

# Gliders: From Wright Field to the Netherlands

By: R. Ray Ortensie



## Paths to the Present FLASHBACK

*"I'll tell you straight out. If you've got to go into combat, don't go by glider. Walk, crawl, parachute, swim, float – anything! But don't go by glider."*<sup>1</sup>

Walter Cronkite, American war correspondent

Glider training had become a requisite for *Luftwaffe* flight training post-World War I and by 1935, in direct violation of the Treaty of Versailles of June 1919, the German Air Force had a formidable accumulation of aircraft with design and production pushing forward without any international threat or interference. Glider clubs within Germany flourished, attracting German youth who received instruction from ex-World War I pilots. At the 1936 Olympic Games in Berlin, Fuhrer, Adolph Hitler, attended in military attire with the skies adorned with gliders during the opening ceremonies for athletes and spectators to witness. Within a year, Germany claimed to have over 40,000 glider pilots and somewhere between 10,000 to 12,000 gliders throughout the country. In two very short years, on 1 September 1939, the blitzkrieg of Poland took place by a combined ground and air forces of Germany, including gliders, which pushed Europe to a full-fledged war.<sup>2</sup>

At the start of hostilities in Europe, the US War Department was not convinced the glider had any real value as a military weapon. In 1939, during the invasion of Poland, the German Army utilized gliders to carry troops and cargo then the following year utilized combat gliders to soar into the Low Countries; in May 1941, 12,000 German glider-borne troops overran Crete. Despite this success with gliders and aroused interest within the United States, those within the Air Corps did not immediately go along with the "soaring zealots" due to the urgent military needs of powered aircraft.<sup>3</sup>

However, this changed in February 1941, as information gained from abroad made it "advisable that a study be initiated," to develop a glider that could be towed by aircraft. General Henry "Hap" Arnold, Chief of the Army Air Forces, personally directed such a study be conducted on 25 February and a few days later requested the submission of a statement of proposal on military glider characteristics and tow planes be completed.<sup>4</sup> Classified Technical Instruction (CTI) 198 on 24 February and CT-203 officially put military gliders in motion on 4 March, which authorized the preparation of design studies and procurement of two, eight, and fifteen place (referring to the number of troops they could carry) gliders and associated equipment.<sup>5</sup>

Like most of the procurement programs of the time, there were pressures of wartime and immediate pre-war needs that caused the Air Corps to sometimes cut corners within the development and production of material and to not always follow the prescribed regulations. The glider program was no different. At the beginning of the program, the Air Corps quickly realized the need for gliders to deliver a number of troops, equipment, and/or supplies to one spot, which led to the decision to procure experimental gliders before the completion of design studies. However, prior to the completion of the design studies, preliminary engineering requirements for the fifteen-place gliders were sent out on 8 March 1941 to eleven companies with only four submitting a favorable response back to



Wright Field, Ohio – Frankfort Sailplane Company, the Waco Aircraft Company, Howlus Sailplanes, Incorporated, and the St. Louis Aircraft Corporation. Nevertheless, before the completion of the design report in May, an order of experimental models of two place commercial gliders for training purposes along with static and flight test models of the eight and fifteen place cargo gliders were made.<sup>6</sup>

The development and production of the eight and fifteen place gliders was destined to be a major effort of the Army Air Forces and as such, an organization was formed to perform functions with personnel with experience in gliding activities wherever possible. In October 1941, Mr. (later Major) Lewin Barringer was appointed coordinator of the glider program by General Arnold. Barringer, active for years in commercial aviation, won three American soaring contests between 1938 and 1940. Prior to Major Barringer's disappearance in an aircraft over the Caribbean, Lt Col B.W. Chidlaw remarked to Lt Col F.O. Carroll that Barringer swung, "...a pretty big stick merely by virtue of being General Arnold's man."<sup>7</sup>

Major Ernest Dichman, formally an aeronautical engineer and sale manager with Vought-Sikorsky Aircraft Division of United Aircraft Corporation, took charge with the loss of Barringer. Colonel Frederick R. Dent Jr. and his staff at the Aircraft Laboratory was in charge of all experimental and technical matters on production gliders here at Wright Field. The Flight Research Unit supervised glider-testing activities at Wright Field until July 1943 when it transferred to the newly built Clinton County Army Air Field in Wilmington, Ohio. The base was designed to accommodate gliders with Materiel Command carrying on many of the research and testing projects essential to the success of the glider program.<sup>8</sup>

