nor FEA could help; nor could the Japanese lingquists.

11. Then a new abbreviation -- "Man-Hi" -- appeared in the messages. This was little more significant, since Manshu Hikoki K.K. means Manchuria Aircraft Company, but still the evidence was inconclusive. However, the traffic did turn up a direct reference to the manufacture by Man-Hi of Type 2 Single Engine Advance Trainers, the type of trainer supplied by the Manchuria Air Depot.

12. Attention was then focused on a search for the meanings of Man-Pi and Man-Hi. All leads proved fruitless, both within and outside MIS, until the officer working on the problem chanced upon a document that solved it all at once. Digging through A-2 files on Japanese aircraft matters he came upon a translation of a letter taken from the Mitsubishi files in New York, which had been found and translated by the MIS (repeat MIS) New York Office. This letter contained the direct statement that both "Man-Pi" and "Man-Hi" were abbreviations for Manshu Hikoki K.K.

13. Thus, the three possible manufacturers of planes in Manchuria -- Man-Pi, Man-Hi and the Manchuria Aircraft company -- were determined to be one and the same; and that one was established as (1) the source of planes moving out of the Air Depot at Mukden and (b) a manufacturer of Type 2 Advanced Trainers.

14. A Mukden street address for the Manchuria Aircraft company was obtained. But it was in Japanese; all the available maps gave the street names in Chinese; and the linquists could not tie the

Japanese name to any street shown on the map. A search was then made for either (a) a map in Japanese or (b) the address in Chinese. The latter was successful; the Chinese address was found in a Japanese yearbook. Thus, the presumed location was pinpointed on a map of Mukden.

15. A search for evidence locating the Air Depot was then made. It was not successful, but it did turn up a document captured in Hollandia (translated by ATIS) consisting of instructions to a person who was going to inspect the Depot. They included a convenient sketch of the Depot and its 72 buildings, with a descriptive title for each building, e.g., "No. 9 Warehouse," "Automobile Garage," "Training Unit," "Dispensary," etc.

16. At that point, we were ready for the aerial photos; and on 19 June the 14th Air Force sent a P-38 on a photo reconnaissance mission over the Mukden area. In due course the photos arrived.

17. A shot was found covering the street where the Manchuria Aircraft Company was supposed to be. It showed buildings suitable to the manufacture of trainer aircraft, with an adjacent airfield. On the field and around the factory there were 125 small planes. The first interpretation of this photo was that the planes on the field were biplanes. This was staggering news, since if the backbone of JAAF advanced training were a biplane, the training program would obviously be inadequate to prepare pilots for combat. The point was called to the interpreters' attention and the pictures were reexamined. One shot was found showing the planes in a favorable light, and they were definitely indentified as monoplanes. The impression of bi-planes had been caused by light effects on the closely parked trainers.

18. A close study of the photos showed that about 40 of the planes on the factory field had engines, while the other 85 did not. This fact, plus the fact that the factory had no vents of the type that would be expected if the operation involved the construction and testing of motors, was considered to show that the motors were manufactured somewhere else in the Mukden area.

19. A study of all the photos of the Mukden area was then undertaken, in an effort to locate the Manchuria Air Depot, by reference to the Hollandia diagram of its buildings. It was located about 7 miles west of the Manchuria Aircraft Company's factory; comparison

of the diagram with the pictures left no doubt of the identification. Around the shops of the Depot were 15 planes identical with those of the Manchuria Aircraft Company's factory.

20. To summarize the principal results of the "research" outlined above:

a. The Manchuria Aircraft Company at Mukden has been established as a manufacturer of Type 2 Single Engine Advanced Trainers, and a tentative estimate of its production had been made possible.

b. A factory (and apparently the only factory) of this company manufacturing Type 2 Trainers has been pinpointed.

c. It has been concluded that the engines for these planes are probably being manufactured in Manchuria, but not at the Manchuria Aircraft Company's factory.

d. The activities of the Manchuria Air Depot have been determined; and its location, including the location of each of its 72 buildings, has been pinpointed.

e. The aircraft appearing in the Mukden photos have been identified as Type 2 Advanced Trainers, about which previously there was no information; the approximate dimensions of this type of plane have been determined; silhouettes of these planes for recognition purposes are now being prepared and will be shipped to the theaters.

f. The information now available about the Type 2 Trainers will permit interpretation of aerial photos of trainer bases on Formosa. The photos, now en route to Washington, are expected to throw light on the progress of the training program. Since it is known where the trainer bases on Formosa are located and what planes their establishment calls for.

21. The preceding paragraph lists what might be called completed intelligence. However, in the course of the work much other valuable information has been picked up. The details would involve too much explanation, but among the subjects on which such information has a bearing are the following:

a. The flow of training planes to Flight Training Units;

b. Identifications of Flight Training Units and their locations;

c. Whether the Type 2 Advanced Trainer is (as it now appears to be) the only SEAT being manufactured and supplied to Flight Training Units;

d. The ability of the Japanese to furnish components for the planes made at Mukden;

e. Whether a twin-engine plane (now identified) is the only SEAT now being manufactured and furnished to Flight Training Units, and whether it can be shown that this plane is manfactured in Japan.

22. This memorandum has been stencilled for use in our training program for new officers. Hence it is pointed out that the above is not an unusual case, but merely a dramatic example of what goes on every day in this work. Almost every issue of the FES contains some simple statement of fact -- e.g., that two Air Divisions have moved from the Kuriles to the Nanseis; that a new Area Army has been identified; that certain ships of specified tonnages have been sunk; that a new type of unit has been identified; or that strength estimates for an area have been revised -- where the basis for the conclusion may have involved at least as much painstaking and imaginative work as in the case described above -- and in many instances harder work, over a much longer period of time, and with less spectacular results.

23. Furthermore, in many cases of the hardest work, no definite results are produced, at least for a long time, but when results appear they are very rewarding.

