Anti- aircraft flak slang

Princeton is a WordNetflak catcher, flak, flack catcher, flack (noun) slick speaker who can turn any criticism in favor of his employerfire, attack, flak, flack, blast (noun) intense unfavorable criticism of Clinton directing his fire at the Republican Party; the government has become the subject of an attack; They don't give me any flakantiplane, anti-aircraft guns, flak, flack, pom-pom, ack-ack, ack-ack gun (noun) artillery designed to fire up on aircraftWiktionaryflak (Noun) Ground-based anti-aircraft guns firing explosive grenades. Etymology: abbreviation Fliegerabwehrkanone. He first testified in 1938 as an anti-aircraft gun, 1940s anti-aircraft fire. The sense of unfavorable criticism has been at evidence since 1963 in the American English.flak Anti-aircraft shell fire. Etymology: abbreviation Fliegerabwehrkanone. He first testified in 1938 as an anti-aircraft gun, 1940s anti-aircraft fire. The feeling of unfavorable criticism has been witnessed since 1963 in American English.flak (Noun)Unfavorable criticism. Etymology: abbreviation Fliegerabwehrkanone. He first testified in 1938 as an anti-aircraft gun, 1940s anti-aircraft fire. A sense of unfavorable criticism has been confirmed since 1963 by an American English.flak Public-Relations spokesman. Etymology: abbreviation Fliegerabwehrkanone. He first testified in 1938 as an anti-aircraft gun, 1940s anti-aircraft fire. A sense of unfavorable criticism has been at evidence since 1963 in American English.Suggested ResourcesflakSong lyrics flak – Explore the wide range of song lyrics performed by flak on the Lyrics.com. FLAK What does FLAK mean? - Explore the different meanings of flak on the Abbreviations.com website. How to pronounce FLAK? How to say FLAK in sign language? NumerologyChaldean NumerologyThe numerical value of FLAK in Chaldean Numerology is: 5Pythagorean NumerologyThe numerical value of FLAK in Pythagorean Numerology is: 3Examples flak in SentenceIvan Briscoe: It does not show that there is a permanent transition to the right, both right and left take flak from citizens. Russ Snell: When flak came in and you heard it, you wanted to get out of that plane, it was like celebrating outside. That's why you like to jump. When those planes go down, that's all. But when you jump, you still have a chance. Seth Meyers: This is scary, she's wearing army gear because it's a USO tour, but frankly, who could blame women if they started wearing military clothing whenever they're around men? Where are you going in your helmet and bulletproof jacket? Metro. '. Randy Bowling: We have mixed emotions, we have caught a lot of flak from our friends who are on the fence. Matt Damon: When Matt Damon seen Harvey Weinstein and Al Franken taking pictures putting Harvey Weinstein and Al Franken's hands on that woman's flak jacket and mugging for the camera... That's like a terrible joke, and it's not funny. It's bad, and he shouldn't have done it, but when you talk about Harvey Weinstein and what Harvey Weinstein is accused of, there are no photos, Harvey Weinstein knew that Weinstein was useless. There are no witnesses. There are no pictures. There's no braggadocio. Those things happened secretly because it was criminal and he knew it. So they don't fall into the same category. Images & Illustrations of FLAK FlugzeugabwehrkanoneGermanwoordvoerder, luchtafweergranaten, afbrekende kritiek, luchtafweergeschutDutchзенитка, перекрёстный огонь, зенитное орудиеRussian - Select - 简体中文 (Chinese - Simplified) 繁體中文 (Chinese - Traditional) Español (Spanish) Esperanto (Esperanto) 日本語 (Japanese) Português (Portuguese) Deutsch (German) العربية (Arabic) Français (French) Русский (Russian) ಕನ್ನಡ (Kannada) 한국어 (Korean) עברית (Hebrew) Gaeilge (Irish) Українська (Ukrainian) اردو (Urdu) Magyar (Hungarian) मानक हिन्दी (Hindi) Indonesia (Indonesian) Italiano (Italian) தமிழ் (Tamil) Türkçe (Turkish) తెలుగు (Telugu) ภาษาไทย (Thai) Tiếng Việt (Vietnamese) Čeština (Czech) Polski (Polish) Bahasa Indonesia (Indonesian) Românește (Romanian) Nederlands (Dutch) Ελληνικκ (Greek) Latinum (Latin) Svenska (Swedish) Dansk (Danish) Suomi (Finnish) اللی (Farsi) 啦 (Yiddish) հայերեն (Armenian) Norsk (Norwegian) English (English) Thanks for your vote! We really appreciate your support. Consider this sentence: The author caught flack for flacking his memoir, where he wasn't welcome, so his flack issued an apology in a press release. This phrase demonstrates three common uses of flack: noun means critique verb means to provide publicity for the noun means an agent who gives publicity for something 'Flack' comes from the German word 'Fliegerabwehrkanonen.' Pilots under fire must have had a shorter word. When you hear someone catching a flack, you hear a figurative extension of the term used for anti-aircraft guns, or for shells fired from them. This term, more commonly spelled flak, stands for Fliegerabwehrkanonen, from German words for flyer, defense, and cannon. In World War II, to catch the flak literally wanted to be damaged by gunshots: As soon as Guttenberger pulled out of launching his torpedo on the Yamato port beam, Duffy unpluged his harness and picked up a look. At that point, the plane caught flak and the impact pounded Duffy's head into the canopy. - David Sears, At War with the Wind, 2008 Figurative use of flak to mean criticism came about in the 1960s. For many years it kept the same spelling as guns, with flack emerging as a common variant in the later decades of the twentieth century. The use of flack to refer to a publicity agent dates back to the 1930s, and there are many apocryphal stories around its origins, including one attributed to the word by a Hollywood columnist named Gene Flack. The dictionary lists the origin of the word as unknown. In 1970, the writer Tom Wolfe (The Bonfire of the Mortility) published Mau-mauing Flak Catchers, an essay depicting intimidation tactics leveled against government workers run by the San Francisco Office of Economic Opportunity. uses the term flak catcher to refer to low-level workers caught amid corrupt action leveled against the city's anti-poverty programs: And then it dawns on you, and you wonder why it took so long for you to realize it. This man is a catcher. His job is to catch the flak for the No 1 man - Tom Wolfe, Mau-mauing Flak Catchers, the 1970s Wolfe use of the term was more or less in line with the established use of figurative flak. But the flak catcher would eventually take on a life of his own, bleeding into the publicity sense of flack. Wolfe's use likely gave confidence to the belief in the relationship between the critic's sense of flak and the publicity sense of flack, to see how to catch a flak for another is to absorb criticism directed at another so that the person doesn't look bad in the public eye. OED now defines a flak-catcher as one who engages in and demiss unfavorable or hostile commentary, questions, etc., in order to protect a person or institution from adverse publicity. This might partly explain why we now see an overlap between flak and flack. For most, flak remains the spelling used for shooting, with flack as a casual option that appears a little more often when you refer to criticism. For publicist/publicity senses, while flack has long been the preferred spelling, flak has appeared increasingly over the past decade. So, while you should be wrong about the flack side, if you're writing a report on military action, flak isn't technically a typo. Certainly not the one that you should catch a flack for. Measures to combat enemy air forces Flak will be redirected here. For more uses, see flak (disambiguation). Anti-aircraft redirects here. For arcade games, see Anti-Aircraft (video game). Ack ack redirects here. For other uses, see Ack Ack. A Swedish Bofors 40mm anti-aircraft gun mounted overlooking a beach in Algeria, manned by the United States anti-aircraft artillery crew. (1943) Part of a series about the war time history of prehistoar ancient Post-Classical early modern Late Modern Industrial Fourth-Gen Battlespace Air Space Land Cold-region Desert Jungle Mountain Urban Sea Amphibious Blue Brown Green Surface Underwater Cyber Information Weapons Armor Artillery Artillery Firing Biological Camouflage Cavalry Chemical Class Combined Weapons Conventional Cyber Denial Misinformation Drone Electronic Infantry Lawfare Loitering Music Nuclear Unconventional Psychological Refugees TacticsList Military Tactics Antenna Battle Cavalry Charge Counterattack Counter-Insurgency Cover Defeat in Detail Foxhole Guerrilla Morality Rapid Dominance Siege Swarming Tactical Goal Saturation Trench Download Operational Blitzkrieg Expedition Deep Operations Maneuver Operational Maneuver Group StrategyList Military Strategies and Concepts Wear Counter-Offensive Climax Defense In Depth Fabian Mosaic Scam Defensive Depth Target Naval Offensive Burned Land Grand Strategy Restrictions Economic Limited Political Religious Strategic Technology Theater Total War Administrative Branch Policy Staff Training Service Sociology Organization Chain of Command Command and Control Doctrines Engineers Intelligence Ranks Technology and Equipment Personnel Recruitment Recruitment Conscription Recruit training Military Specialization Women in Military Transgender People and Military Service Sexual Harassment in military conscientious objections Counter recruitment Logistics Military-industrial complex arms industry Materiel Supply chain management Science Power projection Loss of power Gradient law court-justice combat Perfid Martialy law war crime Theory air domination Full-spectrum dominance Overmatch Related Asymmetric Wars Broken-Backed Cold War Theory Demilitarization Deterrence Theory Horses in War Irregular War Mercenary Military Campaign Military Operation Network-Centric War Operations Research Principle War Proxy War Security Dilemma Tripwire Force War Movie War Game War Game war novel War Sexual Violence Women in World War II Colonial War Endemic War Lanchester Laws Lists Battles Military Occupation Military Tactics Operations Siege War Crimes Wars weapons writers vte Anti-aircraft warfare or air defense is a combat response to an air war defined by NATO as all measures designed to cancel or reduce the