



COLLECTION · COL-01

THE ARSENAL

Weapons, defense and the factories behind them.



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ABOUT THIS COLLECTION

34 case files on the hardware of war: nuclear tests, an interceptor that carries no explosives, Israel's short-range rocket defense, a swing-wing bomber, a Mach 3 bomber that never went to war, missiles that maneuver above Mach 5, a submarine-launched ballistic missile, carrier catapults, a startup that builds drones and missiles on its own money, Iran's underground missile bases, a Serbian truck-mounted howitzer built to fire and move, a 1950s bomber still flying, the Navy's newest nuclear carrier, refueling in midair, a Soviet missile carrier that skimmed the sea, a contractor that builds stealth bombers and space telescopes, a one-man Army helicopter steered by leaning, a Soviet radar the world heard as the Woodpecker, the company behind Patriot, the B-2 stealth bomber, the SR-71 Blackbird, the Tiger II tank, Arleigh Burke-class destroyers, the Eurofighter Typhoon, how submarines dive, the Apache helicopter, railguns, surface-to-air missiles and the steel mill behind it all. Atomic Annie, the M65 280mm Atomic Cannon, is the only artillery piece ever to fire a nuclear shell. **DD-004** The Exoatmospheric Kill Vehicle carries no explosive. It destroys ballistic-missile warheads in space by colliding with them ('hit-to-kill'). **DD-011**

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Atomic Annie

DD-004 · Military / History · The M65 280mm Atomic Cannon, nicknamed Atomic Annie, is the only artillery piece ever to fire a nuclear shell.

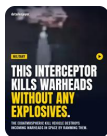
02



Cannikin Quake

DD-026 · Military / History · America's biggest underground nuke shook the ground like a magnitude 7 quake.

03



EKV: Exoatmospheric Kill Vehicle

DD-011 · Military / Tech · This interceptor kills warheads without any explosives.

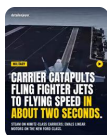
04



Mobile Mortars

DD-021 · Military / History · Soldiers fire this weapon by dropping a shell down the tube.

05



Sending EMALS

DD-025 · Military / Tech · Carrier catapults fling fighter jets to flying speed in about two seconds.

06



Supersonic Striker

DD-036 · Military / History · The B-1 was built to carry nukes but now flies conventional only.

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XB-70 Valkyrie

DD-048 · Military / Tech · A Mach 3 bomber that never went to war.

08



Anduril

DD-727 · Military / Tech · A defense tech company building autonomous weapons.

09



Bethlehem Steel

DD-010 · History / Locations · This steel mill helped build the Golden Gate Bridge.

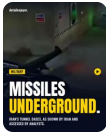
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Hypersonic Missiles

DD-059 · Military / Tech · Mach 5 isn't the new part.

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Iranian Missile Cities

DD-733 · Military / Locations · Iran's tunnel bases for missiles and drones.

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Shoot-and-Scoot

DD-736 · Military / Tech · Serbia's wheeled 155 mm howitzer, the NORA B-52.

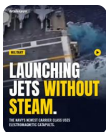
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B52 Stratofortress

DD-708 · Military / History · Built in the 1950s, flying into the 2050s.

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USS Gerald R. Ford

DD-710 · Military / Tech · Launching jets without steam.

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Gassed Up...Way Up

DD-711 · Military / Tech / History · Filling up mid-flight.

16



Ekranoplan

DD-704 · Military / Tech / History · Too low to be a plane.

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Ballistic Trident

DD-627 · Military · Launched from under the sea.

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Northrop Grumman

DD-604 · Military / Tech / Space · From flying wings to Webb's sunshield.

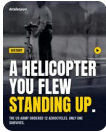
19



The Iron Dome

DD-606 · Military / Tech · Only the rockets that matter.

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Flying Bike

DD-584 · History / Military / Tech · A helicopter you flew standing up.

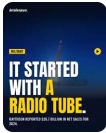
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Duga

DD-592 · Military / History / Tech · A radar the whole world could hear.

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Raytheon

DD-621 · Military / Tech · It started with a radio tube.

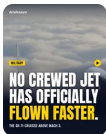
23



2-Billion Dollar B=2

DD-295 · Military / Tech · Twenty-one bombers cost \$44.7 billion.

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Blackbird

DD-117 · Military / Tech · No crewed jet has officially flown faster than the SR-71.

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King Tiger

DD-146 · Military / History · The Tiger II weighed nearly 70 tonnes.

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Destroyer

DD-147 · Military / Tech · The Arleigh Burke class owes its long life to steady upgrades rather than replacement, and its namesake earned his reputation commanding destroyers in combat.

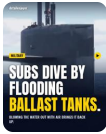
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Typhoon

DD-148 · Military / Tech · The Eurofighter Typhoon is built to be unstable on purpose.

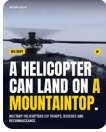
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Subs

DD-149 · Military / Tech / Science · A submarine dives by flooding its ballast tanks.

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Helo

DD-150 · Military / Tech · A pinnacle landing puts a helicopter down on a mountaintop.

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Railguns

DD-151 · Military / Tech / Science · A railgun fires without any gunpowder.

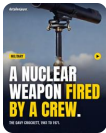
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SAMs

DD-152 · Military / Tech · A SAM can home in by radar, infrared or both.

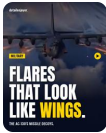
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The Atomic Gun

DD-083 · Military / History · The U.S.

33



Angel of Death

DD-436 · Military · An AC-130 releasing flares can trace the shape of wings.

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Tanking Railways

DD-411 · Military · Trains carry tanks on heavy-duty flatcars.



Collection Quiz and Answer Key

68 questions from every case file

Every quick fact has a stable ID (for example DD-004-F01) and comes from a case file with its sources listed. Online edition with videos and slides: <https://detailenjoyer.com/collections/the-arsenal/>



DD-004 MILITARY / HISTORY · 1 OF 34

ATOMIC ANNIE

In the Grable test (May 25, 1953, Nevada), the 83-ton M65 Atomic Cannon fired the only nuclear artillery shell in history.

QUICK FACTS

DD-004-F01

Atomic Annie, the M65 280mm Atomic Cannon, is the only artillery piece ever to fire a nuclear shell.

DD-004-F02

The M65 Atomic Cannon, nicknamed Atomic Annie, weighed 83 tons.

DD-004-F03

On May 25, 1953, in Nevada, Atomic Annie fired the only nuclear artillery shell in history during the Grable test.

DD-004-F04

The nuclear shell fired in the 1953 Grable test had a yield of about 15 kilotons.

DD-004-F05

Atomic Annie fired the Grable test's nuclear shell about 7 miles downrange.

DD-004-F06

The 1953 Grable test was part of the U.S. nuclear test series Operation Upshot-Knothole.

THE WRITE-UP

M65 280mm Atomic Cannon. Atomic Annie weighed 83 tons.

The Grable test. On May 25, 1953, in Nevada, it fired the only nuclear artillery shell in history.

15 kilotons. The shell's yield was about 15 kilotons.

About 7 miles. The shell was fired about 7 miles downrange.

Permalink: <https://detailenjoyer.com/case/atomic-annie/> · Last updated Apr 25, 2026



CANNIKIN QUAKE

On November 6, 1971, the Atomic Energy Commission set off Cannikin 5,875 feet beneath Amchitka Island in Alaska's Aleutians. The test proved the W71 warhead for the Spartan anti-ballistic missile. Its yield was officially 'less than five megatons', making it the largest underground nuclear test the United States has ever conducted. It shook the ground like a magnitude-7 earthquake, lifted the land and nearby seafloor, and caused rockfalls. Seismometers worldwide recorded it. Protests against the test launched the group that became Greenpeace.

QUICK FACTS

DD-026-F01

Cannikin (1971) was the largest underground nuclear test in U.S. history, with a yield just under five megatons, set off more than a mile beneath Alaska's Amchitka Island.

DD-026-F02

The protest voyage against Cannikin gave Greenpeace its name and founding mission.

THE WRITE-UP

When and where. Cannikin was detonated at 11:00 a.m. Bering Standard Time on November 6, 1971, on Amchitka Island in Alaska's Aleutian chain. It was part of the Atomic Energy Commission's Operation Grommet test series.

America's biggest underground blast. The official yield was 'less than five megatons', with published estimates ranging from about 4.4 to 5.2 Mt. No larger underground nuclear test has been conducted by the United States.

A warhead for missile defense. The test proved Livermore's W71 warhead for the Spartan interceptor, the upper tier of the Safeguard anti-ballistic missile system. Spartan was meant to destroy incoming warheads above the atmosphere with a burst of X-rays.

More than a mile down. The device was emplaced 5,875 feet underground at the bottom of a record-setting shaft about 6,150 feet deep. It was fired from a control point 23 miles away.

Magnitude-7 shaking, worldwide. Livermore says the blast produced the ground motion of a magnitude-7.0 earthquake. Readings from 43 stations in the Worldwide Standard Seismometer Network gave a body-wave magnitude of 6.8 and a surface-wave magnitude of 5.7.

What it did to the island. Hundreds of small aftershocks ended when the explosion cavity collapsed 38 hours later, leaving a subsided area where a new lake formed. The seafloor rose by up to about 56 cm nearby. Rockfalls and turf slides covered about 35,000 square feet. The feared tsunami never happened.

The birth of Greenpeace. Vancouver's Don't Make a Wave Committee sailed the fishing boat Phyllis Cormack, renamed Greenpeace, toward Amchitka to protest the test, but was turned back. In 1972 the group became the Greenpeace Foundation, and the United States ended its tests at Amchitka.

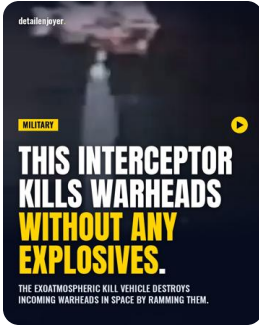
REEL VS. RECORD

- **Confirmed from the frames:** the Reel is about the Cannikin test (caption at 0.9 s: 'The Cannikin Test'). Date, place, U.S. underground record and Spartan purpose are all correct. [AEC D+30 report; LLNL; Wikipedia]
- **Precision:** 'nearly five megatons' matches the official 'less than five megatons'. Estimates range from 4.4 to 5.2 Mt. [AEC D+30 report; BSSA 1972; Wikipedia]
- **Overstated:** 'triggering earthquakes'. The AEC reported that 'no large earthquake was triggered'. The blast itself registered like a magnitude 6.8–7.0 event, and what followed were hundreds of small events (mostly below magnitude 4) tied to cavity collapse and minor local fault slip. [AEC D+30 report; Engdahl, BSSA 1972; LLNL]
- **Clarification:** the 'landslides' were local rockfalls, cliff spalling and turf slides on the island, totaling about 35,000 sq ft. No tsunami resulted. [AEC D+30 report; Wikipedia]
- **Confirmed:** 'detected by seismic instruments around the world'. The AEC report cites 43 stations of the Worldwide Standard Seismometer Network. [AEC D+30 report]

SOURCES

1. Project CANNIKIN D+30 Day Report: Preliminary Operational and Test Results Summary (AEC, via OSTI): <https://doi.org/10.2172/4701483>
2. At the Frontier of Missile Defense, 1971 (Lawrence Livermore National Laboratory history): <https://www.llnl.gov/sites/www/files/1971.pdf>
3. Seismic effects of the MILROW and CANNIKIN nuclear explosions (Engdahl, BSSA, 1972): <https://doi.org/10.1785/bssa0620061411>
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5. Cannikin (Wikipedia): <https://en.wikipedia.org/wiki/Cannikin>
6. Our history (Greenpeace USA): <https://www.greenpeace.org/usa/our-history/>
7. Don't Make a Wave Committee (Wikipedia): https://en.wikipedia.org/wiki/Don't_Make_a_Wave_Committee

Permalink: <https://detailenjoyer.com/case/cannikin-quake/> · Last updated Feb 8, 2026



EKV: EXOATMOSPHERIC KILL VEHICLE

The Exoatmospheric Kill Vehicle (EKV) is the business end of America's Ground-based Midcourse Defense (GMD) system. A three-stage Ground-Based Interceptor rocket lofts it out of the atmosphere. There it separates, picks out the warhead with a multi-color infrared sensor and its own computers, and steers with divert thrusters into a head-on collision. It carries no explosive warhead. Telling warheads from decoys has always been its hardest problem. A planned replacement kill vehicle was cancelled in 2019, and Lockheed Martin is now building the Next Generation Interceptor.

QUICK FACTS

DD-011-F01

The Exoatmospheric Kill Vehicle carries no explosive. It destroys ballistic-missile warheads in space by colliding with them ('hit-to-kill').

DD-011-F02

The EKV rides a three-stage Ground-Based Interceptor rocket out of the atmosphere, then steers itself to the target with onboard sensors and thrusters.

THE WRITE-UP

Part of a bigger system. The EKV is the intercept component of the Ground-Based Interceptor, part of the US Ground-based Midcourse Defense system against long-range ballistic missiles.

Rocket to space. When GMD tracks a threat, it launches a Ground-Based Interceptor. Its three-stage solid-fuel booster carries the EKV out of the atmosphere at near-hypersonic speed.

Hit-to-kill. The EKV destroys its target 'using nothing more than the force of a massive collision'. It carries no warhead, a feat often described as 'a bullet hitting a bullet'.

Its own brain and eyes. The EKV has a multi-color sensor and its own propulsion, communications link, discrimination algorithms, guidance and computers for picking and hitting a target.

Steering thrusters. A liquid-propellant Divert and Attitude Control System, supplied by L3Harris, gives the precise steering needed for impact.

The decoy problem. In a 2014 test the EKV told the target apart from countermeasures. Critics such as MIT's Ted Postol argue that to its sensor, warheads and decoys can look like the same flickering points of light.

What comes next. In 2019 the Pentagon cancelled the Redesigned Kill Vehicle meant to replace the EKV, citing technical design problems. In 2024 it chose Lockheed Martin to build the Next Generation Interceptor.

REEL VS. RECORD

- **Confirmed:** EKV means Exoatmospheric Kill Vehicle. It destroys warheads in space by high-speed collision without explosives, is carried by a ground-based interceptor rocket, and uses onboard sensors, computers and thrusters. [Raytheon; L3Harris]
- **Nuance:** 'identify and track its target among decoys and debris'. Decoy discrimination is the system's most debated weakness. Raytheon reports success in tests; critics argue the sensor can't reliably tell decoys from warheads. [Raytheon 2014; Postol]
- **Nuance:** the Reel uses 'EKVs' as a general term, but the EKV is specifically Raytheon's kill vehicle for the US GMD system. Other hit-to-kill interceptors, such as the SM-3 kinetic warhead, use different names. [Raytheon]
- **Footage:** the clips look like EKV hover tests in a test facility, not intercepts in space. L3Harris shows a similar EKV hover-test image. [L3Harris]

SOURCES

1. Exoatmospheric Kill Vehicle (Raytheon / RTX): <https://www.rtx.com/raytheon/what-we-do/strategic-missile-defense/ekv>
2. Raytheon kill vehicle destroys complex, long-range ballistic missile target in space (Raytheon, Jun 22, 2014): <https://raytheon.mediaroom.com/index.php?item=2586&s=43>
3. Ground-Based Midcourse Defense System (L3Harris): <https://www.l3harris.com/all-capabilities/ground-based-midcourse-defense-system>
4. Why the EKV sensor cannot reliably discriminate decoys from warheads (T. Postol, MIT): https://www.bits.de/NRANEU/BMD/documents/postol_att1.pdf
5. Pentagon terminates program for redesigned kill vehicle (Defense News, Aug 21, 2019): <https://www.defensenews.com/pentagon/2019/08/21/dod-tanks-redesigned-kill-vehicle-program-for-homeland-defense-interceptor/>
6. Lockheed chosen to build new homeland missile defense interceptor (Defense News, Apr 16, 2024): <https://www.defensenews.com/pentagon/2024/04/16/lockheed-chosen-to-build-new-homeland-missile-defense-interceptor/>

Permalink: <https://detailenjoyer.com/case/ekv/> · Last updated May 9, 2026



MOBILE MORTARS

A mortar is a light, smoothbore tube that a small crew can carry and set up on a bipod and baseplate. A round dropped down the muzzle hits a fixed firing pin at the bottom, which sets off its propellant charge and throws it out at a steep angle (generally above 45 degrees). That high arc lets mortars hit targets behind hills or cover that the crew can't see.