In the absence of any experience with cargo gliders, originality and design skill became essential parts of the program. Before the completion of the design studies, preliminary engineering requirements for the fifteen-place glider were sent to eleven companies. Only four companies responded: Frankfort Sailplane Company, the Waco Aircraft Company, Howlus Sailplanes, Incorporated, and the St. Louis Aircraft Corporation.<sup>9</sup>

In March 1941, officials at Wright Field began negotiations with Waco Aircraft Company of Troy, Ohio for the construction of experimental gliders. A contract approved in June provided that Waco would build one static test and one flight test model of an eight place (XCG-3) glider and one static test and two flight test models of a fifteen place (XCG-4) glider. Although Waco was not a large company, it had experience in manufacturing commercial aircraft and was better equipped to handle a development contract than most of the corporations the Materiel Division had turned to in the early days of the glider program.<sup>10</sup>

On 28 April 1942, Waco delivered the fifteen place XCG-4 static test article and the flight test article on 14 May to Wright Field, earning the company an official commendation from the Materiel Center which acknowledged the work of the Waco employees devotion to the project, stating that the XCG-4s had been "delivered several months prior to dates that would have been possible under normal operating conditions of this Company."<sup>11</sup> The first XCG-4 flight article flew on 20 June and, despite having a new rudder and fin combination installed, it received satisfactory remarks. In another significant test, the XCG-4 was successfully towed from





Wright Field to Chanute Field, Illinois, and back again, a distance of 220 air miles, while carrying fifteen passengers along with the pilot and co-pilot.<sup>12</sup>

One of the most significant features of the XCG-4 grew out of a suggestion of General Arnold when he stated he would “like very much to have a small light jeep constructed...to carry two men and have light armor and guns. This jeep should be designed and constructed with a view of fitting wings to it so that we can take it off as a glider and drop it as a glider. Having dropped as a glider, it lands on a field somewhere, sheds its wings, and goes around as a jeep.” In November 1941, Wright Field reported that Waco was, in fact, building both gliders to carry a jeep and a crew of six men. The XCG-4 was constructed to allow the entire nose, including the crew compartment, to swing upward, thereby creating a way for the jeep to unload by simply driving it out of the glider.<sup>13</sup>



The Waco CG-4A was a strut-based, high-wing monoplane with fixed-type landing gear and tail wheel with more than 70,000 individual parts. Constructed of framed plywood and welded steel tubing it was covered with a cotton canvas fabric stretched into place like wallpaper with every seam, hold, and edge covered with an adhesive dope resulting in an airtight structure wherever it was applied. The instrument panel was simple in design and function and included just an air speed indicator, altimeter, rate of climb indicator, and a bank and turn indicator. Light switches, a compass, and two release levers were also located in the cockpit. A two-man crew sitting side-by-side flew the gliders, which could carry 13 combat equipped infantrymen or, a jeep and six men, a jeep trailer fully loaded with combat equipment and nine men, a 75-mm Howitzer artillery piece with five men and eighteen rounds of ammunition, an anti-tank gun with five men, or it could be configured to carry six litters for the evacuation of wounded troops. Waco's were just over 48 feet long with a wingspan of over 83 feet and 12 feet 7 inches tall. They weighed 3,790 pounds empty with a maximum designed gross weight of 7,500 pounds with a tow speed of 150 mph with an average glide speed of 65 mph indicated speed and glide ratio of 5 to 1.<sup>14</sup>

Interestingly, before Waco had even delivered a static test glider on the XCG-4 contract, the Glider Branch of the Aircraft Laboratory discovered that the other experimental contracts for tactical gliders show little promise to deliver an acceptable fifteen-place glider. Due to this, the urgent need for gliders and Waco's progress, production contracts were let before the completion of the experimental articles. Before the first flight of the article, XCG-4 was delivered, eleven companies had been awarded contracts for a total of 649 CG-4As.<sup>15</sup>



In January 1942, the Experimental Engineering Section at Wright Field, assisted by the Industrial Planning Section, surveyed roughly one hundred companies not currently engaged in the manufacturing of combat or training aircraft. From this, the field was narrowed to twelve companies who received initial contracts prior to 1 May 1942 with three more added in June and July. In total, with Waco, sixteen companies were awarded contracts to build tactical gliders. The list of companies that produced the CG-4A included the Gibson refrigerator manufacturer and a wooden furniture maker. Sub-

contractors were also from diverse prewar industries: Steinway and Sons, a New York-based piano maker, contributed wings and tail surfaces; H.J. Heinz pickle company supplied wings to the G and A Aircraft Company; a brewery made inboard wing panels; and, Garner Metal Products Company, a coffin manufacturer, produced steel fittings that connected the wing struts to the fuselage.<sup>16</sup>

