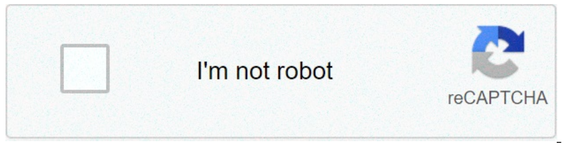

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Heatseker redirects here. For other uses, see HeatseEker (Disambiguation.) A modern air-air missile Iris-T Iris-T infrared play media The movement of the head of the Homing Iris-T Irrared seeker is a passive weapon driving system Which uses infrared luminous emission (IR) from a target to trace it and follow it. The missiles that use the infrared search is often indicated as heat seekers since the infrared is radiated strongly by hot bodies. Many objects like people, vehicle and aircraft engines generate and emit heat and so they are particularly visible in the infrared wavelengths of light compared to objects in the background. Infrared seekers are passive devices, which, unlike radar, do not provide any indication that are tracing a goal. This makes them suitable for sneak attacks during visual meetings or over longer intervals when they are used with a system of infrared cong or similar. Heat hunters are extremely effective: 90% of all air combat losses have been caused by infrared missiles in the last 25 years. [1] They are, however, subject to a number of simple countermeasures, in particular by dropping the flare behind the goal to provide false sources of heat. This works only if the pilot is aware of the missile and distributes the countermeasures, and the refinement of modern seekers has increasingly made them ineffective. The first IR devices were experienced before the Second World War. During the war, German engineers were working on heat research missiles and proximity fuses, but did not have time to complete the development before the end of the war. Truly practical designs have not become possible up to the introduction of conical scan and miniaturized vacuum pipes during the war. Anti-Aircraft IR systems began seriously at the end of the 1940s, but electronics and the whole rocket field were so new that required considerable development before the first examples entered service at half years 50.50. The first examples have had significant restrictions and reached very low success rates in combat during the 1960s. A new generation developed in the 70s and 80s has made great progress and significantly improved their lethality. The last examples of the 90s and the ability to attack the goals out of their field of view (FOV) behind them and also to choose ground vehicles. IR researchers are also the basis for many semi-automatic view-of-line weapons (saclos). In this use, the seeker is mounted on a trolled platform on the launcher and the operator holds it indicated in the direction of the target manually, often using a small telescope. The seeker does not track the goal, but the missile, often helped by rockets to provide a clean signal. The same driving signals are generated and sent to the missile via thin wires or radio signals, driving the missile to the center of the operator telescope. Saclos systems of this type were used for both anti-tank missiles and air surface missiles, as well as other roles. The infrared sensor package on the tip or head of a missile looking for heat is known as the seeker's head. NATO's brevitÃ code for an Air infrared missile launch is Fox Two. [2] History Early search The Nightscope Vampir used a fotomultiplier as a sighting system and provided lighting with an IR lamp mounted above the field. The capacity of some substances to give away electrons when struck by infrared light had been discovered by the famous Indian polimath Jagadish Chandra Bose in 1901, which saw the effect in Known today as lead sulfide, PBS. At the time there was little question, and allowed his 1904 patent to pass. [3] In 1917, Theodore Case, as part of his work on what became the sound system of Movieto, discovered that a mix of thallium and sulfur was much more sensitive, but it was electrically highly unstable and resigned little useful as a Practical detector. [4] However, it was used used a little time from US Navy as a secure communication system. [5] In 1930, the introduction of Photomultiplier AG-O-CS provided the first practical solution to IR detection, combining it with a layer of Galena as the photo. Amplifying the signal emitted by Galena, the photomoltiplier produced a useful output that could be used for the detection of hot objects with long ranges. [4] This has triggered developments in a number of nations, especially the United Kingdom and Germany where it has been seen as a potential solution to the problem of night bombers detection. In the UK, research was storing, with even the main research team of Cavendish laboratories expressing their desire to work on other projects, especially after it became clear that radar would be a better solution. However, Frederick Lindemann, Winston Churchill's Favorite on the tizard committee, remained engaged in IR and became increasingly obstructive at the work of the committee which was otherwise pressing for radar development. They eventually dissolved the Committee and reformed, leaving Lindemann from the roster, [6] and filling his position with the famous Radio Exerct Edward Victor Appleton Appleton. [7] In Germany, radar research was not given nearly the same level of support in the UK, and competed with IR development in the 1930s. IR research was led primarily by Edgar Kutzscher at the University of Berlin [8] who works in concert with AEG. [4] In 1940 they had successfully developed a solution; The key anlage (approximately "Tom Peeping Tom System) consists of a Photomultiplier Detector placed in front of the pilot and a wide searchight equipped with a filter to limit the output to the IR range. This provided enough light to see the short distance target and the key anlage was mounted on a small number of Messerschmitt BF 110 and Dornier make 17 night fighters. These were