QUICK FACTS

DD-021-F01

A mortar fires when a round dropped down the muzzle hits a fixed firing pin at the base, which ignites the propellant charge in its tail.

DD-021-F02

Conventional mortars fire only at high angles (above 45°), so they can hit targets behind hills or cover.

DD-021-F03

The US M224 60 mm mortar weighs only 18 lb in hand-held mode.

THE WRITE-UP

Light, smoothbore and muzzle-loaded. Mortars are usually smoothbore (unrifled), muzzle-loaded indirect-fire weapons. They are relatively portable, and for a given calibre their barrels are shorter and lighter than an artillery gun's.

Tube, bipod, baseplate. A mortar has three main parts: the barrel ('tube'), the bipod, and the baseplate. The bipod steadies the tube and adjusts elevation and direction. The baseplate pushes the recoil into the ground, so the tube isn't driven into the dirt.

Drop it and it fires. In drop-fire mode, a crew member drops the round tail-first down the muzzle. At the bottom it hits a fixed firing pin, which sets off the ignition (propelling) cartridge in the tail. The burning propellant's gas then drives the round up and out of the barrel.

Fins, not spin. All US Army mortar cannons are smoothbore and fire fin-stabilized projectiles. The round's tail fins keep it stable in flight, instead of the spin a rifled barrel would give it.

High-angle fire. Conventional mortars fire only at high angles (above 45°), so their rounds come down steeply. That makes them ideal for hitting targets in defilade: dug-in troops or anything behind cover that direct-fire weapons can't reach.

Range is set two ways. Mortar crews adjust range by changing the barrel's angle (higher means shorter) and by adding or removing propellant increments on the round.

One soldier can carry a 60 mm. The US M224 60 mm lightweight mortar weighs 46.5 lb in conventional mode and 18 lb in hand-held mode. It breaks down into barrel, bipod and baseplate, can be carried by one crew member without disassembly, and reaches about 3,490 m.

REEL VS. RECORD

- **Imprecise:** 'strikes a firing mechanism and ignites its propellant'. In drop-fire, the round's tail hits a fixed firing pin at the base of the tube. That fires the primer in the round's ignition (propelling) cartridge, which then lights the propellant increments. The pin is part of the tube, not a separate mechanism in the round. [Open Source Munitions Portal; CEW Annex C]
- **Added context:** 'steep ballistic trajectory' means high-angle fire, above 45° for conventional mortars. [CEW Annex C]
- **Otherwise accurate:** tube/bipod/baseplate, muzzle loading, fin-stabilized rounds and indirect fire at targets out of line of sight all check out.

SOURCES

1. Mortar projectiles (Open Source Munitions Portal): <https://osmp.ngo/resources/mortars/>
2. Organic Support Weapons: 60-mm Mortar and AT4 (US Navy NRTC 14234, ch. 14, via GlobalSecurity): https://www.globalsecurity.org/military/library/policy/navy/nrtc/14234_ch14.pdf
3. 81 mm, 82 mm & 120 mm Medium and Heavy Mortars (Characterisation of Explosive Weapons, Annex C): <https://characterisationexplosiveweapons.org/studies/annex-c-81-82-120-mm-mortars/>
4. ATP 3-21.90 / MCTP 3-01D, Tactical Employment of Mortars (HQ Dept. of the Army / USMC): https://armypubs.army.mil/epubs/DR_pubs/DR_a/ARN19389-ATP_3-21.90-000-WEB-1.pdf

Permalink: <https://detailenjoyer.com/case/mobile-mortars/> · Last updated Aug 23, 2026



SENDING EMALS

Carrier jets don't have room for a runway, so a catapult does the work. A shuttle in the deck hooks the launch bar on the jet's nose gear and drags the plane to flying speed in about two seconds. The Nimitz-class fleet still uses C-13 steam catapults, which push the shuttle with steam-driven pistons. The new Ford class (USS Gerald R. Ford, CVN 78, and the carriers after it) uses EMALS, the Electromagnetic Aircraft Launch System from General Atomics. It replaces the steam with a linear induction motor fed by energy stored in spinning generator rotors.

QUICK FACTS

DD-025-F01

Only the Navy's newest carriers, the Ford class, use EMALS. Nimitz-class carriers still launch jets with steam catapults.

DD-025-F02

EMALS stores launch energy in spinning generator rotors, then releases it in a pulse lasting a couple of seconds to a linear motor under the deck.

THE WRITE-UP

Same job, new machine. EMALS was built for USS Gerald R. Ford (CVN 78) and the Ford-class carriers that follow it. It does the same job as a steam catapult with entirely different technology: stored kinetic energy and solid-state power electronics.

Most of the fleet still runs on steam. Nimitz-class carriers use Mk 13 (C-13) steam catapults. Steam drives pistons through two slotted cylinders under the deck, and the pistons drag the launch shuttle.

Launch bar meets shuttle. With either system, the jet's nose-gear launch bar hooks onto a shuttle that rides in a slot in the deck. The catapult pulls the shuttle, and the shuttle pulls the jet.

A linear motor in the deck. EMALS uses a linear induction motor laid under the flight deck. Energized coils create a traveling magnetic field that drives the shuttle down a track roughly 100 meters (about 330 feet) long. It works like a maglev train or a launched roller coaster.

Energy in spinning rotors. Motor-generators store energy in the inertia of their spinning rotors. At launch they dump it as an electric pulse through power-conditioning electronics. The whole launch takes a couple of seconds, then the current reverses to brake the shuttle.

Milestones. The first shipboard no-load shots, on Ford in 2015, pushed the empty shuttle past 180 knots. The first fighter launch from the ship, an F/A-18 Super Hornet, came on July 28, 2017.

Gentler and adjustable. Unlike steam, EMALS can dial in the force for each aircraft's weight. The Navy says that lets it launch everything from light drones to heavy strike fighters with less stress on the airframes.

REEL VS. RECORD

- **Confirmed from the frames:** the Reel is about carrier catapults and EMALS (captions at 10.5–12.9 s: 'electromagnetic aircraft launch systems, or EMALS'). [NAVAIR; NAVSEA]
- **Nuance:** 'Modern U.S. carriers use either steam catapults or EMALS.' This is true, but EMALS is only on the Ford class (CVN 78 and later). Every Nimitz-class carrier uses Mk 13/C-13 steam catapults. [NAVAIR; USNI News; DTIC]
- **Imprecise:** 'EMALS, which attach to a launch bar on the jet's nose gear.' The launch bar engages the catapult's shuttle, and this is the same for steam and EMALS; it isn't unique to EMALS. [NAVAIR shared-generator article; Naval Technology]
- **Footage note:** the launch shots (around 15–17 s) show steam venting from the catapult track. That suggests at least some clips are of a steam-catapult carrier, not EMALS. [visual observation; DTIC on steam catapults]
- **Clarification:** 'in just a few moments' means about two seconds. Sources describe a launch pulse of a couple of seconds. [Naval Technology; NAVAIR]

SOURCES

1. Electromagnetic Aircraft Launch System (EMALS), NAVAIR product page: <https://www.navair.navy.mil/product/Electromagnetic-Aircraft-Launch-System-EMALS>
2. Navy Announces Successful Test of Electromagnetic Catapult on CVN 78 (NAVSEA, 2015): <https://www.navsea.navy.mil/Media/News/Article-View/Article/588870/navy-announces-successful-test-of-electromagnetic-catapult-on-cvn-78/>
3. EMALS: launching aircraft with the power of the railgun (Naval Technology): <https://www.naval-technology.com/features/feature-emals-launching-aircraft-with-the-power-of-the-railgun-4380838/>
4. A High-Tech Launch System for Carriers (IEEE Spectrum): <https://spectrum.ieee.org/a-hightech-launchsystem-for-carriers>
5. Sailors Talk First USS Gerald R. Ford Trap, Launch (USNI News, 2017): <https://news.usni.org/2017/08/02/usni-news-video-sailors-talk-first-uss-gerald-r-ford>
6. Electromagnetic Aircraft Launching System: Do the Benefits Outweigh the Costs? (DTIC report ADA602992): <https://apps.dtic.mil/sti/tr/pdf/ADA602992.pdf>
7. Aircraft launch, recovery historic firsts aboard USS Ford (NAVAIR, 2017): <https://www.navair.navy.mil/node/25356>
8. Navy completes EMALS shared generator testing (NAVAIR): <https://www.navair.navy.mil/node/19951>

Permalink: <https://detailenjoyer.com/case/sending-emals/> · Last updated Feb 6, 2026



SUPERSONIC STRIKER

The B-1 began as the Mach 2 B-1A, which was canceled in 1977. It was revived in 1981 as the B-1B, a stealthier and heavier interim bomber, while the B-2 was delayed. Rockwell delivered all 100 B-1Bs between 1985 and 1988, and the type reached initial operating capability on nuclear alert in October 1986. Its wings sweep from 15° (137 ft span) back to 67.5° (79 ft). Top speed is about Mach 1.2. The U.S. dropped the B-1's nuclear mission in 1994, and its nuclear hardware was stripped out by March 2011 under New START, with Russian inspectors verifying it. Today it's a conventional-only bomber, nicknamed the 'Bone'.

QUICK FACTS

DD-036-F01

The B-1B's wings swing from 15° to 67.5°, shrinking its wingspan from 137 ft to 79 ft for high-speed flight.

DD-036-F02

The B-1B was stripped of all nuclear capability by 2011 under New START, and Russian inspectors could verify it every year.

THE WRITE-UP

From B-1A to B-1B. The original B-1A was canceled in 1977. The program was revived in 1981 as the B-1B, an interim bomber while the B-2 was delayed. Engineers cut the radar cross-section by an order of magnitude and added 74,000 lb of payload capacity, but the redesigned inlets dropped its top speed to about Mach 1.2.

Into service. The first B-1B was delivered in 1985, and initial operating capability came on October 1, 1986, on nuclear alert with Strategic Air Command. All 100 aircraft were delivered by 1988. It was officially named 'Lancer' in 1990.

Swing wings. The wings pivot from 15° fully forward (a 137-ft span) for takeoff, landing and efficient cruise, back to 67.5° (79 ft) for high-speed dashes.

Muscle. Four GE F101 afterburning turbofans make more than 30,000 lb of thrust each. Maximum takeoff weight is 477,000 lb, and the B-1B can carry up to 84 500-lb bombs or 24 JASSM cruise missiles.

Nukes out. The U.S. eliminated the B-1's nuclear mission in 1994. Under START and then New START, the conversion to conventional-only was completed in March 2011: nuclear pylons were destroyed, arming wiring was removed and hardpoints were modified.

Russians check. New START gave Russia annual inspections at Ellsworth or Dyess AFB, where it could examine up to three B-1Bs to confirm they can't carry nuclear weapons.

The 'Bone'. The nickname comes from an early newspaper article that spelled the plane 'B-ONE' with the hyphen dropped.

REEL VS. RECORD

- **Confirmed from the frames:** the Reel is about the B-1 Lancer (captions at 0.8–3.9 s). Its 1980s entry into service (IOC October 1986) and variable-sweep wings are correct. [Air Force fact sheet; Wikipedia]
- **Understated:** 'converted primarily for conventional missions.' The B-1B is conventional-only. Its nuclear mission ended in 1994, and its nuclear hardware was removed by March 2011 under New START. [Air Force fact sheet; New START Protocol Part Nine; Wikipedia]
- **Naming:** 'Rockwell' built it, but the program passed to Boeing when it bought Rockwell's defense business in 1996. Later fact sheets call it the Boeing B-1B. [Hill AFB fact sheet; Wikipedia]
- **Nuance:** 'supersonic.' The B-1B tops out around Mach 1.2–1.25 at altitude. The redesign cut it from the B-1A's Mach 2 class. [Air Force fact sheet; Wikipedia]
- **Footage note:** clips come from three accounts (mac1.media, brandonbotts_avifilms, airforcefilms), mixing airshow and Air Force footage. [frames]

SOURCES

1. B-1B Lancer fact sheet (U.S. Air Force): <https://www.af.mil/About-Us/Fact-Sheets/Display/Article/104500/b-1b-lancer/>
2. Rockwell B-1 Lancer (Wikipedia): https://en.wikipedia.org/wiki/Rockwell_B-1_Lancer
3. New START Protocol, Part Nine: Converted B-1B Heavy Bombers (Office of the Assistant Secretary of Defense for Acquisition): <https://www.acq.osd.mil/asda/ssipm/sdc/tc/nst/protocol/PartNine.html>
4. New START Article-by-Article Analysis, Part Nine (OASD Acquisition): <https://www.acq.osd.mil/asda/ssipm/sdc/tc/nst/nst-aa/a/AAAPartNine.html>
5. B-1B 'Lancer' fact sheet, Hill Aerospace Museum (Hill AFB, archived): <https://web.archive.org/web/20110622070753/www.hill.af.mil/library/factsheets/factsheet.asp?id=5802>

Permalink: <https://detailenjoyer.com/case/supersonic-striker/> · Last updated Mar 14, 2026



XB-70 VALKYRIE

North American Aviation designed the B-70 in the late 1950s as a six-engine, delta-winged nuclear bomber that would cruise its whole mission at Mach 3 and about 70,000 feet, too fast and high for the Soviet interceptors of the day. Soviet surface-to-air missiles, which shot down Gary Powers's U-2 in 1960, and the rise of ICBMs undercut that idea, and President Kennedy canceled the bomber in March 1961. Two XB-70A prototypes were completed as research aircraft. AV-1 first flew on September 21, 1964. The aircraft rode its own shock wave for 'compression lift', drooped its wingtips up to 65° at speed, and reached Mach 3.08 and 74,000 ft. On June 8, 1966, AV-2 was lost after an F-104 chase plane collided with it during a GE publicity photo flight. NASA pilot Joe Walker and USAF Maj. Carl Cross were killed. AV-1 flew research missions until 1969 and is now at the National Museum of the U.S. Air Force in Dayton, Ohio.

QUICK FACTS

DD-048-F01

The XB-70 Valkyrie was designed to cruise at Mach 3 and 70,000 ft. Only two were built, and neither ever carried a bomb.

DD-048-F02

The XB-70 used its own shock wave for lift, folding its wingtips down by up to 65° to help trap it.

THE WRITE-UP

Built to outrun. The B-70 was designed to cruise at Mach 3 and about 70,000 ft for the entire mission, faster and higher than any Soviet interceptor of the time.

Undone by missiles. Soviet surface-to-air missiles, which downed Gary Powers's U-2 in 1960, and the arrival of ICBMs made a high-flying bomber look vulnerable and costly. Kennedy canceled the B-70 bomber in March 1961.