Dated 4 February 1942, CTI-480 directed the procurement of 200 to 500 eight-place gliders and 500 to 800 fifteen-place gliders, the numbers would be constantly revised through the years, and at times stopped for weeks. The urgent needs for gliders at a time when the demand for powered aircraft was already taxing American demands put the Materiel Center up against a staggering task. Officials at Wright Field were instructed not to interfere with powered aircraft programs; at the same time General Arnold called for rapid production of gliders. In early July 1942, Brigadier General K.B. Wolfe, Chief of the Production Division told Colonel J.W. Sessums of the Materiel Command in Washington that they could not “just get everything, so I comply with one order and disregard the others” and that he was under “personal direct orders from General Arnold” “to meet the established glider requirements” and he was “going to get these gliders if I don’t do anything else.”<sup>17</sup>

Envisioned as an economical method of sending troops into battle, the government set the cost per unit at \$20,000 but was only met by two companies – Ford Motor Company and Waco Aircraft Company. The Ford plant in Kingsford, Michigan, transformed its assembly line machinery and experience in manufacturing wood-sided station wagons into glider production, producing nearly 4,200 CG-4As, at a cost near \$15,000 each, by the end of the war. Waco went on to build 1,075 at just under \$20,000.<sup>18</sup>

All the manufacturers of the CG-4A signed an “Engineering Assistance and License Agreement” with Waco. The agreement that Waco would supply all the engineering data and information concerning production methods used by Waco as well as the patent and design rights owned by Waco. Companies were allowed to station personnel at the Waco plant to study production methods and secure engineering data but could not hold Waco liable for any damages or expenses. In addition, to protect Waco, the agreement contained a provision forbidding attempts to induce Waco employees to leave their jobs and accept jobs with another company. For its engineering and production services, Waco charged each participating company a fee of \$250 per glider.<sup>19</sup>

Another issue arose within the glider program dealing with the tooling for the CG-4A production. During the original procurement of the CG-4As, the Materiel Center began negotiations relating to the establishment of a coordinated tooling program. The Bromley Engineering Company of Detroit received control for the design of tools suitable for the CG-4A program. On 30 July 1942, a cost-plus-a-fixed-fee contract was given Bromley for the manufacture of master jigs and fixtures to be supplied to the CG-4A contractors. Nevertheless, a month earlier the Materiel Center had wired the CG-4A contractors to start building CG-4As immediately and to build their own production tools, jigs, and fixtures, advising that “interchangeability of parts was unimportant compared to completing gliders.” By September, a change within Materiel Center’s view on the tooling program began to take shape as Waco, Cesena, Ford, and General Aircraft preferred to do their own tooling. Additionally, the contracts for six of the other





companies were being considered for cancellation. As such, it was considered worthwhile not to continue the tool design contract for just six contractors when it was apparent that construction of tools by individual contractors was a substantial time saver. On 12 September, the CG-4A contractors were notified that the proposed tooling contract had been discontinued and no tools would be available by that source.<sup>20</sup>



Beyond the challenges, the Materiel Division faced in developing and constructing the gliders, it would face a public relations nightmare. On 1 August 1943 in St Louis, a city that was home to two of the prime contractors for the construction of Waco gliders, Mayor William Becker, with nine others, was preparing to go up on two demonstration flights from Lambert Field. When a reporter asked if he was nervous, Mayor Becker responded, half-jokingly, "Gentlemen, you can only die once, and we all must die sometime." During the second flight, and within moments of releasing from the C-47 tow plane, at 2,000 feet, the right wing folded and broke away from the fuselage, plunging nose-first into the ground and "smashed like a strawberry box" killing all aboard instantly. Investigators determined that a failed fitting at the lower end of the starboard wing brace that held the wing struts of the fuselage caused the mishap due to the thickness of the plate not meeting the manufacturer's specifications as well as deep machine tool marks, chattering and gouging on the part that failed. There was plenty of blame to go around, from the failed wing strut produced by Robertson Aircraft Company to the wing strut brace from the Gardner Metal Products Company (a St. Louis casket maker), but in the end it was determined that product oversight and quality control was least important to the primary contractor, the sub-contractor, and personnel of the Army Air Force.<sup>21</sup>