largely useless in practice and the pilots complained that the target often became visible only at 200 meters (660 ft), at that point they would have seen anyway [9] Only 15 were built and were removed while the German air radar systems were improved even though 1942. [10] AEG worked with the same systems for use on tanks and unfolded a number of models through the war, with a limited production of FG 1250 from 1943. [4] This work culminated in the Zielgerät 1229 Vampir Riflescope which was used with the STG 44 assault rifle for night use. [11] German researchers The researcher of Madrid was developed for the Enziana surface missile. The devices mentioned above were all detectors, not seekers. They produce a signal indicating the general direction of the target or in the case of later devices, an image. The guide was entirely manual by an operator who looks at the image. There were a number of efforts in Germany during the war to produce a real automatic search system, both for anti-aircraft use and against ships. These devices were still being developed when the war is over; Although some were ready for use, there had been no work to integrate them with a missile aircraft frame and a considerable effort remained before an effective weapon would be ready for use. However, a 1944 summer report to the German Air Ministry stated that these devices were much better developed than competing Soviet systems based on radar or acoustic methods. [12] Aware of the advantages of Passive IR Homing, the research program began with a series of theoretical studies considering the emissions of the objectives. This led to the practical discovery that theMajority of IR production from an aircraft of the piston engine was between 3 and 4.5 micrometers. The exhaust was also a strong emitter, but quickly cooled in the air so that it has not presented a fake tracking target. [13] Studies have also been taken on atmospheric attenuation, which has shown that air is generally more transparent for IR compared to visible light, even if the presence of water vapor and carbon dioxide produced several sharp drops in in Finally, they also considered the problem of the underlying sources of IR, including reflections on clouds and similar effects, concluding that this was a problem because of the way it changed very strongly through the sky.[15] This research suggested that an IR searcher could host on a five-kilometre three-speed bomber (3.1 mi) with a accuracy of about 1⁄10 degrees,[16] making an IR searcher a very desirable device. The Kutzscher team developed a system with Kiel's Eletroacustic Company known as Hamburg, which had been read for installation in the Blohm & Voss BV 143 glide bomb to produce an automatic fire-fighting and forgotten anti-shipping missile. A more advanced version allowed the seeker to be directed off-axis from the bomber in order to block-on to a target on the sides, without flying directly to it. However, this presented the problem that when the bomb was released for the first time it was traveling too slowly for aerodynamic surfaces to easily control it, and the target sometimes slipped out of the view of the seeker. He was developing a stabilized platform to deal with this problem. The company also developed a functional IR proximity fuse by placing additional detectors that radially point out from the missile central line. which triggered when the signal strength began to decrease, which did when the missile exceeded the target. There was work on using a single sensor for both tasks instead of two separate. [17] Other companies also collected Eletroacustic's work and designed their own scanning methods. AEG and Kepka of Vienna used systems with two mobile plates that continuously scan horizontally or vertically, and determined the target position for timing when the image disappeared (AEG) or reappearing (Kepka). The Kepka Madrid system had an instant visual field (IFOV) of about 1.8 degrees and scanned an entire 20-degree model. Combined with the movement of the entire searcher within the missile, it could trace at angles up to 100 degrees. Rheinmetall-Borsig and another AEG team produced different variations on the spinning-disk system. [18] Post-war projects The Falcon AIM-4 was the first IR-led missile to enter service. The translucent dome allows the IR radiation to reach the sensor. The AIM-9 Sidewinder followed the Falcon on duty. It was much easier than the Falcon and proved to be much more effective in combat. Firestreak was the third IR missile to get into service. It was bigger and almost twice as much as its U.S. counterparts, much of this due to a larger warhead. In the post-war era, as German developments became better known, a variety of research projects began to develop researchers based on the PbS sensor. These were combined with techniques developed during the war to improve the accuracy of otherwise inaccurate radar systems, especially the conical scanning system. Such a system developed by the US Army Air Force (USAAF), known as "Sun Tracker", was developed as a possible driving system for an intercontinental ballistic missile. The USAAF MX-798 project was assigned to Hughes Aircraft in 1946 for an infrared tracking missile. The project used a simple grid searcher and an active system to control the roll during the flight. This was replaced the following year by MX-904, calling for a supersonic version. At this point, the concept was for a defensive weapon fired out of a long tube at the rear end of the bomber. In AprilThe Firebird missile project was canceled and the MX-904 was redirected to be a fighting weapon on forward. [20] The first test shots began in 1949, when the AAM-A-2 designation (Air-to-Air missile, Air Force, model 2) and the Falcon name. The IR and semi-active radar homing (SARH) versions entered service in 1956 and