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MASTER OF MILITARY STUDIES

TITLE:

Operation *Market Garden*: The Failure to Utilize German Airborne Innovation

SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF MILITARY STUDIES

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Executive Summary

Title: Operation *Market Garden*: The Failure to Utilize German Airborne Innovation

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Thesis: The German airborne operation during *Fall Gelb* against Fortress Holland demonstrated the successful use of three overarching concepts; use of air support, location of drop and landing zones, and link up of mechanized forces with paratroopers. Had the Allies implemented the German approach to airborne operations regarding these concepts in Operation *Market Garden*, the outcome would have been success.

Discussion: Airborne operations blazed the trail for modern military-era aviation, creating a revolutionary way of inserting ground troops into enemy territory from the air during World War II. This method of insertion requires a high level of coordination between transport aircraft, bomber and fighter aircraft, and paratroopers. The paratrooper is of light infantry design and requires substantial air support during the drop and, once on the ground, in the form of close air support and resupply. The Germans utilized this innovative insertion technique in combat during their campaign in Norway and more notably during Operation *Fall Gelb*. For the Allies, airborne troops were used during Operation Overlord successfully and ultimately failed during Operation *Market Garden*.

At the outbreak of World War II in 1940, the German's launched Operation *Fall Gelb*, a massive attack on the Low Countries, which included an airborne operation against Fortress Holland. German airborne operations at this time were in their infancy and the concept only marginally tested. This airborne operation, although new in concept, foreshadowed *Market Garden* and proved the ability of an airborne operation to gain control of key bridges, link paratroopers with mechanized forces, and set offensive conditions to gain operational success.

Operation *Market Garden* was an attempt by the allies to bring closure to the war through the use of a massive airborne operation, quelling German occupation of the Netherlands, and creating a gap across the Rhine with which to enter German territory. The goal was to utilize paratroopers to gain access to and control of key bridges, which would allow mechanized forces to backfill the area utilizing the bridges creating an entry point into Germany from the east. This operation ended in failure, as the Allies were not able to gain the most important bridge in Arnhem, linking paratroopers with mechanized forces, and therefore failed to create an entrance into Germany north of the Rhine.

Conclusion: These two airborne operations during World War II are strikingly similar in scope and execution. The goals of both were the same, however the Germans were able to end the operation in victory, whereas the Allies failed to achieve their goal. Three concepts: the use of air support, location of drop and landing zones, and linkup of mechanized forces with paratroopers, were vital to both operations. The German airborne operation during *Fall Gelb* against Fortress Holland demonstrated the successful use of these three overarching concepts; had the Allies implemented the German approach to airborne operations regarding these concepts in Operation *Market Garden*, their outcome would have been success, as well.

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Preface

Interest in this topic developed during a trip to the Netherlands where a former Dutch Marine explained the German invasion that took place in 1940. The research that took place into the invasion and the airborne operation that enabled it piqued my interest in World War II airborne operations. As I continued to research, the similarities between *Fall Gelb* and *Market Garden* became readily apparent. Both operations were planned and executed to utilize an airborne force against a defended enemy to gain control of significant bridges in order to allow a ground mechanized force the ability to make the river crossings and posture a massed force in a strategic position. Strikingly, the Germans enjoyed great success in 1940, whereas four years later, the Allies experienced defeat. The significant difference between the two operations drove me to determine why the Allies failed, when in the not-so-distant past the Germans succeeded. Three operational concepts were drawn out; use of air support, location of drop and landing zones, and link up of mechanized forces with paratroopers. The Germans utilized these concepts to their benefit whereas the Allies planned for them but ultimately failed to execute.

I would like to thank Dr. Paul Gelpi for his time and effort in assisting and guiding me in completing this thesis. Without his expert advice and mentorship, this paper and project would never have come to fruition. It is greatly appreciated.

I would also like to thank my family, especially my wife Lois and mother-in-law Beth, for their amazing support during this thesis process.

Airborne Operation: An operation involving the air movement into an objective area of combat forces and their logistic support for execution of a tactical, operational, or strategic mission.

- Joint Forcible Entry Operations, Joint Publication 3-18

About noon, I was disturbed at my desk by a roaring in the air of such mounting intensity that I left my study and went out on the balcony. Wherever I looked I saw aircraft; troop-carriers and large aircraft towing gliders. I was so much impressed during these minutes that I did not think of the danger of the situation. Oh, how I wish I had such powerful means at my disposal!

- Anthony Farrar-Hockley, *Student*

Introduction

The modern worldwide threat environment will likely see the need for a forcible entry operation capability, one that is expected to be joint but more than likely combined, to gain a lodgment within a hostile foreign territory in order to conduct offensive operations. Forcible entry operations are complex, adorned with incredible risk, and require immense planning, coordination, and cooperation among all participants. The forms of forcible entry consist of amphibious assault, amphibious raid, special operations, air assault, and airborne assault. Airborne assault is still a vital method, well trained for, and has the ability to endure in an Anti-Access Area Denial (A2/AD) environment.¹ The battlefield has not seen the use of large scale airborne operations to gain access into a defended area since World War II.

Airborne operations blazed the trail for modern military-era aviation, creating a revolutionary way of inserting ground troops into enemy territory from the air during World War II. This method of insertion requires a high level of coordination between transport aircraft, bomber and fighter aircraft, and paratroopers. Paratroopers are light infantry and require substantial air support during the drop and, once on the ground, in the form of close air support and resupply.² The Germans utilized this innovative insertion technique in combat during their campaign in

Norway and more notably during Operation *Fall Gelb*.³ For the Allies, airborne troops were used during Operation Overlord successfully and ultimately failed during Operation *Market Garden*.⁴

At the outbreak of World War II in 1940, the German's launched Operation *Fall Gelb*, a massive attack on the Low Countries, which included an airborne operation against Fortress Holland.⁵ German airborne operations at this time were in their infancy and the concept only marginally tested. This airborne operation, although new in concept, foreshadowed *Market Garden* and proved the ability of an airborne operation to gain control of key bridges, link paratroopers with mechanized forces, and set offensive conditions to gain operational success.