effectiveness of hostilities. [1] Includes surface, sub-surface (launched submarines) and air weapon systems, associated sensor systems, command and control equipment and passive measures (e.g. balloons). It may be used to protect the maritime, land and air forces at any location. For most countries, however, the main effort tended to be the defense of the homeland. NATO refers to air-to-air and naval missile defences as missile warfare. Missile defence is an extension of missile defence, as well as initiatives to adapt missile defence to the task of intercepting any projectile in flight. In some countries, such as Britain and Germany during World War II, the Soviet Union and modern NATO and the United States, ground-based aircraft against anti-air and anti-air defences were under integrated command and control. While total counter-defense may be for internal defense (including military equipment), forces in the area, wherever they are, always deploy their own counter-defense capabilities if there is an air threat. On-the-face defences on the surface, the ability of the opposite direction can also be deployed offensively to deny opponents the use of airspace. Until 1950, weapons firing ballistic munitions ranging from 7.62 mm to 152.4 mm were standard weapons; missiles then became dominant, with the exception of the shortest ranges (as with nearby weapon systems, which usually use rotary autocannons or in very air-to-air missile modification systems, often combined in a single system with rotary cannons). Terminology Terminology The term anti-air defence was probably first used by Britain when the British Anti-Air Defence (ADGB) was created in 1925 as the command of the Royal Air Force. However, the measures in the UK were also called aircraft anti-aircraft, abbreviated AA, a term that remained in general use until the 1950s last year. After The First World War it was sometimes the prefix 'Light' or 'Heavy' (LAA or HAA) to classify the type of weapon or unit. Nicknames for anti-aircraft weapons include AA, AAA or triple-A, short for anti-aircraft artillery; ack-ack (from the spelling alphabet used by the British for AA voice transmission); [2] and Archie (the First World War British term probably coined by Amyas Borton, and believed to come through the Royal Flying Corps, from music hall comedian George Robey's line Archibald, certainly not! [3]). NATO defines anti-fire warfare (AAW) as measures taken to defend naval forces against attacks by air weapons launched from aircraft, ships, submarines and land posts. [1] In some armies, the term All-Arms Air Defence (AAAD) is used for missile defence by non-specialist units. Among other concepts from the late 20th century, the european Parliament and the Council 2000 on the european Fire-fighting missiles are variously called surface-to-air missiles, abbreviated and pronounced SAM and Surface to Air Guided Weapon (SAGW). Examples are Raytheon Standard Missile 2, Raytheon Standard Missile 6, or MBDA Aster Missile. Non-conservative terms of air defence include German flak (FliegerabwehrKanone, aircraft defense cannon,[4] also cited as Flugabwehrkanone), whence English flak, and the Russian term Protivovozdushnaya oborona (Cyrillic: Противовоздуная обородона), a literal translation of air defense, abbreviated PVO. [5] In Russian, AA systems are called zenitnye (i.e. pointing to zenith) systems (weapons, missiles, etc.). In French, anti-air defence is called DCA (Défense contre les aéronefs, aéronef is a generic term for all types of air equipment (aeroplane, airship, balloon, rocket, rocket, etc.). [6] The maximum distance at which a weapon or missile can engage an aircraft is important. However, many different definitions are used, but if the same definition is used, the performance of different weapons or missiles cannot be compared. For AA weapons only the ascending part of the trajectory can be usefully used. One term is the ceiling, the maximum ceiling is the height of the projectile would reach, if fired vertically, is not practically useful in itself as several AA weapons are able to shoot vertically, and the maximum duration of the fuse may be too short, but potentially useful as a standard for comparing different weapons. The British have adopted an effective ceiling, which means the altitude at which a weapon could deliver a series of rounds against a moving target; It could be limited by maximum fuse operating time as well as weapon capabilities. Until late The British definition was that altitude at which a directly approaching target at 400 mph (=643.6 km/h) can engage 20 seconds before the weapon reaches 70 degree altitude. [7] The effective ceiling for AA heavy weapons was influenced by non-ballistic factors: The maximum fuse running time, which set the maximum usable flight time. Ability of fire control devices to determine the target height over long range. The accuracy of the cyclic fire speed, the length of the fuse had to be calculated and determined where the target would have been at the time of the flight after the shooting, so that it was known exactly when the round would shoot. A general description of the essence of air defense is to detect enemy aircraft and destroy them. A critical issue is to hit a target moving in a three-dimensional space; the attack must not only match these three coordinates, but must do so at a time when the target is in this position. This means that projectiles must either be guided to hit the target or aim at the intended position of the target at the time the projectile reaches, taking into account the speed and direction of both the target and the projectile. In the 19th century, counter-current defence was one of the fastest-growing areas of military technology that responded to aircraft development and used various enabling technologies, in particular radar, missiles and computing (originally electromechanical analogue computing since the 1930s, as is the case with the devices described below). The development of fire defences concerned areas of sensors and technical fire control, weapons and command and control. At the beginning of the 20th century, The New Year's Initially, the sensors were optical and acoustic devices developed during World War II and continued into the 1930s,[8] but were quickly replaced by radar, which was subsequently supplemented by optonics in the 1980s. Command and control remained primitive until the late 1930s, when Britain created an integrated system[9] for the ADGB, which combined the AA army command's ground-based anti-water defences, although field-based counter-defences relied on less sophisticated measures. NATO later called these measures a ground-based anti-air defence environment, defined as a network of ground radar sites and command and control centres within a specific location of operations used for tactical control of counter-defence operations. [1] Rules of engagement are crucial to avoid the involvement of friendly or neutral anti-air defence aircraft. Their use is helped, but does not keep IFF (identification of friend or enemy) electronic devices originally introduced during World War II. While these rules originate from the highest authority, different rules may apply to different types of anti-air defence covering the same area at the same time. AAAD usually operates according to the narrowest rules. NATO calls these rules arms control orders (WCO) are: weapons are free: weapons can be fired at any recognised as friendly. Weapons Tight: Weapons can only be fired at targets recognized as enemy. Possession of weapons: weapons can only be fired in self-defense or in response to a formal order. [1] Until the 1950s, weapons firing ballistic munitions were standard weapons; missiles then became dominant, except for the shortest ranges. However, the type of shell or warhead and its fuzing and with the rocket's guidance arrangement, were and are different. Goals are not always easy to destroy; however, damaged aircraft may be forced to interrupt their mission and, even if they manage to return and land in friendly territory, they may be out of business for several days or permanently. Ignoring small arms and smaller machine guns, ground anti-air defence weapons ranged in calibre from 20 mm to at least 152 mm.[10] Ground counter-defense is deployed in several ways: self-defense of ground forces using their organic weapons, AAAD. Accompanying defense, special defense elements of assistance accompanying armored or infant service units. Point defense around a key target, such as a bridge, a critical government building or a ship. She was a counter-adistent defense, typically belting a counter-vent defense to provide a barrier, but sometimes an umbrella covering the area. Areas can vary greatly in size. They may extend along the national border, e.g. in ground operations, counter-air defence areas may be used by offensive rapid movement through the current transit routes of aircraft. Counter-defence also included other elements, although after The Second World War most came into use: tethered balloons to deter and endanger aircraft flying below balloon altitude, where they are prone to damaging collisions with steel straps. Headlights to illuminate aircraft at night for gun-layer and optical device operators. During The Second World War, the spotlights became radar-controlled. Large smoke screens created by large smoke canisters on the ground to screen targets and prevent precision weapons targeted by aircraft. Passive air defence is defined by NATO as passive measures taken for the physical defence and protection of personnel, essential equipment and equipment in order to minimise the effectiveness of an air and/or missile attack. [1] It remains an important activity of ground forces and includes camouflage and concealment to prevent detection by reconnaissance and attacks on aircraft. Measures such as the camouflage of important buildings were common place in The Second World War. During the Cold War, the runways and taxiways of some airports were painted green. Organisation While the Navy is usually responsible for its own counter-defence, at least for ships at sea, organisational measures for land-based counter-defence vary from country to country and over