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<tr>
<th>Name</th>
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<tr>
<td>Aerolight</td>
<td>“The Aerolight UAV is a close range and training UAV platform. The Aerolight has proven mission training and intelligence UAV applications. In addition to a wheeled conventional take off &amp; landing capabilities, the system can be launched by a catapult and can be recovered by a precision Para-foil recovery system. The system is in use by the Israeli Air Force, the US Navy and additional customers worldwide.”</td>
<td><img src="image" alt="Aerolight UAV" /></td>
<td><a href="http://www.aeronautics-systems.com/aerolight_close_range_uav">http://www.aeronautics-systems.com/aerolight_close_range_uav</a></td>
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<td>Aeryon Scout</td>
<td>“The Aeryon Scout is a vertical take-off and landing (VTOL) micro unmanned aerial vehicle used for tactical, over-the-hill aerial intelligence. Unlike other systems, the Scout puts the control of aerial intelligence directly into the hands of the people on the ground that require the intelligence while delivering the most sophisticated and highest quality aerial intelligence available today”. A touch-screen driven interface allows the controller to fly the aeryon scout beyond the line of sight. Digital video from the flyer is streamed in real time to the Aeryon Scout's command center. Video can also be streamed to any other device – including iPhones, Blackberries or laptops.</td>
<td><img src="image" alt="Aeryon Scout" /></td>
<td><a href="http://www.aeryon.com/products/avs/functionality.html">http://www.aeryon.com/products/avs/functionality.html</a></td>
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<tr>
<td>AH-6 Little Bird</td>
<td>“An unmanned Little Bird helicopter could fly nap-of-the-earth autonomously using software-enabled control (SEC) technology developed for unmanned air vehicles under a US Defense Advanced Research Projects Agency (DARPA) and US Air Force Research Laboratory project. The software enables a UAV to fly low, hugging the terrain, determining safe landing zones using vision-based algorithms and avoiding known and pop-up threats. Boeing's SEC developers are evaluating the Little Bird, based on MD Helicopters' MD530F Maverick; an unmanned variant of the Robinson R22; and the A160 Hummingbird rotary-wing UAV. SEC is a standards-based middleware that could be used for complex mission management. The Boeing Unmanned Little Bird aircraft had flown nearly 100 hours as of January 2005. The goal of a new $1.6 million joint program with the U.S. Army's Aviation Applied Technology Directorate (AATD) during 2005 was to further refine the requirements for safe and accurate unmanned aerial vehicle (UAV) weapons deployment. The Unmanned Little Bird is perfectly suited for doing high risk prototype testing to benefit future UAV systems. The research will enhance the aircraft's ability to perform a wider range of missions suited for UAVs.”</td>
<td><img src="image" alt="AH-6 Little Bird" /></td>
<td><a href="http://www.globalsecurity.org/military/systems/aircraft/amh-6x.htm">http://www.globalsecurity.org/military/systems/aircraft/amh-6x.htm</a></td>
</tr>
<tr>
<td>Boeing X-45A</td>
<td>“The Boeing X-45 unmanned combat air vehicle is a concept demonstrator for a next generation of completely autonomous military aircraft, developed by Boeing's Phantom Works. Manufactured by Boeing Integrated Defense Systems, the X-45 was a part of DARPA's J-UCAS project.” Boeing built two of the model X-45A; both were scaled-down proof-of-concept aircraft. The first was completed by Boeing's Phantom Works in September 2000.[1] The goal of the X-45A technology demonstrator program was to develop the technologies needed to “conduct suppression of enemy air defense missions with unmanned combat air vehicles.”[1] The first generation of unmanned combat air vehicles are primarily planned for air-to-ground roles with defensive air-to-air capabilities coupled with significant remote piloting.”</td>
<td><img src="image" alt="Boeing X-45A" /></td>
<td><a href="http://en.wikipedia.org/wiki/Boeing_X-45A">http://en.wikipedia.org/wiki/Boeing_X-45A</a></td>
</tr>
</tbody>
</table>
### BQM-34 Firebee

“The primary mission of Firebee is to simulate tactical threats by enemy aircraft and missiles for defense readiness training, air-to-air combat training and the development and evaluation of weapons systems. It can fly as fast as Mach 0.97, at levels as low as 10 ft above the sea surface, or at altitudes as high as 60,000 ft. It is capable of performing seven g turns while maintaining high airspeeds for realistic threat presentations. With its high thrust engine, advanced microprocessor flight control system, rugged airframe, and wide assortment of mission augmentation systems, the BQM-34 Firebee is the premier high performance aerial target system in use today. It can be readily modified to meet other special tactical UAV mission needs.”