Alfred McCormack
Colonel, G.S.C.
Director of Intelligence MIS"

Thus, it can be seen that a good deal of work was required to provide a miniscule amount of information. This information had value both for immediate tactical use and for the preparation of long range studies.

In addition to the information supplied by the MEIU and TAIU in conjunction with the military services, the OSS had detachments in

the Far East, most notably the 101 Detachment in Burma commanded by Col. Ray Peers and the 404 Detachment in China. Because of the large area of the Pacific War, political and economic intelligence had to come from the wide range of sources, too numerous for this book to cover. There does not appear to have been the same degree of thought given to the post-war period in the Pacific by U.S. planners as there had been to post-war Europe.

In the area of combat operations, there are two distinct aspects which should be touched upon briefly; the air war and the naval war. The tactics of the war had evolved around the naval task force which kept the sea lanes open and supplies flowing while other task forces landed Marines and Army combat units on Japanese held islands. The Marines secured the beachhead and began pressing inland only to be relieved by U.S. Army units who finished mopping up the islands Japanese garrison. As island after island was secured by combat forces, air bases were established and the bombing campaign was brought closer and closer to the Japanese home islands.

As the war progressed, captured equipment began to reveal the state of affairs in the Japanese industrial base. The weapons became cruder and showed the allies that the naval blockade and air bombardment was taking its toll. While the weapons were still effective and many of the Japanese were fanatics, conducting suicidal attacks, it was apparent that the Japanese industry would not be able to keep their forces supplied. The war, however, was far from being won and there were plans in progress for an invasion of the Japanese home islands.

As a direct result of the work done by the various MEIUs, the Navy Department's Bureau of Ordnance published Ordnance Phamphlet 1666, "German Explosive Ordnance," a two-volume work on German munitions. Part 1 had four chapters: Bombs; Fuses; Rockets; and Land Mines, Grenades, and Ignitors. Part 2 had chapters 5 and 6 on Projectiles and Projectile Fuses. These documents became the basic guide for all military personnel who were engaged in bomb disposal work in Europe and for research and development people who would be working on new fuses. Other volumes were produced on French, Italian, British, and Japanese ordnance items, however, these would not be copied by the Army and Air Force until 1953 when they were designated as TM-9-1985-1 through 8, or TD-39B-1A-10 series.

The United States also had other allies in the war against Japan and it is necessary to review briefly the progress which had been made in rolling back the Japanese empire since 1942. After the loss of Guadalcanal, where the Japanese had tried to cut the American supply route to Australia, and after fierce battles for the Solomon Islands, the Japanese Imperial H.Q. was forced on 25 March 1943, to go over to the defensive. The Japanese Navy was ordered to hold a line running from the Aleutian Archipelago through Wake, Marshall and Gilbert Islands to the Bismark Archipelago, with the result that Rabaul, the natural harbour in the Bismark Archipelago became a vast Japanese base. In June 1943, the Americans launched

their offensive against Japanese bases in the Solomon Islands and on the southeast and east coasts of New Guinea. The experiences gained du ing this long and bloody campaign, during which the Japanese were thrown back step by step, led to a change in strategy towards the end of 1943, when General MacArthur, Allied Commander, S.W. Pacific, decided to by-pass the Japanese bases in Rabaul and New Guinea, and to land to the rear of the Japanese by a series of "island hops". Thence he would blast the Japanese concentrations from the air. Early in 1944, Rabaul was isolated by the occupation of the Admiralty Islands, and the Japanese centers in New Guinea were rendered impotent by American landings and subsequent advances from the northern coast. Towards the end of 1943, the U.S. Fleet had been so greatly augmented with new ships that it was able to launch an independent offensive through the Central Pacific. A trial assault on the Aleutian Islands was followed in November 1943 by an attack on the Gilbert Islands: in January-February, 1944 by an attack on the Marshall Islands and in June-July, 1944 by an attack on the Marianas. In the autumn of 1944, the two U.S. spearheads linked up in a common attack on the Philippines, culminating in the storming of Luzon in January, 1945.

Their landing on Iwo Jima on 19 February 1945, brought the Americans to the gates of the Japanese Home Islands. Okinawa, in the Ryukyu Archipelago, an apparently invincible fortress with a network of underground fortifications, was now Nippon's last bulwark. With its fall (1 April 1945) and Britain's success in opening the Burma road (May, 1945), conditions were ripe for the invasion of Japan (Summer of 1945). Neither the American nor the Japanese troops did, however, have the slightest inkling that the last hundred days of the murderous war in the Pacific had already begun.

Even when Japan's Allies in Europe had lost the war, the Japanese continued to fight with a fanaticism that can only be explained in terms of Japan's history and religion. The tattered Japanese soldier, who emerged from a rock cave in Okinawa, reporting that his superiors had ordered a fight to the last man, and who added laconically that he was just that, was typical of the Japanese attitude. Yet another facet of the Pacific war sprang from this mentality: the fact that the Japanese called their suicide planes Kamikazes (Divine Wind) after the typhoon which destroyed the fleet of Kublai Khan off the coast of Japan in 1281.

After the end of the bloody battle for Okinawa, the Americans intensified their air offensive on the Japanese Home Islands, hoping to break the resistance of the Japanese people with a rain of bombs. The man behind this offensive, General Spaatz, had proved his mettle in the strategic bombardment of German cities. Needless to say, the offensive was also directed against Japanese naval bases and against military and industrial centers.

In S.E. Asia, the Australians had meanwhile landed on Borneo, where they succeeded in driving the Japanese into the jungle. In

Burma, the British had pushed the Japanese back to the impassible mountain territory on the borders of Thailand. The threat to the Home Islands, finally, forced the Japanese to withdraw their troops from South China, with the result that the Chinese, supported by Allied bombes, could continue their advance from Nanning to Kweilin. In the northeast, the Chinese Communist Army was cutting Japanese communications between Manchuria and China; in the southeast, American bombers were pounding the remaining Japanese forces. That, in brief, was the situation at the beginning of August, 1945.