Once built, Waco's, unlike other aircraft, could not just fly to the theater of operations, they had to be disassembled from the factory, crated, lifted aboard a ship, transported, unloaded, shipped to a base/depot for reassembly, and then transported to an operational airfield for eventual deployment. The crates were massive with a CG-4A packed into five, the largest containing the inboard wing panels and spoilers totaling over 25 feet long and 11 feet high. Once in England, they were assembled by a specialized unit of glider mechanics from the United States, the 26<sup>th</sup> Mobile Reclamation & Repair Squadron, at Crookham Common just west of London in Berkshire. Once reassembled, they were ready to play their part in the war effort and would be ferried to the various operational theaters in Europe.<sup>22</sup>



Prior to June 1944, glider use by the military had been semi-successful during operations in North Africa and Italy but soon they were thrust center stage on 6 June 1944. Commonly referred to as "D-Day," the familiar Normandy landings initiated Allied efforts to liberate mainland Europe from Nazi occupation. Waco gliders would take part in the largest seaborne invasion in military history – preceded by extensive bombardment – that began at 0630 with the amphibious landings on the coast of France and saw over 150,000 Allied troops in Normandy by midnight. Nevertheless, D-Day came at a cost with nearly 9,000 Allied soldiers either dead or wounded and five names forever etched into history – Utah, Omaha, Gold, Juno, and Sword. However, before any Allied boots touched the beaches of Normandy, men from the American 101<sup>st</sup> and 82<sup>nd</sup> Airborne and British 6<sup>th</sup> Airborne were inserted by parachute and glider behind



Nazi lines to support the amphibious landings by securing bridges and flanks of the invasion beaches and disabling the strategically placed German artillery batteries.

At roughly 0100 on 6 June, D-Day, those on the topsides of Allied ships heading toward Normandy could hear the hundreds of C-47's overhead in route to their drop zones behind the beaches. Approximately an hour later, six C-47 aircraft flew over the village of St. Moxel near the headquarters of the German 709<sup>th</sup> Infantry Division. Moments later, German sentries engaged the paratroopers from the 101<sup>st</sup> Airborne Division. After two years of planning and a 24-hour postponement due to weather, the liberation of Europe had commenced.<sup>23</sup>

Success for the mission was mixed as Air Chief Marshall Sir Trafford Leigh-Mallory, the Air Commander-in-Chief, doubted the effectiveness of gliders. He wrote General Dwight D. Eisenhower stating he firmly believed the planned glider operations would not succeed with some estimates concluding that half the planes carrying Americans and 70-percent of the gliders would be shot down by German anti-aircraft fire. Lieutenant General Lewis H. Brereton, commander Ninth Air Force, however, asserted that "while I think a high percentage of losses may be incurred, I am convinced that the glider operations will be effective." He

pointed this belief in the advanced state of training that had been attained by the crews who had amassed over 30,000 hours of both day and night airborne exercises just in the month of April.<sup>24</sup>

Prior to the launching of the Normandy invasion, lessons learned from the use of airborne troops and gliders during Operation Husky in Sicily were reviewed repeatedly. One key aspect was the avoidance of complicated route packages with the decision to send the first glider missions into Normandy via the back door across the west coast; however, it was later decided to send them via the east coast over Utah Beach. Also, due to heavy losses suffered during the Sicily invasion to "friendly" anti-aircraft fire, troop carrier commanders demanded a complete prohibition of naval fire during the times they were approaching and departing Normandy.<sup>25</sup>

Preceding the landings of the main airborne force, one hundred and twenty advanced paratroopers known as 'pathfinders' took off from England at 2325 on 5 June in a fleet of gliders 30 minutes prior to the initial airborne assault. Their mission was to mark the drop zones for the paratroopers and landing zones for the gliders with flare paths and electronically with the Eureka Radar Beacon System to prevent the widespread scattering of paratroopers and gliders that had taken place in Sicily. However, the men who had been assigned to mark the fields were often scattered themselves and in the confusion and chaos, most of the fields would remain dark and no beacons were established to guide the gliders in.<sup>26</sup>