[http://ww w.as. northropg rumman. com/products/ targets_b qm34/index. html](http://ww w.as. northropg rumman. com/products/ targets_b qm34/index. html)

### BQM-74E

“The BQM-74E is a turbojet-powered aerial target with high performance capabilities. While simulation of enemy anti-ship cruise missiles is the primary mission; others include simulation of aircraft for training naval aviators in air-to-air combat and support of the test and evaluation of new weapon systems.”

“The BQM-74E can carry a variety of internal and wing tip mounted payloads in support of mission requirements. Payloads include passive and active radar augmentation, infrared (IR) flares, electronic countermeasures (ECM), seeker simulators, scoring, IFF, and dual wing tip-mounted tow bodies. The Integrated Avionics Unit, with its integral Inertial Measurement Unit (IMU), Air Data Computer, and Global Position System (GPS), provides a highly accurate navigation solution. Recently incorporated Low Altitude Control Enhancement (LACE II) software allows the vehicle to perform complex, programmable, 3-dimensional maneuvers and operate down to altitudes of 7 feet.”

“The BQM-74E can be used with multiple command and control systems, including the Integrated Target Control System (ITCS), Multiple Aircraft GPS Integrated Command Control (MAGIC2), Vega, and System for Naval Target Control (SNTC). It can be employed in either a manual mode or a pre-programmed (hands off) mode.”

[http://ww w.as. northropg rumman. com/products/ targets_b qm74e/index. html](http://ww w.as. northropg rumman. com/products/ targets_b qm74e/index. html)

### CQ-10 Snowgoose

“USSOCOM selected the CQ-10A SnowGoose to dispense leaflets for Psychological Operations (PSYOPs), deliver small supply bundles to Special Operations Forces, and provide aerial surveillance and communications relay capabilities. The SnowGoose is a powered, programmable, GPS-guided parafoil with modular payload bays that can carry up to six individual payload or fuel bins. It can be ground launched from a HMMWV or air-deployed from a C-130 or C-17 at altitudes up to 25,000 feet. From the ground, it can climb to 18,000 feet. It can carry up to 575 pounds of leaflets, supplies, or other fixed cargo payloads with an endurance of 1-3 hours or it can stay aloft with a 75-pound payload for 14-16 hours. (Note: Endurance is a function of the selection of ground launch or air launch parachute kit, with greater endurance achieved in its ground launch configuration). The SnowGoose is designed to operate with only four operators with a turn-around time of less than four hours between uses. It was originally developed as the Wind Supported Aerial Delivery System (WSADS) and refined in the Air-Launched Extended Range Transporter (ALERT) ACTD. The first flight occurred in April 2001, and IOC was achieved in Jan 2005.”

[http://uavf orum.org factShee ts/CQ-10- SnowGoo se.pdf](http://uavf orum.org factShee ts/CQ-10- SnowGoo se.pdf)
Desert Hawk

*Desert Hawk is a miniature UAV system developed by Lockheed Martin’s Skunk Works group. It is currently part of the US Air Force’s Force Protection Airborne Surveillance System, or FPASS. 20 Desert Hawk systems (out of 48 ordered) are used in Afghanistan by the USAF, to augment the protection of airbase perimeters, searching for suspected vehicles and people with shoulder-fired missiles lurking to attack aircraft. Desert Hawk can fly at altitudes of less than 330 m and can see about 10 kilometers beyond the perimeter of the base.*