Operation *Market Garden* was an attempt by the allies to bring closure to the war through the use of a massive airborne operation, quelling German occupation of the Netherlands, and creating a gap across the Rhine with which to enter German territory. The goal was to utilize paratroopers to gain access to and control of key bridges, which would allow mechanized forces to backfill the area utilizing the bridges creating an entry point into Germany from the west.⁶ This operation ended in failure, as the Allies were not able to gain the most important bridge in Arnhem, linking paratroopers with mechanized forces, and therefore failed to create an entrance into Germany north of the Rhine.

These two airborne operations during World War II are strikingly similar in scope and execution. The goals of both were the same, however the Germans were able to end the operation in victory, whereas the Allies failed to achieve their goal. Three concepts: the use of air support, location of drop and landing zones, and linkup of mechanized forces with paratroopers, were vital to both operations. The German airborne operation during *Fall Gelb* against Fortress Holland demonstrated the successful use of these three overarching concepts; had the Allies implemented

the German approach to airborne operations regarding these concepts in Operation *Market Garden*, their outcome would have been success.

Operation *Fall Gelb*

The planning for Operation *Fall Gelb* began in the fall of 1939 and laid out the concept of the initial German thrust to take control of the low countries in order to provide a buffer against England and attack into France, bypassing the Maginot Line. This assault on Belgium and the Netherlands, in the German mind, needed to happen before the English or French could respond and gain control of the territory for themselves. The Germans realized that these countries were considered neutral, but the strategic gain of operating space was paramount for German military success. Within this plan, taking control of the Netherlands was vital and needed to happen in a quick and efficient manner.⁷

The plan called for the German occupation of The Hague in order to control the government and diminish any Dutch resistance. The assault on the Netherlands would constitute the use of an airborne operation to gain airfields around The Hague and bridges over the numerous rivers of southern Holland, allowing mechanized forces to utilize the bridges and gain access into Fortress Holland through Rotterdam.⁸ For this paper, the focus of effort will be on the portion of the operation through southern Holland and the gaining of the bridges and linkup of mechanized forces.

Lieutenant General Kurt Student, commander of the Airborne Corps, led the airborne operation. Under his command he had the 22nd Air Transportable Division and 7th Air Division. The 22nd Division focused its effort on the airfields surrounding The Hague, while the 7th Division, as the main effort, focused on gaining and maintaining bridges in the vicinity of Moerdijk, Dordrecht, and Rotterdam, along with seizing Waalhaven Airfield. The 9th Panzer Division con-

stituted the mechanized ground force and would advance into southern Holland through the province of Noord-Brabant, to link up with, and reinforce the paratroopers.⁹

With the 7th Division tasked as the main effort, Student divided the division into five supporting groups. Group South, commanded by Colonel B.O. Brauer, was made up of the 1st and 2nd Battalions of the 1st Parachute Regiment. Their objective was to capture the Moerdijk bridges over the Hollands Diep and the Dordrecht bridges over the Oude Maas. The second group was composed of the 3rd Battalion of the 1st Parachute Regiment and the 11th Company of the 16th Infantry Regiment. The 3rd Battalion would capture Waalhaven Airfield located on the southern shore of the Nieuwe Maas across the river from Rotterdam's city center. The airfield, once captured, would constitute Student's headquarters and allow for reinforcements to be flown in. The 11th Company were to be flown in by Heinkel He-59 floatplanes that would land directly on the Nieuwe Maas in order to capture the bridges. Group North was third, commanded by Colonel Hans Kreysing, and was composed of troops from the 16th Infantry Regiment. Their objective was to reinforce Group Two and take over the occupation of the area between Dordrecht and Rotterdam. Group Four, composed of the 2nd Battalion of the 2nd Parachute Regiment would be flown into Waalhaven Airfield and then maneuver east to capture Barendrecht. This battalion had to be flown in by transport aircraft instead of jumping due to inadequate parachute training. The final group, Group Five, made up the reserve and would be flown in during the subsequent days as reinforcements were needed.¹⁰

The 26th Army Corps led the ground invasion into the Low Countries, with the 9th Panzer Division advancing into the Netherlands. The 9th Division had to make its way from the German border, into and through the Noord-Brabant province, linking up with the groups from the 7th Di-

vision as it crossed the bridges at Moerdijk, Dordrecht, and Rotterdam, before finally linking up with and reinforcing the 22nd Division in The Hague.¹¹

Operation *Fall Gelb* began in the early morning hours of 10 May, 1940. The Luftwaffe bombing campaign against Dutch air defense locations and airfields, along with shaping strikes to support the paratrooper drop zones, were the first indications of the attack. The Luftwaffe bombers flew strategic routing that took them to the North Sea, feinting a strike against England, then returning east to strike targets within Holland. Extensive fighter support was provided to the bombers to ensure their success. The targets were bombed in a simultaneous manner, delivering the shaping required for the air-landing force.¹²

The airborne wave followed closely after the successful bombing of Dutch defenses and landing areas. The German paratroopers made simultaneous jumps into their respective landing areas at 0500 on 10 May. A portion of Group South, consisting of 2nd Battalion, made successful jumps, landing to the north and south of the Moerdijk bridges, massing forces along both sides of the Hollands Diep. The paratroopers took the Dutch defenders by surprise and quickly gained control of the bridgehead. The other portion of Group South, consisting of 1st Battalion, landed to the north of the Oude Maas in the Zwijndrecht area, just west of Dordrecht. A portion of the 3rd Company quickly made its way to the bridge and easily gained control. Another portion of the company met resistance as they maneuvered toward the bridge. The Germans came under heavy fire and an attack from the south, which killed their commander. Those paratroopers were needed to reinforce the occupation of the bridges. This setback would require the 16th of Group North that landed on Dordrecht Island to move to assist in holding the bridges instead of proceeding toward Group Two.¹³