became known as AIM-4 Falcon after 1962. Falcon was a complex system that offers limited performance, especially due to its lack of proximity However, this relatively low success rate must be appreciated in the context of all these murders that represent direct blows, something that was not true of every killing by other American AAMs. In the same year of MX-798, 1946, William B. McLean began studies of a similar concept at the naval ombudsman test station, now known as the China Lake Naval Air Gun Station. He spent three years simply considering various designs, which led to a much less complicated design than the Falcon. When his team had a design they believed would be possible, they started trying to adapt it to the new introduced Zuni 5-inch rocket. They presented it in 1951 and became an official project the following year. Wally Schirra remembers visiting the lab and seeing the seeker follow his cigarette. [22] The missile was given the name Sidewinder after a local snake; the name had a second meaning as the sidewinder is a pit viper and heat hunting, and moves in a wave pattern not unlike the missile. [23] The Sidewinder entered service in 1957, and was widely used during the Vietnam War. It proved to be a better weapon than the Falcon: The B models managed a 14% kill ratio, while the much longer D models managed 19%. Its performance and lower costs have led the Air Force to adopt it as well.[21][24] The first heat seeker built outside the United States was the United Kingdom of Havilland Firestreak. The development began as OR.1056 Red Hawk, but this was considered too advanced, and in 1951 a modified concept was released as OR.1117 and gave the code name Blue Jay. Designed as an antiboding weapon, Blue Jay was bigger, much heavier and flew faster than its U.S. counterparts, but had about the same range. He had a more advanced searcher, using PbTe and cooled at −180 °C (−292.0 °F) by anidra ammonia to improve his performance. A distinctive feature was its faceted nose cone, which was selected after the ice was found would be built on a more conventional hemisphere dome. The first test shot took place in 1955 and entered service with the Royal Air Force in August 1958. The French project R.510 began later on Firestreak and entered experimental service in 1957, but was quickly replaced by a radar-homing version, the R.511. Nor was it very effective and had a short range on the order of 3 km. Both were replaced by the first effective French design, the R.530, in 1962.[26] The Soviets introduced their first infrared missile, the Vympel K-13 in 1961, after reverse engineering a Sidewinder that stuck in the wing of a Chinese MiG-17 in 1958 during the Second Taiwan Strait Crisis. The K-13 was widely exported, and faced his cousin on Vietnam throughout the war. It has proved even less reliable than the AIM-9B on which it was based, with the driving system and melt the suffering in continuous failure. [21] The subsequent SRAAM projects have been designed to address most of the problems encountered with previous IR missiles in a short-range weapon. More than half a century after its introduction, updated versions of the Sidewinder remain the primary IR missile in most Western air forces. The R-73 was a leap forward for Soviet designs, and it caused considerable concern among Western air forces. As Vietnam revealed the terrible performance of existing missile projects, a number of efforts began to address them. In the United States, minor updates to the Sidewinder were made the mostpossible, but more generally the pilots have been taught adequate engagement techniques so that they would not have fired as soon as they heard the tone of the missile, and instead it would have moved to a position where the missile would be able to continue to trace Even after the launch. This problem also led to efforts to make new missiles that would hit their goals even if launched under these less ideal positions. In the United Kingdom this led to the Sraam project, which was at the end victim of continuous change requirements. [27] Two United States United AIM-82 and AIM-95 Agile, met similar destinies. [28] New finder projects have begun to appear in the 1970s and led to a series of more advanced missiles. Major upgrade to the sidewinder began, providing it with a researcher that was quite sensitive to keep track from any angle, giving the missile all aspect capacities for the first time. This was combined with a new scanning scheme that helped refuse sources of confusion (like the sun reflecting the clouds) and improve driving towards the target. A small number of models the resulting were precipitated into the United Kingdom just before their engagement in the Falklands war, where they reached a killing ratio of 82% and lacked were generally due to the target aircraft flying out of reach. [22] The Argentine plane, equipped with Magic Sidewinder B and R.550, could only shoot from the rear aspect, that the British pilots simply avoided simply flying directly directly. The l was so effective that aircraft hastened to add flare countermeasures, which led to another minor update to model M to improve rockets. The models L and M should have been the spine of the western air forces through the end of the era of the cold war. One more bigger step was taken by the Soviets with their R-73, which replaced K-13 and others with a dramatically improved design. This missile has introduced the ability to be fired to goals completely out of the researcher; After shooting the missile you would hate in the direction indicated by the launcher and then try to lock. If combined with a visible mounted helmet, the missile could be mentioned and targeted without the aircraft of the launch from which he had to first point to the target. This has proved to offer significant advantages in â €