



“The First Modern War”: Technology in World War I

Ohio Memory Resource Guide—www.ohiomemory.org

Introduction

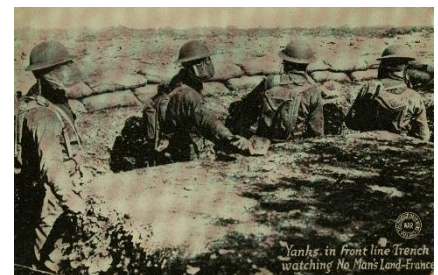
We live in a technological age, with new advancements across disciplines shaping the world around us. Often, research and eventual implementation of new technologies are inspired by our changing planet, and are created in order to meet our evolving needs. Sudden or new challenges have inspired rapid technological advancements throughout our nation’s history, with World War I being no exception.



The unprecedented scale of World War I required new technological advancements, and improvements to existing ones, in order to meet the demands of combat and to maintain large military forces across Europe. Historians sometimes refer to World War I as the first modern war because the new fighting tactic of trench warfare, and the resulting weapons and other equipment created for this combat style, changed how wars are fought and supported.

Rather than two armies colliding on a battlefield in the traditional sense, World War I was fought from trench systems, spanning large stretches of land. The empty space between opposing trenches was called “No Man’s Land,” and was nearly impossible to cross due to the risk of enemy attack, barbed wire protecting enemy trenches, and limited cover. With large-scale land combat taking place on the European Front, armies manufactured airplanes for observation and bombing purposes.

War planes made their debut in World War I as aviation reached new milestones in the late nineteenth and early twentieth centuries. The Allied and Central Powers used existing technology to manufacture combat planes and aircraft used for aerial reconnaissance missions. Germany manufactured zeppelins as observation balloons and targeted bombers that left a path of destruction across England, although the United States manufactured observation balloons as well. Poison gas brought a new face of horror to the front lines. Advancements in weapons and artillery were well adapted to fighting from the trenches rather than launching full-scale offensive attacks, such as automatic machine guns, long-range heavy artillery, hand grenades, and trench mortars.





Armies moving throughout Europe required more instantaneous modes of communication, leading to advancements in radio telephony, telephone, and wireless telegraphy. The speed of communication could have larger implications, even affecting the winner and loser of a battle.¹

Suggested Search Strategies

Try the following terms as an “all word” search: Aviation; Artillery and weapons; Submarines; Zeppelins; Military training; Trench warfare; Radio, Military; Aeronautics, Military

Start your search in the [World War I in Ohio Collection](#) on the collection homepage. Broaden your search to all records on Ohio Memory by searching from the [Ohio Memory homepage](#).

Sample Items on Ohio Memory

Communication

- [American field radio outfit](#): Radio technology was still in its infancy at the start of the Great War, but was improved over time as faster and more reliable communication methods were required, leading to the widespread use of telegraphs and telephones. This stereoview shows a soldier operating a radio station inside a truck in France, with two observers using binoculars to detect aerial threats. (See below)
- [Soldier operating radio](#): This glass plate negative shows a soldier using a field radio, possibly during a training exercise. Radios were often used by soldiers in trenches on the front lines to communicate with their officers, and could warn troops about incoming air raids and poison gas attacks.
- [Telegraph transmitting set photograph](#): Telegraph transmitters were an early form of air-to-ground communication used by pilots, allowing them to communicate with ground crews by sending messages in Morse code.
- [Repairing telephone lines stereograph](#): Although telephones and telegraphs provided instant communication, the wires were easily damaged by artillery fire, mortars, air raids, and heavy foot traffic. Soldiers relied on repair crews to maintain crucial modes of communication.
- [French artillery observers stereograph](#): Located in a trench near the Marne River, these French observers are taking a message over the telephone and using a range-finding instrument to spot enemies in the distance.
- [Company A, 325th Field Signal Battalion photograph](#): The U.S. Army Signal Corps was responsible for developing and maintaining wartime communication methods including



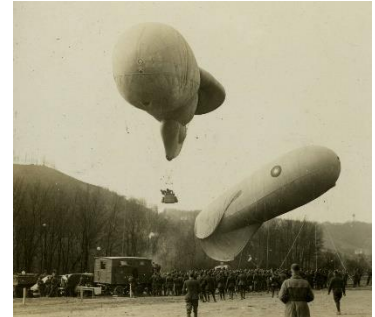
¹ Ross, Stewart. *The Technology of World War I*. Austin and New York: Raintree Steck-Vaughn Publishers, 2003.



telephone, telegraph, radio, aerial reconnaissance and aerial photography, in addition to earlier traditional methods like flags and messengers. The 325th Field Signal Battalion pictured here is posing with flags in specific positions to communicate a message.