time. The most extreme case was the Soviet Union, and this model can still be observed in some countries: it was service, on the same level as the army, navy, or air force. In the Soviet Union, it was called the Voyska NCA, and had both fighter jets, separate from the air force, and ground systems. This was divided into two arms, the NCA Party, the Strategic Counter-Air Defence Service responsible for the anti-air defence of the homeland, which was created in 1941 and became an independent service in 1954, and the NCA SV, the anti-air defence of ground forces. They subsequently became part of the Air Force and ground forces. [11] [12] On the other hand, the United States military has an air defense artillery branch that provides ground air defense for both the homeland and the military in the area, but is operationally under the commander of the Joint Forces Air Force Components. Many other nations also deploy anti-vassally defense branches in the military. Other nations, such as Japan or Israel, choose to integrate their ground-based anti-air defence systems into their air forces. In Britain and some other armies, the only artillery branch is responsible for both domestic and overseas land defences, although in World War I there was a shared responsibility towards the Royal Navy for the anti-air defences of the British Isles. During The Second World War, however, an RAF regiment was created to protect airports everywhere, which included light anti-air defences. In the later decades of the Cold War, this included US Air Force operational bases in the UK. However, all ground counter-defence was withdrawn from the jurisdiction of the Royal Air Force (RAF) in 2004. The British Army's anti-fire command was disbanded in March 1955,[13], but in the 1960s and 1990s it was the first to be re-arrested. During The Second World War, the Royal Marines also provided anti-air defence units; formally part of an organisation for the protection of mobile naval bases, treated as an integral part of the military-launched ground counter-air defences. The base missile defence unit is usually a battery with 2 to 12 weapons or missile launchers and fire-fighting elements. These batteries, especially with weapons, are usually deployed in a small area, although the batteries can be split; this is customary for some rocket systems. SHORAD rocket batteries are often deployed in an area with individual launchers several kilometres apart. When manpads are operated by experts, batteries can have several dozen teams deployed separately in small sections; self-propeasing anti-air defence weapons may be deployed in pairs. Batteries are usually grouped into battalion or equivalents. In a field army, a light pistol or SHORAD battalion is often assigned to a maneuvering division. Heavier long-range weapons and missiles can be in anti-air defence brigades and can be under command or senior command. The homeland's anti-vouching defenses can have a full military structure. The ADGB included, for example, the UK's anti-ship command, which was commanded by a General of the British Army. At its peak from 1941 to 1942 it consisted of three AA choirs with 12 AA between them. [14] [14] The first use of balloons by the U.S. military during the U.S. Civil War prompted the Confederacy to develop methods to combat them. These included the use of artillery, small arms and saboteurs. They were unsuccessful, but internal politics led the Balloon Corps of the United States Army to be dissolved in the middle of the war. Confederates experimented with balloons as well. The Turks carried out the first ever anti-car aircraft operation in history during the Italo-Turkish War. Although they lacked anti-aircraft guns, they were the first to shoot down the plane by firing a rifle. The first aircraft that crashed in the war was lieutenant Piero Manzini's aircraft, shot down on 25.[16] [17] The first known use of weapons specially made for a missile role occurred during the Franco-Prussian War of 1870. After the disaster in Saloon, Paris was besieged and French soldiers outside the city began attempting to communicate through a balloon. Gustav Krupp mounted a modified 1-pounder (37mm) handgun - ballonabwehrkanone (Balloon Defensive Cannon) or BaK - on top of a horse-drawn carriage in order to shoot down these balloons. [18] [page needed] Ballonabwehrkanone krupp Ballonabwehrkanone krupp Ballonabwehrkanone on prussian corvette Nymphe 1872. 20 mm Becker-Oerlikon Model 1917 AA-Gun Until the beginning of the 20th century. Various types of ammunition, highly explosive, incendiary, bullet-chains, rod bullets and shrapnel have been designed. The need for some form of hitchhiker or smoke trail has been formulated. Fuzing options, both impact and time types, were also explored. Installations were generally base type, but could be on field platforms. The trials were conducted in most countries of Europe, but until 1910 only Krupp, Erhardt, Vickers Maxim and Schneider were published. Krupp's designs included modifications to their 65mm 9-pounder, 75mm 12-pounder, and even a 105mm gun. Erhardt also had a 12-pounder, while Vickers Maxim offered 3-pounder and Schneider 47mm. A French balloon gun appeared in 1910, it was an 11-pounder, but mounted on a vehicle, with a total weight without a screed of 2 tons. However, because the balloons were slowly moving, the sights were simple. However, the challenges of moving aircraft more quickly have been recognised. [19] Until 1913, only France and Germany had developed field weapons suitable for the involvement of balloons and aircraft and dealt with issues of military organisation. The British Royal Navy would soon introduce QF 3-inch and QF 4-inch AA weapons and also had vickers 1-pounder rapid firing pom-pom that could be used in various assembl assemblers. [20] [21] The first U.S. anti-aircraft cannon was a 1-pounder concept design by Admiral Twining in 1911 to meet the perceived threat of airships, which eventually was used as the basis for the U.S. Navy's first operational anti-aircraft cannon: a 3/23 caliber handgun. [22] First World War 1909 vintage Krupp 9-pounder anti-aircraft gun Canadian unit from 1918 taking the post French anti-aircraft motor battery (motorized AAA battery) that brought down the Zeppelin near Paris. From Horseless Age magazine, 1916. 30 September 1915, serbian army troops spotted three enemy aircraft approaching Kragujevac. Soldiers shot at them with shotguns and machine guns, but failed to prevent them from dropping 45 bombs over the city, hitting military facilities, a railway station and many other, mostly civilian, targets in the city. During the bombing raid, soldier Radoje Ljutovac fired his cannon at an enemy plane and successfully shot down one. He collapsed in the city and both pilots died from their injuries. The Ljutovac cannons used were not designed as an anti-aircraft weapon; it was a slightly modified Turkish cannon captured during the first Balkan war in 1912. This was the first time in military history that a military aircraft had been shot down by ground fire. [23] [24] [25] The British recognised the need for anti-aircraft capability a few weeks before the outbreak of The First World War; On July 8, 1914, the New York Times reported that the British government had decided to dot the Coast of the British Isles with a series of towers, each armed with two special design sprinklers, while a full circle of towers was to be built around naval facilities and other particularly vulnerable locations. By December 1914 the Royal Naval Volunteer Reserve (RNVR) crew of AA weapons and reflectors had been assembled from various sources in some nine ports. The Royal Garrison Artillery (RGA) has been given responsibility for defending the AA in the area, using a motorized two-gun section. The first was officially established in November 1914. Initially they used QF 1-pounder pom-pom (37mm version of Maxim Gun). [21] [26] Anti-aircraft machine gun Maxim. All armies soon deployed AA weapons often based on their smaller array of pieces, especially the French 75mm and Russian 76.2mm, usually simply leaning on some embankment to get the muzzle spiked into the sky. The British Army adopted a 13-pounder quickly to produce new brackets suitable for use AA, 13-pdr QF 6 cwt Mk III was released in 1915. It remained in service throughout the war, but the 18-pdr guns were lined up to provide a 13-pdr shell with a larger cartridge producing 13-pr QF 9 cwt and these proved much more satisfactory. [27] In general, however, these ad hoc solutions have proved largely unnecessary. With little experience in the role, no means of measuring the target, range, height or speed of difficulty observing their shell bursts in relation to the target shooters has proven to be able to get their fuse settings correct and most rounds burst well below their targets. The exception to this rule was the weapons protecting the spotting of balloons, in which case the altitude could be accurately measured from the length of the cable holding the balloon. The first problem was ammunition. Before the war, it was acknowledged that the munitions needed to explode Both high explosive (HE) and shrapnel were used, mostly first. Airburst fuses were either igniferious (based on a burning fuse) or mechanical (watch). Igniferious fuses were not suitable for anti-aircraft use. The length of the fuse was determined by the flight time, but the burning rate of gunpowder was affected by altitude. British pom-poms only had contact-muated ammunition. Zeppelins, being hydrogen-filled balloons, were targets for incendiary shells and the British presented these with airburst fuses, both shrapnel-type forward projections of incendiary 'pot' and basic ejection of incendiary current. Britons also mounted indicators on their shells for use at night. Smoke shells were also available for some AA weapons, these explosions were used as targets during training. [28] German air strikes on the British Isles increased in 1915 and the AA effort was considered somewhat ineffective, so an expert on royal navy firing, Admiral Sir Percy Scott, was appointed to improve, in particular, the integrated AA defence for London. The anti-admination defense has been expanded with