Two research jets. Only two XB-70A prototypes were completed, AV-1 and AV-2, and they served as research aircraft for supersonic transport and sonic-boom studies. AV-1 first flew on September 21, 1964.

Riding its own shock wave. The XB-70 used compression lift from the shock wave off its engine intake, and lowered its outer wingtips up to 65° to trap that shock and stay stable at speed.

Records. AV-2 reached Mach 3.08 on April 12, 1966, and the program's highest altitude was 74,000 ft. AV-2 first hit Mach 3 on January 3, 1966, and made nine Mach 3 flights by June.

The 1966 collision. On June 8, 1966, during a GE publicity photo flight, NASA's F-104N drifted into AV-2's wing. Pilot Joe Walker and XB-70 co-pilot Maj. Carl Cross were killed, and pilot Al White ejected with serious injuries. AV-1 flew until 1969 and is now at the National Museum of the U.S. Air Force.

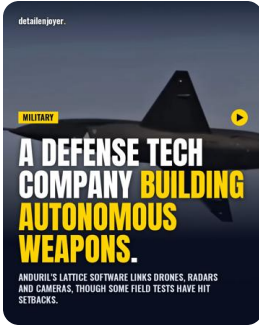
REEL VS. RECORD

- **Confirmed from the frames:** the Reel is about North American Aviation's XB-70 Valkyrie (captions at 0.8–11.2 s), a Mach 3, high-altitude nuclear bomber prototype meant to outrun Soviet defenses rather than hide from them. [NASA; NASA TM 1966]
- **Missing context:** it never became a bomber. Kennedy canceled the B-70 bomber in 1961, before the first flight, and the two XB-70As flew from 1964 to 1969 as research aircraft. [Wikipedia; NASA]
- **Slightly off:** 'altitudes above 70,000 feet.' The design cruise altitude was about 70,000 ft, and the highest it ever flew was 74,000 ft. [NASA TM 1966; Wikipedia]
- **Imprecise:** 'in the 1960s.' The design was chosen in 1957 and named in 1958. The 1960s were when the prototypes flew. [Wikipedia]
- **Left out:** one of the two was destroyed. On June 8, 1966, AV-2 was lost after an F-104 chase plane collided with it, killing pilots Joe Walker and Carl Cross. The surviving aircraft is at the National Museum of the U.S. Air Force. [NASA fact sheet; Wikipedia]

SOURCES

1. XB-70 Valkyrie (NASA): <https://www.nasa.gov/aeronautics/xb-70-valkyrie/>
2. XB-70A Valkyrie fact sheet FS-084 (NASA Dryden/Armstrong): https://www.nasa.gov/wp-content/uploads/2021/09/121584main_FS-084-DFRC.pdf
3. Summary of preliminary data derived from the XB-70 airplanes (NASA TM, 1966): <http://hdl.handle.net/2060/19660018723>
4. North American XB-70 Valkyrie (Wikipedia): https://en.wikipedia.org/wiki/North_American_XB-70_Valkyrie

Permalink: <https://detailenjoyer.com/case/xb-70-valkyrie/> · Last updated Dec 7, 2025



ANDURIL

Anduril Industries was incorporated on April 20, 2017, by Palmer Luckey (creator of the Oculus Rift), Trae Stephens, Matt Grimm, Joe Chen and Brian Schimpf (now CEO). It's based in Costa Mesa, California. Its Lattice software fuses data from Anduril's own and third-party sensors and is the core of its products, which range from Sentry surveillance towers used on the U.S.–Mexico border to Ghost and Altius drones, Roadrunner and Barracuda interceptors and missiles, Ghost Shark autonomous submarines and the Fury (YFQ-44A) collaborative combat aircraft, first flown on October 31, 2025. Unlike traditional contractors paid to develop to a Pentagon requirement, it builds products on its own money and then sells them. A \$5 billion raise in May 2026 valued it at \$61 billion, and 2025 revenue was reported at about \$2.2 billion. It also has critics: the WSJ reported test setbacks, including a Navy exercise in which more than a dozen Lattice-controlled drone boats failed, and civil-liberties groups have criticized its border towers.

QUICK FACTS

DD-727-F01

Anduril was founded in 2017 by a group that included Oculus Rift creator Palmer Luckey, and it's named after Aragorn's sword in The Lord of the Rings.

DD-727-F02

Anduril's Lattice software fuses data from drones, radars and cameras into one picture, though a Navy test of Lattice-run drone boats left more than a dozen dead in the water.

THE WRITE-UP

Who founded it. Anduril was incorporated on April 20, 2017, by Palmer Luckey, Trae Stephens, Matt Grimm, Joe Chen and Brian Schimpf. The name comes from Aragorn's sword in The Lord of the Rings.

Lattice. Lattice uses AI to classify objects by fusing data from many sensors, Anduril's and third parties'. It's the core of the company's products and has run border and military-base surveillance.

Building before being asked. The company develops products before the Pentagon requests them, in contrast to the traditional model in which a contractor is paid to develop against a set requirement.

What it makes. Its products include Sentry towers, Ghost and Altius drones, Anvil and Roadrunner interceptors, Barracuda cruise missiles, the Ghost Shark submarine and the Fury (YFQ-44A) uncrewed combat aircraft, first flown on October 31, 2025.

Money. A \$5 billion round in May 2026 valued Anduril at \$61 billion, double its June 2025 valuation of \$30.5 billion. That figure is a private valuation, not a market price.

Setbacks and criticism. The WSJ reported breakdowns and safety issues, including a Navy exercise in which more than a dozen Lattice-run drone boats idled and had to be towed. The ACLU and others have criticized its border towers.

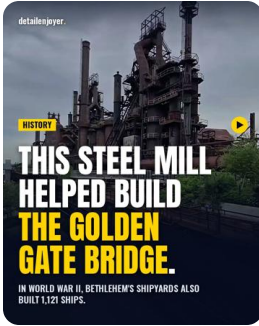
REEL VS. RECORD

- **Confirmed from the frames:** the Reel is about Anduril Industries (captions at 0.8–4.0 s), a U.S. defense tech company founded in 2017 whose Lattice software fuses data from drones, radars and cameras. [Wikipedia; Wired]
- **Garbled:** 'rather than traditional defense procurement models.' What sets Anduril apart is its business model: it develops products with its own money before the Pentagon asks, instead of being paid to build to a requirement. It still sells through government contracts. [Wired; Wikipedia]
- **Understated:** 'autonomous military systems' undersells it. Anduril also makes weapons, including Roadrunner-M interceptors, Barracuda cruise missiles, Altius loitering munitions and the Fury uncrewed combat jet. [Wikipedia]
- **Note:** One-sided: the Reel leaves out the setbacks. The WSJ reported breakdowns and safety issues, including a Navy drone-boat exercise in which more than a dozen Lattice-run boats failed, and civil-liberties groups have criticized its border towers. [WSJ; Wikipedia]
- **Source note:** the credit reads 'Source: Anduril', so the footage (launches, intercepts, the Lattice interface) is the company's own promotional material, not independent footage. [frames]

SOURCES

1. Anduril Industries (Wikipedia): https://en.wikipedia.org/wiki/Anduril_Industries
2. Anduril doubles valuation to over \$60 billion as defense tech funding boom continues (CNBC, May 13, 2026): <https://www.cnbc.com/2026/05/13/anduril-valuation-defense-tech-funding-boom.html>
3. 'We Do Fail ... a Lot': Defense Startup Anduril Hits Setbacks With Weapons Tech (Wall Street Journal): <https://www.wsj.com/business/anduril-industries-defense-tech-problems-52b90cae>
4. Behind Anduril's Effort to Create an Operating System for War (Wired, 2020): <https://www.wired.com/story/behind-anduril-effort-create-operating-system-war/>
5. Anduril Announces \$5B Series H Raise (Anduril, company release): <https://www.anduril.com/news/anduril-announces-usd5b-series-h-raise>

Permalink: <https://detailenjoyer.com/case/anduril/> · Last updated Jul 10, 2026



BETHLEHEM STEEL

Bethlehem Steel grew out of the Saucona Iron Company, founded in South Bethlehem, Pennsylvania, in 1857. It became Bethlehem Steel Company in 1899 and a corporation in 1904, and was for decades America's second-largest steelmaker. Its wide-flange beams helped make skyscrapers possible. Its steel went into the Golden Gate and George Washington bridges and the Empire State Building. In World War II its shipyards built 1,121 ships, more than any other builder. It went bankrupt in 2001 and was dissolved in 2003.

QUICK FACTS

DD-010-F01

Bethlehem Steel's subsidiary McClintic-Marshall fabricated and erected the Golden Gate Bridge's 67,908 tons of structural steel.

DD-010-F02

In World War II, Bethlehem Steel's 15 shipyards built 1,121 ships, more than any other builder.

THE WRITE-UP

Older than the name. The company's earliest predecessor, the Saucona Iron Company, was formed in South Bethlehem, Pennsylvania, in 1857. The name Bethlehem Steel Company dates from 1899, and Charles M. Schwab formed Bethlehem Steel Corporation in 1904.

The beam that built skyscrapers. In 1908, Bethlehem's new Grey mill produced the nation's first wide-flange structural beams. They changed building construction and made the age of the skyscraper possible.

Landmarks in Bethlehem steel. Its steel went into the Empire State Building, Rockefeller Center and Madison Square Garden. It also went into the George Washington, Verrazzano-Narrows and Golden Gate bridges.

Golden Gate, from Pennsylvania. Bethlehem's subsidiary McClintic-Marshall fabricated and erected the Golden Gate Bridge's steel: 67,908 tons in all, 45,000 of them in the two towers. The main cables were the one big part it didn't make; Roebling supplied them.

World War I. When WWI began in 1914, Bethlehem could make 1.1 million tons of steel a year. It produced vast amounts of ships, armor, guns and munitions for the US and its allies.

World War II: 1,121 ships. Bethlehem's 15 shipyards built 1,121 ships in WWII, more than any other builder, and nearly a fifth of the Navy's two-ocean fleet. It also made a quarter of the warship armor plate.

Decline. At its peak, Bethlehem Steel was a symbol of American manufacturing. It went bankrupt and was dissolved in 2003.

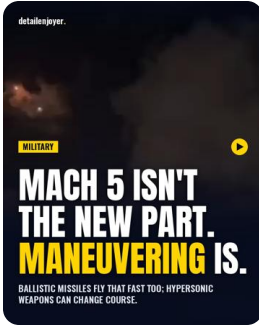
REEL VS. RECORD

- **Imprecise:** 'founded in the late 19th century'. The company's roots go back to the Saucona Iron Company of 1857 (mid-19th century). The Bethlehem Steel name dates from 1899 and the corporation from 1904. [bethsteel.com; Wikipedia]
- **Overstated:** 'much of the US Navy during both World Wars'. In WWII its yards built nearly one-fifth of the Navy's two-ocean fleet (1,121 ships in total, counting merchant ships). In WWI it was a major builder and armorer, but there's no source for 'much of the Navy'. [Wikipedia; FSU thesis; bethsteel.com]
- **Nuance:** Golden Gate Bridge. Bethlehem made the structural steel and its subsidiary McClintic-Marshall erected it, but the main cables came from Roebling. [lehighvalleylive; Golden Gate Bridge District]
- **Confirmed:** one of the largest and most influential US steelmakers, headquartered in Bethlehem, PA, with steel for bridges, skyscrapers, railroads and warships. [Wikipedia; bethsteel.com]

SOURCES

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3. Bethlehem Steel's role in Golden Gate Bridge remembered as bridge turns 75 (lehighvalleylive.com, 2012): https://www.lehighvalleylive.com/nick-falsone/2012/05/bethlehem_steels_role_in_san_f.html
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5. Bethlehem's Arsenal: Bethlehem Steel in World War II (Florida State University thesis): <https://repository.lib.fsu.edu/islandora/object/fsu:887394>

Permalink: <https://detailenjoyer.com/case/bethlehem-steel/> · Last updated May 8, 2026



HYPERSONIC MISSILES

The Congressional Research Service defines hypersonic weapons as maneuvering weapons that fly at Mach 5 or faster, roughly a mile per second. They come in two types: glide vehicles boosted by a rocket, and cruise missiles powered by air-breathing scramjets. Ballistic missile warheads also exceed Mach 5. What sets hypersonic weapons apart is maneuvering and a lower, flatter flight path, which ground radars may not detect until late. CBO concluded they probably wouldn't be more survivable than ballistic missiles with maneuverable warheads unless those faced highly effective long-range defenses. Heat is the main engineering challenge: GAO says surfaces can exceed 2,000 °F, and CBO cites sustained temperatures as high as 3,000 °F. Russia reportedly fielded its first hypersonic weapons in December 2019, and China likely by 2020. The DOD's FY2026 request for hypersonic weapons was \$3.9 billion, down from \$6.9 billion in FY2025.

QUICK FACTS

DD-059-F01

Ballistic missile warheads also exceed Mach 5. A hypersonic glide vehicle's distinction is that it can maneuver.

DD-059-F02

Hypersonic missiles can face sustained temperatures as high as 3,000 °F, according to the Congressional Budget Office.

THE WRITE-UP

Two kinds. Hypersonic weapons fly at Mach 5 or faster. Boost-glide weapons release a maneuverable glide vehicle from a rocket booster, and hypersonic cruise missiles use air-breathing scramjet engines.

Speed isn't the difference. Missiles with ballistic warheads also reach Mach 5, about a mile per second. The key difference is that a glide vehicle can maneuver and change course after release, often on a flatter, lower path.

Detection. Because of line-of-sight limits, most ground-based radars can't see a hypersonic weapon until late in its flight, leaving little time to launch interceptors.

Survivability debate. CBO concluded that hypersonic missiles probably wouldn't be more survivable than ballistic missiles with maneuverable warheads, unless the ballistic missiles faced highly effective long-range defenses. CRS notes that critics say the weapons lack defined mission requirements.

Heat. GAO says the exterior can exceed 2,000 °F. CBO cites sustained temperatures as high as 3,000 °F, which require extensive flight testing.

Who has them. Russia reportedly fielded its first hypersonic weapons in December 2019, and China likely did as early as 2020. The U.S. Defense Department requested \$3.9 billion for hypersonic weapons in FY2026, down from \$6.9 billion in FY2025.

