

WORLD WAR ONE WEAPONS – NEW TECHNOLOGY

New weapons revolutionized combat in World War One. Combat morphed from a rapid, noble and relatively ephemeral thing to a new model: trench warfare. This new style of warfare was brought about principally by new technology that arose from the furnaces and factories of industrial Europe.

- 1. Machine guns:** These weapons were first used in the American Civil War to devastating effect. But with World War One their effectiveness reached frightening new levels. Firing up to 600 bullets a minute (the equivalent of 250 men with rifles), Machine Guns were then deemed to be 'weapons of mass destruction'.



- 2. Artillery:** These were the new and upgraded versions of cannons. Never in the history of man, where there so many cannons used in one war alone. For four years the British had been using artillery and firing 170 million shells in that time. But Germany had a plan up their sleeve. For years, German scientists were developing the biggest artillery ever known. It was called the '**Big Bertha**'. Big Bertha was so powerful it could fire at the heart of Paris from 120 kilometers away. The cannons weren't the only things that had



been improved. The shells were upgraded as well. Instead of ordinary shells, new High-explosive shells were developed. The Shells were thin casings and were filled with tiny lead pellets. This was so effective, that artillery fire killed hundreds and thousands of men. It also blew the ground, which made hiding much more difficult.

3. Gas Grenades: These were highly toxic and very effective weapons. The Germans had invented 3 main gas grenades. The first was Chlorine gas, which was used at the battle of Ypres in 1915, killing thousands. Second was Phosgene gas and third was Mustard gas. This burned the lungs of the inhaler leaving them to die in agony. Gas masks were issued to everyone in the country, but they weren't so useful and many people died.



4. Transportation: transportation greatly increased, as more troops were needed at battlefields and other places. British forces used everything from trains to trucks and even taxis. They transported 500 men in 1914; 250 taxis took the reserve troops to the Battle of Marne and thousands of lorries were used to transport troops to Verdun in 1916.



5. Communication: In 1914 both radios and telephones were the main ways of communication. These were very vital for the troops in trenches. However, that did not mean that messengers, dogs and pigeons were out of business.

6. Tanks: Tanks were known as 'The Chariots of God' at First, they were giant blocks of metal that could carry 1-2 personnel and traveled at about 5 kilometers per hour. But scientists and developers kept making new and improved tanks and by 1918 the Anglo-American Mark 8th could carry up to 8 men, and at the same time fire 208 shells and up to 13,000 bullets. Although these beasts were powerful, they were not so



reliable. Most broke down and a good example is the battle of Amiens. The British sent 525 tanks, and after four days, only 25 were left in working order. Rolls Royce also joined in the development of these tanks, by building their own armored car! It could travel up to 88 kilometers and had 8mm machine guns.

7. Planes: These were the new types of weapons use in advanced technological warfare. They had everything from mini scout planes to huge blimp like bombers called Zeppelins. Air warfare was not seen as important as any other type so it did not have its own category.



8. Anti-Aircraft: As aircrafts became common new ways to protect against them also became more common. The aircraft did not fly fast, 100-300 km/h and if you were really skilled you could shoot them down with a rifle. Several nations developed both machine guns and anti-aircraft guns to clear the sky from aircrafts. Anti-aircraft cannons had grenades that exploded at a preset altitude so that shrapnel from the grenade would damage the aircraft within a certain distance. Another way to be protected from enemy aircraft was to send up balloons that hung in a steel cable, so called "barrage balloons". The idea was that the aircraft's wings would be damaged if the plane flew into the wire and then it would plunge to the ground!



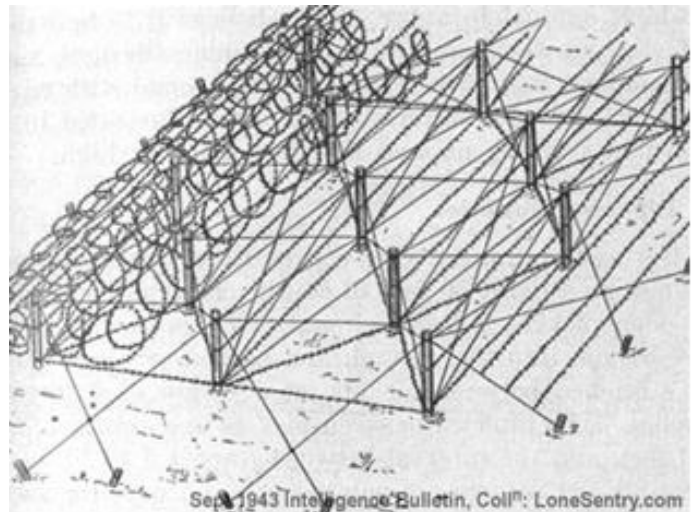
Barring Balloons were used mainly around major bombing targets like factories.