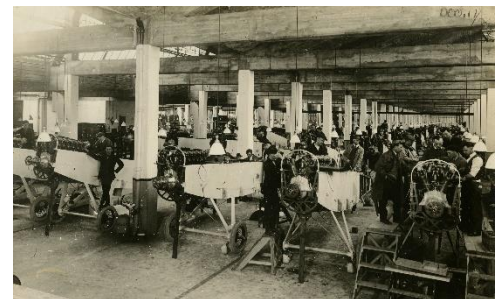
Zeppelins

- [Dirigible R-34 at Mineola stereograph](#): Zeppelins, a type of dirigible or airship, like the one pictured here, were hydrogen-filled observation balloons used by the German army and navy for reconnaissance missions and as targeted bombers during World War I.
- [Troops attaching ropes to observation balloon](#): This stereoview shows American troops attaching ropes to an observation balloon as it prepares for ascension.
- [Observation balloons stereograph](#): Observation balloons were used to observe enemy movements, formations, and possibly detect an oncoming attack. In this stereograph, German troops inflate two observation balloons, the higher of which has two soldiers in the observation basket, calling down instructions to the men on the ground. (See right)
- [German observation balloon shot stereograph](#): Although zeppelins and air balloons were relatively durable, their hydrogen bellies were highly flammable, could be penetrated by bullets, and were sometimes shot down by airplanes, like the German balloon pictured here.



Aviation

- [Bridgnet Michelin bombarding airplane stereograph](#): Soldiers push this Bridgnet Michelin bombarding plane as it prepares for takeoff in France.
- [Fuselage Department, Dayton-Wright Airplane Company photograph](#): This photograph shows employees in the Fuselage Department at Dayton-Wright Airplane Company installing engines in DH-4 planes, a relatively obsolete British observation airplane. For more photographs of the Dayton-Wright Airplane Company, click [here](#). (See right)
- [Major Doyen P. Wardwell's uniform and equipment](#): Doyen P. Wardwell served as a combat pilot with the 12th Aero Squadron, 185th Escadrille in France, conducting reconnaissance, pursuit, bombing, and escort missions. The collection includes [photographs and postcards](#), [his uniform and flying gear](#), and [military decorations](#).
- [Eddie Rickenbacker in plane photograph](#): Edward Rickenbacker was born in Columbus, Ohio, in 1890, and in 1917 put his career as one of the country's leading race car drivers on hold to train as a fighter pilot during World War I. Serving in the 94th Aero Squadron, Rickenbacker earned the title Ace of Aces due to his excellence in aerial combat and the most aerial





victories of any fighter pilot during the war, with 26 total. To learn more, read [this Ohio Memory blog post](#), or view [more photographs](#) of Rickenbacker and the 94th. Captain William C. Lambert of Ironton, Ohio, was the second-ranking ace pilot in World War I. To learn more about Lambert, read [this post](#) on the National Museum of the U.S. Airforce website.

- [“Aviation Weekly” and “The Flier” newsletters](#): Many pilots trained at Wilbur Wright Field in Dayton, Ohio, as it was established in 1917 as a pilot training and flight testing facility, and served as the Signal Corps Aviation School headquarters. Read issues of “Aviation Weekly” and the “The Flier” newsletters to learn more about living and training at Wilbur Wright Field, leisure and recreational activities for pilots, and an insider glimpse of camp life.