multiple RNVR AA weapons, 75mm and 3-inch, pom-poms being ineffective. The Navy 3-inch was also adopted by the Army, the QF 3-inch 20 cwt (76 mm), a new field assembly was introduced in 1916. Since most of the attacks were at night, reflectors were soon used, and acoustic methods of detection and localization were developed. By December 1916 there were 183 sections of the AA defending Britain (most with 3-inch), 74 with BEF in France and 10 in the Middle East. [29] AA gunnery was a tough business. The problem was the successful focus of the shell on the rupture near the future position of its target, with various factors influencing the predicted trajectory of the clams. It was called a scathing gun-laying, 'off-set' angles for range and altitude were set at gunsight and updated as their target moved. In this method, when the sights were on target, the barrel was aimed at the target of the future position. Range and height of the target specified fuse length. The difficulties increased as the performance of the aircraft improved. The British first looked at measuring the range when it became realised that scale was the key to creating a better fuse setting. This led to a height/range finder (HRF), the first model being the Barr & Stroud UB2, a 2-metre optical identical front mounted on a tripod. It measured the distance to the target and the angle of altitude, which together indicated the height of the aircraft. These were complex tools and various other methods were also used. The HRF was soon joined by a height/fuse indicator (HFI), marked with altitude angles and height lines covered by fuse length curves, and the necessary fuse length could be read using the height reported by the HRF operator. [30] However, the problem of setting the vying – the shutdown target – required knowing the speed of the change in the position of the target. Both France and the United Kingdom have put in place tachymetric devices to monitor and produce vertical and horizontal angles of anging. The French Brocq system was electric, the operator entered the target range and had displays on the weapons; it was used with their 75mm. British Wilson-Dalby gun director used a pair of trackers and mechanical tachymetry; the operator has entered the length of the fuse and the deflection angles have been subtract from the instruments. [31] [32] By the beginning of World War II, 77mm had become a standard German weapon, and came mounted on a large traverse that could easily be picked up on a car for movement. Krupp's 75mm weapons were supplied with an optical observation system that improved their capabilities. The German army also adapted the revolving arteil, which was known to Allied aviators as burning onions from clams during the flight. The weapon had five barrels that quickly triggered a series of 37mm artillery shells. [citation needed] As planes began to be used against ground targets on the battlefield, AA weapons could not be passed quickly enough to nearby targets, and relatively few were always in the right place (and were often unpopular with other soldiers), so changed positions frequently. Soon the forces were adding various machine gun-based weapons mounted on the poles. These short-range weapons have proved more lethal and it is believed that the Red Baron was shot down against the Vickers aircraft by machine guns. When the war was over, it became clear that increasing aircraft capacity would require better resources to achieve the targets and their targets. Nevertheless, a model was established: an anti-fire war would use heavy weapons to attack high-altitude targets and lighter weapons to use when aircraft arrived at lower altitudes. The No.1 Mark III Predictor, which was used with the QF 3.7-inch AA Gun Shooting with an anti-aircraft gun in Sweden's 1934 Interwar Years of World War I showed that aircraft could be an important part of the battlefield, but in some countries it was the prospect of a strategic air strike that was a major challenge posing both a threat and an opportunity. The experience of four years of air strikes by the Zeppelins and Gotha G.V bombers on London has particularly affected the British and has been one of, if not the main driver, of the creation of an independent air force. As the capabilities of aircraft and their engines improved, it was clear that their role in the next war would be even more critical as their range and weapons load grew. In the years immediately after The Second World War, however, the prospects for another major war seemed remote, especially in Europe, where nations were most militarily capable, and little funding was available. Four years of war have seen the creation of a new and technically demanding branch of military activity. The anti-suuch defence has made huge strides, though from a very low starting point. But they were new and often lacked influential friends in the competition for a share of limited defence budgets. Demobilisation meant that most AA weapons were taken services, so only the most modern. However, lessons had to be learned from this. Especially Britons who had AA guns in most theatres in action in broad daylight and used them against nighttime attacks at home. In addition, during the war they also created an anti-aircraft experimental section and accumulated a large amount of data, which was subjected to extensive analysis. As a result, they published a two-component textbook of anti-missile shooters between 1924 and 1925. It contained five key recommendations for HAA equipment: enhanced ballistic-shaped shells with HE fillers and mechanical time fuses. Higher fire rate with the help of automation. Height using remote optical devices. Centralized fire control at each position of the gun, directed by tachymetric devices containing equipment for the use of moment corrections for meteorological and wear factors. More accurate sound-placement for the direction of the reflectors and provide plots for firing fire. Two assumptions supported the British approach to haa fire; First, targeted fire was the primary method, and it was allowed by predicting gun data from visual target tracking and having its height. Second, that goal would maintain a steady course, speed and height. This HAA was supposed to engage targets up to 24,000 feet. Mechanical, unlike igniferous, time fuses were needed because the rate of combustion of the powder varied with height, so the length of the fuse was not an easy function of flight time. Automated fire ensured a constant fire rate, which facilitated the prediction of where each shell should be individually targeted. [33] [34] In 1925, the British adopted a new instrument developed by Vickers. It was a mechanical analog computer Predictor AA No. 1. Due to the target height, its operators tracked the target and the predictor produced bearing, quadrant height and fuse adjustment. These were passed electrically to the weapon, where they were displayed on repeater dials into layers who 'matched indicators' (target data and weapon actual data) to lay the weapons. This system of repeater electrical dials built on measures introduced by the British coast artillery in the 1880s, and the coastline artillery was against the backdrop of many AA officers. Similar systems were adopted in other countries and, for example, the later Sperry device, designated M3A3 in the USA, was also used by Britain as Predictor AA No 2. High-rise finders have also accelerated, in Britain World War I Barr & Stroud UB 2 (7-foot optical base) was replaced by UB 7 (9-foot optical base) and UB 10 (18-foot optical base, used only in static places AA). Goertz in Germany and Levallois in France produced 5-meter devices. However, in most countries the main effort in HAA weapons until the mid-1930s was to improve existing ones, although various new designs were on the drawing board. [34] [35] Since the early 1930s, eight countries have developed radar; this development was until the end of the thirties last year development work on sound localisation acoustic devices to be generally stopped, although the equipment has been maintained. In addition, in Britain, a volunteer observation corps set up in 1925 provided a network of observation points to manage enemy aircraft flying over Britain. Initially, radar was used to surveillance airspace to detect approaching enemy aircraft. However, the German Würzburg radar was able to provide data suitable for controlling AA weapons, and British AA 1 Mk 1 GL radar was designed to be used for AA weapons positions. [36] The Treaty of Versailles prevented Germany from having AA weapons and, for example, Krupps designers joined Bofors in Sweden. Some weapons from World War II were preserved and some concealed AA training began in the late 1920s. Germany introduced 8.8 cm FlaK 18 in 1933, 36 and 37 models followed with various improvements, but ballistic performance did not change. In the late 1930s 10.5 cm FlaK 38 appeared, soon followed by 39; this was mainly designed for static locations, but had mobile mounting, and the unit had 220 V 24 kW generators. In 1938 the design began at 12.8 cm FlaK. [37] [38] The USSR introduced the new 76 mm M1931 in the early 1930s and 85 mm M1938 towards the end of the decade. [39] Britain successfully tested a new HAA weapon, a 3.6-inch, in 1918. In 1928 the 3.7-inch became the preferred solution, but it took 6 years to raise funds. Production of the 3.7-inch QF (94 mm) began in 1937; this weapon has been used on mobile wagons with a field army and transportable weapons on fixed holders for static positions. At the same time, the Royal Navy adopted a new 4.5-inch (114 mm) weapon in the double tower, which the army has adopted in simplified single-weapon brackets for static positions, mostly around ports where naval munitions were available. The performance of the new weapons was limited by their standard fuse No. 199, with a 30-second running time, although the new mechanical time fuse gave 43 seconds approaching readiness. In 1939, a machine fuse adjuster was introduced to remove manual fuse adjustment. [40] The US ended World War I with two 3-inch AA weapons and improvements were developed between the war time. However, in 1924 they began work on a new 105mm static mounting AA pistol, but only a few were manufactured in the mid-1930s because by this time work had begun on a 90mm AA gun, with mobile cars and static mounts capable of engaging air, sea and land targets. The M1 version was approved in 1940. During the 1920s there was some work on the 4.7-inch that disappeared but revived in 1937, leading to new weapons in 1944. [41] While the HAA and associated acquisition and fire control targets were the main focus of AA's efforts, low-level near-range targets remained and by the mid-1930s they had become a problem. Until this time the British, at the insistence of the RAF, continued to use machine guns from World War II, and introduced twin MG brackets for AAAD. The military was forbidden from thinking about anything more than 50 inches. 