9. Naval Units:

Naval ships were counted very important for some of the war. Britain specialized in ships such as battleships, and the Germans specialized in Submarines – U-boats...



10. Barbed wire: Barbed wire had been around since 1870 for fencing cows and other livestock. During the First World War large fields were covered with barbed wire to stop the enemy soldiers when they attacked and so they were easier to kill.



11. Hand grenades:

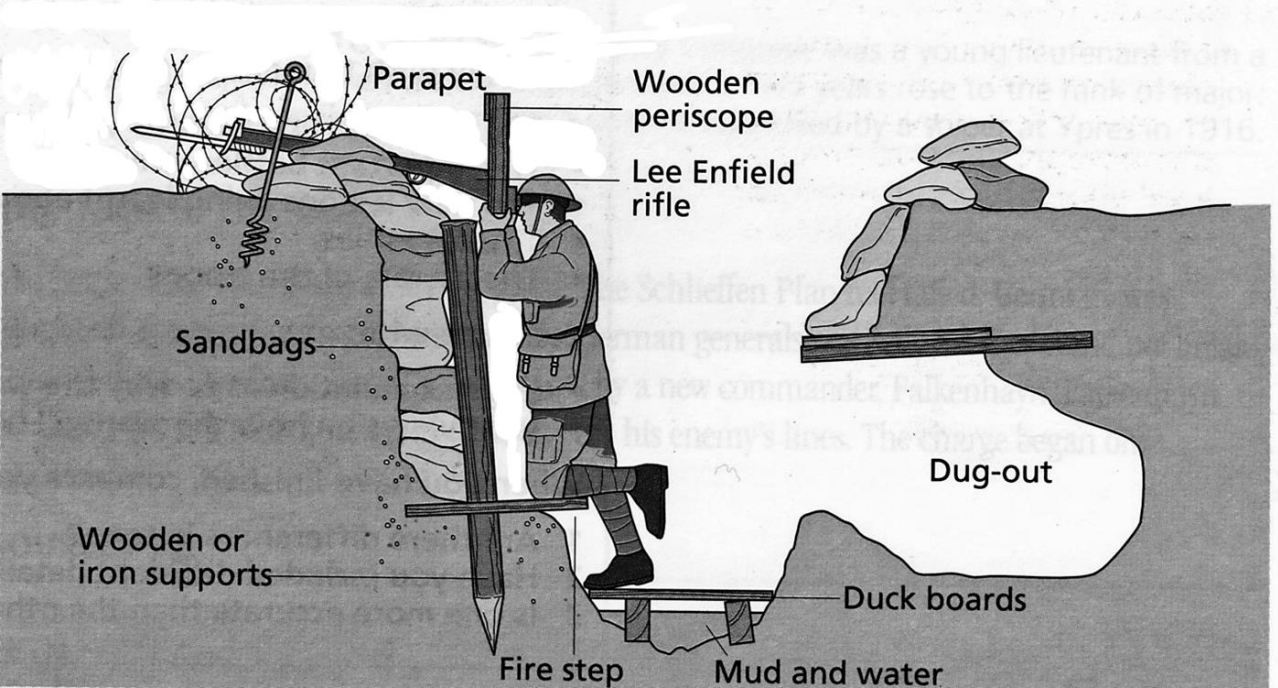
Soldiers had used hand grenades in previous wars but the grenades that were used during the First World War had a fuse and a high explosive charge with steel pieces around it, much like the high-explosive shells. This

meant that a single soldier equipped with hand grenades could do as much damage as a cannon made a few years earlier.

12. Flamethrower: Germany invented the flamethrowers, a feared arm which consisted of a tube with compressed air and an oil tank. When using the flamethrower it spread an oil cloud that ignited a long jet of flaming oil. Flamethrowers were effective in the trenches but whoever wore the flamethrowers were an easy target to hit and kill since the range was so short.



IN THE TRENCHES...