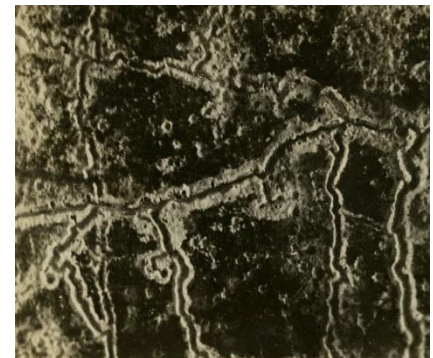
Poison gas

- [Clarence Matlock affidavit](#): Chlorine, phosgene, and especially mustard gas became one of the most feared weapons during the war. Odorless and colorless, it was difficult to detect on the battlefield. This affidavit for Clarence Matlock documents his complaints about lung trouble, which he claims is a result of gas exposure while he served in the 166th Infantry.
- [Soldiers with gas masks stereograph](#): This stereograph shows American soldiers in France learning how to properly wear gas masks. Although the first models were not as effective, gas masks and respirators protected soldiers’ lungs and eyes, which decreased the risk of temporary or permanent blindness and blistering lungs. However, the men’s uniforms could not prevent blisters on the skin. (See right)
- [Gas training exercise lantern slides](#): Soldiers had to learn not only how to protect their bodies from the effects of gas attacks, but also had to practice performing tasks with their masks and respirator boxes on, including digging and maneuvering through trenches, participating in an attack with impaired vision, and alerting others of oncoming attacks. You can view other gas trainings [here](#).



Trench warfare

- [Western Front aerial stereograph](#): The term *trench warfare* is one of the most common ways used to describe the fighting style of World War I. This aerial photograph of a trench network communicates how vast and complex trench systems were, completely altering the topography of the natural environment. (See right)
- [No Man’s Land stereograph](#): The space between opposing trench systems was referred to as No Man’s Land, as men rarely left their trenches to attack their enemy as heavy artillery fire eliminated trees and all other forms of cover, leaving soldiers exposed to enemy fire. This photograph shows trees reduced to stumps and trunks, as well as



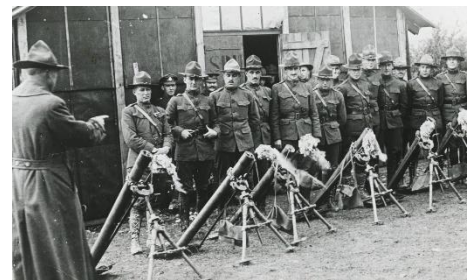


artillery and other debris, soldiers killed during an attack, and craters from bombs and grenades, now filled with water.

- [French soldiers resting in trench stereograph](#): When there were no major sieges or attacks occurring, soldiers often had a lot of downtime in the trenches, where they ate meals, rested, and filled their time as best they could. As this stereograph shows, trenches were narrow and soldiers survived harsh living conditions, continually combating disease and pests.
- [Derelict World War I tank stereograph](#): Tanks were first used during World War I, as armies needed a vehicle that could easily navigate the treacherous, muddy landscapes of trench warfare, crushing any debris and barbed wire in its path. This stereograph shows an abandoned British tank in Cambrai, France, destroyed by a German bomb.

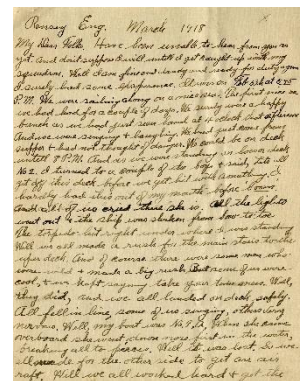
Guns and Artillery

- [Soldier operating heavy artillery weapon](#): Heavy artillery included cannons and howitzers, short and long-range large guns respectively, and could shoot further than ten miles. Due to their size, these large artillery weapons were often transported on railroad tracks.
- [Grenade training lantern slide](#): Grenades were small, easy to transport, and caused heavy destruction in enemy trenches. These soldiers practice throwing grenades from a trench during a training exercise.
- [Mortar training lantern slide](#): These soldiers learn how to set up and fire trench mortars, as opposed to the large mortar launchers, which are comparable in size to a howitzer. Mortars were easily transported and operable by one soldier, proving to be effective trench weapons. (See right)
- [Machine gun training lantern slide](#): Machine guns allowed soldiers on the front to barrage enemy trenches before offensive attacks. Although the first machine gun was invented in 1884, original designs were hand-cranked; by the end of World War I, they were fully automatic firing weapons. You can view other images of military training exercises [here](#).