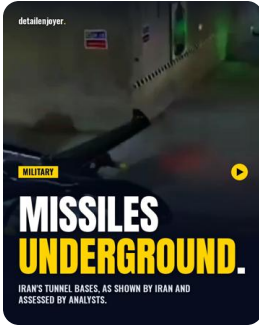
REEL VS. RECORD

- **Missing context:** speed alone isn't new. Ballistic missile warheads also fly faster than Mach 5. What sets hypersonic weapons apart is their ability to maneuver, often on a lower, flatter path. [CRS IF11459; CRS IF11623]
- **Note:** Nuance on 'evading traditional missile defenses': ground radars may see them late, but CBO concluded they probably wouldn't be more survivable than ballistic missiles with maneuverable warheads, except against highly effective long-range defenses. [CRS IF11623; CBO]
- **Note:** Nuance on 'redefine modern warfare': that's contested. Supporters cite fast strikes on defended or time-sensitive targets, while critics say the weapons lack defined mission requirements. The DOD's FY2026 request fell to \$3.9 billion from \$6.9 billion. [CRS R45811; CRS IF11459]
- **Nuance:** Mach 5 is about a mile per second (roughly 5,800 km/h). The Reel's 6,100 km/h is a near-sea-level figure, because the speed of sound depends on air temperature. [CRS IF11623]
- **Confirmed:** heat is the main challenge. GAO says exteriors can exceed 2,000 °F, and CBO cites sustained temperatures up to 3,000 °F. [GAO; CBO]
- **Footage note:** the night clips of strikes over a city show hypersonic missile strikes, as confirmed by the creator. The Reel doesn't say which weapon, which country or which event they show, and the case doesn't identify them. [frames; creator confirmation]

SOURCES

1. Hypersonic weapons: background and issues for Congress (CRS R45811): <https://www.congress.gov/crs-product/R45811>
2. Defense primer: hypersonic boost-glide weapons (CRS IF11459, updated May 14, 2026): <https://www.congress.gov/crs-product/IF11459>
3. Hypersonic missile defense: issues for Congress (CRS IF11623): <https://www.congress.gov/crs-product/IF11623>
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5. U.S. hypersonic weapons and alternatives (Congressional Budget Office, 2023): <https://www.cbo.gov/publication/58924>

Permalink: <https://detailenjoyer.com/case/hypersonic-missiles/> · Last updated Jun 22, 2025



IRANIAN MISSILE CITIES

Iran's Islamic Revolutionary Guard Corps (IRGC) has publicized underground 'missile cities' in state-released videos. In March 2025 it showed a large facility where Iranian media said missiles including Sejil, Qadr-H and Kheibar Shekan were stored. Analysts at The War Zone noted that the munitions appeared to sit in open galleries with few blast doors. During the June 2025 Israel-Iran war, analysts at ISW reported that Israeli strikes destroyed launch sites and tunnel entrances at several missile bases. In November 2025, Iran's passive-defense chief said the underground infrastructure was largely intact. Many details can't be independently verified.

QUICK FACTS

DD-733-F01

Iran publicized a large underground missile facility in March 2025.

DD-733-F02

Assessments of the 2025 damage differ between Israeli, analyst and Iranian sources.

THE WRITE-UP

What Iran has shown. On March 25, 2025, Iranian state media released video of senior commanders touring an underground facility. Tehran Times described it as one of 'hundreds' of IRGC missile cities, holding missiles such as Emad, Sejil, Qadr-H and Kheibar Shekan. These numbers come from Iran and can't be independently verified.

Analysts' view. The War Zone observed that the munitions in the video appeared to be stored in long galleries with few or no blast doors. It noted this could risk chain-reaction explosions if the site were breached, unlike some other Iranian sites.

The June 2025 war. Analysts at ISW/CTP reported, based on commercial satellite imagery, that Israeli strikes destroyed launch sites, storage tunnels and tunnel entrances at bases near Tabriz and in Kermanshah province. The Israeli military said it destroyed about half of Iran's ballistic-missile launchers.

Iran's account. In November 2025, Iran's passive-defense chief, Gholamreza Jalali, said almost all underground and under-mountain missile infrastructure remained intact, with only minor damage at some access points.

Contested picture. Both sides' claims serve their own interests, and outside observers can see only part of these sites. The case presents each claim with its source.

REEL VS. RECORD

- **Attribution:** most details, such as 'hundreds' of missile cities and the missile types stored, come from Iranian state media and can't be independently verified.
- **Missing context:** during the June 2025 Israel-Iran war, analysts (ISW/CTP) reported Israeli strikes on launch sites and tunnel entrances at several missile bases.
- **Balance:** Iran's passive-defense chief said in November 2025 that its underground missile infrastructure was almost entirely intact. The damage remains contested.
- **Missing context:** analysts at The War Zone noted that the March 2025 footage appeared to show munitions stored without separating blast doors, a potential vulnerability.
- **Framing:** 'missile cities' is the IRGC's own term, used in its publicity.

SOURCES

1. Tehran Times (Iranian state-aligned): IRGC unveils one of its largest underground missile cities (March 25, 2025): <https://www.tehrantimes.com/news/511206/Iran-s-IRGC-unveils-one-of-its-largest-underground-missile-cities>
2. Al-Monitor: Iran's IRGC unveils underground facility housing thousands of ballistic missiles (2025): <https://www.al-monitor.com/originals/2025/03/irans-irgc-unveils-underground-facility-housing-thousands-ballistic-missiles>
3. The War Zone: Iran Shows Off Underground 'Missile City': <https://www.twz.com/news-features/iran-shows-off-underground-missile-city>
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Permalink: <https://detailenjoyer.com/case/iranian-missile-cities/> · Last updated Aug 29, 2026



DD-736 MILITARY / TECH · 12 OF 34

SHOOT-AND-SHOOT

The NORA-B52 is a 155 mm, 52-caliber self-propelled gun-howitzer made by Serbia's state-owned Yugoimport-SDPR, mounted on 8×8 truck chassis (KAMAZ and MAN). According to the manufacturer, ranges are 32.5 km with ERFB rounds, 41.5 km with base-bleed rounds and up to 52 km with V-LAP rounds, at up to 4 rounds per minute. The newest NG ('Perun') variant, shown in 2023, is operated from the cab and has a fully automatic loader holding 30 rounds plus 6 more on the vehicle. The M21 variant on a MAN chassis has 12 rounds in its autoloader, plus 24 stowed.

QUICK FACTS

DD-736-F01

The NORA-B52 NG's autoloader holds 30 rounds, with 6 more on the vehicle.

DD-736-F02

Manufacturer-quoted range reaches 52 km with V-LAP ammunition.

THE WRITE-UP

The gun. The NORA-B52 fires 155 mm ammunition from a 52-caliber barrel. The manufacturer gives ranges of 32.5 km with ERFB rounds, 41.5 km with base-bleed rounds and up to 52 km with V-LAP rounds, and says it can fire all types of 155 mm ammunition.

Several versions. Earlier versions were mounted on KAMAZ 8×8 trucks. The M21 is on a MAN chassis, with 12 rounds in its autoloader plus 24 stowed, and a five-person crew.

The NG 'Perun'. Unveiled at the Partner 2023 exhibition, the NG is controlled from the cab like a remote weapon station. It has a fully automatic loader with 30 rounds, 6 more stowed on the vehicle, a four-person crew and readiness to fire in 60 seconds.

Shoot-and-scoot. Truck-mounted guns like this are designed to emplace quickly, fire and leave before counter-battery fire arrives. The manufacturer quotes a maximum rate of fire of 4 rounds per minute and the ability to land 3 rounds at once on a target 30 km away (MRSl).

Compared with Archer. Sweden's Archer applies a similar concept, a fast-emplacing automated 155 mm gun on wheels. Its original version is mounted on a 6×6 Volvo articulated hauler.

REEL VS. RECORD

- **Versions:** autoloader capacity differs by variant. The NG holds 30 rounds plus 6 on board, while the M21 holds 12 in the autoloader plus 24 stowed. Earlier versions were mounted on KAMAZ trucks.
- **Archer comparison:** the concept is similar, but Archer's original version sits on a 6×6 Volvo articulated hauler, not an 8×8 truck.
- **Missing context:** the performance figures (up to 52 km and 4 rounds per minute) are the manufacturer's (Yugoimport-SDPR) and depend on the ammunition used.
- **Missing context:** the NG variant ('Perun'), unveiled in 2023, is operated from the cab and is ready to fire in about 60 seconds.
- **Unverified:** I couldn't confirm the 'chain conveyor' detail in the manufacturer's brochures.

SOURCES

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Permalink: <https://detailenjoyer.com/case/shoot-and-scoot/> · Last updated Sep 7, 2026



DD-708 MILITARY / HISTORY · 13 OF 34

B52 STRATOFORTRESS

The Boeing B-52 Stratofortress first flew on April 15, 1952, and entered US Air Force service in 1955. Boeing built 744, and the last B-52H was delivered in 1962. Only the B-52H model is still flying. The Air Force fact sheet lists a payload of about 70,000 lb of mixed weapons and a 185 ft wingspan, with eight engines in four paired pods. It was built for high-altitude nuclear missions and was later adapted for low-level flight, conventional bombing and cruise missiles. Under the Commercial Engine Replacement Program, the Air Force plans to fit Rolls-Royce F130 engines and a new radar, rename the aircraft the B-52J and keep it in service into the 2050s. On June 15, 2026, a B-52H radar test aircraft crashed on takeoff at Edwards Air Force Base, killing all eight crew members. As of July 2026, the cause was under investigation.

QUICK FACTS

DD-708-F01

The B-52 first flew on April 15, 1952.

DD-708-F02

The Air Force plans to keep the re-engined B-52J flying into the 2050s.

THE WRITE-UP

Origins. Boeing's design first flew as the YB-52 on April 15, 1952, and the bomber entered service with Strategic Air Command in 1955. Boeing built 744 across eight models, ending with the B-52H in 1962.

The airframe. The B-52 has 35-degree swept wings spanning 185 ft and eight engines (Pratt & Whitney TF33s on the H model) in four paired pods. The Air Force fact sheet lists about 70,000 lb of mixed ordnance.

Changing roles. It was built for high-altitude nuclear bombing. Over time it was adapted for low-level penetration, conventional carpet bombing and standoff cruise missiles, and later for precision-guided weapons.

Toward the B-52J. The Air Force plans to replace the TF33s with Rolls-Royce F130 engines under the Commercial Engine Replacement Program, and to add an AN/APQ-188 radar. Upgraded aircraft will be called B-52Js and are meant to fly into the 2050s. GAO has warned the program is behind schedule.

The 2026 crash. On June 15, 2026, a B-52H fitted for radar testing crashed on takeoff at Edwards Air Force Base, California, and all eight crew members were killed. The Air Force said a second test aircraft was being modified so testing could resume.

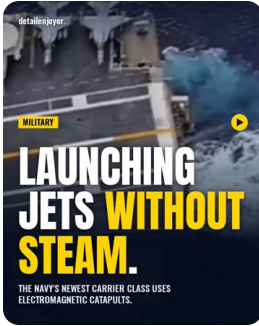
REEL VS. RECORD

- **Name:** the official designation is hyphenated, B-52. The title 'B52 Stratofortress' is kept as written.
- **Missing context:** it first flew in 1952. Service entry in 1955 is correct, and the last of 744 aircraft was delivered in 1962.
- **Missing context:** the high-altitude design was later adapted for low-level flight because of Soviet air defenses. Only the B-52H remains in service.
- **Out of date:** the eight TF33 engines are due to be replaced with Rolls-Royce F130s under CERP, and the upgraded aircraft will be called B-52Js. The Air Force plans to fly them into the 2050s.
- **Since the Reel:** a B-52H radar test aircraft crashed at Edwards AFB on June 15, 2026, killing all eight crew members. As of July 2026 the cause was under investigation (DefenseScoop).

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Permalink: <https://detailenjoyer.com/case/b52-stratofortress/> · Last updated Mar 27, 2026



USS GERALD R. FORD

USS Gerald R. Ford (CVN-78) is the lead ship of the US Navy's newest class of nuclear-powered aircraft carriers. It was delivered on May 31, 2017, and commissioned on July 22, 2017, at Naval Station Norfolk. According to the Congressional Research Service, its two A1B reactors give it about three times the electrical generating capacity of a Nimitz-class carrier. The class is designed for a sortie rate about 33% higher than the Nimitz class, with about 700 fewer shipboard crew. New systems include EMALS electromagnetic catapults, Advanced Arresting Gear and electromagnetic weapons elevators. Pentagon testers and the GAO have reported reliability problems and delays with several of them. The ship's first full deployment came in 2023.

QUICK FACTS

DD-710-F01

Ford's A1B reactors give it about three times the electrical capacity of a Nimitz-class carrier (CRS).

DD-710-F02

Ford was commissioned on July 22, 2017.

THE WRITE-UP

The ship. CVN-78 is named for the 38th US president. It was delivered on May 31, 2017, and commissioned on July 22, 2017. The follow-on ships in its class are John F. Kennedy (CVN-79), Enterprise (CVN-80) and Doris Miller (CVN-81).

More power. According to CRS, the two A1B reactors give the ship about three times the electrical generating capacity of a Nimitz-class carrier. That headroom is meant for electric catapults, elevators and future systems.

Launch and recovery. EMALS replaces steam catapults with linear electric motors, and Advanced Arresting Gear (AAG) replaces the older hydraulic arresting engines. Electromagnetic weapons elevators move munitions between decks.

Design goals. The Navy's targets for the class are about 160 sustained and 270 surge sorties a day, about 33% more than the Nimitz class, with about 700 fewer shipboard crew.

Growing pains. DOT&E annual reports and GAO reviews have flagged the reliability of EMALS, AAG and the weapons elevators. The ship's first full deployment came in 2023, about six years after commissioning.

REEL VS. RECORD

- **Missing context:** Pentagon testers (DOT&E) and GAO have reported reliability problems with EMALS, the arresting gear and the weapons elevators. The first full deployment didn't come until 2023.
- **Precision:** CRS puts the electrical gain at about three times the generating capacity of a Nimitz-class carrier.
- **Precision:** 'higher sortie rates' is a design target, about 160 sustained and 270 surge sorties a day, roughly 33% above Nimitz.
- **Missing context:** the class is also designed to need about 700 fewer shipboard crew than a Nimitz carrier.
- **Date detail:** the ship was delivered on May 31, 2017, and commissioned on July 22, 2017, at Naval Station Norfolk.

SOURCES

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Permalink: <https://detailenjoyer.com/case/uss-gerald-r-ford/> · Last updated Mar 30, 2026



DD-711 MILITARY / TECH / HISTORY · 15 OF 34

GASSED UP...WAY UP

Aerial refueling moves fuel from a tanker to another aircraft in flight. The first successful transfer took place on June 27, 1923, over Rockwell Field in San Diego. Two US Army Air Service DH-4B biplanes used a 50-foot hose to pass about 75 gallons, according to the National Museum of the US Air Force. Today there are two main methods. With probe and drogue, the tanker trails a hose ending in a basket and the receiver flies its probe into it. The US Navy, the Marine Corps, many allied air forces and helicopters use this method. With the flying boom, a boom operator on the tanker steers a rigid telescoping tube into a receptacle on the receiver. That's the standard for US Air Force aircraft. Some tankers carry both.

QUICK FACTS

DD-711-F01

The first air-to-air refueling took place on June 27, 1923, over San Diego.

DD-711-F02

The US Air Force mainly uses the flying boom, while the Navy uses probe and drogue.

THE WRITE-UP

A hose in 1923. On June 27, 1923, Lts. Virgil Hine and Frank W. Seifert passed fuel through a 50-foot hose to Capt. Lowell H. Smith and Lt. John P. Richter over San Diego. The receiving DH-4B stayed aloft for 6 hours 38 minutes.

Probe and drogue. The tanker trails a flexible hose with a cone-shaped basket (the drogue), and the receiving pilot flies a probe into it. The method was developed in Britain by Flight Refuelling Ltd around 1949. It's used by the US Navy and Marine Corps, many other air forces and helicopters.

Flying boom. A boom operator on the tanker 'flies' a rigid telescoping tube, using small control surfaces, into a receptacle on the receiver while its pilot holds position. Boeing developed it in the late 1940s, and it's the standard for US Air Force aircraft.

Both on one tanker. Many tankers can do both. A boom can be fitted with a drogue adapter, and some tankers carry hose-and-drogue pods under the wings.

Not only for warplanes. In 1949, the B-50A Lucky Lady II flew nonstop around the world with four in-flight refuelings, showing how far the technique could stretch range.