Group Two had the mission of gaining Waalhaven Airfield and the bridges over the Nieuwe Maas in the vicinity of Rotterdam. 3rd Battalion made their jumps directly onto Waalhaven Airfield. Due to the bombing of the airfield, most of the buildings, hangars, and aircraft were on fire. Some paratroopers succumbed during the jump due to landing in the burning portions of the airfield and the river itself. Those paratroopers that landed successfully were able to quickly overcome the Dutch defense and take control of the airfield.¹⁴

Landing simultaneously was the second half of Group Two, the 11th Company of the 16th in about twelve Heinkel He-59 floatplanes. The floatplanes landed on the Nieuwe Mass along both sides of the bridges. The landing force utilized rubber rafts to row from the planes to the bridges. A portion of paratroopers that landed near Feyenoord stadium conducted a link up and gained control of the bridges.¹⁵

Following shortly after was Student himself, landing to Waalhaven Airfield with reinforcements. During this time, the Dutch were able to mass defensive forces in Rotterdam and were establishing themselves to put fire on the bridgeheads north of the Nieuwe Maas and also to dissuade any more floatplanes from landing on the river. The German hold on the northern bridgehead was somewhat dissolving due to Dutch fire.¹⁶

Throughout the rest of the day, reinforcements continued to arrive into Waalhaven Airfield. Student set up his headquarters to the south of Rotterdam. All of the bridges were under German control and the Germans made preparations for a Dutch counterattack. The mission was now to hold and maintain the bridges to allow the linkup with the 9th Panzer Division.¹⁷

The next day, 11 May, saw numerous Dutch counterattacks to try to regain ground lost to the German paratroopers the day before. Early in the morning, the Dutch troops crossed the Oude Maas and headed north in an attempt to regain Waalhaven Airfield. Once they crossed the

river they came under heavy German machine gun fire and were immediately repulsed back across the river. A Dutch attack against a bridge in Barendrecht was also immediately contained by the German paratroopers. Another attempt by the Dutch was to reinforce the town of Dordrecht and attack the bridges over the Oude Maas. The attack did not begin until after dark and in the early morning hours, the Germans had devastated the attempt. With these failures, Commander of Fortress Holland, Lieutenant General Van Andel called to engage his reserve, the Light Division. Their mission was to cross the Noord, regain the bridges in Dordrecht and then move toward Waalhaven. The Germans had reinforced their positions and were able to defend the bridges against the Light Division. The Luftwaffe also provided support to the paratroopers against Dutch forces in Alblasserwaard and against French troops and armor moving north. The Luftwaffe attacks were incredibly effective as they worked unhindered with air superiority.¹⁸

On 12 May, Student saw the area of Dordrecht and the bridges over the Oude Maas as critical to the success of the operation. He realized that the Dutch were trying to regain the area and mounted an attack to separate the city from the rest of the island allowing for the destruction of Dutch forces. The attack was a success and the city was taken. Considerable confusion was created on the Dutch part, aiding to the German victory. If any Dutch resistance remained in Dordrecht later in the day, it was diminished immediately as light armored vehicles of the 9th Panzer crossed the Moerdijk bridges and were into Dordrecht the next day.¹⁹

The Dutch retained their drive to resist the German invasion even though reports were confirmed that German tanks had crossed the Hollands Diep. Despite confirmation, Van Andel did not believe it and reaffirmed that French tanks would make it to the area of Dordrecht the next day. Colonel Van der Bijl, in order to regain the initiative, split the Light Division into two groups to make an attack early in the morning of 13 May. Their goal was to dispel German

troops and regain control of Dordrecht. The Dutch launched their attack only to be met with heavy firepower from German tanks and Luftwaffe attack aircraft. This was devastating to the Dutch troops and they were made to withdraw south off Dordrecht Island. The German tanks continued to advance north. Dordrecht had been lost by the Dutch and the local population was being evacuated from the city. The Dutch, now defeated, saw a last-ditch hope in attacking the Moerdijk bridges, to slow the advance of the rest of the 9th Panzer Division. The Dutch tried to destroy the bridges with artillery, but to no affect. With the failure of the artillery, the Dutch launched their only remaining bomber, with fighter escort, to attack the bridges. The first bombing attack resulted in a miss and on the second, the bomb did not explode. The Dutch bomber and fighters were intercepted by German fighters. The bomber and one fighter were shot down. The road to Rotterdam was now in complete German control. All of the bridges had been held, and the linkup of the paratroopers with 9th Panzer completed, to create the XXXIX Corps, commanded by Lieutenant General R. F. K. Schmidt.²⁰

Schmidt reported to the commander of the 18th Army, General G. F. K. W. von Kuchler, who gave Schmidt the order to utilize his corps and supporting air assets to break the Dutch resistance within the city of Rotterdam by any means available, to include destroying the city itself. The German military hierarchy wanted the resistance in Holland broken and the country occupied as soon as possible in order to redirect assets toward the invasion of France. Student was under the impression that the mass of the 9th with the paratroopers would be enough to cross the Nieuwe Maas and capture Rotterdam. Schmidt, on the other hand felt that heavy artillery would be required to break the resistance in Rotterdam. Student posited that an air bombardment of the defensive positions would better shape the battlefield to allow the maneuver of the 9th across the bridges into the city. He also wanted the bombardment to be localized to the defensive areas to

decrease the amount of debris that the tanks would have to make their way through. Schmidt agreed and organized the air support. The problem arose in that the Luftwaffe hierarchy saw it vital to victory that the city of Rotterdam be strategically bombed.²¹