From 17 July to 2 August 1945, Truman, Stalin and Churchill met at Potsdam where there were further clarifying discussions of plans for dealing with defeated Germany and all the former occupied countries in Europe. Stalin confirmed his undertaking to join the war with Japan but also told the other Allies of peace moves that the Japanese had made via the as yet neutral USSR. There were no definite proposals contained in these approaches and it was, therefore, decided to do nothing direct to follow them up.

On the 24th Truman and Churchill mentioned to Stalin that they had a new and powerful weapon for use against Japan but did not explain what it was. It was possible that Stalin already knew of the bomb through his espionage organization in the United States. President Truman made the decision to use the bomb on Japan if they did not soon come to terms. Whatever the later doubts about the morality of using the weapon, at the time there was very little doubt. It was simply a question of quickly persuading the Japanese to surrender in order to save many lives on both sides that would be lost if the Allies invaded the Japanese Home Islands. No real thought was given to the possible forms of a demonstration use of the bomb to frighten the Japanese without having to destroy a city. There is ample evidence to support the theory that such a demonstration would have had little effect on the Japanese and would have delayed the end of hostilities even longer.

On 26 July a broadcast was made to Japan with what had become known as the Potsdam Declaration. This repeated the demand for unconditional surrender, but stated that the Allies did not want to reduce Japan to poverty in the postwar world. It said nothing of allowing or preventing the Emperor to remain at the head of the Japanese government.

On 28 July Japanese Premier Suzuki held a press conference in which he said that the Japanese government would take no notice of the Potsdam Declaration. At least that is the interpretation that is put on his speech by the Allies, but it is possible that the word he used was intended to mean 'make no comment on for the moment' and that more might have been done to encourage a diplomatic response. It was upsetting to the Japanese that the declaration had not been delivered through the proper diplomatic channels via a neutral power and this contributed to their decision to take no immediate action on it.

On 6 August 1945 the first atomic bomb was dropped on the City of Hiroshima by a plane from the 509th Composite Group of the 20th Air Force piloted by Colonel Paul Tibbets. The plane was named by Tibbets after his mother, Enola Gay. The bomb was a uranium fission weapon and the yield was in the region of 20,000 tons of TNT. Sixty percent of the city was destroyed in the blast or the firestorm that followed. There were about 80,000 dead, many of them being killed instantly. Many more were horribly burned or would become ill in later years with the effects of the radiation. It was not the most devastating bombing attack of the war -- the March fire raids on Tokyo had a larger effect -- but the economy of effort involved in sending only one plane on a mission to destroy a city shows only too well the complete change in military and political thinking which has been begun.

On 8 August the Soviet Union declared war on Japan, citing as the reason Japan's failure to respond to the Potsdam Declaration. The second atomic bomb was dropped on Nagasaki. This was a plutonium fission device of the type tested at Alamagordo. The attack was less devastating than at Hiroshima even although the bomb was of the technologically more advanced plutonium type. About 40,000 Japanese were killed. Following the attack President Truman broadcast a radio message threatening Japan with destruction by atomic bombs with the result that the Japanese Supreme War Council agreed late that night that they should accept the Potsdam Declaration if the monarchy was to be allowed to be preserved. Objections from the military were overruled by the Emperor himself.

In Manchuria, the Soviet forces began a powerful offensive against the Japanese. The Soviets had assembled about 1,500,000 men in three fronts; First Far East Front, Second Far East Front and the Transbaikal Front. The 1,000,000 men of Yamada's Kwantung Army had no answer to the mechanized Soviet forces and were almost equally powerless in the air. The Japanese defense lines were almost immediately smashed.

Beginning on 9 August, the British and American carriers returned to the attack of Japanese Home Islands after a replenishment period. The carrier Wasp and the battleship Duke of York had joined the force and Admiral Fraser was now present to command the British contingent. Airfields and shipping on Honshu and in the waters nearby were attacked with great effect on 9-10 August and there was a bombardment of Kamasishi.

On 10 August the Japanese radio announced that a message had been sent accepting the terms of the Potsdam Declaration provided this 'does not compromise any demand that prejudices the perrogatives of the Emperor as sovereign ruler.' On the 11th the Allies replied, saying that the Imperial authority would be subject to the decision of the Supreme Commander of Allied Powers in the occupation force. The Japanese were not yet ready to accept this demand which still seemed very close to unconditional surrender. On the 13th there was a raid on Tokyo in which many Japanese aircraft were

destroyed on the ground.

By 14 August, at a government meeting, Emperor Hirohito decided to end the wranglings of his politicians and ordered that the war should end. He recorded a radio message to the Japanese people saying that they should "Bear the unbearable." During the night there was an attack by a group of military officers on the Imperial Palace in an attempt to steal the recording and prevent it being broadcast, but this was foiled by the palace guards. The Japanese decision was transmitted to the Allies and it was announced by them that Japan would accept unconditional surrender.

Since the end of the war it has often been debated what the final cause was that made the Japanese decide to surrender. Examination of Japanese records and of the people concerned seems to show that it was from a combination of the threat of atomic attack, but also and perhaps predominantly from the defeat by the Soviets of the Kwantung Army.

15 August 1945 was declared VJ Day. Emperor Hirohito's broadcast was made to the Japanese people, many of whom could not at first accept what had happened because the tight control of the government had prevented civilians knowing the full extent of the weakness of Japan's position. On the same day new attacks were under way when the order ending hostilities arrived. Not all planes heard the recall. There was some air fighting also with Admiral Ugaki leading a final Kamikaze attack.