Airfields ranging from Devon to Lincolnshire saw action during the







night of 5 June as paratroopers from the 82<sup>nd</sup> and 101<sup>st</sup> Airborne Divisions boarded C-47s or Waco CG-4As for drops behind Utah beach. Plans called for a total airlift for over 17,000 men together with support equipment – jeeps, 57-mm antitank guns, and small tanks – that would be carried by over 900 C-47s and 500 gliders of IX Troop Carrier Command heading west for peninsula behind Utah beach. To persuade the participants to the success of the operation, Eisenhower and Breton visited units of the 101<sup>st</sup> during the evening and observed their departures. By the end of D plus 1, losses amounted to 41 aircraft and 9 gliders. With losses far below those feared, Leigh-Mallory quickly admitted his error and congratulated Eisenhower on the wisdom of his difficult discussion of 30 May. However, not all was congratulatory. Prior to the invasion, aerial reconnaissance had failed to show that the Germans had flooded fields on both sides of the

two rivers, the Douve and Merderet. It was within these marshes that many of the heavily laden paratroopers had tumbled and drowned.<sup>27</sup>

Three months later, gliders would again be called upon to insert Allied forces for Operation MARKET GARDEN – in some cases utilizing the same gliders and troops from the Normandy operation – for what was the largest airborne attack to that point in time of the war, to liberate the Netherlands. Planning for the airborne operation piece of Operation MARKET GARDEN began on 24 August when General Eisenhower recognized some issues between the northern and eastern approaches into Germany. Prior to the Normandy landings, a line of advance north of the Ardennes was determined as the most direct and strategic route into the heart of Germany. This route would bring the Allied armies onto the broad plain of western Germany, giving them the advantages of maneuverability, but also lead them to the industrial center of Germany.<sup>28</sup> That same week, Eisenhower issued another directive reflecting a two-pronged attack, ordering Field Marshal Bernard L. Montgomery's forces and those of Lieutenant General Omar Bradley's to secure the port facilities of Antwerp and then seize the Ruhr with the assistance of airborne forces.<sup>29</sup>

Operation MARKET consisted of airborne forces dropping across the waterways on the general axis of advancement and the capture of vital roads, rails, and pontoon bridges between Eindhoven and Arnhem. Assigned these objectives was the U.S. 82<sup>nd</sup> and 101<sup>st</sup> Airborne Division, the British 1<sup>st</sup> Airborne Division, the Polish 1<sup>st</sup> Independent Parachute Brigade, and a number of smaller specialized units such as aviation engineers. The 101<sup>st</sup> was assigned to seize the city of Eindhoven and the bridges near Veghel, St. Oedenrode, and Zon; 82<sup>nd</sup> was to capture several bridges at Nijmegen and Groesbeek; and the British 1<sup>st</sup> Airborne, supported by the Polish paratroopers, was to gain control of the road, rail, and pontoon bridges at Arnhem.<sup>30</sup>

The ground phase of the campaign – coded GARDEN – was given two major objectives: first, a rapid advance of the British Second Army's bridgehead across the Meuse-Escaut Canal





northward towards the Rhine and the Zuider Zee, thus flanking the Siegfried Line, and secondly, taking possession of the area between Arnhem and the Zuider Zee to advance across the IJssel River into the Northern German Plain.<sup>31</sup>

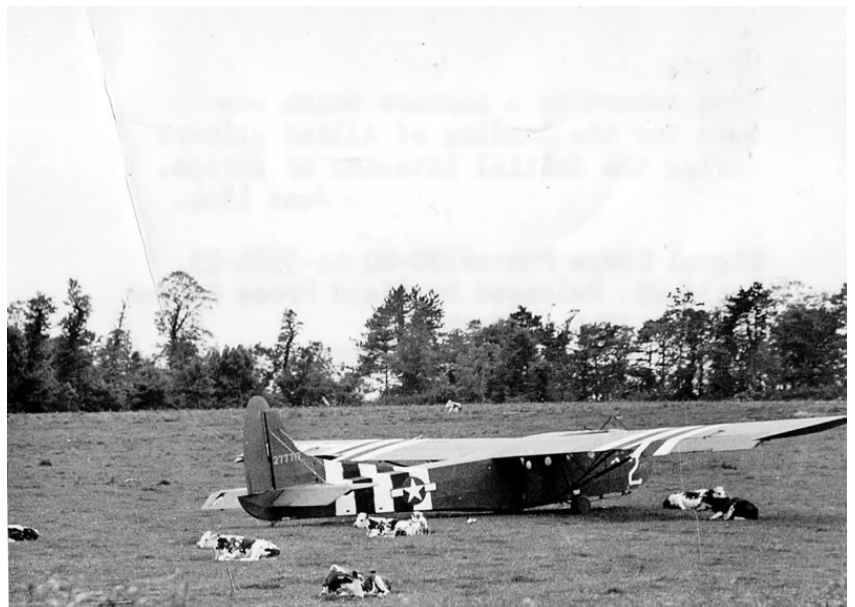
Two approaches were considered with the most direct route to the targets passing over Schouwen Island and passing over enemy-held territory for roughly eighty miles with the alternate route, a more southerly course, passing over roughly sixty miles of enemy-controlled territory. When assessing enemy territory, it was expected that the main opposition that would need to be overcome was not from the *Luftwaffe* but from flak guns, which Allied air forces planned to reduce substantially prior to the