Negotiations for the surrender of Rotterdam began early in the morning of 14 May. An unsigned German ultimatum of surrender was given to the Dutch commander, Colonel Scharoo. The ultimatum stated that the surrender needed to be complete in the next two hours or the city would be destroyed. Scharoo did not surrender and asked for a signed ultimatum to gain time. This information was relayed, especially that the negotiations of surrender were taking place and that the bombings needed to be postponed. However, the Luftwaffe had already launched for Rotterdam and radio contact was no longer possible. At this time a signed ultimatum had been delivered to the Dutch. Shortly after, German bombers were seen on the horizon heading directly toward the city. Schmidt immediately gave the order to launch red flares, the signal to abort the bombing, unfortunately only the aircraft approaching from the south saw the flares and aborted. The bombers from the east carried out their mission, devastating Rotterdam. The Dutch quickly continued their surrender after the bombing, putting Fortress Holland into German hands.²²

Operation *Market Garden*

Operation *Market Garden* developed following the successful invasion of Normandy during the summer of 1944. The Allied forces had gained a foothold in France and through sustained combat operations were able to push east, deteriorating German defenses. With the notion at hand of victory, the plan to deliver a final blow to Germany was developed to end the war.²³ The operation would constitute an airborne assault (Market) coinciding with a ground force maneuver (Garden), giving the operation its known name, *Market Garden*.²⁴

Field Marshal Sir Bernard Montgomery, commander of the 21st Army Group, would lead the entire operation and issued his orders for Operation *Market Garden* on 12 September. His plan detailed the coordinated efforts of airborne troops with mechanized forces to gain entrance into Holland in order to ultimately enter Germany from the west. D-Day would be set for 17 September, only five days later.²⁵

The plan called for airborne troops to capture bridges over major rivers and canals within the vicinity of the towns of Eindhoven, Nijmegen, and Arnhem. Lieutenant General Lewis Brereton, in command of the First Allied Airborne Army, focused his efforts on the Market portion of the plan which planned for only one airlift wave per day during the operation.²⁶ This decision came in cooperation with Major General Paul Williams, commander of IX Troop Carrier Command, in order to preserve aircrew rest and allow for aircraft maintenance.²⁷ Brereton decided that his deputy, Lieutenant General Frederick Browning would command all three of the airborne divisions (101st Airborne Division, 82nd Airborne Division, and 1st British Airborne Division) as commander, I Airborne Corps. Browning planned for each division to land within six miles of their perspective objectives and then maneuver to gain operational control.²⁸

The 101st Division, commanded by Major General Maxwell Taylor, was to drop just north of Eindhoven. Once on the ground they would capture bridges over the River Aa, Willems Canal, River Dommel, and the Wilhelmina Canal. Once the bridges were under control, they would advance to take the town of Eindhoven. The 82nd Division, commanded by Brigadier General James Gavin, would drop to the east of Nijmegen to capture Groesbeek heights, followed by the bridges over the River Maas, Maas-Waal Canal, and the River Waal. Lastly, the 1st Division, commanded by Major General Robert Urquhart, would drop to the west of Arnhem to gain control of the bridges over the Lower Rhine.²⁹

The Garden portion of the plan was led by the commander of Second British Army, Lieutenant General Sir Miles Dempsey, who made XXX Corps, led by Lieutenant General Brian Horrocks, the main effort. The Guards Armored Division would lead the way along the club route defeating German defenses as they moved east. As XXX Corps made its way east, it would linkup with each airborne division and take them under its command. The goal at the end of the operation was to have XXX Corps north of the Rhine with each of the airborne divisions attached to posture for a follow-on offensive east into Germany.³⁰

Shaping operations in the form of bombing missions began on 16 September, focusing efforts on German fighter airfields and anti-aircraft gun positions. The following morning, D-Day, the bombing support continued focusing on anti-aircraft positions along the transport routes and airfields near Eindhoven. Later that morning, the first wave of airborne troops loaded transport and glider aircraft. The massive air armada would be separated into two flight routes, the 101st taking the southern route through Belgium while the 82nd and 1st took the northern route directly into Holland. A total of 2,083 aircraft were used flying at an altitude of 1,500 feet. The flight time was between 90 and 150 minutes to the target areas. The first aircraft to land were the gliders, carrying British troops west of Arnhem. The transports and gliders of the first wave were successful in inserting airborne troops to their respective areas with minimal losses.³¹

That afternoon, following the successful airborne insertions, XXX Corps crossed its line of departure under the guise of artillery fire at Joe's Bridge. XXX Corps successfully broke through the initial German defense and made ground east, halting in the vicinity of Valkenswaard. This put XXX corps just to the south of the first objective area at Eindhoven, where the 101st had been successful at reaching and controlling their objectives by nightfall.

With this progress, Montgomery relayed back to London that XXX Corps would be to Arnhem by the next day.³²

The 82nd ran into resistance in Nijmegen, as German forces destroyed multiple bridges before paratroopers could mass and access the area. This halted their movement, delaying their attempt to enter the city and reconnoiter the River Waal bridge, until nightfall. They were stopped by German defenders before reaching the bridge.³³

The 1st encountered major opposition upon landing west of Arnhem. The three battalions split and took separate routes from the drop zone heading east toward Oosterbeek, which resided just west of Arnhem. By nightfall, 2nd Battalion was able to reach the northern end of the Arnhem bridge and hold it, while German forces were kept across the river at the south end of the bridge.³⁴

The morning of 18 September began with heavy fog and rain, delaying the second airlift wave and denying the paratroopers and XXX Corps any air support. This development allowed the German Luftwaffe to take advantage of conditions, gain local air superiority, and support the German defense. Also, German forces were reinforcing from the east, especially at Arnhem. Eventually, the second wave was able to launch from England, but the weather and reinforced German defenses limited the wave's ability to insert all supporting troops and equipment. Throughout the day, the 101st were able to defeat the remaining German defenders in Eindhoven and successfully linkup with XXX Corps. The 82nd relayed at three different times during the day that they had control of the bridge at Nijmegen, only to have the German defense retake it. At Arnhem, the 1st continued to push east and reinforce their hold of the northern end of the Arnhem bridge. The battle turned into a confused state of urban fighting as Allied and German reinforcements entered the area, making it difficult to determine where the enemy was coming from.³⁵