On 17 August with the Japanese occupation ended, the Republic of Indonesia declared itself independent of Dutch colonial rule. No British forces would arrive to take over occupation duty from the Japanese for six weeks. In the postwar period there would be various spells of fighting between the Indonesian Nationalists and the Dutch before, in August 1950, the new republic was recognized worldwide. In Manchuria, virtually the whole province had been overrun by the Soviet forces. They had taken Harbin and were closing in on Mukden and Changchun. In an advance from near Vladivostock they entered northern Korea. On 22 August, the Japanese Kwantung Army in Manchuria surrendered. Soviet forces had reached Port Arthur and Dairen and by 27 August, the Allied fleets anchored in Tokyo Bay within sight of Mount Fujiyama.

On September 2, 1945, the Japanese surrender was signed aboard the battleship Missouri in Tokyo Bay. Foreign Minister Shigemitsu led the Japanese delegation. General MacArthur accepted the surrender on behalf of all the Allies. Admiral Nimitz signed for the United States and Admiral Fraser for Britain along with representatives of all the other Allied nations. Also present were Generals Percival and Wainright who had been Japanese prisoners since they had surrendered at Corregidor and Singapore. On the same day in what had been French Indo-China, Ho Chi-Minh proclaimed the existence of the Democratic Republic of Vietnam. As in the Dutch East Indies, France, the pre-war colonial power, would try to reimpose

its control after the war and would eventually be forced to leave after much fighting.

The war in the Pacific had been a Naval war followed by the Marines' inland-hopping campaign, or as one famous general said, "Hit'em where they ain't!" American tank designers paid little attention to operations in the Pacific as tank warfare was not as prevalent as in Europe and North Africa which had been the scene of the lengendary tank battles. They were more concerned with trying to develop a really powerful tank that could carry an enormous gun inside a hull whose armor plate could withstand any known armor-piercing shellfire. This tank would answer the known German King Tiger and possibly the rumored super tanks that the Nazi propaganda was darkly promising.

In late April 1945, Allied investigation teams were combing through the rubble of what once was a highly industrialized nation. One such investigation team was headed by Lt. Col. G. C. Reeves of His Majesty's Royal Tank Regiment. Colonel Reeves and his staff of American and British technical experts were charged with looking into the wartime activities of the Porsche firm. They found that the professor and his entire staff had fled in the face of advancing Allied troops, taking up residence in the two small Austrian towns of Zell-am-Zee and Gmund, together with all their files. Reeves and staff immediately set out for Austria, arriving in Zell-am-Zee on May 13, 1945. There the Allied team found both Professor Porsche and his son, Ferry, who was assistant director of the company at the time. The key members of Porsche's staff were also in Zell-am-Zee. Almost every one of these men would go on to figure prominently in the postwar German automotive industry. The remainder of the company's staff was in Gmund.

Colonel Reeves and his team of technical experts spent the following week shuttling back and forth between the two towns interviewing Porsche and his employees. Upon departing, they took hundreds of drawings, plans and other documents with them, planning to return at a later date for more in-depth interrogations. Unfortunately, the planned interviews seem never to have taken place, but, Colonel Reeves' team did prepare a report based on their May conversations. Thirty-eight copies were typed, reproduced and sent to the appropriate authorities in America and Britain, along with copies of selected blueprints and Porsche factory documentation. Upon arrival at their destinations, the reports were duly filed and then apparently forgotten.

One of the many vehicles that was covered in the report was the Porsch Type 205 or "Maus" as it was referred to by the Germans. The investigation of this vehicle also provided the allies with additional information on the German armament program. The Maus, or Type 205 (it was referred to by both terms in official documents during its development, began in 1942 with an order from Hitler himself for Porsche to begin development of a superheavy tank which would mount a 128mm. main gun as its primary weapon and have the maxi-

mum possible armor.

Porsche was appointed head of the Reich Tank Commission, with the title of "official leading authority on German tank and vehicle design." Porsche, however, was politically naive and made the mistake of crossing swords with Albert Speer, Hitler's Minister of Armaments. This political gaffe caused Porsche's fall from official grace, and he was dismissed from his exalted position in 1943. His successor, Steele von Heidekamp, was from Henschel, a rival firm, and Porsche's military contracts suffered. But in the words of Colonel Reeves, Porsche did "continue to undertake some tank design work presumably paid direct by the Nazi chiefs of the Wehrmacht." Porsche also worked on some civilian projects during his period of official disfavor. His firm designed a two-cylinder, two-cycle diesel engine for the KdF-Wagen and a "producer gas" (wood gas) tractor for farm use. Both are covered in some detail in the Reeves Report, along with several other military development projects.

The Type 205 was a Porsche design from beginning to end, but many components were allocated to subcontractors, their actual production overseen by Porsche representatives. The engine, for example, was obtained from Daimler-Benz, while the vehicle's electrical components were produced by Siemens. The tank hull and turret were manufactured by Krupp. The various components would be assembled by Porsche into complete units. Altogether, 150 Type 205s were to have been produced, but the Allied investigators could not help but wonder why, since, "for every one of which it must certainly have been possible to build several Tigers or Panthers [tanks]." Regardless, work on the Maus project continued, and as tanks go it certainly would have overshadowed any tank built before or since in terms of size and weight. The Type 205 was so huge that Porsche himself referred to it as a mobile pillbox rather than a tank.

The two Maus prototypes actually built were somewhat different while embodying the same overall concept. The basic idea was actually little more than a fairly conventional tank design on gigantic scale. What differentiated them both from other such concepts (the Germans had other monster tanks under development, but the Maus was the largest) was Porsche's engineering innovations, although such a huge vehicle could be considered to be an innovation in itself.