launching of the operation. Also, with planners believing that the *Luftwaffe's* day fighter strength had been heavily reduced more than night fighters, the decision was made to launch the operation by day. In the end, a decision was reached that "no appreciable differences between the hazards existed" with either route, both corridors were used in order to eliminate any danger of heavy congestion within the air.<sup>32</sup>

Weather, which had presented issues in prior airborne operations, was not an issue during the initial kickoff of Operation MARKET on Sunday morning, 17 September 1944. Initially, 181 aircraft from RAF Bomber Command launched struck flak defenses along the northern route at Moerdijk Bridge and the airfields at Leeuwarden, Steewijk-Havelte, Hopsten, and Salzbergen during the night of the 16/17 September. In the early morning, RAF bombers hit coastal batteries in the Walcheren area and attacked shipping near Schouwen Island, while a large force of B-17's from the Eighth Air Force struck 112 anti-aircraft positions along both routes later that morning.<sup>33</sup>

At around noon, 1,546 aircraft and 478 gliders carrying roughly half the British 1<sup>st</sup> and U.S. 82<sup>nd</sup> and 101<sup>st</sup> Airborne Divisions converged on their designated drop and landing zones with 1,481 aircraft and 425 gliders successfully reaching their target areas; losses were far less than had been projected. Paratroopers from the 101<sup>st</sup>, having landed between Veghel and Eindhoven, moved quickly to establish their position at Zon, roughly between St. Oedenrode and Eindhoven. After slight opposition from enemy tanks but overcome with assistance by the RAF Second Tactical Air Force (TAF), the paratroopers quickly seized the bridge at Veghel; however, the Germans destroyed the bridge at Zon over the Wilhelmina Canal as the paratroopers approached. To the north, the 82<sup>nd</sup> landed southeast and southwest of Nijmegen and captured the bridge over the Maas River at Grave and the two smaller bridges over the Maas-Waal Canal but could not secure the Nijmegen bridge. The British 1<sup>st</sup> Airborne Division succeeded in capturing the northern end of the Neder Rijn bridge north of Nijmegen but failed to capture the entire bridge due to the presence of the 9<sup>th</sup> SS and 10<sup>th</sup> SS Panzer Divisions; Allied intelligence had not foretold of their presence in the area and they presented an unexpected and exceedingly strong opposition to the British 1<sup>st</sup> Airborne Division.<sup>34</sup>

Poor visibility on the morning of 18 September postponed the launching of 1,306 aircraft and 1,152 gliders until the afternoon. The second wave the airborne operations achieved its goals at a cost of 22 aircraft and 21 gliders destroyed





or missing. The British 1<sup>st</sup> Airborne Division and most of the U.S. 82d and 101<sup>st</sup> Divisions had been delivered to the battle area at costs which in no way diminished the capacity of the Allied air forces to provide such continuing assistance as might be required.<sup>35</sup>