WAR IN THE AIR

When Archduke Ferdinand was assassinated on the 28th of June 1914, it was just over a decade since the Wright brothers' first twelve second flight at Kitty hawk.

In the intervening years advances in range and reliability proved that the airplane was a viable, if still somewhat exotic, means of transport. In **1909 Bleriot** made the first flight across the English Channel. In **1913 Roland Garros** made the first cross Mediterranean flight, from the south of France to Tunisia.

There was also, in this period, some initial understanding of the military implications of the airplane. After Bleriot's flight H. G. Wells was to write, prophetically, that "...this is no longer, from a military point of view, an inaccessible island." In **1911 the Italians**, at war with Turkey in Libya, **became the first to make military use of the airplane, dropping grenades from a German-built monoplane.** In 1912 they also dropped bombs from an airship.

When war broke out the number of aircraft on all sides and all fronts was very small. **France**, for example, had less than **140 aircraft at the start of the war.** By **the end of the war she fielded 4,500 aircraft**, more than any other protagonist. While this may seem an impressive increase, it does not give a true indication of the amount of aircraft involved. **During the war France produced no less than 68,000 aircraft. 52,000 of them were lost in battle, a horrendous loss rate of 77%.**

The period between 1914 and 1918 saw not only tremendous production, but also tremendous development in aircraft technology.

A typical British aircraft at the outbreak of the war was the general purpose BE2c, with a top speed of 116 km/h (72 mph). Powered by a 90 hp engine, it could remain aloft for over three hours. By the end of the war aircraft were designed for specific tasks. Built for speed and maneuverability, the SE5a fighter of 1917 was powered by a 200 hp engine and had a top speed of 222 km/h (138 mph).

Britain's most famous bomber, the Handley-Page O/400, could carry a bomb load of 900kg (2000 lb) at a top speed of 156 km/h (97mph) for flights lasting eight hours. It was powered by two 360 hp engines.

In 1914 it was important that aircraft be easy to fly, as the amount of training that pilots received was minimal, to say the least. Louis Strange, an innovative pilot from the opening stages of the war, was an early graduate of the RFC (Royal Flying Corps) flight school. He began flying combat missions having completed only three and a half hours of actual flying time. For this reason aircraft were designed for stability. By the end of the war stability had given way to manoeuvrability. **The famous Sopwith Camel was a difficult aircraft to fly, but supremely agile.**

Not only did aircraft become faster, more maneuverable and more powerful, but a number of technologies that were common at the start of the war had almost disappeared by the end of it. Many of the aircraft in 1914 were of "pusher" layout. This is the same configuration that the Wright brothers used, where the propeller faced backwards and pushed the aircraft forward.

The alternative layout where the propeller faces forwards and pulls the aircraft, was called a "tractor" design. It provided better performance, but in 1914 visibility was deemed more important than speed. **World War One marked the end of pusher aircraft.**

Another technology that scarcely survived the war was the rotary engine. In this type of engine the pistons were arranged in a circle around the crankshaft. When the engine ran, the crankshaft itself remained stationary while the pistons rotated around it. The propeller was fixed to the pistons and so rotated with them. Rotary engines were air cooled, and thus very light. They provided an excellent power-to-weight ratio, but they could not provide the same

power that the heavier in-line water cooled engines could. Although they remained in use throughout the war, by 1918 Sopwith remained the last major manufacturer still using them.

The rapid pace of technological innovation was matched by a rapid change in the uses to which aircraft were put. **If in 1914 there were few generals who viewed aircraft as anything more than a tool for observation and reconnaissance (and many of them had great reservation even to that use) by the end of the war both sides were integrating aircraft as a key part of their planned strategies.**

While the plane did not play the decisive roll that it was to play in later conflicts, the First World War proved their capabilities. It was during this period that the key tasks that aircraft could perform were discovered, experimented with, and refined: observation and reconnaissance, tactical and strategic bombing, ground attack, and naval warfare. With the growing importance and influence of aircraft came the need to control the air, and thus the fighter was born.

One of the many innovations of World War I, aircraft **were first used for reconnaissance purposes and later as fighters and even bombers.** Consequently, this was the first war which involved a struggle for control of the air, which turned it into another battlefield, alongside the battlefields of the land and the sea. Yet given the early state of development of aircraft at the time, aerial combat missions played a relatively small part in determining the outcome of the war. It would take another world war before military aircraft would be used to their full potential.