50-inch. In 1935 their tests showed that the minimum effective wheel was a bump of 2 pounds HE shell. The following year they decided to take bofors 40mm and twin barrel Vickers 2-pdr (40mm) on a modified sea hill. Air-cooled Bofors was much better for land use, is much lighter than water-cooled pom-pom, and UK production of Bofors 40mm has been licensed. Predictor AA No 3, as Kerrison Predictor was officially known, was introduced to him. [42] 40 mm Bofors was available in 1931. In the late 1920s, the Swedish navy ordered Bofors to develop a 40mm naval anti-aircraft weapon. It was light, fast-firing and reliable, and a mobile version of the four-wheel wagon was soon developed. Known simply as 40mm, it was adopted by about 17 different nations just before World War II and is still currently in some applications, such as the Coast Guard frigates. Rheinmetall in Germany developed the automatic 20mm in 1920 and Oerlikon in Switzerland obtained a patent for an automatic 20mm weapon designed in Germany during World War I. Germany introduced rapid fire 2 cm FlaK 30 and later in the decade was redesigned Mauser-Werke and became 2 cm FlaK 38. [43] However, while 20 mm was better than a machine gun and mounted on a very small trailer was easy to move, its efficiency was limited. Germany therefore added 3.7 cm. The first, 3.7 cm FlaK 18 developed by Rheinmetall in the early 1930s, was basically magnified by 2 cm FlaK 30. It was introduced in 1935 and production stopped the following year. The redesigned 3.7cm FlaK 36 gun entered service in 1938, it too had a two-wheeled cart. [44] However, in the mid-1930s the Luftwaffe realized that there was still a coverage gap between 3.7 cm and 8.8 cm guns. They began with the development of a 5 cm pistol on a four-wheeled cart. [45] After World War II, the U.S. military began developing a dual role (AA/ground) automatic 37 mm cannon designed by John M. Browning. It was standardized in 1927 as a T9 AA cannon, but tests quickly revealed that it was worthless in the country's role. However, while the shell was a bit light (well below 2lbs), it had a good effective ceiling and fired 125 rounds per minute; transport of AA was exported and entered into operation in 1939. Browning 37mm proved prone to interference, and was eventually replaced in 40mm AA Bofors units. Bofors attracted the attention of the U.S. Navy, but none was obtained before 1939. [46] Also, in 1931 the U.S. Army worked on a mobile anti-aircraft machine mount on the back of a heavy truck with four .30 caliber water cooled machine guns and an optical director. It turned out to be unsuccessful and was abandoned. [47] The Soviet Union also used a 37 mm, 37 mm M1939, which appears to be copied from bofors 40 mm. Bofors 25 mm, basically reduced by 40 mm, was also copied as 25 mm M1939. [48] During the 1930s, solid fuel rockets were in the Soviet Union and Britain. In Britain there was interest in anti-aircraft fire, it quickly became clear that guidelines would be needed for accuracy. However, missiles or unrepaed projectiles, as they were called, could be used for anti-fire fire. A 2-inch rocket using a HE or wire obstacle warhead was introduced as the first to deal with low-level or dive bombing attacks on smaller targets such as airports. The 3-inch was in development at the end of the inter-war period. [49] The maritime aspects of WW1 were a war in which air warfare flourished but did not mature to the extent that it was a real threat to naval forces. Assumptions that a few small relatively small naval weapons of caliber could manage to keep enemy aircraft out of reach where damage could be expected. In 1939, radio-guided drones were made available to the US Navy in quantities that allowed for more realistic testing of existing anti-aircraft suites against actual flight and manoeuvring targets. [50] The results were sobering to an unexpected degree. The United States was still emerging from the effects of the Great Depression and funding for the military was sparse. To the extent that the powder muated shells were still 50% of the shells used. [50] The U.S. Navy found that a significant portion of its shells were duds or low order explosions (an incomplete explosion of an explosive contained by a shell). Virtually every major country involved in the fight in The Second World War has invested in aircraft development. The cost of research and development of aircraft was small and the results could be large. [51] So fast was the power leaps of the evolving aircraft that the British HAC's fire fighting system was outdated and designing a successor very difficult for British equipment. [52] Electronics would be proven to be a prerequisite for effective anti-missile systems, and both the US and the UK had a growing electronics industry. [52] In 1939, radio controlled drones were available to test existing systems in the British and US service. The results were disappointing by any measure. High-level manoeuvring drones were virtually immune to the AA on-board system. U.S. drones could simulate dive bombing that showed a desperate need for autocannons. Japan introduced powered gliders in the 1940s as drones, but apparently was unable to dive the bomb. [53] There is no evidence of other powers when using drones in this application at all. It could have caused a great underestimate of the threat and inflated the view of their AA systems. [54] World War II This section needs additional quotes to verify. Please help improve this article by adding quotes to reliable sources. Non-source material can be challenged and removed. (July 2013) (Learn how and when to delete this message template) The Polish defence of the AA does not coincide with the German attack and the situation was similar in other European countries. [55] A major AA war began with the Battle of Britain in the summer of 1940. backbone of AA ground defence, although a significant number of 3-inch 20-cwt were originally used. The Army Counter-Ship Command, which was under the command of Air Defence UK, has grown to 12 AA divisions in 3 AA corps. 40 mm Bofors entered service in increasing numbers. In addition, the RAF Regiment was created in 1941 with responsibility for counter-defending airports, eventually with Bofors 40mm as their main armament. Solid Defense AA, using HAA and LAA, was established by the military in key overseas locations, not particularly Malta, Suez Town and Singapore. While the 3.7-inch was the main HAA weapon in solid defense and the only mobile HAA weapon with a field army, the 4.5-inch, manned artillery, was used near seaports, using naval munitions supplies. The 4.5-inch in Singapore had its first success in shooting down Japanese bombers. In the middle of the war a 5.25-inch HAA gun began to be emplaced in some permanent locations around London. This weapon was also deployed in a dual role of coast defense/AA position. German 88mm flak gun in action against Allied bombers. Germany's high-altitude needs were originally going to be filled with a 75mm gun from Krupp, designed in collaboration with its Swedish counterpart Bofors, but the specifications were later changed to require much higher performance. In response, Krupp engineers unveiled a new 88mm design, the FlaK 36. First used in Spain during the Spanish Civil War, the weapon turned out to be one of the best anti-aircraft guns in the world, as well as particularly lethal against light, medium, and even early heavy tanks. After the Dambusters raid in 1943, a completely new system was developed that was needed to shoot down any low-flying aircraft with a single hit. The first attempt to manufacture such a system used a 50mm weapon, but it proved inaccurate and the new 55mm gun replaced it. The system used a centralized control system, including both search and targeting radar, which calculated the target for weapons after considering wind and ballistic, and then sent electrical commands to weapons that used hydraulics to target them at high speed. The operators simply fed the weapons and selected targets. This system, modern even by today's standards, was in late development when the war ended. A German soldier manning an MG34 anti-aircraft gun in the 2nd Air strike in The New Year's Day was found dead in a car. They had the power to knock down planes of any size, but were light enough to be mobile and easily spun. The weapon became so important to British war effort that it even produced a film, The Gun, which encouraged workers on the assembly line to work harder. Imperial measurement production drawings the British developed were supplied to Americans who produced their own (unlicensed) copies of 40mm at the start of the war, switching to licensed manufacturing in mid-1941. USAAF B-24 hit flak over Italy, 10 April However, service tests showed another problem: that the scale and tracking of new high-speed targets was almost impossible. At short range, the apparent target area is quite large, the trajectory is flat and the flight time is short, allowing the guidance to be corrected by tracking indicators. Over long distances, the aircraft remains at the shooting range for a long time, so the necessary calculations can theoretically be done according to the rules of the image-though, because small errors in the distance cause large errors in the amount of shell fall and detonation time, the exact margin is crucial. For the ranges and speeds that Bofors worked on, neither response was good enough. A British QF 3.7-inch gun in London in 1939. The solution was automation, in the form of a mechanical computer, Kerrison Predictor. Operators still pointed it at the target, and Predictor then calculated the correct target point automatically and displayed it as an indicator mounted on the weapon. Gun operators simply followed the pointer and loaded the shells. Kerrison was relatively simple, but showed the way for future generations to incorporate radar, first for range and later for tracking. Similar predictor systems were introduced by Germany during the war, adding radar during the war. U.S. Coast Guardsmen in the South Pacific man a 20mm anti-aircraft cannon. A plethor amount of anti-aircraft weapon systems of smaller caliber was available to the German Wehrmacht Combined Force, and among them the 1940s-origin Flakvierling quadruple-20mm-autocannon-based anti-aircraft weapon system was one of the most commonly-seen weapons, seeing service on land