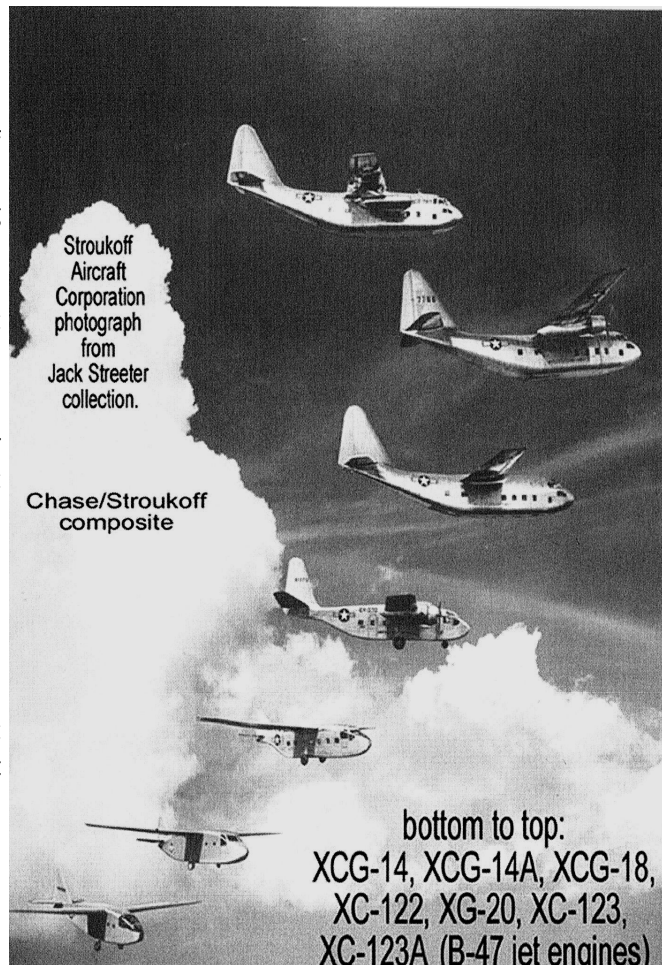
Due to weather, it was not until 23 September when large-scale operations could resume but by then, the issue at hand had been settled. Weather also reduced the effectiveness of the supporting fighter operations and seriously effective the inability of the RAF Second TAF to provide continuous close air support for paratroopers. This in turn benefitted the Germans and allowed them to repeatedly cut established lines of communication with Montgomery's forces and position themselves astride the axis of the Allied advance.<sup>36</sup>

Due to weather issues, the authorized withdrawal of British troops from Arnhem was given the night of the 23<sup>rd</sup> and accomplished two nights later. As the Allied line readjusted, US paratroopers held on at Nijmegen; however, on the 19<sup>th</sup>, Leigh-Mallory released them from any further commitments to MARKET. Some attested that the air-ground operations, which had involved some hope for an early Allied victory over Germany, had ended in failure. After the war, General Montgomery insisted that MARKET GARDEN was 90-percent successful due to the possession of forces crossing over the four major water obstacles as well as the Maas and Waal rivers.<sup>37</sup>

During Operation MARKET GARDEN, there was little complaint made of the troop carrier operations. While there were delays, these were weather related. While there were inaccurate drops of both paratroopers and supplies, these were due to both the influence of weather and the constriction of the areas held by the previously landed troops, making accurate drops difficult. Most of the complaints were made regarding the altered drops at Arnhem due to the actual ground situation and the failure in communication. In the end, the air phases of MARKET GARDEN were undoubtedly the most effective of the entire operation. Lisa von Overweld, a 14-year-old, observing the glider landings near Son, Netherlands remarked, "It was beautiful to see the gliders landing. You could see the gliders opening their fronts and all of a sudden a Jeep would dart out at full speed and head into the meadows. Those Yankees were so quick."<sup>38</sup>

Glider would be utilized for carrying glider-borne and other troops into tactical operations, carrying supplies and equipment into combat, evacuating casualties and other personnel, and supplementing the transportation services of other agencies in each of the areas of operations during World War II. Sixteen contractors produced nearly 14,000 Waco CG-4A from 1942 until the end of the war with more than 7,000 modifications and for use in European combat operations.<sup>39</sup> They would earn nicknames such as flying coffins, death crates, Purple Heart boxes, tow targets, and flimsy, unprotected, unarmed 48-foot contraptions. Those who operated or flew within would describe landings as controlled crashes in fields, hedgerows, and trees where both wings were sometimes whacked off.<sup>40</sup>

Glider testing would continue at Clinton County Army Airfield, Wilmington, Ohio, for several more years after the war; however, interest in gliders began to wane. However, some developed into future airframes in the new US Air Force. Chase Aircraft's XCG-14 contract changed to the XCG-18 with engines added later making it the XPG-18 and becoming the C-122 troop transport. The same fate became of the XCG-20 when engines were added to it and it became the Fairchild C-123 *Provider* troop transport. The *Provider* went on to serve in combat in Southeast Asia as a troop transport, delivering supplies, evaluating wounded, defoliating missions, and various covert operations.<sup>41</sup>