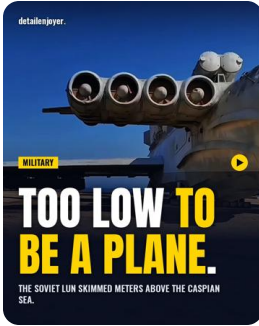
REEL VS. RECORD

- **Who uses which:** the US Air Force uses the flying boom, while the US Navy, the Marine Corps, many allied forces and helicopters use probe and drogue. Some tankers carry both.
- **Precision:** with a boom, an operator on the tanker steers the boom into the receptacle. The receiving pilot holds position rather than 'guiding' it in.
- **Missing history:** the first successful transfer was on June 27, 1923, when two Army DH-4Bs used a 50-foot hose over San Diego (NMUSAF).
- **Scope:** it isn't only for 'military planes'. Helicopters and tilt-rotors refuel this way too, and it was used for record flights such as Lucky Lady II's 1949 nonstop trip around the world.
- **Origin:** probe and drogue came from Britain's Flight Refuelling Ltd around 1949, and Boeing developed the flying boom in the late 1940s.

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Permalink: <https://detailenjoyer.com/case/gassed-up-way-up/> · Last updated Apr 19, 2026



EKRANOPLAN

The Project 903 Lun was a Soviet wing-in-ground-effect craft from Rostislav Alexeyev's design bureau, built as a fast anti-ship missile carrier. Only one, MD-160, was completed. It was about 73.8 m long with a 44 m wingspan, weighed about 380 tonnes at takeoff, and carried six P-270 Moskit (SS-N-22) anti-ship missiles in pairs on its back. Eight Kuznetsov NK-87 turbofans on forward pylons blew air under the wings for takeoff. Published maximum speeds are about 500 to 550 km/h (about 310 to 340 mph). A CIA assessment quoted by The Aviationist gave about 250 knots. It entered trial service in the late 1980s or 1990, sources vary, and sat unused at Kaspiysk from the late 1990s. On July 31, 2020, it was towed to Derbent, Dagestan, for a planned Patriot Park display.

QUICK FACTS

DD-704-F01

Only one Lun-class ekranoplan, MD-160, was completed.

DD-704-F02

It carried six P-270 Moskit anti-ship missiles.

THE WRITE-UP

Ground effect. Flying within a fraction of its wingspan of the surface traps a cushion of air under the wing, which raises lift and cuts induced drag. The Lun cruised a few meters above the water.

The machine. MD-160 was about 73.8 m long with a 44 m wingspan and a takeoff mass of about 380 tonnes, crewed by about 10 people (Russian sources).

Engines and weapons. Eight NK-87 turbofans on forward pylons, rated at about 127 kN each, blew air under the wings for takeoff. Six P-270 Moskit anti-ship missiles sat in pairs on top of the fuselage.

One of a kind. Eight were planned. Only MD-160 was completed, and work stopped after the Soviet collapse. It went into trial service and was laid up at Kaspiysk from the late 1990s.

To the beach. On July 31, 2020, tugs towed the non-operational craft 14 hours to Derbent, Dagestan, for display at a planned Patriot Park.

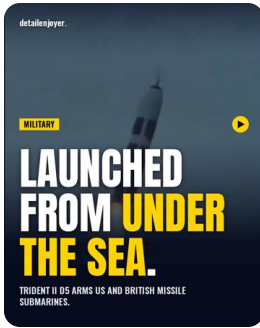
REEL VS. RECORD

- **Speed:** published top speeds are about 500 to 550 km/h (about 310 to 340 mph). A CIA assessment gave about 250 knots (about 290 mph), so 'around 300 mph' is a cruise-range figure.
- **Engine placement:** the eight NK-87 turbofans sit on forward pylons or canards beside the nose, angled to blow air under the wings for takeoff.
- **Missing armament:** it was a missile carrier, with six P-270 Moskit (SS-N-22) anti-ship missiles in pairs on its back.
- **Missing context:** only one, MD-160, was completed out of eight planned. It has been on a beach at Derbent, Dagestan, since being towed there on July 31, 2020.
- **Radar claim:** flying low keeps it below a ship's radar horizon for longer, but it isn't stealthy. A craft that big is easy to detect once it's in line of sight.

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Permalink: <https://detailenjoyer.com/case/ekranoplan/> · Last updated Mar 4, 2026



DD-627 MILITARY · 17 OF 34

BALLISTIC TRIDENT

The Trident II D5 is a submarine-launched ballistic missile (SLBM) built by Lockheed Martin for the U.S. Navy. It has three solid-propellant stages and inertial guidance. It is 44 ft (13.41 m) long and weighs about 130,000 lb (58,500 kg). The Navy lists its range as 4,000 nautical miles (about 7,360 km), and other sources note that range depends on payload. It can carry several independently targetable reentry vehicles (MIRVs). The missile was first deployed in 1990. Expanding gas pushes it out of the launch tube, and the rocket motors fire once it breaks the surface. Under U.S. Navy listings, each Ohio-class submarine carries 20 D5 missiles and each British Vanguard-class submarine carries 16. The United Kingdom didn't co-develop the missile. It agreed in 1982 to buy Trident II under the Polaris Sales Agreement. According to the UK Parliament, Britain has title to 58 missiles, held in a shared pool with U.S. missiles at Kings Bay, Georgia, while the UK makes its own warheads. A life-extended version (D5LE) joined the fleet in 2017 and is set to arm the next U.S. Columbia-class and UK Dreadnought-class submarines.

QUICK FACTS

DD-627-F01

Trident II D5 was first deployed in 1990.

DD-627-F02

The UK draws its Trident missiles from a shared pool in Georgia.

THE WRITE-UP

Who built it. Lockheed Martin built the D5 for the U.S. Navy. It was first deployed in 1990.

The basics. Three solid-fuel stages, inertial guidance, 44 ft long, and a listed range of 4,000 nautical miles.

Out of the water. Gas pressure pushes the missile out of its tube, and the first-stage motor fires after it breaks the surface.

Britain's share. The UK bought Trident II under a 1982 deal and draws from a shared pool at Kings Bay, Georgia, while fitting its own warheads.

Still serving. Life-extended D5LE missiles entered the fleet in 2017 and are planned for the next U.S. and UK submarines.

REEL VS. RECORD

- **Note:** 'Developed by the US and the UK': Lockheed Martin designed and built the D5 for the U.S. Navy. The UK buys the missile under the Polaris Sales Agreement and draws from a shared pool at Kings Bay, Georgia. It does supply its own warheads.
- **Wording:** 'submarine-launched ballistic missile', not 'submarine launch'.
- **Range:** the Navy lists 4,000 nautical miles (about 7,360 km). The Reel's 'exceeding 7,400 km' matches some published estimates, but range depends on payload and sources differ.
- **Missing:** the D5 entered service in 1990 and is carried by U.S. Ohio-class (20 each) and British Vanguard-class (16 each) submarines.
- **Missing:** the missile is pushed out of its tube by expanding gas, and its rocket motors fire only after it breaks the surface.

SOURCES

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Permalink: <https://detailenjoyer.com/case/ballistic-trident/> · Last updated Jul 30, 2025



DD-604 MILITARY / TECH / SPACE · 18 OF 34

NORTHROP GRUMMAN

Northrop Grumman is a US aerospace and defense company based in Falls Church, Virginia. Its 2025 annual report (Form 10-K) says the company began in 1939 in Hawthorne, California, as Northrop Aircraft Incorporated, founded by Jack Northrop. Northrop Corporation was a principal developer of flying-wing designs, which, according to the company's heritage page, led to the B-2 stealth bomber. In 1994 it acquired the Grumman Corporation, which built the Apollo Lunar Module, and the combined company was renamed Northrop Grumman. The heritage page lists more than 20 companies it has since absorbed, including Westinghouse's defense electronics business (1996), Litton (2001), TRW (2002), Scaled Composites (2007) and Orbital ATK (2018). The 10-K reports 2025 sales of \$41.954 billion, about 84% of them to the US government, and about 95,000 employees. It lists the B-21 Raider long-range strike bomber for the US Air Force and support for the B-2 Spirit among its key programs. For NASA's James Webb Space Telescope, launched on December 25, 2021, Northrop Grumman was the prime contractor. It designed and built the deployable sunshield, provided the spacecraft and integrated the whole observatory. NASA describes the sunshield as five layers of Kapton coated with reflective metal, each thinner than a human hair, about the size of a tennis court. The Reel uses company footage, including a hangar with aircraft, a holographic globe, an underwater drone, a cleanroom and a satellite.

QUICK FACTS

DD-604-F01

Northrop Grumman began as Northrop Aircraft in 1939.

DD-604-F02

Northrop Grumman built the Webb telescope's sunshield.

THE WRITE-UP

Started as Northrop. The company began in 1939 as Northrop Aircraft in Hawthorne, California.

Plus Grumman. In 1994 Northrop acquired Grumman, builder of the Lunar Module, and took the combined name.

Flying wings. Northrop's flying-wing work led to the B-2 stealth bomber; the B-21 Raider is its successor program.

By the numbers. 2025 sales were about \$42 billion, roughly 84% to the US government, with about 95,000 employees.

Webb's sunshield. As Webb's prime contractor, it designed and built the five-layer sunshield.

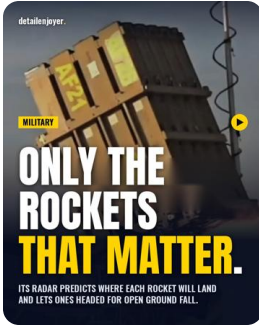
REEL VS. RECORD

- **Note:** 'Founded in 1939': Northrop Aircraft was founded in 1939. Northrop Grumman itself formed in 1994, when Northrop acquired Grumman.
- **Note:** 'Radar-evading materials': Northrop's flying-wing and stealth work led to the B-2 bomber, and it now builds the B-21 Raider. The company doesn't detail its stealth materials publicly.
- **Note:** 'James Webb Space Telescope's sunshield': yes, and more. Northrop Grumman was Webb's prime contractor: it designed and built the sunshield, provided the spacecraft and integrated the whole observatory.
- **Note:** 'Systems for air, land, and sea': and space. The 2018 acquisition of Orbital ATK added rockets and satellites, and the US government accounts for about 84% of sales.
- **Missing:** the company is headquartered in Falls Church, Virginia, and reported about \$42 billion in 2025 sales and about 95,000 employees.

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Permalink: <https://detailenjoyer.com/case/northrop-grumman/> · Last updated Jun 27, 2025



THE IRON DOME

Iron Dome is a mobile short-range air defense system built by Israel's Rafael Advanced Defense Systems with Israel Aerospace Industries. According to Wikipedia, it is designed to intercept rockets and artillery shells fired from about 4 to 70 km away. A battery has three parts. The EL/M-2084 radar, built by Elta, detects a launch and tracks its path. A battle-management center, built by mPrest, predicts where the rocket will land and fires only at those headed for populated or protected areas. Three or four launchers each hold 20 Tamir interceptors, which carry electro-optic sensors and steering fins. Rafael says the Tamir has a special warhead that detonates the target's warhead in the air. In a 2015 drone test, some targets were destroyed by the proximity warhead and others by a direct hit. Iron Dome was declared operational near Beersheba on March 27, 2011, and made its first interception on April 7, 2011. The United States contributed \$1.6 billion from 2011 to 2021 and approved another \$1 billion in 2022. Success rates are disputed. Rafael says more than 90%. Israeli military figures reviewed by Michael Armstrong (2018) were about 85% in 2012 and about 90% in 2014. Those rates count only rockets the system chose to engage. Critics, including MIT's Theodore Postol and Richard Lloyd, argued from video and damage analysis that far fewer warheads were destroyed. Armstrong reports that proponents dispute those methods. Rafael has also offered a naval version, C-Dome, unveiled in 2014.

QUICK FACTS

DD-606-F01

Iron Dome was declared operational on March 27, 2011.

DD-606-F02

Iron Dome only fires at rockets predicted to hit protected areas.

THE WRITE-UP

Three parts. An Elta radar, an mPrest battle-management center, and launchers holding 20 Tamir interceptors each.

Choosy by design. It predicts impact points and engages only rockets headed for protected areas.

Since 2011. It was declared operational on March 27, 2011, and made its first interception on April 7, 2011.

Disputed numbers. Official rates of about 85-90% count engaged rockets only. Critics such as Postol argued for far lower rates, and proponents dispute their methods.

Status. In 2026 Israel tested upgrades with the Iron Beam laser and received the first fully US-made Tamirs.

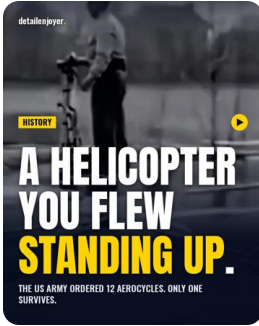
REEL VS. RECORD

- **Note:** 'A hit-to-kill approach': Rafael says the Tamir carries a special warhead that detonates the target's warhead in the air. In a 2015 drone test, some targets were destroyed by the proximity warhead and some by a direct hit.
- **Note:** 'Achieving a 90% success rate': this is an official figure (Rafael says more than 90%) and counts only rockets the system chose to engage. Critics including Theodore Postol and Richard Lloyd argued for much lower rates, and proponents dispute their methods (Armstrong 2018).
- **Note:** 'Developed by Israel's Rafael': Rafael leads the program with Israel Aerospace Industries. The radar is built by IAI's Elta and the battle-management center by mPrest.
- **Note:** 'Short-range rockets and artillery shells': according to Wikipedia, the range is about 4–70 km, and later upgrades target drones and cruise missiles too (Israel MOD, 2026).
- **Missing:** the US contributed \$1.6 billion from 2011 to 2021 and approved another \$1 billion in 2022. Since October 2026, complete Tamirs are also produced in East Camden, Arkansas.

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Permalink: <https://detailenjoyer.com/case/the-iron-dome/> · Last updated Jul 1, 2025



FLYING BIKE

From the footage, I identify the machine as the de Lackner HZ-1 Aerocycle, a one-man 'personal helicopter' built for the US Army in the mid-1950s. It grew out of work by Charles H. Zimmerman of NACA on kinesthetic control: with the rotors below the pilot, the craft could be steered by shifting body weight, much like riding a bicycle or a surfboard. The Aerocycle had a cross-shaped frame with the pilot standing on a platform in a safety harness, above two contra-rotating 15-foot rotors driven by a 40-horsepower Mercury outboard motor. A motorcycle-style twist-grip throttle sat on the handlebars, and airbags on each arm plus a central rubber float served as landing gear. It made its first tethered flight on November 22, 1954, and its first free flight in January 1955 at the Brooklyn Army Terminal in New York. Early tests suggested untrained soldiers could learn to fly it in about 20 minutes, and the Army ordered 12. After testing moved to Fort Eustis, Virginia, in 1956, test pilot Capt. Selmer Sundby found it much harder to fly than expected. Two crashes, in which the rotors intermeshed and shattered, and the wider failure of the 'personal lifting device' concept ended the program. One HZ-1 survives at the US Army Transportation Museum at Fort Eustis.

QUICK FACTS

DD-584-F01

The HZ-1 Aerocycle was steered by the pilot shifting his weight.

DD-584-F02

The Aerocycle's first free flight was in January 1955 at the Brooklyn Army Terminal.

THE WRITE-UP

Steer by leaning. NACA's Charles Zimmerman showed a craft with rotors below the pilot could be steered by shifting weight.