The Maus hull alone was approximately 31 feet in length; the main gun added some ten feet more to the vehicle's length. While tanks of other nations had machine guns for coaxial armament (firing on the same axis as the main gun), the Type 205 mounted a 75mm. antitank gun, itself the equivalent of the main gun on most other tanks of the era. The 75mm. secondary cannon was presumably for those targets that weren't worthy of the huge main gun. The Maus also had an anti-aircraft gun mounted in the turret roof.

The first of the two Type 205s was strictly a prototype. It had

torsion-bar suspension and was powered by an inverted, fuel-injected, and super-charged Mercedes-Benz aircraft engine rated at 1,200 DIN horsepower at 2,400 rpm. The exhaust was water-cooled. Approximately 150 horsepower was used just to drive the engine's cooling fans. The starter for the big Mercedes powerplant was a separate, 8-horsepower gasoline engine. Another completely separate auxiliary power plant pressurized the crew compartment, charged the batteries and provided for underwater operations.

The amphibious feature of the Type 205 was necessitated by its enormous weight. When dealing with a vehicle of some 200 tons, crossing bridges becomes a questionable venture at best. Thus, one of Porsche's specifications was that the Type 205 must be amphibious in order to preserve the Reich's bridges. Stream crossings in a Type 205, like all else associated with the vehicle, would have been complicated. The Maus not only required extensive preparation simply to clank into the water, but required the assistance of another Type 205 on the riverbank to provide external electrical power via an umbilical cable while its river-crossing sibling was imitating a U-boat. Once the first Maus was safely across, the helpmate roles presumably were reversed.

The second prototype was also amphibious, but differed substantially from its predecessor in many design details. The changes were generally simplifications oriented toward expediting production. The inverted gasoline engine gave way to a rightside-up Mercedes-Benz D.B. 507 diesel with the same 1,200 horsepower rating as the earlier power plant. This change was motivated by a shortage of gasoline in the dying Reich. Both engines were similar, however, having been derived from the D.B. 603 engine that powered the Messerschmidt Bf. 109 fighter. The other major change in the second prototype was the suspension, which incorporated a simpler volute spring design very similiar to that found in the American M-4 Sherman tank. Since the Maus was not deemed to require the higher mobility characteristics inherent in the torsion-bar design, and since volute springs were cheaper to produce, the second Type 205 was built with the less effective suspension.

The drivetrain of the Maus reveals Porsche's longtime fascination with electric drive. The powerful Mercedes-Benz engine was not connected directly to the Type 205s drive mechanism, but instead drove tandem generators which produced power for two electric motors. These, in turn, fed through transfer cases to the machine's two epicyclic final drives.

If all this seems complicated, it was. The Allied Commission Report states, "The general impression given by the interior of the Maus in spite of its size, is that it is filled almost completely with a mass of complicated machinery." As careful examination of the sectioned drawings of the Type 205 will reveal, it almost seems that Porsche treated the entire Maus project as an engineering exercise in electromechanical complexity.

In the United States, despite the fact that heavy tank development had been stopped, as the war progressed, interest in a heavy tank was revived. The result of tank-automotive research was the T28 Heavy Tank weighing 98.2 tons and mounting a 105mm gun. The frontal armor was 12 inches thick and the tank had a very low silhouette of 112 inches. The gun had no recoil mechanism as the tank was so heavy that it absorbed all the recoil energy. Only two of these tanks were built and they never saw combat. The designation T28 Heavy Tank was changed to T95 Gun Motor Carriage.

One aspect of German tank development which impressed American tank designers was the success of the German diesel engine. With its relatively high torque at low RPM, it is ideally suited to heavy armored fighting vehicles. It also has a vastly decreased fire hazard which however was the primary advantage. These facts did not escape the Ordnance Corps and a huge plant was constructed in Texas to manufacture diesel engines, however, Army field forces in Europe indicated that they would not allow diesel powered vehicles in Europe as it would greatly complicate fuel supply to an army that had at times bogged down because of a lack of fuel.

After the war ended, the plant in Texas was eventually sold to the LTV Corporation. The basic work on development of new tanks for the Army centered around the M47, M48 series which should have had diesel engines, however, logistics constraints became the controlling factor. The ultimate solution to this problem came many years later with a network of underground pipelines.

At the same time that Army personnel were examining captured German and Japanese ground combat weapons, Army Air Corps officers in Europe were involved in analyzing the technical characteristics of German jet engines and rocket motors. The officers involved became the cadre of the Air Force technical intelligence operation that eventually became the Foreign Technology Division at Wright-Patterson Air Force Base. These officers travelled throughout Europe on Technical Intelligence activities in support of projects "Paperclip" and "Football." These officers developed methods for using Special Intelligence in Scientific and Technical Intelligence and developed a comprehensive long-range program for analyzing foreign advances in materials sciences and technologies. The Army also established a similar organization known as the U.S. Army Material Systems Analysis Agency as part of the Aberdeen Research and Development Center; however, its scope of operations was not as extensive as the Foreign Technology Division of the Air Force.

In both overseas theaters of operation, military forces began occupation duty and the process of rebuilding the defeated nations. In Europe, intelligence operations were initially conducted to exploit German prisoners of war and the arms industry. Among the many units created to handle this work were various interrogation teams. On April 18, 1946, the 525th Prisoner of War Interrogation team was established and it became operational on May 1, 1946. It consisted of one officer and three enlisted men and worked at

Heidlberg.

The 7707th European Command Intelligence Center was established at Oberursel, Germany, and the EUCOM Historical Division established an Interrogation Enclosure at Neustadt, Germany. During late 1947 and early 1948, a committee of former German officers in Neustadt, Germany, prepared a phamphlet, MS #T-22, "Peculiarities of Russian Warfare," and it was published in June 1949. At this time, Russia was still officially America's ally and the U.S. had not fully begun to understand Soviet postwar aims. America's wartime intelligence agency at the time was the OSS which was disbanded in 1946. Within the military, intelligence positions were considered branch immaterial and people from all branches passed through these positions.