Eagle Eye

*The Bell Eagle Eye has the appearance of a conventional aircraft with tilt rotors at the end of each wing that allow it to maneuver up or down and hover. Bell Helicopter Textron Incorporation (BHTI) became involved with the Unmanned Aerial Vehicle (UAV) program by taking the wind tunnel V-22 model, using off the shelf helicopter parts, i.e., engine, drive shafts, gear boxes, etc. and built the Eagle Eye tilt rotor UAV. The Eagle Eye has a wing span of 15.2 ft, is 17.9 ft in length, is 5.7 ft high, and weighs around 2,000 pounds (depending on payload). The first flight test (hover only) were conducted at BHTI facility in Dallas, Texas during the winter/spring of 1992.*

http://www.fas.org/irp/program/collect/eagle-eye.htm

Guardian Griffin

*The Guardian Griffin is a navy built paraglider. “Junior engineers from Naval Surface Warfare Center (NSWC) Dahlgren, Va. …designed, built and tested the UAV”. [The] … system consists of a modified commercial powered ultralight paraglider outfitted with optical cameras, laser designator and a simulated machine gun. "Guardian Griffin UAVs can be launched from trucks, boats, trains, tall structures, ships and aircraft,” said Tom Jean, a Guardian Griffin project mentor who is an NSWC Dahlgren Systems Research and Technology Department engineer.*

http://www.spacewar.com/reports/Successful_Test_Flights_Of_New_Armed_UAV.html

Hermes 450

*“The Elbit Systems Hermes 450 is an Israeli medium size multi-payload unmanned aerial vehicle (UAV) designed for tactical long endurance missions. It has an endurance of over*
Inview (1) Unmanned Aircraft System was developed in 2010 by Barnard Microsystems Limited[2] for use in scientific, commercial and state applications. The InView is a twin engined unmanned aircraft with a “dry” (no fuel on board) weight of just under 20 kg. The twin engine configuration was selected to enable the InView to fly on one engine, should problems be experienced in the other engine. The relatively light weight of this 4m wingspan aircraft and use of composite materials were design goals to reduce the amount of crash damage to a structure, such as an oil or gas pipeline.

The IAI Heron (Machatz-1) is an unmanned aerial vehicle (UAV) developed by the Malat (UAV) division of Israel Aerospace Industries. It is capable of Medium Altitude Long Endurance (MALE) operations of up to 52 hours’ duration at up to 35,000 feet. It has demonstrated 52 hours of continuous flight, but the effective operational maximum flight duration is less, due to payload and flight profile. There is a new version, Heron TP, also known as IAI Eitan: “Heron navigates using an internal GPS receiver, and either a pre-programmed flight profile (in which case the system is fully autonomous from takeoff to landing), manual override from a ground control station, or a combination of both. It can autonomously return to base and land in case of lost communication with the ground station. The system has fully automatic launch and recovery (ALR) and all-weather capabilities. Heron can carry an array of sensors, including infra-red and visible-light surveillance, intelligence systems (COMINT and ELINT) and various radar systems, totaling up to 250 kg (550 lb). The system has fully automatic launch and recovery (ALR) and all-weather capabilities. Heron can carry an array of sensors, including infra-red and visible-light surveillance, intelligence systems (COMINT and ELINT) and various radar systems, totaling up to 250 kg (550 lb). The payload sensors communicate with the ground control station in real-time, using either direct line of sight data link, or via an airborne/satellite relay. Like the navigation system, the payload can also be used in either a fully pre-programmed autonomous mode, or manual real-time remote operation, or a combination of both.”

The IAI Harpy is an unmanned aerial vehicle (UAV) produced by Israel Aerospace Industries. The Harpy is designed to attack radar systems. It carries a high explosive warhead. The Harpy has been sold to several foreign nations, including South Korea, Turkey, India, and China. In 2004, the Harpy became the focus of the effort by the United States to restrict arms transfers and the sales of advanced military technology to China. Sold to China in 1994 for around $US 55 million, the UAVs were returned to Israel in 2004 under contract to be upgraded. The United States demanded that Israel seize the UAVs and nullify the contract. According to the United States, the Harpy contains U.S. technology; according to Israel, the Harpy is an indigenously designed UAV. In 2005, the UAVs were returned to China without being upgraded. This incident rekindled relations between the United States and Israel, with Israel being suspended from its status as Security Cooperative Participant in the Joint Strike Fighter program. As of November 6, 2005, however, Israel has stated that it has been re-admitted into the program.