The dawn of air combat

Aircraft were initially used as mobile observation vehicles with the responsibility of mapping enemy positions below. This was an improvement over previous observation vehicles such as the Zeppelin, which was too large and slow moving (and therefore an easy target) and the observation balloon, which had to be tethered to the ground and wasn't very mobile.

As Dickson predicted, both the Entente and Central powers first used aircraft only for observation purposes. When rival observation planes crossed paths, the aviators at first exchanged smiles and waves. This soon progressed to throwing bricks, grenades, and other objects, even rope, which they hoped would tangle the enemy plane's propeller. Eventually pilots began firing handheld firearms at enemy planes. Once the guns were mounted to the aircraft, the era of air combat began.

Problems mounting machine guns

Another major limitation was the early mounting of machine guns, which was awkward due to the position of the propeller. It would seem most natural to place the gun between the pilot and the propeller, so they would be able to aim down its sight as well as service it during a gun jam. However, this gun position presents an obvious problem - the bullets would fly directly into the propeller.

Frenchman Roland Garros attempted to solve this problem by attaching metal deflector wedges to the blades of his propeller, which he hoped would guide bullets away. Garros managed to score several kills with his deflector modification, yet it was still an inadequate and dangerous solution, as when Germany tried this, their steel-jacketed bullets shattered the wedges. The French Hotchkiss machine gun (as well as the Lewis gun) used by the Allies used more conventional copper- and brass-jacketed ammunition.

1915: The Fokker Scourge

In 1915, Anthony Fokker designed the synchronizer gear, which turned the tide of war in Germany's favor. This ingenious device mechanically linked the gun to the propeller, allowing it to fire between blades. This was first fitted in the spring of 1915 to the production prototypes of the Fokker *Eindekker*, known as the Fokker M.5K/MG, making it top-of-the-line in design, maneuverability (although the *Eindekker* used wing warping for roll control), and most importantly, gun placement. Leutnant Kurt Wintgens, on July 1, 1915, scored the earliest known victory for a synchronized gun-equipped fighter with his M.5K/MG over a two-seat Morane Saulnier Parasol near Luneville, France. The result was devastating for the Allied powers, and gave the Germans almost total control of the air. Soon Allied planes were forced to flee for home at the mere sight of German monoplanes. A solution was needed, and quickly.

April 1917: Bloody April

In April the Allies launched a joint offensive with the British attacking near Arras in Artois, northern France, while the French Nivelle Offensive was launched on the Aisne and the air forces were called on to provide support, predominantly in reconnaissance and artillery spotting.

However, the Germans were prepared for the offensive, and were equipped with the new Albatros D-III, "the best fighting scout on the Western Front" at the time.

The month became known as **Bloody April** by the Allied air forces. The Royal Flying Corps suffered losses so severe it came close to being annihilated. However, they managed to keep the German Air Force on the defensive, largely preventing them from using their planes on bombing or reconnaissance missions to assist their troops on the ground.

Shortly after "Bloody April", the Allies re-equipped their squadrons with new planes such as the Sopwith Pup, and SE5a which helped tip the balance back in their favor. The Germans responded with new fighters as well, such as the Fokker Dr.I but these were countered by the British Sopwith Camel and French SPAD S.XIII. As a result, neither side managed to take a clear technological advantage for the remainder of the war, but eventually the Allies would gain the advantage in numbers and material toward the end of the year.

Up to 1918: the final years of war

The final year of the war (1918) saw increasing shortages of supplies on the side of the Central Powers. Captured Allied planes were scrounged for every available material, even to the point of draining the lubricants from damaged engines just to keep one more German plane flyable. Manfred von Richthofen, the famed Red Baron credited with around 80 victories, was killed in April, possibly by an Australian anti-aircraft machinegunner (although Royal Air Force pilot Captain Arthur Roy Brown was officially credited), and the leadership of Jagdgeschwader 1 eventually passed to Hermann Göring, future head of Nazi Germany's Luftwaffe. Germany introduced the Fokker D.VII, both loved and loathed to the point that surrender of all surviving examples was specifically ordered by the victorious allies.