and at sea. Similar allied weapons of the U.S. defense were also quite capable, although little attention was paid to them. Their needs could be cogently met with smaller-caliber ammunition beyond the use of the usual singles-mounted M2.50 caliber machine gun atop the tank tower, as the four ground-used heavy barrel (M2HB) weapons were mounted together on the U.S. firm's Maxson M45 Quadmount gun (as a direct answer to Flakvierling), they were often mounted on the back of a half-track to form the Half Track, M16 GMC, Protia aircraft. Although they have less power than Germany's 20mm systems, the typical four or five combat batteries of the AAA army battalion often spread many kilometres apart, quickly connecting and disconnecting from larger ground combat units to provide welcome defences against enemy aircraft. Indian soldiers crew a Bren light machine gun in an anti-aircraft hill in 1941. AAA battalions have also been used to suppress ground targets. Their larger 90mm M3 gun would have turned out as much as eighty-eight to be an excellent anti-tank weapon as well, and was widely used late in the war in this role. Also available to Americans at the start of the war was the 120mm M1 weapon stratosphere weapon, which was the most powerful AA weapon with impressive 60,000ft (18km) of height capability, but not The M1 was sometimes blown up on an enemy plane. Weapons with a diameter of 90 mm and 120 mm would continue to be used until the 1950s last year. The U.S. Navy also gave some thought to the problem, when the U.S. Navy began rearming in 1939 in many ships the primary short range weapon was an M2.50 caliber machine gun. While effective in fighter jets at 300 to 400 yards it's point blank range in naval anti-aircraft ranges. Production of the Swiss Oerlikon 20mm has already begun to provide protection for Britons, and it was taken in exchange for M2 machine guns. [56] Between December 1941 and January 1942, production increased not only to all British requirements, but also to allow 812 units to actually be delivered to the US Navy. [57] By the end of 1942, 20 mm accounted for 42% of all aircraft destroyed by the US Navy's AA ship. However, the Royal Council noted that the balance is shifting towards the larger weapons used by the fleet. The US Navy intended to use British Pom-Pom, but the weapon required the use of a cordite, which BuOrd found undesirable for US service. [58] Further investigation has revealed that powders in the USA will not work in Pom-Pom. [59] The Office of Ordnance was well aware of the Bofors 40mm handgun. York Safe and Lock negotiated with Bofors about achieving rights to the air-cooled version of the gun. At the same time Henry Howard, an engineer, and entrepreneur learned about it and contacted RAMD W. R. Furlong chief of the Office of Ordnance. He ordered bofors' weapons system to be investigated. York Safe and Lock would be used as a contract agent. The system had to be redesigned for both the English measurement system and mass production, as the original documents recommended manual submission and drilling into shape. [60] Back in 1928, the U.S. Navy saw the need to replace a .50-caliber machine gun with something heavier. A 1.1/75 (28 mm) mark has been designed. Placed in a four-cylinder holder with a fire rate of 500 rpm, this would meet the requirements. However, the weapon has been suffering from the squeathing problems of being prone to interference. While it could be resolved the weight of the system was the same as that of quad mount Bofors of 40mm, while missing the range and power that Bofors provided. By the end of the war, the weapon had been reassued on smaller, less important ships. [61] Naval Weapon 5/38 rounded up the U.S. Navy's AA suite. Dual design mount it was used in both surface and AA roles with great success. He paired up with a mark of 37 and the proximity of the fuse could normally knock drones out of the sky in the range of up to 13,000 yards. [62] The semi-automatic double pistol with 3/50 MK 22 was manufactured but not used before the end of the war and therefore beyond the scope of this article. However early signs of 3/50 were used in destroyer escorts and on merchant ships. The 3/50 caliber handgun (Marks 10, 17, 18 and 20) first entered service in 1915 as a refit of the USS Texas (BB-35), and were subsequently many types of ships because the need for protection against aircraft has been recognised. During World War II, they were primarily weapon armament at destroyer escorts, patrol frigates, submarine pursuers, mines, some submarine fleets, and other auxiliary vessels, and were used as secondary dual-purpose batteries on some other types of ships, including some older battleships. They also replaced the original low-angle 4/50 caliber handgun (Mark 9) on flush-deck Wickes and Clemson-class destroyers to provide better protection against aircraft. The weapon was also used for special destroyer conversion; conversion of the offer of seaplanes AVD received two weapons; APD high-speed transports, DM minelayers, and DMS mine conversions got three guns, and those maintaining the destroyer classification got six. [63] One of the six flak towers built during The Second World War in Vienna. British North Sea World War Maunsell Fort. The Germans developed massive reinforced concrete panels, some more than six storeys high, which were known as Hochbunker High Bunkers or Flaktürme flak towers, on which they placed anti-aircraft artillery. Those in cities attacked by Allied ground forces have become strongholds. Several in Berlin were some of the last buildings to fall to the Soviets during the Battle of Berlin in 1945. The British built structures such as Maunsell Forts in the North Sea, the Thames Estuia and other tidal areas on which they based weapons. After the war most were left to rot. Some were outside territorial waters, and had a second life in the 1960s as platforms for pirate radio stations, while another became the basis of micronomy, the Principality of Sealand. The USAAF B-24 bomber emerges from a cloud flak with its No 2 engine smoking. Some nations began missile research before World War II. The first step was unmanaged missile systems such as the British 2-inch RP and 3-inch, which were fired in large numbers from Z batteries, and were also mounted on warships. It is suspected that the shooting of one of these devices during an airstrike caused disaster in Bethnal Green in 1943. [quote needed] In the face of the threat of Japanese Kamikaze attacks British and American developed surface-to-air missiles like the British Stooge or american Lark as a countermeasure, but none of them were ready at the end of the war. German missile research was the most advanced of the war as the Germans made considerable efforts to research and develop missile systems for all purposes. Among them were several controlled and unmanaged systems. Unmanaged systems included Fliegerfaust (literally a plane fist) as the first MANPADS. The controlled systems were several sophisticated radio, wire or radar missiles, such as the Wasserfall missile (waterfall). In view of the serious war situation in Germany, all these systems were produced in only a small number and most of them were only test units. Flak in the Balkans, 1942 (drawing by Helmuth Ellgaard). Another aspect of the anti-flight defence was the use of firing balloons to initially be a physical obstacle for bombers over cities and later for ground attack aircraft over normandy invasion fleets. The balloon, a simple flare strapped to the ground, worked in two ways. First, this and the steel cable were a danger to all the planes that tried to fly between them. Second, to avoid balloons, bombers had to fly at a higher altitude, which was more convenient for weapons. Firing balloons were limited in the application, and had minimal success in shooting down the aircraft, being largely motionless and passive defenses. The Allies' most advanced technology was demonstrated by anti-fire defences against German V-1 missiles (V means Vergeltungswaffe, retaliatory weapon). 