The IAI Searcher (Meyromit - “Marsh tern” [1], or officially in Israel as the Hugla - “Alectoris”) is a reconnaissance UAV developed in Israel in the 1980s. In the following decade, it replaced the IMI Mastiff and IAI Scout UAVs then in service with the Israeli Army. The Searcher looks almost identical to the Scout and Pioneer, but is in fact scaled up and is well over twice the size of the Scout. The Searcher is powered by a 35 kW (47 hp) piston engine. The new design features updated avionics and sensor systems with greater flight endurance as well as increased redundancy for improved survivability. In addition to Israel, the system had been exported and is currently in use by India, South Korea, Singapore[2], Thailand and Turkey.

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<tr>
<td><strong>J-UCAS X-45C</strong></td>
<td>&quot;The Boeing joint unmanned combat air system X-45 is an unmanned combat air vehicle being developed for strike missions such as Suppression of Enemy Air Defense (SEAD), electronic warfare, and associated operations. The X-45C has a larger payload performance (2,041kg), persistence, and range envelope than the X-45B. The X-45C has a similar fuselage design to that of the X-45B but with a new wing design that gives the X-45C its distinctive arrowhead shaped profile. Boeing began assembly of the first of three X-45C demonstrators in June 2004 and first flight will be in early 2007, to be followed by a two-year operational assessment.&quot;</td>
</tr>
<tr>
<td><strong>Luna x2000</strong></td>
<td>&quot;The LUNA UAV is an autonomous lightweight unmanned powered glider UAV, currently fielded by the German and Norwegian Armies. The Luna is powered by a two-cylinder twin-stroke engine. It is powered by a 6 HP piston engine driving a pusher propeller mounted above the wing. The glider flying capabilities enable Luna to shut the engine and perform unique stealthy glides without an acoustic signature. Another advantage is the use of robust takeoff by bungee catapult and crash-safe parachute landing system using redundant parachute release and impact dampers. Using a 3D digital terrain map model, the aircraft constantly monitors the terrain and known obstacles in its flight path, to avoid collision. The aircraft is programmed to perform automated reconnaissance and surveillance missions, without the need for radio emissions by the ground station. Mission update or active remote control is also available. The vehicle transmits secure real-time images and system data to the ground station via the communications downlink.&quot;</td>
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<tr>
<td><strong>Manta</strong></td>
<td>The Manta is a compact UAV built and distributed by Bae Systems. It has an &quot;Infrared pan/tilt/zoom camera providing long range, low altitude, and live situational awareness capability.&quot; It has a 775 cubic inch payload volume and can hold up to 15 lbs. Its standard weight is 45 lb. It has an 8 hour flight time operation and can operate in the daytime or at night.</td>
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| **MQ-1 Predator** | "The MQ-1 Predator is a medium-altitude, long-endurance, unmanned aircraft system. The Predator's primary missions are close air support, air interdiction, and intelligence, surveillance, and reconnaissance, or ISR. It acts as a Joint Forces Air Component Commander-owned theater asset for reconnaissance, surveillance, and target acquisition in support of the Joint Forces Commander. A fully operational system consists of four aircraft (with sensors and weapons), a ground control station, or GCS, a Predator Primary Satellite Link, or PPSL, and spare equipment along with operations and maintenance crews for deployed 24-hour operations."

"The MQ-1 Predator carries the Multi-spectral Targeting System, or MTS-A, which integrates an infrared sensor, a color/monochrome daylight TV camera, an image-intensified TV camera, a laser designator and a laser illuminator into a single package. The full motion video from each of the imaging sensors can be viewed as separate video streams or fused together. The aircraft can employ two laser-guided AGM-114 Hellfire missiles which possess a highly accurate, low collateral damage, and anti-armor and anti-personnel engagement capability." |
MQ-1C Warrior

“The remotely-piloted General Atomics MQ-1C "Sky Warrior" is part of the ever-growing breed of armed UAV (Unmanned Aerial Vehicle) systems that are being fielded by the United States Army. Recent actions in both Iraq and Afghanistan have finally delivered the need and subsequent technology for such systems and the US Army is actively working to procure such devices for future combat zones. The MQ-1C represents a further development of the failed Predator UAV line and is a larger, armed version of the former but with improved performance capabilities from a new jet-fuel burning diesel engine.