This year also saw the United States increasingly involved. While American volunteers had been flying in Allied squadrons since the early years of the war, it wasn't until 1918 when all-American squadrons begin patrolling the skies above the trenches. At first, the Americans were largely supplied with second-rate weapons and obsolete planes, such as the Nieuport 28. As American numbers grew, equipment improved, including the SPAD S.XIII, one of the best French planes in the war. By the end of World War I, four American aviators were awarded the Medal of Honor: Fighter pilots Eddie Rickenbacker and Frank Luke, along with recon pilot Harold Goettler and his observer, Erwin Beckley, a member of the Kansas Army

National Guard who had volunteered for aviation duty. Beckley was the first of only three National Guard aviators to be awarded the Medal of Honor during the 20th century.

Impact

By the war's end, the impact of air missions compared to the ground war was relatively small. This was partly due to its restricted funding and use, as it was, after all, a new technology. Some, such as General William Mitchell, claimed that "the only damage that has come to [Germany] has been through the air".

It took World War II for the rest of the world to be convinced of this. Finally, in 1946, Mitchell was posthumously awarded the Congressional Gold Medal of Honor, "in recognition of his outstanding pioneer service and foresight in the field of American military aviation".

(Sources: <http://www.firstworldwar.com/airwar/index.htm>
http://en.wikipedia.org/wiki/Aviation_in_World_War_I)

WAR AT SEA

Naval combat in World War I was mainly characterized by the efforts of the Allied Powers, with their larger fleets and surrounding position, to blockade the Central Powers by sea, and the efforts of the Central Powers to break that blockade or to establish an effective blockade of the United Kingdom and France with submarines and raiders.

Prelude

The naval arms race between Britain and Germany to build dreadnought battleships in the early twentieth century is the subject of a number of books. Germany's attempt to build a battleship fleet to match that of the United Kingdom, the dominant naval power on the nineteenth century and an island country that depended on seaborne trade for survival, is often listed as a major reason for the enmity between those two countries that led the UK to enter World War I. German leaders desired a navy in proportion to their military and economic strength that could free their overseas trade and colonial empire from dependence on Britain's good will, but such a fleet would inevitably threaten Britain's own trade and empire.

By the beginning of the war, the United Kingdom still had a significant naval lead over Germany, meeting a traditional British standard of having a navy larger than the second and third largest national navies combined. Germany nonetheless had an impressive fleet both of capital ships and submarines. Other nations had smaller fleets, generally with a lower proportion of battleships and a larger proportion of smaller ships like destroyers and submarines. France, Italy, Russia, Austria-Hungary, Japan, and the United States all had modern fleets with at least some dreadnoughts and submarines.

Naval technology

Naval technology in World War I was dominated by the battleship. Aviation was primarily focused on reconnaissance, with the aircraft carrier yet to be invented and bomber aircraft capable of lifting only relatively light loads. Battleships were built along the **Dreadnought** model, with several **large turrets of equally sized big guns**. **Radio** was in early use, with naval ships commonly equipped with **radio telegraph**, merchant ships less so. Radar was still unknown, and **sonar in its infancy** by the end of the war.

Submarines were increasingly in use, although they were limited compared to modern examples, in their ability to stay submerged for long periods. Submarines were generally more effective in attacking poorly defended merchant ships than in fighting surface warships, though several small to medium British warships were lost to torpedoes launched from U boats.

Naval mines were also increasingly well developed. Defensive mines along coasts made it much more difficult for capital ships to get close enough to conduct coastal bombardment or support attacks. The first battleship sinking in the war — that of HMS *Audacious* — was the result of her striking a naval mine on 27 October 1914. Suitably placed mines also served to restrict the freedom of movement of submarines.

Theaters

North Sea

The North Sea was the main theater of the war for surface action. The **British Grand Fleet** took position **against the German High Seas Fleet**. Britain's larger fleet could maintain a blockade of Germany, cutting it off from overseas trade and resources. Germany's fleet remained mostly in harbor behind their screen of mines, occasionally attempting to lure the British fleet into battle in the hopes of weakening them enough to break the blockade or allow the High Seas Fleet to attack British shipping and trade. Britain strove to maintain the blockade and, if possible, to damage the German fleet enough that British ships could be used elsewhere.

Major battles included the **Battle of Heligoland Bight**, the **Battle of the Dogger Bank**, the **Battle of Jutland**, and the **Second Battle of Heligoland Bight**. In general, Britain, though not always tactically successful, was able to maintain the blockade and keep the High Seas Fleet in port, although the High Seas Fleet remained a threat that kept the vast majority of Britain's capital ships in the North Sea.