Warships and Submarines

- [Valford S. Clark letter to J.W. Clark, March 1918](#): In this letter to his parents, Clark describes when his ship, the Tuscania, transporting American soldiers, was torpedoed by a German U-Boat.
- [American soldiers on ship](#): These soldiers are fully equipped with life jackets as they train to abandon ship while aboard a submarine. Submarines wreaked havoc across the seas, but were also susceptible to attack from anti-submarine destroyers, high-speed ships that used underwater detection equipment and depth charges to locate and attack submarines.





- [S.S. Aquitania stereograph](#): This stereograph shows the S.S. Aquitania, an American transport ship, painted with dazzle camouflage, a British method meant to make it difficult for enemy ships to estimate the target's range, speed, and direction by using contrasting and intersecting geometric shapes.
- [U.S.S. Pennsylvania stereograph](#): This shot of the U.S.S. Battleship Pennsylvania's deck gives a sense of the power and force of its weaponry and potential for destruction embodied in World War I's battleships. The Pennsylvania was one of the most deadly battleships in the war. To learn more about the U.S.S. Pennsylvania and other U.S. naval ships, visit the [Dictionary of American Naval Fighting Ships \(DANFS\)](#).

Selected standards that these digital resources support include:

Ohio's New Learning Standards: Social Studies

American History (AH)

- AH.8: The rise of corporations, heavy industry, mechanized farming and technological innovations transformed the American economy from an agrarian to an increasingly urban industrial society.
- AH.14: As a result of overseas expansion, the Spanish-American War and World War I, the United States emerged as a world power.

Modern World History (MWH)

- MWH.3: Historians analyze cause, effect, sequence and correlation in historical events, including multiple causation and long- and short-term causal reactions.
- MWH.8: Industrialization had social, political and economic effects on Western Europe and the world.
- MWH.12: Advances in technology, communication and transportation improved lives, but also had negative consequences.

Contemporary World Issues (CWI)

- CWI.14: The development and use of technology influences economic, political, ethical and social issues.
- CWI.15: Technologies inevitably involve trade-offs between costs and benefits. Decisions about the use of products and systems can result in intended and unintended consequences.

Additional Resources

- Ohio in World War I (<http://www.worldwar1centennial.org/index.php/ohio-in-ww1-home-page.html>)
- The United States World War I Centennial Commission (<https://www.worldwar1centennial.org/index.php>)
- World War I Union Bibliography (<http://www.ohiohistoryhost.org/wwibib/>)





- The National World War I Museum and Memorial (<https://www.theworldwar.org>)
- World War I Transcription Tool (<http://transcribe.ohiohistory.org/>)
- Chronicling America (<http://chroniclingamerica.loc.gov/>)

Sources Cited

Archival Collections

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- Clarence Meredith Matlack Papers. VFM 4667. Ohio History Connection.
- Dalton Smith Hayes Collection. Rutherford B. Hayes Presidential Library & Museums.
- Dayton-Wright Airplane Company Photographs. SC 5799. Ohio History Connection.
- Edward V. Rickenbacker Photograph Collection. P 395. Ohio History Connection.
- "The Flier" newsletter. 940.4985 F642. Ohio History Connection
- Major Doyen P. Wardwell Collection. Hocking County Historical & Genealogical Society & Museum
- World War I Collection. MSS 247. Ohio History Connection.
- World War I Photograph Collection. State Archives Series 2728 AV. Ohio History Connection.
- World War I Stereoview Collection. State Archives Series 1947 AV. Ohio History Connection.
- World War I Training Slides. AV 65. Ohio History Connection.

Digital Resources

- National Museum of the U.S. Airforce. "Capt. William C. Lambert." Accessed October 23, 2018. <https://www.nationalmuseum.af.mil/Visit/Museum-Exhibits/Fact-Sheets/Display/Article/197431/capt-william-c-lambert/>
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