With the disbanding of the OSS in 1946, intelligence operations reverted to their prewar state of inactivity. The State Department again picked up diplomatic, political, and economic intelligence and the JCS through whatever military assets they had was responsible for military intelligence. It was a system that would not work and something had to be done. In 1947, the National Security Act became law and established the National Security Council, a Central Intelligence Agency, a National Security and Resources Board and the Secretary of War was re-designated, Secretary of Defense. Under the Secretary of Defense were the Joint Chiefs of Staff, the Munitions Board and the Research and Development Board, as well as the Secretary of the Army, Secretary of the Navy and the new Secretary of the Air Force which was established as a separate service.

Unfortunately, with the creation of the Air Force as a separate service, the ground work was laid for inter-service rivalry. While the Air Force had primary responsibility for aviation and air defense and long range missiles, the Army also retained a close air defense mission. Much of the work done in the development of rockets and missiles would prove to be a costly duplication of effort. In addition, there was a limited amount of intelligence support for both efforts.

Perhaps of more significance was the fact that the Secretary of Defense had no intelligence assets other than the military services. In theory, the Central Intelligence Agency would provide what the military could not and there would be liaison between the CIA field stations and the military. During what would become known as the Cold War Era, most of American intelligence activities in Europe were directed towards the political activity of the Soviet Union and very little attention was paid to Soviet weapons and equipment. American weapons and equipment were considered by some to be much superior to Russian equipment except in tanks. German equipment was technologically superior to both.

In the area of continuing intelligence operations, there emerged on the scene Reinhard Gehlen who had been chief of German Military Intelligence on the Eastern Front. Gehlen had accumulated an archive of information on the Russians which he buried in the

Bavarian Alps, and eventually he offered to assist the Allies. He established an organization to conduct intelligence operations in the Eastern sector of Germany. The story of General Gehlen's career in intelligence is covered in his book, "The General Was A Spy." Without Gehlen's expertise, Washington would have been ignorant of the Soviet Union's political and military aims in the postwar years.

A good deal of the information on postwar intelligence operations remains classified for a variety of reasons. One reason was that former NAZI officials were being utilized for their extensive knowledge, either of weapons development or because of their background in intelligence operations in Russia. Many projects were underway to evaluate the German Arms industry, not the least of which was Project Paper Clip, the evacuation of German rocket scientists to America.

In addition to assisting in Project Paperclip, Lt. Nottrodt was selected to be the chief of the Military Interrogation Section of the 7707th ECIC. The interrogation team was commanded by Lt. Harger and Sgt. Mittermeier, a former NCO from the German tank troops. Operating with elements of General Gehlen's organization, this team helped to interview German POW's returning from Russia. The initial interviews were conducted at Moschendorf and Giessen, and those who were considered knowledgeable were invited to Oberursel for detailed interrogations under a joint services "wringer project."

Within continental United States, peacetime training of the Army was conducted and the "aggressor" concept, introduced in 1947 was in use. The aggressor was a maneuver enemy based upon our knowledge of the Russian army but wearing a distinctive U.S. uniform and with U.S. equipment. The main reason for this was a political desire to refrain from using actual Russian terminology, and a lack of captured Russian material.

Field Manuals FM 30-103 and FM 30-104 on "The Aggressor" were published and followed the same format as the TM's on German and Japanese forces. These manuals would remain the standard for training until 1976 when new versions would be produced, however, in both theaters of operations, the military forces on occupation duty began to feel the effect of drawdowns, demobilization, and cutbacks in defense spending. The 525th Prisoner of War Interrogation Team was deactivated on November 6, 1946, having completed its mission, and was not reactivated until February 1948 and reassigned to Fort Bragg, North Carolina.

By 1949, the Foreign Material Branch at Aberdeen had been disbanded but, the ORDGO-IN, Ordnance Intelligence Office in the Intelligence, Safety and Security Division of OCO in the Pentagon, had been formed. It consisted of three civilians and was basically a documents library. The 528th Ordnance Technical Intelligence Detachment was formed at Aberdeen Proving Ground. Captain H. E. Pinkstone and two NCO's, Simmons and Mills, were the original members. In this year the North Atlantic Treaty Organization was

formed, which was a mutual defense agreement for all nations of the North Atlantic and provided that an attack on one national would be considered an attack on all nations. The implication was a fear of Soviet expansion.

In the period between World War II and Korea, the United States began the development of a group of tanks known as "The New Family of Tanks." There would be a basic light, medium, and heavy model which would answer all the needs of the commanders in the field. These were known as the T41, T42, and T43. All of these vehicles were heavier than most of their foreign counterparts which created confusion in descriptions, so the words light, medium, and heavy were dropped from official descriptions, and they were known by their gun calibers, 77mm, 90mm, and 122mm, respectively. In the process, American tank designers did study captured tanks and in their analysis of German tanks, the Tiger Model E, occupies a distinguished place in the history of tank design. It exerted a very great influence on tank design in the United Kingdom, the United States and Russia, particularly in the fields of fire power, protection and deep wading. Certainly the British emphasis on fire power as the main design factor for its postwar main battle tanks Centurion and Chieftain resulted, partly from the consistent outgunning of its war-time tanks by their German equivalents but, most especially, from the shock of meeting the Tiger, which combined an even more powerful gun with armour frontally impenetrable to British tank guns at virtually point-blank range.

Development of combat vehicles in the U.S., Britain and the Soviet Union are a book in itself, but there are some aspects which are worth discussing. In addition to the stated mission of a combat vehicle, designers must consider threats to the particular system. The principle threat to a tank was the antitank weapon. In addition to antitank weapons, designers must also consider the environment in which the tank must operate. While antitank weapons were well understood, the effect of a nuclear weapon on the environment was not. In the next chapter I have begun a discussion of the development of both rockets and antitank weapons as well as a brief description of nuclear fission research conducted in Germany. To a large degree this information is from reports that were based on an analysis of the various interrogation reports, captured documents and captured weapons, personal correspondence and John Weeks book, "MEN AGAINST TANKS." Perhaps the saddest note to the analysis of captured weapons was provided by a former member of the Ordnance Technical Intelligence effort in the 1950's.