The set-piece battles and maneuvering have drawn historians' attention but **it was the blockade of German commerce through the North Sea, which ultimately starved the German people and industries into seeking the Armistice of 1918.**

English Channel

Though little noticed, the naval campaign in the English Channel was of vital importance in permitting the maintenance of the British Army in France. Like the North Sea campaign, it consisted largely of maintaining minefields. In this case, the need was to exclude surface raiders but particularly submarines. The Admiralty was conscious of the submarine danger from the outset.

Atlantic

While Germany was greatly inconvenienced by Britain's blockade, Britain, as an island nation, was heavily dependent on foreign trade and imported resources. **Germany found that their submarines**, or U-boats, while of limited effectiveness against surface warships on their guard, **were greatly effective against merchant ships**, and could easily patrol the Atlantic even when Allied ships dominated the surface.

By 1915, Germany was attempting to use submarines to maintain a naval blockade of Britain by sinking cargo ships, including many passenger vessels. Submarines, however, depending on stealth and incapable of withstanding a direct attack by a surface ship (possibly a Q-ship disguised as a merchant ship), found it difficult to give warning before attacking or to rescue survivors, which meant that civilian death tolls were high. This was a major factor in galvanizing neutral opinion against the Central Powers, as countries like the United States

suffered casualties and loss to their trade, and was one of the causes of the eventual entry of the US into the war.

Over time, the **use of defended convoys of merchant ships allowed the Allies to maintain shipping across the Atlantic, in spite of heavy loss.** This was also assisted by the entry of the US into the war and the increasing use of primitive sonar and aerial patrolling to detect and track submarines.

Mediterranean

Some limited sea combat took place between the navies of Austria-Hungary and Germany and the Allied navies of France, Britain, Italy and Japan. The navy of the Ottoman Empire only sortied out of the Dardanelles once late in the war, preferring to focus its operations in the Black Sea.

The main fleet action was the Allied attempt to knock the Ottoman Empire out of the war by an attack on Constantinople in 1915. This attempt turned into the Battle of Gallipoli which was an Allied defeat.

For the rest of the war, **naval action consisted almost entirely in submarine combat by the Austrians and Germans and blockade duty by the Allies.**

Black Sea

The Black Sea was the domain of the Russians and the Ottoman Empire. The large Russian fleet was based in Sevastopol and it was led by two diligent commanders: Admiral Eberhart (1914-1916) and (1916-1917) Admiral Kolchak. The Ottoman fleet on the other hand was in a period of transition with many obsolete ships. It had been expecting to receive two powerful dreadnoughts fitting out in Britain, but the UK seized the completed *Reshadiye* and *Sultan Osman I* with the outbreak of war with Germany and incorporated them into the Royal Navy. The war in the Black Sea started when **the Ottoman Fleet bombarded several Russian cities in October 1914.** The most advanced ships in the Ottoman fleet consisted of two ships of the German Mediterranean Fleet: the powerful battlecruiser SMS *Goeben* and the speedy light cruiser SMS *Breslau*, both under the command of the skilled German Admiral Wilhelm Souchon. *Goeben* was a modern design, and with its well-drilled, crack crew, could easily outfight or outrun any single Russian ship in their fleet. However it was often outgunned by the superior numbers of its slower opponent and would be forced to flee when the Russian battleship fleet was able to unite in pursuit. A continual series of cat and mouse operations ensued for the first two years with both sides' admirals trying to capitalize on their particular tactical strengths in a surprise ambush. Numerous battles between the fleets were fought in the initial years and *Goeben* and Russian units were damaged on several occasions.

The Russian Black Sea fleet was mainly used to support General Yudenich in his Caucasus Campaign. However, the appearance of the *Goeben* could dramatically change the situation, so all activities, even shore bombardment, had to be conducted by almost the entire Russian Black Sea Fleet, since a smaller force could fall victim to the *Goeben's* speed and guns.

However by 1916, this situation had swung in the Russians favour - the *Goeben* had been in constant service for the past two years. Due to a lack of facilities, the ship was not able to enter refit and began to suffer chronic engine breakdowns. Meanwhile, the Russian Navy had received the modern dreadnought *Imperatritsa Mariya* which although slower, would be able to stand up to and outfight *Goeben*. Although the two ships skirmished briefly, neither managed to capitalize on their tactical advantage and the battles ended with *Goeben* fleeing and *Imperatritsa Mariya* gamely trying to pursue. However, the Russian ship's arrival severely curtailed *Goeben's* activities and so by this time, the Russian fleet had nearly complete control of the sea, exacerbated by the addition of another dreadnought, *Imperatritsa*

Ekaterina Velikaya. German and Turkish light forces would though continue to raid and harass Russian shipping until the war's end.