The next day, 19 September, began as the day before did, with fog and rain. The third wave was delayed until the afternoon and again, the paratroopers received little-to-no air support. XXX Corps was able to make it to Nijmegen and linkup with the 82nd, even though the Nijmegen bridge was still not under Allied control. Horrocks, now in command, ordered assault boats to maneuver forward to make a crossing of the River Waal to attack the bridge from both ends. In Arnhem, the fighting had been continuous. The 1st was now running short of supplies, had taken extensive casualties, and was fighting exhaustion. The German Luftwaffe along with German artillery compounded the problem and delivered continuous fire on their positions. The 1st was struggling for survival, still they didn't surrender and resisted the German counterattack as best they could.³⁶

Fog and rain continued on 20 September, allowing for only resupply drops. The drops proved only marginally successful at Nijmegen and were completely unsuccessful at Arnhem. The British in the vicinity of Oosterbeek were forced into a perimeter, separating them completely from those trying to hold the north end of the Arnhem bridge. Continuing to struggle to gain the bridge at Nijmegen, XXX Corps was still south of the Waal, ever-reducing their ability to reach Arnhem. That afternoon, the assault boats arrived and the crossing of the Waal was conducted by two companies under heavy German fire, allowing only half of the boats to make it, leading to six additional crossings before all reinforcements had crossed successfully. Once ashore, the paratroopers attacked east gaining the railway and road bridges. Coordinated with the crossing, mechanized forces attacked through the town toward the road bridge, crossing it that evening. In Arnhem, the state of the 1st was dire. Casualties were amassing to the point that care could no longer be provided. Food, water, and ammunition were at critical levels and the Germans continued to bombard their positions.³⁷

The morning of 21 September saw the last effort of the British to hold the north end of the Arnhem bridge. By mid-morning, they were out of ammunition and the Germans crossed the bridge from north to south. With the bridge now under German control and the rest of the British pinned down in Oosterbeek, the Germans advanced south to reinforce and deny the Allied advance north from Nijmegen. The only saving grace for the British, was that now XXX Corps artillery could range Oosterbeek and give some fire support. The Polish reinforcements and resupply runs were again limited by the weather and Luftwaffe fighters. The Poles were able to land south of Oosterbeek and the Rhine, in Driel.³⁸

The weather improved on 22 September, allowing Allied air support to commence missions. The missions supported Eindhoven while the Germans still retained local air superiority over Nijmegen and Arnhem. XXX Corps remained willing to linkup with the 1st and by late afternoon, they made it to Driel and reinforced the Poles. That night, a river crossing utilizing four rubber boats was attempted under German fire. They only managed to get 35 troops across. The Germans continued attacks on the Oosterbeek perimeter through the night.³⁹

The next day saw the best weather yet and Allied air support was busy over Oosterbeek. That afternoon, the largest wave since D-Day departed to insert reinforcements at all positions. A much needed resupply to Driel was successful and that night more troops utilizing rubber boats crossed the river to reinforce the 1st. The next day saw continued air support, but the perimeter at Oosterbeek was diminishing. The British were incredibly exhausted and running well short of ammunition. Later that day the order to withdraw from Arnhem came. From whom is unknown, but Montgomery relayed the decision to London, making it official.⁴⁰

The withdrawal of troops from Oosterbeek across the Rhine to Driel took place on 25 and 26 September. The withdrawal was named Operation *Berlin*. Wounded troops were left behind

with volunteers to be captured by the Germans. The final river crossing and subsequent movement south to Nijmegen saw the fatal end to Operation *Market Garden*, as Germans consumed the Oosterbeek area.⁴¹

Use of Air Support

Airborne operations are inherently reliant upon air support before, during, and after the initial insertion of paratroopers. Paratroopers are designed as light infantry, carrying with them the firepower, equipment, and supplies needed for a short duration. Their greatest asset is that of surprise and shock to an enemy that can be carried out quickly after landing, not that of an enduring fight. Coordination of continued air support during an operation needs to be developed during planning and those assets need to be tasked appropriately. The paratrooper will need cover from the air in the form of close air support, as well as resupply as the duration of the operation extends.⁴² Both *Market Garden* and *Fall Gelb* demonstrate the requirement and necessity of air support, but only the German Luftwaffe delivered the support needed to ensure operational success.

The German airborne operation against Fortress Holland started in the same manner as *Market Garden*, with an early morning bombing campaign. The Luftwaffe flew numerous bombers, strategically routing them to the North Sea to maintain surprise, and then effectively bombed Dutch airfields, air defense locations, and landing areas. The transports carrying the paratroopers followed directly behind the bombers, making the best possible use of the shaping efforts to successfully insert the German force.⁴³ The separation between the bombing efforts and transports were so small, that German paratroopers died due to landing into burning buildings on Waalhaven Airfield.⁴⁴

The Germans realized that massing paratroopers was incredibly important for operational success. The Germans utilized two methods of inserting paratroopers. Either a unit was inserted into the same area or a unit was split up to different areas but dropped at the same time.⁴⁵ During *Fall Gelb*, the latter was used. The initial drops were conducted at the same time immediately following the bombing support. This allowed the Germans to mass forces throughout the area and maintain surprise. Also, all of the reinforcements were dropped or flown in during the first day, to include Student and his headquarters. Successive drops were made to reinforce the initial wave and Waalhaven airfield was utilized to continue landing transports with more reinforcements and supplies.⁴⁶ German doctrine makes clear that paratroopers are at great risk once on the ground and that reinforcements and adequate resupply is a must if they are to be successful.⁴⁷ Success of the initial wave was achieved by surprise, as all the bridges were brought under German control early on, but the operation was made successful by reinforcing and resupplying the initial wave.