"The MQ-1C was born out of the US Army's 2002 Extended-Range Multi-Purpose (ERMP) UAV program seeking a UAV platform with improved loiter times. General Atomics, already having garnered the required experience with their Predator UAV family line, submitted a revised form in their "Sky Warrior" product. Similarly, a revised version of the IAI (Israeli Aircraft Industries) RQ-5 Hunter UAV was also considered during the evaluation. The General Atomics product was selected as the winner and assigned the designation of "MQ-1C". A contract was drawn up for further development at a taxpayer cost of approximately $214 million dollars with the full program cost expecting to reach $1 billion dollars".

MQ-8 Fire Scout

"Fire Scout has the ability to autonomously take-off from and land on any aviation-capable warship and also at unprepared landing zones close to the forward edge of the battle area (FEBA). It can carry out surveillance, find tactical targets, track and designate targets and provide accurate targeting data to strike platforms such as strike aircraft, helicopters and ships. The UAV is also able to carry out battle damage assessment. The navy is currently using the Pioneer UAV and has 21 Pioneer systems operational on its ships".

MQ-9 Reaper

"The MQ-9 Reaper is a medium-to-high altitude, long endurance unmanned aircraft system. The Reaper's primary missions are close air support, air interdiction, and intelligence, surveillance and reconnaissance, or ISR. It acts as a Joint Forces Air Component Commander-owned theater asset for reconnaissance, surveillance and target acquisition in support of the Joint Forces Commander.

"The MQ-9 baseline system carries the Multi-spectral Targeting System, or MTS-B, which has a robust suite of sensors for targeting. The MTS-B integrates an infrared sensor, a color/monochrome daylight TV camera, an image-intensified TV camera, a laser designator and a laser illuminator into a single package. The full motion video from each of the imaging sensors can be viewed as separate video streams or fused together".

Nano Hummingbird

"AV is developing the Nano Air Vehicle (NAV) under a DARPA sponsored research contract to develop a new class of air vehicle systems capable of indoor and outdoor operation. Employing biological mimicry at an extremely small scale, this unconventional aircraft could someday provide new reconnaissance and surveillance capabilities in urban environments. In tests, the nano has: "Demonstrated precision hover flight, demonstrated hover stability in a wind gust flight which required the aircraft to hover and tolerate a two-meter per second (five miles per hour) wind gust from the side, without drifting downhill more than one meter, demonstrate a continuous hover endurance of eight minutes with no external power source, flown and demonstrated controlled, transition flight from hover to 11 miles per hour fast forward flight and back to hover flight, demonstrated flying from outdoors to indoors, and back outdoors through a normal-size doorway, demonstrated flying indoors 'heads-down' where the pilot operates the aircraft only looking at the live-video image stream from the aircraft, without looking at or hearing the aircraft directly, flown the aircraft in hover and fast forward flight with bird-shaped body and bird-shaped wings"."
NASA Sierra

“The Science Instrumentation Environmental Remote Research Aircraft (SIERRA) is a medium class, medium duration UAS originally designed by the Naval Research Laboratory (NRL). Researchers at the NASA Ames Research Center developed a partnership with NRL to evaluate the utility of this class of aircraft to the NASA earth science community. The relatively large payload (~100bs) coupled with a significant range (500 miles) and small size (20ft wingspan) makes it an attractive observational platform that complements the current suite of modified NASA science aircraft. This UAS conducts very low altitude missions for tropospheric chemistry sampling and remote area surveys such as arctic ice reconnaissance”.

RQ-2 - Pioneer

“The U.S. Navy’s Pioneer was the first tactical battlefield UAV in service with the U.S. armed forces. Israel Aircraft Industries (IAI) began its development in 1984 as an improved derivative of their Scout tactical UAV”.