An outboard motor. A 40-horsepower Mercury outboard motor drove two contra-rotating 15-foot rotors.

Brooklyn, 1955. Its first free flight came in January 1955 at the Brooklyn Army Terminal in New York.

Twelve ordered. Early tests looked promising, and the US Army ordered 12.

Harder than it looked. Testing showed it was hard to fly, and two rotor-collision crashes ended the program.

REEL VS. RECORD

- **Note:** 'Blending motorcycle mechanics with helicopter technology': I'd narrow that. The motorcycle part was mainly the twist-grip throttle. The engine came from a Mercury outboard boat motor, and the steering was by leaning (kinesthetic control), an idea from NACA.
- **Note:** 'The 1955 New York Flying Bike': I think this is the de Lackner HZ-1 Aerocycle, whose first free flight was in January 1955 at the Brooklyn Army Terminal. Its first tethered flight was on November 22, 1954.
- **Missing:** it was a US Army program, not a consumer vehicle. The Army ordered 12, then dropped the project after testing showed it was hard to fly and two crashes in which the rotors collided.

SOURCES

1. Wikipedia: De Lackner HZ-1 Aerocycle: https://en.wikipedia.org/wiki/De_Lackner_HZ-1_Aerocycle
2. Wikipedia: Hiller VZ-1 Pawnee: https://en.wikipedia.org/wiki/Hiller_VZ-1_Pawnee

Permalink: <https://detailenjoyer.com/case/flying-bike/> · Last updated May 29, 2025



DUGA

Duga, Russian for 'arc', was a Soviet over-the-horizon radar system that formed part of the USSR's early-warning network against ballistic missiles. Over-the-horizon radar bounces shortwave signals off the ionosphere to see far beyond the line of sight. After an experimental Duga near Mykolaiv proved the idea, two operational systems were built: Duga-1 in what is now northern Ukraine, then the Ukrainian SSR, and Duga-2 in eastern Siberia near Komsomolsk-on-Amur. Duga-1 split its transmitter and receiver about 60 kilometers apart. The giant receiving array stands in the closed town of Chernobyl-2, a few kilometers from the Chernobyl nuclear plant, and the transmitters were near Liubech. From July 1976 to December 1989, its pulses, at up to about 10 megawatts, swept across the shortwave bands as a sharp tapping, usually 10 times a second. Listeners worldwide called it the 'Russian Woodpecker', and it disrupted broadcasts, amateur radio and aviation communications, drawing thousands of complaints. NATO reportedly gave it the reporting name STEEL WORK or STEEL YARD. The Chernobyl antenna is about 700 meters long and 150 meters high. The signals faded in the late 1980s and stopped in 1989; the reasons were never made public. The abandoned array, inside the Chernobyl Exclusion Zone, is now a listed monument in Ukraine. The footage shows its rusting steel towers and antenna elements.

QUICK FACTS

DD-592-F01

Duga-1 operated from July 1976 to December 1989.

DD-592-F02

Shortwave listeners nicknamed Duga the Russian Woodpecker for its tapping signal.

THE WRITE-UP

Over the horizon. Duga bounced shortwave signals off the ionosphere to watch for missile launches far beyond the horizon.

1976 to 1989. Duga-1 operated from July 1976 to December 1989.

The Woodpecker. Its pulses sounded like rapid tapping, usually 10 a second, so listeners called it the Russian Woodpecker.

Two sites. Duga-1's receiver was at Chernobyl-2, and its transmitters were near Liubech, about 60 km apart.

700 by 150 meters. The Chernobyl antenna is about 700 meters long and 150 meters high.

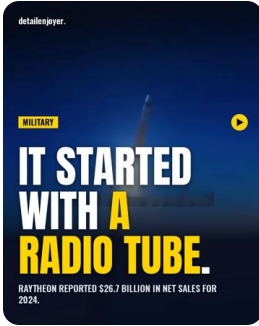
REEL VS. RECORD

- **Note:** 'Located near Chernobyl, in Ukraine': I'd say it's the receiver array that stands near Chernobyl, in what was then the Ukrainian SSR. The transmitters were about 60 kilometers away, near Liubech.
- **Missing:** there was more than one Duga. An experimental system near Mykolaiv came first, and a second operational system, Duga-2, stood in eastern Siberia.
- **Note:** Otherwise the Reel matches the record: 1976 to 1989, the tapping signal, the ionosphere and the 700 by 150 meter array.

SOURCES

1. Wikipedia: Duga radar: https://en.wikipedia.org/wiki/Duga_radar

Permalink: <https://detailenjoyer.com/case/duga/> · Last updated Jun 8, 2025



RAYTHEON

Raytheon is one of RTX Corporation's three business segments, alongside Collins Aerospace and Pratt & Whitney. The company began in 1922 in Cambridge, Massachusetts, as the American Appliance Company, founded by Laurence K. Marshall, Vannevar Bush and Charles G. Smith. Its first hit product was a gas-filled rectifier tube, named Raytheon ('light from the gods'), that let radios run on household current instead of batteries. The company took the tube's name and grew through radar and microwave work, including the first microwave ovens. In April 2020, Raytheon Company merged with United Technologies to form Raytheon Technologies, which renamed itself RTX in 2023. Today the Raytheon segment makes air and missile defense systems such as Patriot, the AN/SPY-6 family of naval radars, missiles and sensors. RTX reported Raytheon's 2024 net sales at \$26.7 billion, with growth from Patriot, NASAMS and counter-drone programs. Raytheon's own site lists more than 52,000 employees, and in 2024 it sold its cybersecurity, intelligence and services business. RTX as a whole has a backlog of about \$218 billion. The footage is corporate promotional video: control rooms, a missile launch, lab work and a Raytheon sign.

QUICK FACTS

DD-621-F01

Raytheon was founded in 1922 as the American Appliance Company.

DD-621-F02

RTX reported Raytheon's 2024 net sales at \$26.7 billion.

THE WRITE-UP

Founded in 1922. Raytheon began in 1922 in Cambridge, Massachusetts, as the American Appliance Company.

A radio tube. Its Raytheon rectifier tube let radios run on household current, and the company took its name.

Part of RTX. Raytheon merged with United Technologies in 2020. The combined company is now RTX.

Patriot and SPY-6. Raytheon makes the Patriot air defense system and the AN/SPY-6 family of naval radars.

\$26.7 billion. RTX reported Raytheon's 2024 net sales at \$26.7 billion.

REEL VS. RECORD

- **Note:** 'Employing around 70,000 people': I can't match that. Raytheon's own site lists more than 52,000 employees for the segment. RTX as a whole is much larger.
- **Note:** 'It generates over \$30 billion annually': RTX reported Raytheon's 2024 net sales at \$26.7 billion, so I'd call that an overstatement.
- **Note:** 'ANSPY-6 radar': the designation is written AN/SPY-6. I left the on-screen spelling in the transcript.
- **Note:** 'Cyber security': Raytheon sold its cybersecurity, intelligence and services business in 2024, so that part is out of date.

SOURCES

1. RTX: RTX Reports 2024 Results and Announces 2025 Outlook (January 28, 2025): <https://raytheon.mediaroom.com/2025-01-28-RTX-Reports-2024-Results-and-Announces-2025-Outlook>
2. Wikipedia: RTX Corporation: https://en.wikipedia.org/wiki/RTX_Corporation
3. RTX 2024 Annual Report (SEC filing): <https://www.sec.gov/Archives/edgar/data/101829/000130817925000069/rtx4383903-a-rs.pdf>
4. Raytheon: Who We Are: <https://www.rtx.com/raytheon/who-we-are>

Permalink: <https://detailenjoyer.com/case/raytheon/> · Last updated Jul 23, 2025



2-BILLION DOLLAR B-2

The Northrop B-2 Spirit is a US Air Force stealth bomber with a flying-wing shape designed to reduce its radar cross-section. It first flew publicly in 1989. By 1996, the program had produced 21 B-2s at a total cost of \$44.7 billion, an average of \$2.13 billion per aircraft when research and development are included. The cost of building each additional aircraft, without development, has been estimated at about \$737 million in 1997 dollars. Plans for 132 aircraft were cut back as the Cold War ended, which raised the per-plane share of development costs. The B-2 is being succeeded by the Northrop Grumman B-21 Raider. The footage shows a B-2 in flight and close-ups of its wing.

QUICK FACTS

DD-295-F01

Only 21 B-2s were built.

DD-295-F02

The program averaged \$2.13 billion per aircraft.

THE WRITE-UP

Flying wing. The B-2's flying-wing shape helps reduce its radar cross-section.

First flight. The B-2 first flew publicly in 1989.

21 aircraft. The program produced 21 B-2s at a total cost of \$44.7 billion.

Average cost. That averages \$2.13 billion per aircraft including development.

Successor. The B-21 Raider is set to succeed the B-2.

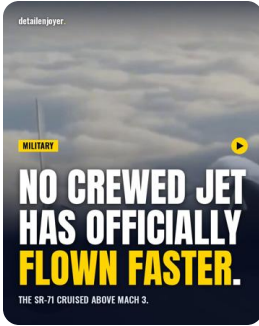
REEL VS. RECORD

- **Note:** 'Each bomber costing approximately \$2,000,000,000': fair as an average including development (\$2.13 billion). I'd note the cost to build one more aircraft was estimated at about \$737 million in 1997 dollars.

SOURCES

1. Wikipedia: Northrop B-2 Spirit: https://en.wikipedia.org/wiki/Northrop_B-2_Spirit

Permalink: <https://detailenjoyer.com/case/2-billion-dollar-b2/> · Last updated Aug 10, 2024



BLACKBIRD

The Lockheed SR-71 'Blackbird' is a retired long-range, high-altitude, Mach 3+ strategic reconnaissance aircraft developed in the 1960s by Lockheed's Skunk Works from the earlier A-12. It first flew in 1964 and was operated by the US Air Force. Its standard tactic against surface-to-air missiles was to accelerate and outrun them, and no SR-71 was lost to enemy fire. It set the absolute speed record for an air-breathing crewed aircraft, 3,529.6 km/h (2,193.2 mph), in 1976, which still stands. The Air Force retired it in 1998 and NASA flew its last in 1999. The footage shows SR-71s in flight and on the ground, with the presenter.

QUICK FACTS

DD-117-F01

The SR-71 is a retired Mach 3+ reconnaissance aircraft.

DD-117-F02

Lockheed developed it in the 1960s from the A-12.

THE WRITE-UP

Mach 3+. The SR-71 is a retired Mach 3+ reconnaissance aircraft.

Skunk Works. Lockheed developed it in the 1960s from the A-12.

Outrunning missiles. Its tactic was to accelerate away from missiles.

1976 record. It set the air-breathing crewed speed record in 1976.

Retired. The Air Force retired it in 1998; NASA in 1999.

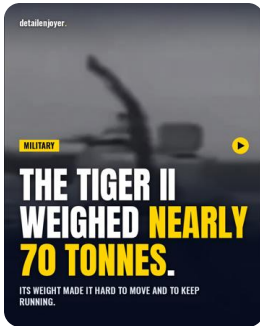
REEL VS. RECORD

- **Note:** None needed.

SOURCES

1. Wikipedia: Lockheed SR-71 Blackbird: https://en.wikipedia.org/wiki/Lockheed_SR-71_Blackbird

Permalink: <https://detailenjoyer.com/case/blackbird/> · Last updated Dec 12, 2023



DD-146 MILITARY / HISTORY · 25 OF 34

KING TIGER

The Tiger II, nicknamed 'King Tiger' by Allied soldiers, was a German heavy tank of the Second World War, used in combat from 1944 to 1945. It weighed about 68 to 70 tonnes and carried the 8.8 cm KwK 43 L/71 gun. Its sloped frontal armor, up to 180 mm thick on the turret, was hard for most Allied tank guns of the time to penetrate from the front. About 490 were built. Its weight strained the engine and drivetrain, which were prone to breakdowns, and it was difficult to transport and to cross many bridges. The footage shows archive and museum images of the Tiger II, with the presenter.

QUICK FACTS

DD-146-F01

The Tiger II was a German heavy tank used 1944-45.

DD-146-F02

It weighed about 68 to 70 tonnes.

THE WRITE-UP

WWII heavy tank. The Tiger II was a German heavy tank used 1944-45.

Weight. It weighed about 68 to 70 tonnes.

Gun. It carried the 8.8 cm KwK 43 L/71.

About 490 built. Production was about 490.

Breakdowns. Its drivetrain was prone to breakdowns.

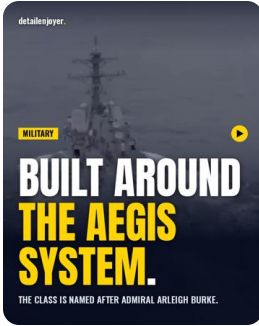
REEL VS. RECORD

- **Note:** None needed. The caption writes the gun as 'KWK 43'; its designation is KwK 43 L/71.

SOURCES

1. Wikipedia: Tiger II: https://en.wikipedia.org/wiki/Tiger_II

Permalink: <https://detailenjoyer.com/case/king-tiger/> · Last updated Dec 27, 2023



DD-147 MILITARY / TECH · 26 OF 34

DESTROYER

The Arleigh Burke class has the longest production run of any U.S. Navy surface combatant, built in successive 'Flights' up to Flight III with the newer AN/SPY-6 radar, and the Navy may procure up to 117 ships in all. Upgrades have also given the class a ballistic-missile-defense role. Its namesake, Admiral Arleigh Burke, led the 'Little Beavers' destroyer squadron in World War II and later served as Chief of Naval Operations.

QUICK FACTS

DD-147-F01

The class is US Navy guided-missile destroyers.

DD-147-F02

USS Arleigh Burke was commissioned in 1991.

THE WRITE-UP

Built in Flights. The class has been built in successive versions: Flight I, Flight II, Flight IIA and Flight III, which introduced the AN/SPY-6 active electronically scanned radar.

Up to 117 ships. The U.S. Navy may procure up to 42 Flight III ships, for an overall total of 117 ships in the class.

Missile defense role. Upgrades to the radar and missiles under the Aegis Ballistic Missile Defense System have given the class anti-ballistic-missile and anti-satellite capability.

The USS Cole attack. USS Cole was damaged on 12 October 2000 while docked in Aden, Yemen, by an attack using a shaped charge.

The Little Beavers. Arleigh Burke's Destroyer Squadron 23, the 'Little Beavers', fought in 22 engagements in four months after covering the Bougainville landings in November 1943.

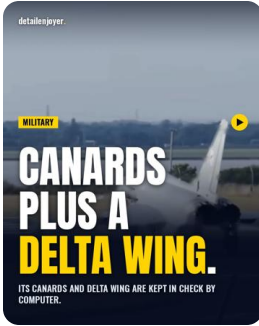
REEL VS. RECORD

- **Note:** None needed.

SOURCES

1. Wikipedia: Arleigh Burke-class destroyer: https://en.wikipedia.org/wiki/Arleigh_Burke-class_destroyer
2. Wikipedia: Arleigh Burke: https://en.wikipedia.org/wiki/Arleigh_Burke

Permalink: <https://detailenjoyer.com/case/destroyer/> · Last updated Dec 28, 2023



TYPHOON

The Eurofighter Typhoon is a twin-engine multirole fighter built by a consortium of Airbus, BAE Systems and Leonardo. It first flew in 1994 and entered service in 2003. It uses a canard-delta layout, with small foreplanes (canards) ahead of a delta wing. The design is aerodynamically unstable, and a digital fly-by-wire system keeps it under control, which gives the aircraft high agility. It's flown by Germany, the UK, Italy, Spain and Austria, and also by Saudi Arabia, Oman, Kuwait and Qatar. The footage shows Typhoons in flight and on the ground, with the presenter.