The Luftwaffe gained and maintained air superiority for the duration of the operation. Consistent fire support from the air was provided to the paratroopers. This action not only destroyed the Dutch physically, but also emotionally, demoralizing them as they realized they couldn't mount any air counterattack due to the devastation caused by the initial bombing campaign. When a French column of troops and armor were spotted by a reconnaissance plane, the information was quickly relayed, and the French were effectively targeted.⁴⁸ Field Marshal Albert Kesserling, commander of the German 2nd Air Force during *Fall Gelb*, alludes to the Air Force commander as needing to not only put emphasis into the initial airborne wave, but more importantly the successive waves and the close air support or flying artillery that is required to

create success for the paratroopers.⁴⁹ The support of the Luftwaffe to gain air superiority and provide close air support throughout *Fall Gelb* was crucial to its success.

D-Day, 17 September 1944, showed that a massive airborne operation could be conducted, attaining the surprise required to be effective against a defended enemy. The bombing campaign that took place was effective in hindering German air defenses along the flight routes and drop zone locations. The Allied air superiority that reigned at that time made the bombing campaign seem normal to Germans occupying Holland.⁵⁰ The initial wave of paratroopers and gliders was a success.⁵¹ Air support, surprise, and weather allowed for an uneventful flight to each of the landing locations with successful drops and landings. The days following are where air support broke down for the allies, and with the element of surprise eliminated, the Germans were given a victorious advantage.

In contrast, the *Market Garden* airlift plan called for one wave per day to support the operation.⁵² The decision not to execute a second wave on D-Day, was determined by Williams in order to support crew rest and aircraft maintenance.⁵³ Brereton ultimately agreed with Williams and implemented the plan to execute only one wave on D-Day.⁵⁴ With the initial weather forecast, this should have been operationally sustainable. However, with the degradation in weather that occurred, the initial wave of paratroopers was left unreinforced for far too long. Based on the round-trip distance of the flight route and the need to amass as many paratroopers as possible, a second airlift wave on the first day may not have brought success to the operation, but would have helped improve the probability of success significantly.

Another planning factor that hindered the operation was that Brereton decided that while his flights were in the air, the 2nd Tactical Air Force would remain grounded in order to lessen the confusion throughout the airspace.⁵⁵ Air Marshal Sir Arthur Coningham commanded 2nd Tac-

tial Air Force, based in Brussels, Belgium. A report sent to SHAEF Air Staff in January of 1945 documented the lack of coordination with 2nd Tactical Air Force even though the operation took place through their airspace. In reality, the planning did not include Coningham, as it was solely conducted in England leading to the inability of 2nd Tactical Air Force assets to support *Market Garden*.⁵⁶ Ultimately this decision would devastate the operation once the weather degraded. With heavy fog and rain in England, Brereton was not able to launch air support to the target areas, allowing the Luftwaffe to gain local air superiority and support German defensive positions. It wasn't until 23 September, seven days into the operation that the 2nd Tactical Air Force gave any close air support to the paratroopers.⁵⁷ By this time, the support was welcomed and assisted the ground troops, but was too late to change the fate of *Market Garden*.

While weather played a role in hindering *Market Garden* and supported the Germans against Fortress Holland, the failure of operation *Market Garden* lies in the fact that paratroopers need support from the air, which they did not receive during the Allied operation. The Germans effectively coordinated bombers with transports for the initial wave, made multiple waves on the first day, massing their force, and continued to provide close air support throughout the operation. If the *Market Garden* plan stipulated more than one wave on the first day and coordinated with the 2nd Tactical Air Force to provide support, the operation may have ultimately had a better ending for the Allies.

Location of Drop and Landing Zones

Since paratroopers are light infantry and do not have the ability to endure extensive fighting in order to gain their objectives, it is vital to drop or land paratroopers as close to their objective as possible. The priority mission for an airborne force is to gain immediate control of the assault objective (i.e. a bridge) and then support the airhead for follow-on forces. Depending

on the enemy situation, the drop zone should be located as close as possible to the assault objective.⁵⁸ The Germans understood this and planned accordingly, whereas the Allies added risk due to the distance of the drop zones in relation to their objectives.

During the German airborne operation against Fortress Holland, the Germans put significant effort into dropping and landing as close to the objectives as possible, as illustrated by the fact that some paratroopers actually died landing on burning buildings at Waalhaven Airfield.⁵⁹ For the bridges in Moerdijk and Dordrecht, the Germans were able to land and overwhelm defenders quickly and gain control of the bridges. In regard to attaining the bridges over the Nieuwe Maas, Heinkel He-59 floatplanes landed directly on the river. This allowed the troops of the 16th to quickly row directly toward the bridges and gain control. All of the objective bridges were captured intact during the first day.

German doctrine incorporated three methods for attacking objectives with airborne troops from their experiences throughout World War II. The three methods are: on top of the objective, near the objective, and a distance from the objective. Landing on top of the objective is best utilized for small areas and those that defended against a ground attack. Jumping near the objective is best suited for gaining control of bridges and airfields and the goal is to have airborne forces attack the objective from multiple landing areas, acquiring the objective from all directions. Landing a distance from the objective is utilized when the objective area is large and a slow deliberate ground attack is needed. During Fall Gelb, the Germans utilized primarily landing near, with some instances of right on top of the objective.⁶⁰

The objective for the 1st Division was the Arnhem bridge, located toward the east side of the city, crossing the Rhine River. The primary drop and landing zones for the initial wave on 17 September were located eight miles to the west of the bridge on the north side of the Rhine. No

airborne forces were dropped or landed on the south side of the Rhine and none were planned to be until 19 September, D+2⁶¹. Once on the ground, 2nd Battalion had to move from the landing area and make their way east through the town of Oosterbeek and the city of Arnhem before reaching the northern bridgehead.⁶² The selection of the landing area at such a distance from the objective was made strategically to give separation between the transport aircraft and German defenses. However, the distance created a separation in the airborne force, a portion defending the northern bridgehead and the rest defending the landing area for future waves, degrading their fighting strength and allowed German defenders to mass and take advantage of their divided force. Montgomery takes responsibility for this mistake and remarks that:

The airborne forces at Arnhem were dropped too far away from the vital objective – the bridge. It was some hours before they reached it. I take the blame for this mistake. I should have ordered Second Army and I Airborne Corps to arrange that at least one complete Parachute Brigade was dropped quite close to the bridge, so that it could have been captured in a matter of minutes and its defence soundly organised with time to spare. I did not do so.⁶³

Dempsey echoes this mistake as the failure of *Market Garden* and places the blame on Urquhart and the 1st. He alludes to the decision to select drop and landing zones that far away from the Arnhem bridge as “inept planning by 1 Airborne Division.”⁶⁴

Enduring increased risk to aircraft and landing airborne forces as close as possible to their objective is vital to operational success when utilizing an airborne assault and ground force maneuver strategy. Surprise and shock is the main weapon of the paratrooper and needing to traverse and even fight over a distance to the objective deteriorates this capability greatly. The Germans proved their effectiveness in understanding the importance of airborne drop and landing zones throughout *Fall Gelb*, whereas the Allies should have utilized a drop and landing zones closer to their objective bridges, especially in Arnhem.

Link Up of Mechanized Forces with Paratroopers

The plans for both operations called for the seizure of key bridges by paratroopers to allow the movement and eventual link up with mechanized forces. This linking of forces was vital to both plans, as the paratroopers needed the firepower brought to bear by the armor and artillery. Both plans were bold in scope as the mechanized force had considerable distance to cover, breaking through defensive positions, to link up with the paratroopers and continue forward. The German 9th Panzer Division was successful in linking up with their paratroopers and massing a force south of Rotterdam, whereas XXX Corps never reached Arnhem during *Market Garden*.

The 9th Panzer Division was the mechanized ground element that launched their invasion into Holland, crossing the German border, from the southeast. With the exceptional effort by the paratroopers to gain and hold every bridge, the 9th found little resistance and were able to break-through and conduct the link up. Their ability to arrive on time and make their way to Dordrecht completely demoralized the Dutch resistance. Their eventual movement north, massing forces south of Rotterdam, laid the groundwork to begin the negotiations of surrender.⁶⁵

The Germans realized the importance of the ground attack force linking up with the airborne force and that it would be perilous if it did not occur. They planned for airborne forces to link up and come under control of the ground force within two to three days. This was due to the lack of transport aircraft that could be consistently utilized, the unreliability of resupply by air, and the possibility of losing air superiority.⁶⁶

Garden was the ground maneuver portion of *Market Garden*. XXX Corps, led by Horrocks, would depart along the Club Route at the same time the airborne wave launched. Horrocks expected some German resistance prior to Eindhoven, but thought that once they broke through, the rest of the movement would be easy going. The Club Route, the path that XXX Corps would

take toward Arnhem, was a single road surrounded by flat, rural countryside made up of orchards, farm fields, streams, and bogland. This made exiting the road nearly impossible, restricting armor movement to narrow avenue of approach.⁶⁷

The narrow avenue of approach and limited maneuver space allowed German defenders and reinforcements to successfully hinder movement of XXX Corps and keeping them from reaching Arnhem. Brereton, in a report about *Market Garden* to General Marshal and General Arnold, begins with, “Despite the failure of the 2nd Army to get through to Arnhem and establish a permanent bridgehead over the Lower Rhine, Operation Market was a brilliant success.”⁶⁸ Brereton saw only success within the Market portion of the operation and placed the blame for mission failure solely on the Garden portion and the 2nd Army. Horrocks responds to the criticism that XXX Corps was too slow by taking the blame, even though he feels he imparted the essence of speed on his troops. He also wishes that he had a Dutch liaison that could have assisted in assessing the terrain and that would have helped in creating a better route to and through the objective areas.⁶⁹ Ultimately, the link up of XXX Corps with the 1st in Arnhem never occurred, resulting in the British withdrawal south across the Rhine during Operation *Berlin*.

To experience success, both operations, needed to conduct a link up of the mechanized force with the airborne force. The inability of XXX Corps to reinforce the 1st at Arnhem led to their demise and withdrawal from the Oosterbeek perimeter. The German 9th Panzer Division made their breakthrough into Holland and ultimately gave the German paratroopers the support they required for operational success.

Conclusion

Airborne operations are incredibly complex, require significant planning, intimate coordination between paratroopers, air assets, and ground forces, and precise timing during execu-

tion. World War II brought airborne operations into execution on a large scale to achieve operational and strategic goals. Two operations, *Fall Gelb* and *Market Garden*, are examples of complex airborne operations. Both had the planned goal of utilizing paratroopers to gain and hold bridges in order to conduct a link up with mechanized forces and posture a force to achieve success.

Operation *Fall Gelb*, the first showing of Germany's war machine and the concept of blitzkrieg, utilized an airborne operation to great success against Fortress Holland. This operation took place four years prior to *Market Garden* and could have served as a case study for the Allies on how to be successful if studied and replicated. The Luftwaffe provided overwhelming support, conducting an extensive bombing campaign, multiple transport waves during the first day, and continued air support throughout the operation. The multiple waves accrued the force mass required to hold the bridges and the fighter-bomber support demoralized the Dutch and kept any French armor from interfering with the operation. The drop and landing zones planned and utilized were as close to the objectives as possible. Paratroopers were able to gain access to their target areas, maintaining surprise, and catching the Dutch defenders completely off guard. The 9th Panzer Division also provided crucial support to the paratroopers by breaking through southeastern Holland and linking up with forces in Moerdijk, at a crucial time, to quell the Dutch resistance in Dordrecht. Ultimately, the 9th linking with the airborne forces and massing south of Rotterdam created the force needed to achieve surrender negotiations with Fortress Holland.