> "...there was a man by the name of Burkett that was the first man in the Walther factory. I believe he even outranked Jarrett in OTI and he stole the complete Walther collection, including many rare prototypes of Walther assault rifles. These, he kept for himself and I believe he set America's gun designers back fifty years. The Russians got some of the designs and went on to produce the AK47. Burkett

kept all the material and while I was at Aberdeen, he sold it to Burt Munhall of the H.P. White Laboratories. Burt knew his material was stolen, but Mr. White did not know and I understand there was a controversy after it had been purchased.

Much of this material was later sold after Mr. White's death with considerable gain going to Mr. Munhall."

The MP44 assault rifle had been encountered in combat as early as the fall of 1944 and samples had been sent to the rear through Ordnance Technical Intelligence channels for preliminary evaluation. This evaluation was of prime importance to weapons designers but against the background of armored warfare supported by V1 and V2 rockets the development received little emphasis. Several unique applications of the weapon were developed to include a curved barrel mounted in a ball housing to be fired from armored vehicles. The Ordnance Corps, having the largest contingent of the various technical Intelligence teams assigned to Ordnance Technical Intelligence Team 3 the project of investigating the curved barrel system. One of the officers, Captain P. B. Sharpe, and other members of the team conducted tests of the weapon while other personnel were assigned to the Walther Factory at Zella-Mehilis. By 18 July 1945, Technical Intelligence Report Number 347 was finalized.

While the MP44 and its variants were encountered in quantity during the latter stages of the war, the FG42 or Fallschirmjaeger Gewehr 1942 was less frequently encountered but samples were returned to the United States and were modified somewhat by putting the feed mechanism of the MG42 on the side of the gun, thus converting it from a magazine fed weapon to a belt fed version. Officially called the T44, this weapon was developed by the Bridge Tool and Die Company and became the base upon which the M60 light machine gun was developed.

The lack of detailed information on the MP44 combined with work already in progress to refine the M1 rifle led to the development of a T44 rifle which eventually became the M14 rifle and was designed to replace the M1 rifle, the BAR, and the M1 and M2 carbines. This weapon did not become standard until 1958, the same time that Aberdeen Proving Ground published its study on German Assault Rifles.

The Soviets, on the other hand, produced the M1943 cartridge and later an entire series of small arms to include the SKS, AK-47 and RPD light machine gun. It was for many years a widely held belief that the Russians had copied and refined the German MP44, however, in late 1985, Dr. Edward Ezell, curator of the National Firearms Collection presented a new version of Soviet Small Arms development. The truth is unimportant in discussing future developments and the intelligence assessments that were based on false assumptions. The "truth" would only become important in intelligence studies done after 1985 that discussed the Soviet Small

Arms Industry. I cannot refrain from remarking that small arms development history like all other weapons systems developmental histories are at best inaccurate as much of the written material that forms the basis of a history is sales propaganda. Dr. Ezell's book, however, owes a great deal to the recovery of weapons on the battlefield by Ordnance Technical Intelligence personnel.

Unfortunately, American policy was such that military research, as well as military operations, was reactionary. We reacted to a threat or to a new weapon system. Some long range research was being done, but the vast bulk of activity among America's research and development community was conducted to correct deficiencies in our equipment or to develop countermeasures to existing threats. It would be another twenty years before the United States would begin to develop a system for forecasting future scientific advances that would have military significance.

One American engineer who was a veteran of the period was interviewed in the 1980's and his comments are very revealing of conditions at the time.

While American and Allied Forces were engaged in combat operations, American scientists and engineers were also busy. The engineers and scientists who worked frantically and faithfully before and during World War II will tell you life was very different in the '40s. So were the laboratories. There was no Electronics Research and Development Command then. And Harry Diamond couldn't have imagined an entire laboratory would one day be named in his honor. In 1940 the munitions program approved for the Army required that everything needed to equip and maintain a force of 1.2 million soldiers be procured within 16 months. The Army received more than $8 billion to get what it needed. With the German defeat of France and the increasing threat to Great Britain, American involvement in the war became a strong possibility.

Then, when the news of the attack on Pearl Harbor reached the War Department on December 7, 1941, U.S. involvement was imminent. In America, people feared an attack here. In Washington, the mood was of urgency said Charles Ravitsky, who began working at the National Bureau of Standards that year, where the research and development of instruments for war was done.

"We felt we were lagging behind the Germans."

The National Defense Research Committee was established at the bureau by President Roosevelt. It was comprised of two groups to study proximity fuzes for bombs, rockets, and mortars. Harry Diamond headed one of the groups. Wilbur S. Hinman, co-inventor of the proximity fuze with Diamond, said the fuze was being developed before the attack on Pearl Harbor. "Actually, the first proximity fuze demonstration was done four months after we started research," Hinman said. "But it was a long struggle after that, getting the fuzes into production. I think we worked 80-hour weeks all during

the war."

It was a time when the engineers and scientists realized the impact of their work and the necessity to produce, to help our soldiers overseas win the war, Hinman said. General George S. Patton wrote to the U.S. War Department from Europe, describing the proximity fuze as "devastating." "I think that when all the armies get this, we'll have to devise some new method of warfare," he said. "I am glad you all thought of it first."