QUICK FACTS

DD-148-F01

It's built by Airbus, BAE Systems and Leonardo.

DD-148-F02

It first flew in 1994.

THE WRITE-UP

Consortium. It's built by Airbus, BAE Systems and Leonardo.

1994. It first flew in 1994.

2003. It entered service in 2003.

Canard-delta. Canards sit ahead of a delta wing.

Fly-by-wire. Computers keep the unstable design under control.

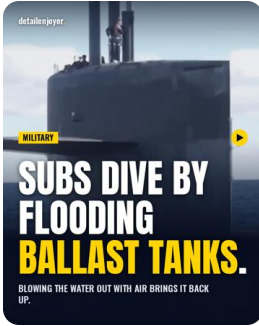
REEL VS. RECORD

- **Note:** 'Used by several European countries': it's also flown by Saudi Arabia, Oman, Kuwait and Qatar.

SOURCES

1. Wikipedia: Eurofighter Typhoon: https://en.wikipedia.org/wiki/Eurofighter_Typhoon
2. Wikipedia: Canard (aeronautics): [https://en.wikipedia.org/wiki/Canard_\(aeronautics\)](https://en.wikipedia.org/wiki/Canard_(aeronautics))

Permalink: <https://detailenjoyer.com/case/typhoon/> · Last updated Dec 28, 2023



SUBS

A submarine controls its buoyancy with ballast tanks. Flooding the main ballast tanks with seawater makes the boat heavier than the water it displaces, so it submerges; blowing the water out with compressed air makes it lighter, so it surfaces. Smaller trim tanks and the boat's diving planes fine-tune its depth and balance underwater. Submarines are used by navies for patrol, reconnaissance and deterrence, and research submersibles explore the deep sea. The first submarine to sink an enemy warship was the Confederate H. L. Hunley, in 1864. The footage shows submarines surfacing and underway, with the presenter.

QUICK FACTS

DD-149-F01

Submarines dive by flooding ballast tanks.

DD-149-F02

Blowing the tanks with air brings them up.

THE WRITE-UP

Ballast tanks. Submarines dive by flooding ballast tanks.

Compressed air. Blowing the tanks with air brings them up.

Trim and planes. Trim tanks and diving planes fine-tune depth.

Uses. Navies use submarines for patrol and deterrence.

1864. The H. L. Hunley sank a warship in 1864.

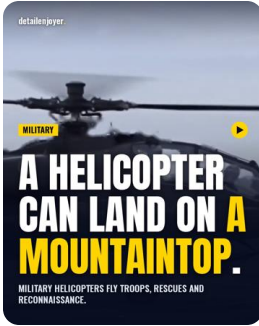
REEL VS. RECORD

- **Note:** 'Travel silently': submarines are designed to be very quiet, not completely silent.

SOURCES

1. Wikipedia: Submarine: <https://en.wikipedia.org/wiki/Submarine>
2. Wikipedia: Ballast tank: https://en.wikipedia.org/wiki/Ballast_tank
3. Wikipedia: H. L. Hunley (submarine): [https://en.wikipedia.org/wiki/H._L._Hunley_\(submarine\)](https://en.wikipedia.org/wiki/H._L._Hunley_(submarine))

Permalink: <https://detailenjoyer.com/case/subs/> · Last updated Dec 29, 2023



HELO

Military helicopters fill many roles, including troop transport, reconnaissance, search and rescue, medical evacuation and close air support, because they can hover and land almost anywhere. The Boeing AH-64 Apache is a US attack helicopter that first flew in 1975 and entered service with the US Army in 1986; it is also flown by many other countries. A pinnacle landing is a standard helicopter technique for landing on a peak, ridge or other elevated spot where wind and limited space make the approach harder. It's taught to helicopter pilots generally, not only Apache crews. The footage shows Apaches and other military helicopters, with the presenter.

QUICK FACTS

DD-150-F01

Military helicopters carry troops, rescue people and scout.

DD-150-F02

The AH-64 Apache is a US attack helicopter.

THE WRITE-UP

Many roles. Military helicopters carry troops, rescue people and scout.

Apache. The AH-64 Apache is a US attack helicopter.

1975 and 1986. It first flew in 1975 and entered service in 1986.

Pinnacle landing. A pinnacle landing sets down on a peak or ridge.

Common skill. Many helicopter pilots train for pinnacle landings.

REEL VS. RECORD

- **Note:** 'The Boeing AH-64 Apache ... can perform the Pinnacle landing maneuver': it's a general helicopter technique, not a feature unique to the Apache.

SOURCES

1. Wikipedia: Military helicopter: https://en.wikipedia.org/wiki/Military_helicopter
2. Wikipedia: Boeing AH-64 Apache: https://en.wikipedia.org/wiki/Boeing_AH-64_Apache

Permalink: <https://detailenjoyer.com/case/helo/> · Last updated Dec 29, 2023



RAILGUNS

A railgun is an electromagnetic launcher. A very large electric current runs up one rail, through a conductive projectile or armature, and back down the other rail; the magnetic field this creates pushes the projectile along the rails at very high speed. Conventional guns use chemical propellant instead. The US Navy researched railguns for years and tested prototypes, but paused its program in 2021. Japan's defense agency reported test-firing a railgun from a ship in 2023. Problems include rail wear and the huge power the guns need. The footage shows railgun tests and launches, with the presenter.

QUICK FACTS

DD-151-F01

A railgun is an electromagnetic launcher.

DD-151-F02

Current runs through rails and the projectile.

THE WRITE-UP

Electromagnetic. A railgun is an electromagnetic launcher.

Two rails. Current runs through rails and the projectile.

No propellant. It uses magnetic force, not chemical propellant.

US Navy pause. The US Navy paused its railgun program in 2021.

Japan test. Japan reported a ship-based test in 2023.

REEL VS. RECORD

- **Note:** None needed. The caption's ending ('forward with tremendous') is cut off in the frames I saw.

SOURCES

1. Wikipedia: Railgun: <https://en.wikipedia.org/wiki/Railgun>

Permalink: <https://detailenjoyer.com/case/railguns/> · Last updated Dec 30, 2023



DD-152 MILITARY / TECH · 31 OF 34

SAMS

A surface-to-air missile (SAM) is launched from the ground or a ship to destroy aircraft, helicopters, drones or other missiles. Guidance varies: some SAMs ride a radar beam or home on radar energy reflected from the target, some home on infrared (heat), and some combine methods. Systems range from shoulder-fired missiles such as the Stinger to long-range systems such as the Patriot and S-400. SAMs were first used in combat in the Second World War era and became widespread during the Cold War. The footage shows SAM launchers and launches, with the presenter.

QUICK FACTS

DD-152-F01

SAMs are launched from the ground or ships.

DD-152-F02

They target aircraft, drones and missiles.

THE WRITE-UP

Ground-launched. SAMs are launched from the ground or ships.

Targets. They target aircraft, drones and missiles.

Radar. Some home on radar energy.

Infrared. Some home on heat.

Range of sizes. They range from shoulder-fired to long-range.

REEL VS. RECORD

- **Note:** 'Targeting and intercepting ... helicopters and airplanes': SAMs are also used against drones and missiles.

SOURCES

1. Wikipedia: Surface-to-air missile: https://en.wikipedia.org/wiki/Surface-to-air_missile

Permalink: <https://detailenjoyer.com/case/sams/> · Last updated Dec 30, 2023



DD-083 MILITARY / HISTORY · 32 OF 34

THE ATOMIC GUN

The Davy Crockett was a U.S. tactical nuclear weapon system of the Cold War: a recoilless rifle that fired the M388 nuclear projectile. Its W54 warhead had a yield of roughly 10 to 20 tons of TNT, tiny for a nuclear weapon. It was deployed with U.S. Army units, including in West Germany, from 1961 until it was withdrawn by 1971.

QUICK FACTS

DD-083-F01

It was a recoilless rifle.

DD-083-F02

It fired the M388.

THE WRITE-UP

System. It was a recoilless rifle.

Projectile. It fired the M388.

Yield. About 10 to 20 tons of TNT.

Deployed. It entered service in 1961.

Withdrawn. It was withdrawn by 1971.

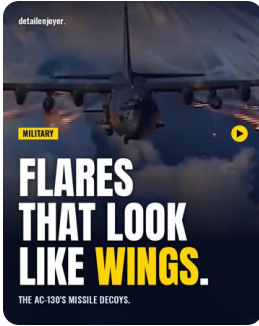
REEL VS. RECORD

- **Note:** The Reel calls the projectile the 'Atomic Hand Grenade'; I could not confirm that nickname.

SOURCES

1. Wikipedia: Davy Crockett (nuclear device): [https://en.wikipedia.org/wiki/Davy_Crockett_\(nuclear_device\)](https://en.wikipedia.org/wiki/Davy_Crockett_(nuclear_device))
2. Wikipedia: W54: <https://en.wikipedia.org/wiki/W54>

Permalink: <https://detailenjoyer.com/case/the-atomic-gun/> · Last updated Nov 16, 2023



DD-436 MILITARY · 33 OF 34

ANGEL OF DEATH

The Lockheed AC-130 is a heavily armed ground-attack variant of the C-130 Hercules transport, first used by the U.S. Air Force during the Vietnam War in the late 1960s. Like many military aircraft, it carries flares, pyrotechnic decoys that burn hot to draw infrared-guided missiles away. Released in symmetric patterns, the flare trails can resemble wings, a display sometimes called angel flares. The footage shows an AC-130 releasing flares.

QUICK FACTS

DD-436-F01

Ground-attack C-130 variant.

DD-436-F02

Late 1960s, Vietnam War.

THE WRITE-UP

Aircraft. Ground-attack C-130 variant.

Era. Late 1960s, Vietnam War.

Flares. Decoy heat-seeking missiles.

Pattern. Can resemble wings.

Operator. U.S. Air Force.

REEL VS. RECORD

- **Note:** None needed.

SOURCES

1. Wikipedia: Lockheed AC-130: https://en.wikipedia.org/wiki/Lockheed_AC-130
2. Wikipedia: Flare (countermeasure): [https://en.wikipedia.org/wiki/Flare_\(countermeasure\)](https://en.wikipedia.org/wiki/Flare_(countermeasure))

Permalink: <https://detailenjoyer.com/case/angel-of-death/> · Last updated Dec 21, 2024



DD-411 MILITARY · 34 OF 34

TANKING RAILWAYS

Armies often move tanks over long distances by rail, loading them onto heavy-duty flatcars and securing them with chains, straps and wheel or track chocks. Rail moves many vehicles at once, saves wear on the tanks and roads and costs less than moving each one separately; it is used for deployments, exercises and transfers between bases. The footage shows tanks on rail flatcars.

QUICK FACTS

DD-411-F01

Heavy-duty flatcars.

DD-411-F02

Chains and chocks.

THE WRITE-UP

Cars. Heavy-duty flatcars.

Securing. Chains and chocks.

Capacity. Many tanks at once.

Uses. Deployments and exercises.

Savings. Less wear and cost.

REEL VS. RECORD

- **Note:** None needed.

SOURCES

1. Wikipedia: Flatcar: <https://en.wikipedia.org/wiki/Flatcar>

Permalink: <https://detailenjoyer.com/case/tanking-railways/> · Last updated Dec 7, 2024

COLLECTION QUIZ

Test Your Knowledge: 68 questions from The Arsenal. Answers are on the next page.

1. How much did Atomic Annie, the M65 280mm Atomic Cannon, weigh? (DD-004 · Atomic Annie)

- A. 8 tons
- B. 30 tons
- C. 83 tons
- D. 250 tons

2. On what date did Atomic Annie fire its nuclear shell in the Grable test? (DD-004 · Atomic Annie)

- A. May 25, 1953
- B. July 16, 1945
- C. August 6, 1945
- D. October 30, 1961

3. Where was the Cannikin test conducted? (DD-026 · Cannikin Quake)

- A. Nevada Test Site
- B. Bikini Atoll
- C. Amchitka Island, Alaska
- D. White Sands, New Mexico

4. What was Cannikin's approximate yield? (DD-026 · Cannikin Quake)

- A. 15 kilotons
- B. About 1 megaton
- C. Just under 5 megatons
- D. 50 megatons

5. What does EKV stand for? (DD-011 · EKV: Exoatmospheric Kill Vehicle)

- A. Explosive Kinetic Vehicle
- B. Exoatmospheric Kill Vehicle
- C. Extended Kill Vector
- D. Exo-Kinetic Validator

6. How does the EKV destroy a warhead? (DD-011 · EKV: Exoatmospheric Kill Vehicle)

- A. A large explosive charge
- B. A laser
- C. A direct high-speed collision
- D. An electromagnetic pulse

7. What are the three main parts of a typical mortar? (DD-021 · Mobile Mortars)

- A. Barrel, bipod and baseplate
- B. Barrel, breech and recoil spring
- C. Tube, tripod and trigger housing
- D. Barrel, turret and tracks

8. In drop-fire mode, what actually fires a mortar round? (DD-021 · Mobile Mortars)

- A. A crew member pulls a lanyard on the breech
- B. The round hits a fixed firing pin at the bottom of the tube
- C. An electric igniter wired to a battery
- D. A slow-burning fuse lit by hand

9. What does EMALS stand for? (DD-025 · Sending EMALS)

- A. Electronic Missile Alert and Launch System
- B. Electromagnetic Aircraft Launch System
- C. Emergency Marine Air Lift System
- D. Electric Motor Arrested Landing System

10. Which U.S. carriers use EMALS? (DD-025 · Sending EMALS)

- A. All of them
- B. Only the Ford class
- C. Only the Nimitz class
- D. None yet

11. What is the B-1 Lancer's nickname? (DD-036 · Supersonic Striker)

- A. The Bone
- B. The Buff
- C. The Warthog
- D. The Spirit

12. When did the B-1B reach initial operating capability? (DD-036 · Supersonic Striker)

- A. 1974
- B. 1986
- C. 1997
- D. 2005

13. What speed was the XB-70 designed to cruise at? (DD-048 · XB-70 Valkyrie)

- A. Mach 1
- B. Mach 2
- C. Mach 3
- D. Mach 5

14. What helped kill the B-70 bomber program? (DD-048 · XB-70 Valkyrie)

- A. Stealth aircraft
- B. Surface-to-air missiles and ICBMs
- C. A fuel shortage
- D. A treaty ban

15. When was Anduril founded? (DD-727 · Anduril)

- A. 1999
- B. 2010
- C. 2017
- D. 2023

16. What does Lattice do? (DD-727 · Anduril)

- A. Builds jets
- B. Fuses sensor data into one picture
- C. Makes VR headsets
- D. Prints circuit boards

17. What was the name of Bethlehem Steel's earliest predecessor, formed in 1857? (DD-010 · Bethlehem Steel)

- A. Saucona Iron Company
- B. Carnegie Steel
- C. Lehigh Iron Works
- D. Pittsburgh Forge

18. What 1908 Bethlehem product made the skyscraper age possible? (DD-010 · Bethlehem Steel)

- A. Stainless steel
- B. The wide-flange structural beam
- C. Steel cable
- D. Rebar

19. What two types of hypersonic weapons does CRS describe? (DD-059 · Hypersonic Missiles)

- A. Boost-glide and scramjet cruise
- B. Drones and shells
- C. Torpedoes and mines
- D. Lasers and railguns