419 and 601. Following the liberation of Antwerp, the port city immediately became the target of the highest priority and received the largest number of V-1 and V-2 missiles of any city. The smallest tactical unit in the operation was a weapon battery consisting of four 90 mm guns that fired rounds equipped with radio proximity. The incoming targets were obtained and automatically tracked by the SCR-584 radar developed at MIT Rad. The output from the weapons-laying radar was fed by the director of M-9, an electronic analog computer developed at Bell Laboratories to calculate lead and height corrections for weapons. With the help of these three technologies, almost 90% of the V-1 missiles on their way to the defensive zone around the port have been destroyed. [65] [66] 1970s Post-War Anti-Fire Missile Talos While these numbers were undesirable during the war, the arrival of a nuclear bomb significantly changed the acceptability of even one bomber that reached its target. Developments during The Second World War continued for a short time even into the postwar period. In particular, the US military has set up a huge network of anti-air defences around its larger sites based on radar-controlled 90mm and 120mm weapons. U.S. efforts continued into the 1950s with a 75mm Skysweeper system, an almost fully automated system including radar, computers, power supply and auto-loading weapon on a single powered platform. Skysweeper replaced all the smaller weapons then in the army, especially the 40mm Bofors. By 1955, the U.S. military considered 40mm Bofors obsolete due to its reduced ability to shoot down jet engines, and turned to developing SAM, with Nike and RSD-58. NATO's Allied Command in Europe developed NATO's Integrated Air Defense Defense System (NADGE), which later became NATO's integrated air defense system. The launch of the guided missile has led to a significant shift in the anti-fire strategy. Although Germany desperately tried to deploy anti-fire missile systems, no one was operational during The Second World War. However, after several years of post-war development, these systems began to mature into viable weapons. The U.S. began modernizing its defenses with a Nike Ajax missile and soon disappeared with larger firearms. The same thing happened in the USSR after the introduction of their SA-2 guidance systems. The JASDF three-million-year-old firefighting team uses a rocket target with the Kai MANPADS 91 training variant during an exercise at Eielson Air Base in Alaska as part of the Red Flag - Alaska. As this process continued, the rocket found itself used for more and more roles previously filled with weapons. First, the big weapons were replaced by equally large rocket systems with much higher performance. They were soon followed by smaller rockets, which eventually became small enough to be mounted on armored cars and tank chassis. They began replacing, or at least replacing, similar weapon-based SPAAG systems in the 1960s, and by the 1990s replaced almost all such systems in modern armies. Man-portable missiles, MANPADS as they are known today, were introduced in the 1960s and have replaced or replaced even the smallest weapons in the most advanced armies. In the 1982 Falklands War, Argentina's armed forces deployed the latest Western European weapons, including the 35mm Oerlikon GDF-002 two-gun and SAM Roland. The Rapier missile system was the primary GBAD system used by both British artillery and the RAF regiment, with several brand new FIM-92 Stingers used by British special forces. Both sides also used a Blowpipe missile. British naval missiles used included Sea Dart and older Sea Slug long-range systems, Sea Cat and new Sea Wolf short-range systems. Machine guns in AA mounts were used both on the shore and above the water. During the 2008 War in South Ossetia, air power faced strong SAM systems, such as the Buk-M1 of the 1980s. In February 2018, an Israeli F-16 fighter jet was shot down in the occupied Golan Heights province after attacking an Iranian target in Syria. [67] [68] [69] [70] In 2006, Israel also lost a helicopter over Lebanon, shot down by a Hezbollah missile. [71] AA combat systems Although firearms used by infantry, in particular machine guns, can be used to engage air targets at low altitude, occasionally with remarkable success, their effectiveness is generally limited and flashes of the muzzle reveal infantry positions. The speed and altitude of modern jets limit target opportunities and critical systems can be armored in aircraft designed for ground attack tasks. Modifications to the standard Originally designed for air-to-ground use, and heavier artillery systems were commonly used for most anti-aircraft gunners, starting with standard pieces on new mounts, and evolving into specially designed weapons with much higher performance before World War II. Ammunition and shell casings fired by these weapons are usually equipped with different types of altercations (barometric, time delay or proximity) to an explosion near an air target, which releases a shower of rapid metal fragments. For shorter range work, a lighter weapon with a higher firing speed is required to increase the likelihood of hitting a fast air target. Weapons between 20 mm and 40 mm caliber were widely used in this task. Smaller guns, typically 0.50 caliber or even 8mm rifle caliber guns were used in the smallest brackets. Soviet World War II-era armored train with anti-aircraft shooters As opposed to heavier weapons, these smaller weapons are in widespread use due to their low cost and ability to quickly track the target. Classic examples of autocannons and large caliber weapons are the 40mm autocannon and the 8.8cm FlaK 18, 36 gun, both designed by Bofors of Sweden. Artillery weapons of this kind were most replaced by effective surface-to-air missile systems that were introduced in the 1950s. The development of surface-to-air missiles began in Nazi Germany during the late Second World War with missiles such as Wasserfall, although no working system was deployed before the end of the war, and featured new attempts to increase the effectiveness of anti-aircraft systems facing a growing threat from bombers. Ground-based SAM can be deployed from fixed installations or mobile launchers, whether wheeled or tracked. Tracked vehicles are usually armored vehicles specially designed to carry SAM. Larger SAM can be deployed in fixed launchers, but can be towed/re-deployed according to the sly. SAMs launched by individuals are known in the United States as Man-Portable Air Defense Systems (MANPADS). The manpads of the former Soviet Union have been exported around the world, and can be found in the use of many armed forces. Targets for non-ManPAD SAMs usually acquire air-search radar, then tracked before/while SAM is locked-on and then fired. Potential targets, if they are military aircraft, will be identified as friend or enemy before they are involved. The development of the latest and relatively inexpensive short-range missiles began replacing autocannons in this role. Soviet 85mm anti-aircraft guns deployed around St Isaac's Cathedral during the Siege of Leningrad (formerly Petrograd, now called St. Petersburg,) in 1941. A fighter aircraft (or simply an interceptor) is a type of fighter aircraft designed specifically to intercept and destroy enemy aircraft, especially bombers, which usually rely on high speed and altitude capabilities. Several jet interceptors such as the Delta F-102 The F-106 Delta Dart, and the MiG-25 were built in the period beginning after the end of World War II and ending in the late 1960s, when they became less important due to the shifting strategic bombing role of ICBMs. The type is always distinguished from other fighter aircraft structures by higher speeds and shorter operating ranges, as well as much reduced munitions costs. Radar systems shall use electromagnetic waves to identify the range, altitude, direction or speed of aircraft and weather services to provide tactical and operational warnings and direction, in particular during defence operations. In their functional tasks, they provide target search, threat detection, guidance, reconnaissance, navigation, instrumentation and weather reporting support in the fight against operations. Defense against UAVs See also: The UAV Unmanned Aerial System Defense System (AUDS) is a defense system against military unmanned aerial vehicles. Various designs have been developed, using lasers,[72] net-weapons and air-to-air netting, signal interference, and hi-jacking through in-flight hacking. [73] UAV defence systems were deployed against ISIL drones during the Battle of Mosul (2016-2017). [74] [75] Alternative approaches to dealing with UAVs included the use of a close-range shotgun, and, for smaller drones, the training of eagles to catch them from the air. [73] Royal Navy Type 45 destroyers are advanced anti-missile defence ships Future development weapons are increasingly being pushed into specialised roles such as the Dutch goalkeeper CIWS, which uses the Gau-8 Avenger 30mm gatling seven-point weapon for the latest missile and missile defence. Even this previously front-line weapon is currently being replaced by new missile systems such as the RIM-116 Rolling Airframe Missile, which is smaller, faster, and allows mid-flight course correction (guidance) to secure a hit. To bridge the gap between weapons and missiles, Russia mainly produces Kashtan CIWS, which uses both weapons and missiles for ultimate defense with two six-barrelled 30mm Gsh-6-30 Gatling weapons and eight 9M311 surface-to-air missiles providing their defensive capabilities. Worrying about this development of all-missile systems is the current move toward stealth aircraft. Long-range missiles depend on long-range detection to provide a significant head start. Stealth patterns reduce detection ranges so much that the plane is often never even seen, and when it is, it is often too late to intercept. Detection and surveillance systems for inconspicuous aircraft are a major problem for anti-aircraft development. However, as stealth technology grows, so does anti-stealth technology. Several transmitter radars, such as those from bistatic radars and low-frequency radars, are said to have the ability to detect stealth aircraft. Advanced forms of thermographic cameras such as those containing QWIPs could visually see Stealth aircraft regardless of aircraft radar (RCS). In addition, Side searches for radars, high-powered optical satellites, and sky-scanning, high-aperture, high sensitivity radars, such as radio telescopes, could all narrow the location of stealth aircraft under certain parameters. [76] The latest SAM have claimed the ability to be able to detect and engage stealth targets, with the most reported being the Russian S-400, which is claimed to be able to detect a target with a 0.05-square meter RCS from 90 km away. [77] Another potential weapon system on the missile is a laser. Although air planners have imagined lasers in combat since the late 1960s, only the most adrenal laser systems are currently reaching what could be considered an experimental utility. In particular, a tactical high energy laser can be used in anti-aircraft and anti-missile roles. The future of projectily-based weapons can be found in the railgun. Tests are currently underway to develop systems that could cause as much damage as a Tomahawk (missile), but at a fraction of the cost. In