**ENDNOTES:**

1. Walter Cronkite, American war correspondent, remarking after his experiences accompanying glider airborne troops into battle. Gary A. Best, *Silent Invaders: Combat Gliders of the Second World War*, (Croydon: Fonthill Media, 2014), 16-7.
2. Best, *Silent Invaders*, 14-5.
3. Paul M. Davis and Amy C. Fenwick, *Development of Gliders in the Army Air Forces, 1941-1944*, (Wright Field: Air Technical Service Command, May 1945), 1, 5.
4. Memo for Maj Gen George H. Brett, Acting Chief of Air Corps by Maj Gen H.H. Arnold, Dep Chief of Staff for Air, 25 Feb 1941, cited in Davis and Fenwick, *Development of Gliders*, 5.
5. Davis and Fenwick, *Development of Gliders*, 5-6.
6. *Ibid.*, 15-16, 35.
7. Phone transcription, Lt Col B.W. Chidlaw, Exp Eng Brnh, MD Washington and Lt Col F.O. Carroll, Chief Exp Eng Sect, WF, 24 Jan 1942, cited in Davis and Fenwick, *Development of Gliders*, 16-7.
8. Davis and Fenwick, *Development of Gliders*, 19-20.
9. *Ibid.*, 35.
10. *Ibid.*, 37.
11. Ltr, Exp. Eng. Sect., Materiel Center to Waco Aircraft Company, cited in Davis and Fenwick, *Development of Gliders*, 38-9.
12. Davis and Fenwick, *Development of Gliders*, 39.
13. CTI-318, 4 Sept 1941, cited in Davis and Fenwick, *Development of Gliders*, 39-40.
14. Ray Whitehead, who participated in glide tests, stated to author Charles Day, that they had used the distance between Wright Field and Patterson Field, a distance of one mile, to measure the glide ratio. Some glider pilots stated the ratio was 10 to 1 and 12 to 1. Best, *Silent Invaders*, 19; Charles L. Day, *Silent Ones: WWII Invasion Glider Test and Experiment, Clinton County Army Air Field Wilmington, Ohio*, Lambertville: Charles Day, 2001, 79.
15. Davis and Fenwick, *Development of Gliders*, 40-1.
16. *Ibid.*, 96-7; Best, *Silent Invaders*, 23.
17. *Ibid.*, 94-5.
18. Best, *Silent Invaders*, 23.
19. Davis and Fenwick, *Development of Gliders*, 98-9.
20. *Ibid.*, 99-100.
21. Best, *Silent Invaders*, 27.
22. *Ibid.*, 24.
23. Michael E. Haskew, *The Airborne in World War II: An Illustrated History of American's Paratroopers in Action*, (New York: Thomas Dunne Books, 2016), 83; Craig L. Symonds, *Neptune: The Allied Invasion of Europe and the D-Day Landings*, (New York: Oxford University Press, 2014), 250.
24. Milton Dank, *The Glider Gang: An Eyewitness History of World War II Glider Combat*, (Philadelphia: J.B. Lippincott Co., 1977), 100; Haskew, *Airborne in World War II*, 88.
25. Dank, *Glider Gang*, 96; Haskew, *Airborne in World War II*, 86.
26. Jonathan Mayot, *D-Day: Minute to Minute*, (New York: Marble Arch Press, 2014), 72; Haskew, *Airborne in World War II*, 88; Dank, *Glider Gang*, 96, 112-3.
27. Wesley Frank Craven and James Lea Crate, *The Army Air Forces in World War II, Vol. III: Europe, Argument to V-E Day, January 1944 to May 1945*, (Washington: Office of Air Force History, 1983), 86, 186-8; Haskew, *Airborne in World War II*, 84; Hans Den Brok, "Normandy: Operation Overlord, 6-7 June 1944," National World War II Glider Pilots Association, <https://www.ww2gp.org/Normandy.php>; Dank, *Glider Gang*, 113; Jonathan Mayot, *D-Day: Minute to Minute*, (New York: Marble Arch Press, 2014), 108.
28. Craven and Cate, *Augment to V-E Day*, 598.
29. *Ibid.*, 599.
30. *Ibid.*, 600-1.
31. *Ibid.*, 600.
32. *Ibid.*, 602.
33. *Ibid.*
34. *Ibid.*, 602, 604.
35. *Ibid.*, 606.
36. *Ibid.*, 606-7.
37. *Ibid.*, 607-8.
38. *Ibid.*, 609; Quoted in George C. Koskimaki, "Hell's Highway," cited in Day, *Silent Ones*, 78.
39. The CG-15 and CG-13A were used in the Philippines on a small scale.
40. Best, *Silent Invaders*, 16-7; Day, *Silent Ones*, 78.
41. Day, *Silent Ones*, 105.





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