After Admiral Kolchak took command in August 1916, he planned to invigorate the Russian Black Seas Fleet with a series of aggressive actions. The Russian fleet mined the exit from the Bosphorus, preventing nearly all Ottoman ships from entering the Black Sea. Later that year, the naval approaches to Varna, Bulgaria were also mined. The greatest loss suffered by the Russian Black Sea fleet was the destruction of the dreadnought *Empress Maria*, which blew up in port on 7 October 1916, just one year after being commissioned. The subsequent investigation determined that the explosion was probably accidental, though sabotage could not be completely ruled out. The event shook Russian public opinion. The Russians continued work on two additional dreadnoughts under construction, and the balance of power remained in Russian hands until the collapse of Russian resistance in November 1917.

Baltic Sea

In the Baltic Sea, Germany and Russia were the main combatants, with a number of British submarines sailing through the Kattegat to assist the Russians. With the German fleet larger and more modern (many High Seas Fleet ships could easily be deployed to the Baltic when the North Sea was quiet), the Russians played a mainly defensive role, at most attacking convoys between Germany and Sweden.

A major coup for the Allied forces occurred on August 26, 1914 when as part of a reconnaissance squadron, the light cruiser SMS *Magdeburg* ran aground in heavy fog in the Gulf of Finland. The other German ships tried to refloat her, but decided to scuttle her instead when they became aware of an approaching Russian intercept force. **Russian Navy divers scoured the wreck and successfully recovered the German naval codebook which was later passed on to their British Allies and provided immeasurably to Allied success in the North Sea.**

With heavy defensive and offensive mining on both sides, fleets played a limited role in the Eastern Front. The Germans mounted major naval attacks on the Gulf of Riga, unsuccessfully in August 1915 and successfully in October 1917, when they occupied the islands in the Gulf and damaged Russian ships departing from the city of Riga, recently captured by Germany. This second operation culminated in the on major Baltic action, the battle of Moon Sound at which the Russian battleship *Slava* was sunk.

By March 1918, the Russian Revolution and the Treaty of Brest-Litovsk made the Baltic a German lake, and German fleets transferred troops to support newly independent Finland and to occupy much of Russia, halting only when defeated in the West.

Distant Oceans

A number of German ships stationed overseas at the start of the war engaged in raiding operations in poorly defended seas, such as the SMS *Emden*, which raided into the Indian Ocean, sinking or capturing thirty Allied merchant ships and warships, bombarding Madras and Penang, and destroying a radio relay on the Cocos Islands before being sunk there. Better known was the flotilla of Admiral Graf Maximilian von Spee, who sailed across the Pacific, winning the Battle of Coronel before being defeated and destroyed at the Battle of the Falkland Islands.

Allied naval forces captured many of the isolated German colonies, with Samoa, Micronesia, Qingdao, German New Guinea, Togo, and Cameroon falling in the first year of the war. Only German East Africa held out in a long guerrilla land campaign.

WAR AT SEA

SHIPS:

New battleships – Dreadnoughts (1906)
Q-ships (armed merchant ships)
Fueling ships – coal/oil (moveable docks + fueling stations)
Submarines
Flat Deck Carriers – Air Carriers

TACTICS

Blockade (surface / minefields)
Blockade (submarines)
Convoy (defend the merchant ships)

TECHNOLOGY

Radio telegraph (“Sparky”)
Rangefinders (There were two basic methods: coincidence rangefinders and stereoscopic rangefinders. Coincidence rangefinders displayed two separate images in the eyepiece that could be adjusted; when the two images were aligned, the range could be calculated. Stereoscopic rangefinders also used the separate parallax images but added a visual mark to each image; when the marks coincided, the range could be calculated.)

WEAPON

Mines
Torpedo
Torpedo nets
Depth Charges

AIRSHIPS / AIRPLANES AT SEA

Airships (Zeppelins)
Airplanes
Sea Planes
Torpedo Bomber

WAR IN THE AIR

TACTICS

1. Reconnaissance (Scouting)
2. Fighters
3. Bombers