20. What distinguishes a hypersonic glide vehicle from a ballistic warhead? (DD-059 · Hypersonic

Missiles)

- A. Higher speed
- B. Ability to maneuver
- C. Larger size
- D. Nuclear-only

21. When did Iran publicize a large underground missile facility? (DD-733 · Iranian Missile Cities)

- A. March 2025
- B. 1979
- C. 2010
- D. January 2026

22. Who uses the term 'missile cities'? (DD-733 · Iranian Missile Cities)

- A. The IRGC, in its publicity
- B. NATO
- C. The UN
- D. NASA

23. What caliber is the NORA-B52's gun? (DD-736 · Shoot-and-Scoot)

- A. 105 mm
- B. 122 mm
- C. 155 mm
- D. 203 mm

24. How many rounds does the NG's autoloader hold? (DD-736 · Shoot-and-Scoot)

- A. 6
- B. 12
- C. 30
- D. 100

25. When did the B-52 first fly? (DD-708 · B52 Stratofortress)

- A. 1945
- B. 1952
- C. 1955
- D. 1962

26. How many engines does a B-52 have? (DD-708 · B52 Stratofortress)

- A. Four
- B. Six
- C. Eight
- D. Ten

27. What does EMALS replace? (DD-710 · USS Gerald R. Ford)

- A. Steam catapults
- B. Arresting wires
- C. Jet engines
- D. Radar

28. Roughly how much electrical generating capacity does Ford have compared with a Nimitz carrier, per CRS? (DD-710 · USS Gerald R. Ford)

- A. About the same
- B. About 1.5 times
- C. About 3 times
- D. About 10 times

29. In what year did the first air-to-air refueling take place? (DD-711 · Gassed Up...Way Up)

- A. 1903
- B. 1923
- C. 1949
- D. 1955

30. Which method does the US Air Force mainly use? (DD-711 · Gassed Up...Way Up)

- A. Flying boom
- B. Probe and drogue
- C. Wing-to-wing hose
- D. Drop tanks

31. What effect lets an ekranoplan fly so efficiently? (DD-704 · Ekranoplan)

- A. Ground effect
- B. Coriolis effect
- C. Doppler effect
- D. Venturi effect

32. How many Lun-class craft were completed? (DD-704 · Ekranoplan)

- A. One
- B. Three
- C. Eight
- D. Twenty

33. Who is the prime contractor for Trident II D5? (DD-627 · Ballistic Trident)

- A. Lockheed Martin
- B. Boeing
- C. BAE Systems
- D. Raytheon

34. When was the D5 first deployed? (DD-627 · Ballistic Trident)

- A. 1990
- B. 1965
- C. 1978
- D. 2005

35. When was Northrop Aircraft founded? (DD-604 · Northrop Grumman)

- A. 1939
- B. 1909
- C. 1969
- D. 1994

36. Which company merged with Northrop in 1994? (DD-604 · Northrop Grumman)

- A. Grumman
- B. Boeing
- C. Lockheed
- D. Douglas

37. Which company leads Iron Dome development? (DD-606 · The Iron Dome)

- A. Rafael
- B. Lockheed Martin
- C. Elbit
- D. Thales

38. When was Iron Dome declared operational? (DD-606 · The Iron Dome)

- A. March 2011
- B. March 2001
- C. March 2016
- D. March 2021

39. How did an Aerocycle pilot steer? (DD-584 · Flying Bike)

- A. By shifting his weight
- B. With a steering wheel
- C. With foot pedals only
- D. By radio control

40. What powered the Aerocycle? (DD-584 · Flying Bike)

- A. A Mercury outboard motor
- B. A jet engine
- C. An electric motor
- D. A motorcycle engine

41. How did Duga see beyond the horizon? (DD-592 · Duga)

- A. By bouncing signals off the ionosphere
- B. With satellites
- C. By listening for sound waves
- D. With lasers

42. When did Duga-1 operate? (DD-592 · Duga)

- A. 1976 to 1989
- B. 1945 to 1953
- C. 1991 to 2000
- D. 1962 to 1964

43. What was Raytheon called when it was founded in 1922? (DD-621 · Raytheon)

- A. The American Appliance Company
- B. United Technologies
- C. General Radio
- D. Hughes Aircraft

44. What was the original Raytheon product? (DD-621 · Raytheon)

- A. A rectifier tube for radios
- B. A missile
- C. A jet engine
- D. A refrigerator

45. What helps the B-2 evade radar? (DD-295 · 2-Billion Dollar B=2)

- A. Its flying-wing shape
- B. Its speed
- C. Its paint color only
- D. Its size

46. When did the B-2 first fly publicly? (DD-295 · 2-Billion Dollar B=2)

- A. 1989
- B. 1969
- C. 2009
- D. 1979

47. How fast could the SR-71 fly? (DD-117 · Blackbird)

- A. Mach 3+
- B. Mach 1
- C. Mach 10
- D. Subsonic

48. Who built it? (DD-117 · Blackbird)

- A. Lockheed
- B. Boeing
- C. Airbus
- D. Sukhoi

49. Which army used the Tiger II? (DD-146 · King Tiger)

- A. Germany's
- B. Britain's
- C. Japan's
- D. Italy's

50. About how much did it weigh? (DD-146 · King Tiger)

- A. 68 to 70 tonnes
- B. 7 tonnes
- C. 200 tonnes
- D. 20 tonnes

51. Which navy operates the Arleigh Burke class? (DD-147 · Destroyer)

- A. The US Navy
- B. The Royal Navy
- C. The French Navy
- D. The Indian Navy

52. When was the lead ship commissioned? (DD-147 · Destroyer)

- A. 1991
- B. 1945
- C. 2015
- D. 1960

53. Who builds the Typhoon? (DD-148 · Typhoon)

- A. Airbus, BAE Systems and Leonardo
- B. Boeing alone
- C. Sukhoi
- D. Embraer

54. When did it first fly? (DD-148 · Typhoon)

- A. 1994
- B. 1964
- C. 2014
- D. 1984

55. How does a submarine dive? (DD-149 · Subs)

- A. It floods its ballast tanks
- B. It drops an anchor
- C. It shuts its engine
- D. It deflates

56. How does it surface? (DD-149 · Subs)

- A. Blows water out with compressed air
- B. Pumps in oil
- C. Releases its crew
- D. Opens the hatch

57. Why are helicopters so versatile? (DD-150 · Helo)

- A. They can hover and land almost anywhere
- B. They fly faster than jets
- C. They need no pilots
- D. They float

58. What kind of helicopter is the Apache? (DD-150 · Helo)

- A. Attack
- B. Cargo
- C. Firefighting
- D. Airliner

59. What drives a railgun projectile? (DD-151 · Railguns)

- A. Electromagnetic force
- B. Gunpowder
- C. Compressed air
- D. A spring

60. What does the current flow through? (DD-151 · Railguns)

- A. Two rails and the projectile
- B. A rubber band
- C. Water
- D. A fuse

61. Where are SAMs launched from? (DD-152 · SAMs)

- A. The ground or ships
- B. Satellites
- C. Submarines only
- D. Airplanes only

62. What can SAMs target? (DD-152 · SAMs)

- A. Aircraft, drones and missiles
- B. Only tanks
- C. Only ships
- D. Only satellites

63. What kind of weapon was the Davy Crockett? (DD-083 · The Atomic Gun)

- A. A recoilless rifle
- B. A missile
- C. A bomber
- D. A mine

64. What did it fire? (DD-083 · The Atomic Gun)

- A. The M388 projectile
- B. A torpedo
- C. A rocket
- D. Shells only

65. What aircraft is the AC-130 based on? (DD-436 · Angel of Death)

- A. C-130 Hercules
- B. B-52
- C. F-16
- D. Boeing 747

66. What do flares decoy? (DD-436 · Angel of Death)

- A. Heat-seeking missiles
- B. Radar only
- C. Birds
- D. Drones

67. What rail car carries tanks? (DD-411 · Tanking Railways)

- A. Flatcar
- B. Boxcar
- C. Tank car
- D. Sleeper

68. How are they secured? (DD-411 · Tanking Railways)

- A. Chains and chocks
- B. Glue
- C. Magnets
- D. Rope only

ANSWER KEY

1. **C. 83 tons** Now You Know: Atomic Annie weighed 83 tons. *(DD-004)*
2. **A. May 25, 1953** Now You Know: The Grable test took place on May 25, 1953, in Nevada. *(DD-004)*
3. **C. Amchitka Island, Alaska** Now You Know: Cannikin was fired beneath Amchitka Island in the Aleutians on November 6, 1971. *(DD-026)*
4. **C. Just under 5 megatons** Now You Know: The official yield was 'less than five megatons', the largest U.S. underground test. *(DD-026)*
5. **B. Exoatmospheric Kill Vehicle** Now You Know: Exoatmospheric Kill Vehicle, the intercept part of the Ground-Based Interceptor. *(DD-011)*
6. **C. A direct high-speed collision** Now You Know: It's 'hit-to-kill': no warhead, just the force of the collision. *(DD-011)*
7. **A. Barrel, bipod and baseplate** Now You Know: A mortar is a barrel (tube) on a bipod, seated in a baseplate that pushes the recoil into the ground. *(DD-021)*
8. **B. The round hits a fixed firing pin at the bottom of the tube** Now You Know: The round slides tail-first down the tube and hits a fixed firing pin, which sets off its ignition cartridge. *(DD-021)*
9. **B. Electromagnetic Aircraft Launch System** Now You Know: EMALS is the Electromagnetic Aircraft Launch System, built for Ford-class carriers. *(DD-025)*
10. **B. Only the Ford class** Now You Know: USS Gerald R. Ford (CVN 78) and later Ford-class carriers have EMALS. Nimitz-class carriers use steam. *(DD-025)*
11. **A. The Bone** Now You Know: An early newspaper wrote 'B-ONE' without the hyphen, and it stuck. *(DD-036)*
12. **B. 1986** Now You Know: IOC was October 1, 1986, on nuclear alert. *(DD-036)*
13. **C. Mach 3** Now You Know: It was designed to fly the whole mission at Mach 3. *(DD-048)*
14. **B. Surface-to-air missiles and ICBMs** Now You Know: A high-flying bomber no longer looked survivable. *(DD-048)*
15. **C. 2017** Now You Know: It was incorporated on April 20, 2017. *(DD-727)*
16. **B. Fuses sensor data into one picture** Now You Know: It's the software at the core of Anduril's products. *(DD-727)*
17. **A. Saucona Iron Company** Now You Know: The Saucona Iron Company was formed in South Bethlehem, PA, in 1857. *(DD-010)*
18. **B. The wide-flange structural beam** Now You Know: Its Grey mill rolled the nation's first wide-flange structural sections. *(DD-010)*
19. **A. Boost-glide and scramjet cruise** Now You Know: Glide vehicles ride a rocket booster; cruise missiles use scramjets. *(DD-059)*
20. **B. Ability to maneuver** Now You Know: Ballistic warheads also exceed Mach 5. *(DD-059)*
21. **A. March 2025** Now You Know: State media released video on March 25, 2025. *(DD-733)*

22. **A. The IRGC, in its publicity** Now You Know: It's the IRGC's own term. *(DD-733)*
23. **C. 155 mm** Now You Know: 155 mm, with a 52-caliber barrel. *(DD-736)*
24. **C. 30** Now You Know: 30 rounds, plus 6 stowed on the vehicle. *(DD-736)*
25. **B. 1952** Now You Know: April 15, 1952, as the YB-52. *(DD-708)*
26. **C. Eight** Now You Know: Eight, in four paired pods. *(DD-708)*
27. **A. Steam catapults** Now You Know: Its linear electric motors replace steam catapults. *(DD-710)*
28. **C. About 3 times** Now You Know: About three times. *(DD-710)*
29. **B. 1923** Now You Know: June 27, 1923, over San Diego. *(DD-711)*
30. **A. Flying boom** Now You Know: The flying boom. *(DD-711)*
31. **A. Ground effect** Now You Know: A cushion of air between the wing and the surface. *(DD-704)*
32. **A. One** Now You Know: Only MD-160. *(DD-704)*
33. **A. Lockheed Martin** Now You Know: Lockheed Martin builds it for the U.S. Navy. *(DD-627)*
34. **A. 1990** Now You Know: 1990. *(DD-627)*
35. **A. 1939** Now You Know: In Hawthorne, California. *(DD-604)*
36. **A. Grumman** Now You Know: The combined company became Northrop Grumman. *(DD-604)*
37. **A. Rafael** Now You Know: With Israel Aerospace Industries. *(DD-606)*
38. **A. March 2011** Now You Know: Near Beersheba, on March 27, 2011. *(DD-606)*
39. **A. By shifting his weight** Now You Know: An idea called kinesthetic control. *(DD-584)*
40. **A. A Mercury outboard motor** Now You Know: It made 40 horsepower. *(DD-584)*
41. **A. By bouncing signals off the ionosphere** Now You Know: That's over-the-horizon radar. *(DD-592)*
42. **A. 1976 to 1989** Now You Know: It went silent in December 1989. *(DD-592)*
43. **A. The American Appliance Company** Now You Know: In Cambridge, Massachusetts. *(DD-621)*
44. **A. A rectifier tube for radios** Now You Know: It let radios run on household current. *(DD-621)*
45. **A. Its flying-wing shape** Now You Know: It minimizes radar cross-section. *(DD-295)*
46. **A. 1989** Now You Know: It was revealed in 1988. *(DD-295)*
47. **A. Mach 3+** Now You Know: Over three times the speed of sound. *(DD-117)*
48. **A. Lockheed** Now You Know: At the Skunk Works. *(DD-117)*
49. **A. Germany's** Now You Know: In 1944-45. *(DD-146)*
50. **A. 68 to 70 tonnes** Now You Know: Very heavy for its time. *(DD-146)*
51. **A. The US Navy** Now You Know: Guided-missile destroyers. *(DD-147)*
52. **A. 1991** Now You Know: USS Arleigh Burke. *(DD-147)*
53. **A. Airbus, BAE Systems and Leonardo** Now You Know: A European consortium. *(DD-148)*

- 54. **A. 1994** Now You Know: Service began in 2003. *(DD-148)*
- 55. **A. It floods its ballast tanks** Now You Know: It gets heavier. *(DD-149)*
- 56. **A. Blows water out with compressed air** Now You Know: It gets lighter. *(DD-149)*
- 57. **A. They can hover and land almost anywhere** Now You Know: Hover and vertical landing. *(DD-150)*
- 58. **A. Attack** Now You Know: Built for the US Army. *(DD-150)*
- 59. **A. Electromagnetic force** Now You Know: Huge currents. *(DD-151)*
- 60. **A. Two rails and the projectile** Now You Know: A loop. *(DD-151)*
- 61. **A. The ground or ships** Now You Know: Surface to air. *(DD-152)*
- 62. **A. Aircraft, drones and missiles** Now You Know: Air threats. *(DD-152)*
- 63. **A. A recoilless rifle** Now You Know: Fired by a crew. *(DD-083)*
- 64. **A. The M388 projectile** Now You Know: Nuclear. *(DD-083)*
- 65. **A. C-130 Hercules** Now You Know: Transport. *(DD-436)*
- 66. **A. Heat-seeking missiles** Now You Know: Infrared. *(DD-436)*
- 67. **A. Flatcar** Now You Know: Open deck. *(DD-411)*
- 68. **A. Chains and chocks** Now You Know: Tie-downs. *(DD-411)*

NOW YOU KNOW!