Market Garden is a well-known operation, largely due to its failure to achieve the goal of massing an Allied force north of the Rhine in order to attack the German homeland from the west in hopes of ending the war early. The plan was incredibly complex and the inability to master three concepts lead to its failure. The planning and execution did not coordinate for continued

air support to the inserted paratroopers in the event of bad weather. Multiple waves should have been flown on the first day and the 2nd Tactical Air Force should have been allowed to fly support from Belgium as the weather degraded in England. The drop and landing zones were not located close enough to the target bridges, creating an extensive distance, especially in Arnhem, that the unsupported paratroopers could not overcome. Montgomery and Horrocks were overconfident in the ability of XXX Corps to achieve the distance from Joe's Bridge to Arnhem within the time needed. Ultimately, delays due to German defenders and reinforcements, especially along the narrow corridor and Nijmegen bridge, did not allow for the link up with the 1st in Arnhem. By the time XXX Corps were north of Nijmegen and their artillery could range Oosterbeek, it was too late. The operation failed, even though valiant fighting occurred, the 1st had to withdraw south across the Rhine.

These two airborne operations have incredible similarities; the Allied failure during *Market Garden* would have been rendered a success if they had utilized the concepts of air support, drop and landing zone location, and link up with mechanized forces in the way that the Germans did during *Fall Gelb*. The German airborne operation against Fortress Holland highlights the successful use of these concepts and was executed four years prior to *Market Garden*. The knowledge of the German operation should have been considered by the Allied hierarchy in the planning and execution of *Market Garden* and ultimately, could have aided the Allies in executing a successful operation, rather than one riddled with failure.

The case studies examined retrospectively give incredible insight into the modern use of airborne operations. The failures and successes of both have extensive value when applying airborne capabilities to a modern military problem. The evolution of modern threats, the diplomatic challenges of gaining access, and the growth of other world actors will require the United States

to invest in and renew the operational ability to project forces through airborne means. An operation of this nature will need to be fought in a joint and combined manner to provide a capable force that can fight in synchronization across the domains of warfare. For a modern airborne operation to be successful, a combined force will need to support it with significant air assets, a surface maneuver element, and a solidified command and control structure to ensure efficiency and speed are maintained throughout its duration. Airborne operations created a new path during World War II and were utilized to achieve operational and strategic goals. The future of warfare will require the same capability to achieve success and a modern combined force utilizing airborne tactics can win in the A2/AD environment.

Notes

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³ Hellmuth Reinhardt, *Airborne Operations a German Appraisal*, CMH Pub 104-13, (Washington DC: US Government Printing Office, 1989), 15, <http://www.history.army.mil/books/wwii/104-13/104-13.HTM>.

⁴ Stephen Badsey, *Arnhem 1944: Operation Market Garden*, (London: Osprey, 1993), 6.

⁵ Douglas C. Dildy, *Fall Gelb 1940 (2) Airborne Assault on the Low Countries*, (Oxford, United Kingdom: Osprey Publishing, 2015), Kindle edition, 273-278.

⁶ C.B. Mackenzie, *It Was Like This! A Short Factual Account of the Battle of Arnhem and Oosterbeek*, (Oosterbeek: Stichting Airborne Museum, 1984), 10.

⁷ E.H. Brongers, *The Battle for the Hague, 1940: The First Great Airborne Operation in History*, Translated by C.C.W. van Romont Vis, (Soesterberg: Aspekt, 2004), 22-23.

⁸ H. Amersfoort and P.H. Kamphuis, *May 1940: The Battle for the Netherlands*, (Leiden: Brill, 2010), 343. <http://site.ebrary.com/lib/usmcu/detail.action?docID=10439204>.

⁹ H. Amersfoort and P.H. Kamphuis, *May 1940: The Battle for the Netherlands*, (Leiden: Brill, 2010), 343-35. <http://site.ebrary.com/lib/usmcu/detail.action?docID=10439204>.

¹⁰ H. Amersfoort and P.H. Kamphuis, *May 1940: The Battle for the Netherlands*, (Leiden: Brill, 2010), 344-345. <http://site.ebrary.com/lib/usmcu/detail.action?docID=10439204>.

¹¹ E.H. Brongers, *The Battle for the Hague, 1940: The First Great Airborne Operation in History*, Translated by C.C.W. van Romont Vis, (Soesterberg: Aspekt, 2004), 38.

¹² Douglas C. Dildy, *Fall Gelb 1940 (2) Airborne Assault on the Low Countries*, (Oxford, United Kingdom: Osprey Publishing, 2015), Kindle edition, 1060-1115.

¹³ H. Amersfoort and P.H. Kamphuis, *May 1940: The Battle for the Netherlands*, (Leiden: Brill, 2010), 348-353. <http://site.ebrary.com/lib/usmcu/detail.action?docID=10439204>.

¹⁴ H. Amersfoort and P.H. Kamphuis, *May 1940: The Battle for the Netherlands*, (Leiden: Brill, 2010), 353-354. <http://site.ebrary.com/lib/usmcu/detail.action?docID=10439204>.

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- ²⁰ H. Amersfoort and P.H. Kamphuis, *May 1940: The Battle for the Netherlands*, (Leiden: Brill, 2010), 370-378. <http://site.ebrary.com/lib/usmcu/detail.action?docID=10439204>.
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- ³⁴ Stephen Badsey, *Arnhem 1944: Operation Market Garden*, (London: Osprey, 1993), 43-44.
- ³⁵ Stephen Badsey, *Arnhem 1944: Operation Market Garden*, (London: Osprey, 1993), 45-54.
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- ³⁷ Stephen Badsey, *Arnhem 1944: Operation Market Garden*, (London: Osprey, 1993), 59-67.
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