February 2008, the U.S. Navy tested a railgun; fired a shell at 5,600 miles (9,000 km) per hour using 10 megajoules of power. Its expected output is more than 13,000 miles (21,000 km) per hour at muzzle speed, accurate enough to hit a 5-meter target from 200 nautical miles (370 km) away while firing at 10 shots per minute. It is expected to be ready between 2020 and 2025. [78] These systems, although currently designed for static targets, would only need the ability to be re-targeted to become the next generation of the AA system. Structures of the armed forces See also: Category: Counter-air defence forces Most Western and Commonwealth armies integrate anti-air defence exclusively with traditional army services (i.e. army, navy and air force), as a separate hand or as part of artillery. In the British Army, for example, anti-conuit defence is part of the artillery arm, while in the Pakistani army it was separated from artillery in 1990 to form a separate arm. This is at odds with some (predominantly communist or former Communist) countries, where not only are there provisions on anti-air defence in the army, navy and air force, but there are specific branches that deal only with the anti-air defence of the territory, such as soviet NCAs. The USSR also had a separate strategic missile force responsible for nuclear intercontinental ballistic missiles. Navy Soviet-Russian AK-630 CIWS (close-in weapon system) Model of the German Navy's IDAS multipurpose missile, which can be fired from submerged anti-aircraft weapon systems Smaller ships and ships usually have machine guns or fast cannons, which can often be fatal to low flying aircraft when connected to a radar-controlled fire-controlled cannon system for point defense. Some vessels, such as destroyers equipped with Aegis and cruisers, are as much a threat to aircraft as any ground-based anti-air defence system. In sea-going vessels should be treated with regard to aircraft, aircraft, equally true. Transport battle groups are particularly well defended because not only are they usually made up of many heavy-weapon anti-air defence vessels, but they are also capable of launching fighter jets for overhead combat air patrols to intercept incoming air threats. Organizations like Japan use their SAM-equipped vessels to create an outer air defense perimeter and radar pickup truck to defend their home islands, and the United States also uses its Aegis-equipped ships as part of its Aegis ballistic missile defense system to defend the continental United States. Some modern submarines, such as the German Navy's Type 212 submarines, are equipped with Type 212 missile systems because helicopters and anti-submarine combat aircraft are significant threats. The submersion launched by the anti-air missile was first intended by U.S. Navy Rear Admiral Charles B. Momsen, in a 1953 article. [79] A layered fire defense RIM-67 surface into the air rocket captures a Firebee drone at White Sands, 1980. Counter-defence in maritime tactics, especially within a group of carriers, is often built around a system of centre layers with an aircraft carrier in the middle. The outer layer will usually be provided by the carrier's aircraft, namely its AEW&C aircraft in combination with the CAP. If the attacker is able to penetrate into this layer, then the next layer would come from the surface-to-air missiles that carry the escort carrier; missiles against areas of defense, such as the RIM-67 standard, with a range of up to 100 nmi, and missiles against point defense, such as the ESSM RIM-162, with a range of up to 30 nmi. Finally, virtually every modern warship will be equipped with small-caliber weapons, including the CIWS, which is usually a radar-guided Gatling weapon between 20 mm and 30 mm caliber capable of firing several thousand rounds per minute. [80] Armies typically have in-depth air defences, from integral portable air defence systems (MANPADS) such as RBS 70, Stinger and Igla at smaller force levels to army-level missile defence systems such as Angara and Patriot. Long-range long-range missile systems at high altitude often force aircraft to fly at low levels, where their anti-aircraft guns can shoot them down. In addition to small and large systems, intermediate systems must be used for effective counter-defence. These can be deployed at regimental level and may consist of a squad of self-propezzling anti-flight platforms, be they self-propezzling anti-fire weapons (SPAAGs), integrated missile defence systems such as Tunguska or all-in-one Roland or SA-8 Gecko missile platforms. Nationally, the United States military was atypical in that it was primarily responsible for the missile defense of the continental United States with systems such as the Nike project. The U.S. Air Force's F-22A Raptor launches an AIM-120 missile from the air into the air. Air force anti-air defences are usually provided by fighter jets carrying air-to-air missiles. However air force you decide to expand to expand Surface-to-air missile systems because they are such valuable targets and are the subject of attack by enemy aircraft. In addition, some countries decide to place all counter-defence obligations under the air force. The missile defence area, the missile defence of a particular area or location (as opposed to point defence) were previously operated by both armies (e.g. the British Army's Anti-Ship Command) and the US Air Force (CIM-10 Bomarc). Anti-air defence systems have a medium to long range and can be thin from different other systems and networked into an area-to-area system (in which case they can be cut from several short-range systems that are combined to effectively cover the area). An example of impoverished defense is the defense of Saudi Arabia and Israel with MIM-104 Patriot missiles during the first Gulf War, where the goal was to cover populated areas. Mobility tactics Russian Pantsir-S1 can engage targets in motion, thus achieving high survival. Most modern anti-air defence systems are quite mobile. Even larger systems tend to be mounted on trailers and are designed to be fairly quickly broken down or adjusted. This has not always been the case in the past. Early missile systems were cumbersome and required a lot of infrastructure; many could not be moved at all. With the diversification of anti-air defences, much more emphasis has been placed on mobility. Most modern systems are usually either self-propelled (i.e. weapons or missiles are mounted on a truck or tracked chassis) or towed. Even systems that consist of many components (transporter/upright/rocket launchers, radars, command stations etc.) benefit from mounting on the fleet of vehicles. In general, a fixed system can be identified, attacked and destroyed, while the mobile system may appear in places where it is not expected. Soviet systems focus mainly on mobility after the experience gained in the Vietnam War between the US and Vietnam. For more information about this part of the conflict, see SA-2 Guidance. Fire defense versus fire defense suppression AGM-88 and AIM-9 on the Luftwaffe Tornado. Israel and the U.S. Air Force, in cooperation with NATO members, have developed important tactics to suppress fire defenses. Specialized weapons, such as anti-radiation missiles and advanced electronic intelligence platforms and electronic countermeasures, try to suppress or negate the effectiveness of the enemy missile system. It's an arms race; As better interference, countermeasures and anti-radiation weapons are developed, so are improved SAM systems with ECCM capabilities and the ability to shoot down anti-radiation missiles and other munitions aimed at them, or targets that prevent them. Insurgent tactics Rocket-propelled grenades can be – and often are – used against hovering helicopters (e.g. Somali militias during the Battle of Mogadishu (1993)). Shooting RPG in steep poses a danger to the user because the backblast of the reflected off the ground. In Somalia, militia members sometimes welded steel plates to exhaust the end of an RPG tube to stave off pressure from the gunman while firing at U.S. helicopters. Rpg is used in this task only when more effective weapons are not available. Another example of the use of RVR against helicopters is Operation ANACONDA in March 2002 in Afghanistan. Taliban insurgents defending the Sheh-i-Kot Valley used RPG in direct fire against landing helicopters. 4 Rangers were killed [81] when their helicopter was shot down by an RPG and SEAL team member Neil C. Roberts fell out of the helicopter when he was hit by 2 RPGs. [82] In other cases, helicopters were shot down in Afghanistan during a mission[83] in Wardak Province. One of the features that makes RPG useful in air defense is that they are fused automatically to detonate at 920 m.[84] When directed into the air it causes the warhead to explode, which can release a limited but potentially harmful amount of shrapnel hitting a helicopter landing or taking off. For the insurgents, the most effective method of combating aircraft is to attempt to destroy them on the ground, either by penetrating the perimeter of the air network and by self-destroying aircraft, e.g. by penetrating the perimeter of the air network. A recent trend emerging during the Syrian civil war is the use of ATGM against landing helicopters. [85] See also Air Domination Artillery Weapons Laying List of Anti-Aircraft Weapons Self-Propelled Anti-Aircraft Gun Bomber will always get through Reference Quotes ^ and b c d e AAP-6^ack-ack, adj. and n.. Archived september 24, 2015 at Wayback Machine OED Online. They shall forthwith communicate to the Commission the text of those provisions and a correlation table between those provisions and this Directive Oxford University Press. (available until 14 September 2013). ^ Air Vice-Marshal E Borton. Air of Authority - History of the RAF. Rafweb.org. Archived from the original 3. ^ flak. Merriam-Webster Online Dictionary. Archived from the original 14. Acquired on 30 April 2004. ^ Bellamy 1986, p. 219. ^ le petit Larousse 2013 p20–p306 ^ Hogg WW2 pg 99–100 ^ Hearst Magazines (December 1930). A huge ear locates the planes and tells them the speed. Popular mechanics. 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