Dr. Jacob Radinow also worked on the fuzes, designing safety mechanisms to keep them from arming prematurely. Today, all non-rotating projectiles use the multi-element setback devices he designed. "In those days there was no organization," he said. "Everybody was overloaded with work. But the work didn't include paperwork, requirements for proposals, or committees. We never really knew where the money came from to do what we did. There was just plenty of it." The bureau ran like a scientific organization, Ravitsky recalled. People came and left when they pleased. They worked long hours, and Saturday was considered a regular workday. Leading scientists continued to work after mandatory retirement, at age 70. The bureau's director did, too, Ravitsky said. "The wonderful thing about working in those days was if you wanted something you just made a sketch, went into the shop and said, 'build it.' Things went very, very fast, and easy. I could call a contractor Monday and have a finished model by Friday," Rabinow recalled.

Testing was done on-site, too. "We used to fire three-inch rockets from hand-held tubes behind the bureau. There were no buildings north of Van Ness Street where the University of Maryland buildings now stand. Once one of the rockets got away from me and headed for a nearby restaurant. Luckily, it was diverted by a tree."

Rabinow remembers the bureau's work on the first guided missiles -- the glide bombs or Bats, as they were called. He had to design safety mechanisms for the bomb. "We used to take a 500-pound bomb and attach wings to it. I designed gyroscopes and flap controls for it. I remember seeing a whole bunch of the Bats lined up in the hydraulic laboratory. On top of each missile was a movie camera with a steel case. The aerial cameras photographed the area as the bomb was dropped. We would recover the film, and it sort of broke my heart to see all those brand new cameras smashed. The cameras cost about $40 then; the missiles $100,000 each."

The work of the bureau was as diverse as the inventors. Rabinow worked on many projects, one an automatic parachute release device for pilots who bail out at high altitudes. The men were told to pull the cord as late as possible so they'd fall quickly. Often they were unable to pull the cord. Because of the time it takes to fall from high altitudes, the men sometimes froze to death or were unconscious when they landed, Rabinow said. The bureau's job was to develop a radio altimeter that would release the chute at 2,000 feet above ground.

Another request called for an automatic hypodermic needle that would shoot adrenalin into the pilot's behind automatically after he hit the ground -- to revive him if he was unconscious. "It was amazing," Rabinow said. "I worked with some of the pilots and they weren't afraid to take terrible chances flying over enemy territory. But they were terrified about a needle sticking them in the behind." The latter project was dropped.

"In 1944 we worked on a fuze for the trench mortar. The requirement was for 50,000 a day," Rabinow said. But there weren't enough electronic components to meet the need. Harry Rubinstein, then chief engineer of the Central Labs Division of Globe Union, visited the bureau and suggested that resistors, compacitors and the wiring be done by machine. This was the invention of printed circuits.

Rabinow said there were problems with bomb fuzes. Delaying their arming was difficult because of differences in the way the Army and Navy dropped bombs. The Army dropped them from great heights; the Navy, from low down. "We had to keep modifying things until I designed a little clip-on device, and we set the fuze for a minimum distance (about 2,000 feet). It attached to the antenna of the bomb fuze and could be set to delay the arming. (It could be adjusted for 20,000 feet extra, or more.) It had a little windmill at the back of the device. We got a call from the Theater of War in the Pacific that the thing was working backwards," Rabinow said. "When they set it for long distances, it would arm quickly, scaring the hell out of everybody. When they set it at shorter distances, the fuzes could arm close to the ground or become duds."

It all turned out to be a misunderstanding. The soldiers seemed to think the windmill was on backwards, Rabinow said. So they'd ignore the directional arrow stamped into the steel which identified proper position and simply mounted the device upside down. "Later, I designed another model which would make it a dud rather than result in an early explosion if the arming device was not on correctly," Rabinow said.

The efforts of engineers and scientists before and during the war no doubt helped our military forces win that war. And the marks of their accomplishments today live on through the research and development of new technologies at the Electronics Research and Development Command and all its laboratories -- including Harry Diamond Laboratories which grew out of the bureau.

The fact that engineers and scientists felt we were lagging behind the Germans, General Patton's letter on the proximity fuze, and the problems with the bomb fuzes in the Pacific were based in part on the collection of foreign materiel and its analysis by the Foreign Materiel Branch. The analysis of captured material was of prime importance because the United States lacked an effective Scientific and Technical Intelligence effort in the pre-war era. The work of attaches and other observers was hampered by German

Security efforts. Information that had been reported in published research, suddenly disappeared from view. The best example was nerve gas. In the late thirties a German scientist, Gerald Schrader, discovered a group of organic phosphorus insecticides from which Parathion and Melathion were developed. The German Government immediately put a security blank over all this work, seeing the potential value of nerve gas as a weapon. They filmed the effect of them upon concentration camp prisoners. The films and the research came into Allied hands during the war and the research was continued by U.K., U.S.S.R. and U.S.A. and still continues to be important as a military weapon, however, there was no organization keeping track of German science during the 1930's that could have noted the "disappearance" of published research.

With the defeat of NAZI Germany and Japan, certain aspects of the American character, as well as the other allies, took hold. The desire to punish these nations was overwhelming. In the case of the Japanese, General McArthur pushed through the trial of Japanese General Yamashita for the crime of failure to control his troops during the war. Completely disregarding the facts, as well as legal procedures, General McArthur forced a conviction and ultimate execution of the General, thus setting a dangerous precedent for future conflicts.

In Germany, the allies were on much firmer ground in that Germany had signed the Kellog-Briand Pact in which they had renounced war as an instrument of National Policy. As a result, many of the NAZI leaders were placed on trial at Nurenberg. Many veterans of the O.S.S. had been lawyers in civilian life and were utilized at the trials, ostensibly as prosecution staff. Among those involved, was our family attorney of many years, John Monigan. Monigan was one of several people who interviewed Herman Goering on various topics that related to the development and use of the Luftwaffe.

With the collapse of Germany and Japan, as mentioned, the Ordnance Intelligence effort was considered superfluous to an Army that was beginning to feel the constraints of peacetime with it's reduced budgets and lack of any incentive to remain combat ready.