The RQ-2A is of twin-boom pusher configuration and is powered by a single Sachs & Fichtel SPZ-350 two-cylinder two-stroke piston engine. When deployed on land bases, the UAV can either take off conventionally on its non-retractable tricycle landing gear, or be launched by a catapult or a rocket booster. On U.S. Navy ships, the Pioneer is launched by a Mk 125 MOD 2 solid-propellant rocket booster, giving a thrust of 3.76 kN (859 lb) for 2 seconds. The UAV can either land on a runway using a tailhook to catch an arresting wire, or fly into a recovery net (for ship-board recovery). It is equipped with an autopiolt, an inertial navigation system and a two-way C-band datalink. Although it can fly an autonmous mission, the usual mode of operation is manual remote control using video provided by the datalink. Maximum range of the line-of-sight datalink is 185 km (100 nm). The RQ-2A can be equipped with a wide variety of ATacam payload systems. Typical tasks for the UAV are naval gunfire support, reconnaissance, target acquisition and BDA (Battle Damage Assessment)”.

RQ-3 - Dark Star

“The DarkStar UAV was developed for DARPA’s “Tier III” requirement for a LO-HAE (Low- Observable High-Altitude Endurance) UAV. “Tier III” itself was a downgraded variant of the “Tier III” specification, which called for a larger and more complex vehicle. “Tier III” was abandoned because of too many technological and financial risks. The ACTD (Advanced Concept Technology Demonstration) contract for the “Tier III” UAV was awarded to Lockheed Martin in June 1994. A major subcontractor with a 55% share was Boeing, which was responsible for wing development and production. The first flight was originally intended to occur in October 1995, but was delayed by software problems until March 1996. However, the program was stopped again after the first prototype crashed on take-off for its second flight in April that year because of a control system malfunction leading to pitch-up and stall. In January 1997, the DarkStar was officially designated RQ-3A, and in June 1998, flight testing finally resumed with the second RQ-3A vehicle.

The RQ-3A was a LO flying wing design with a very slightly forward-swept wing and a “flying saucer”-shaped fuselage section. It was powered by a single Williams F129 (Model FJ44-1A) turbofan engine, and could cruise for about 12 hours at an altitude of up to 19800 m (65000 ft). For the planned fully autonomous missions, the DarkStar was equipped with a GPS/INS navigation system, which could be retasked in flight. Communication was done via two-way datalinks (command and control uplink, sensor data downlink), either a wideband line-of-sight link or a J-band SATCOM link. The payload bays in the lower fuselage could accommodate various types of sensors, but the primary options were a Northrop Grumman AN/ZPD 1 TESAR (Tactical Endurance Synthetic Aperture Radar) surveillance radar or a Recon/Optical CA-236 electro-optical camera system”.

RQ-4 - Global Hawk

“The Global Hawk is the U.S. Air Force’s first operational UAV in the HAE (High Altitude Endurance) category. Its development began in 1994, when DARPA issued a request for proposals for their “Tier II+” HAE UAV requirement. In March 1995 an ACTD (Advanced Concept Technology Demonstration) contract was awarded to Teledyne Ryan Aeronautical (now part of Northrop Grumman), and in January 1997, the designation RQ-4A was officially allocated to the Global Hawk UAV. The first of five ACTD vehicles flew for the first time in February 1998. The EMD (Engineering and Manufacturing Development) phase of the program began in March 2001, and in February 2002, low rate initial production was approved.

The RQ-4A is powered by a Rolls-Royce/Allison F137-AD-100 (model AE 3007H) turbofan. It takes off and lands on conventional runways using a retractable tricycle landing gear. The airframe is a typical layout of a high-endurance UAV, and the prominent nose bulge houses the wideband SATCOM antenna of 1.2 m (4 ft) diameter. The vehicle can reach an altitude of 19800 m (65000 ft) and has a maximum endurance of at least 36 (and possibly up to 42) hours. A Global Hawk system consists of two RQ-4A UAVs and two major ground stations, the RQ-2A Mission Control Element (MCE) and the RQ-2B Launch and Recovery Element (LRRE). The LRE is used to load autonomous flight data into the UAV’s GPS/INS navigation system, control the vehicle during take-off and landing, and monitor its flight performance. The MCE personnel controls and monitors the UAV’s sensor systems. Both LRE and MCE can control three RQ-4As simultaneously. The main components of the RQ-4A’s ISS (Integrated Sensor Suite) for its surveillance, reconnaissance and target acquisition missions are SAR/MTI (Synthetic Aperture Radar/Moving Target Indicator) and IR/EOS (Infrared/Electro Optical) sensors. For self-defense, the UAV is equipped with an AN/ALR-69 radar warning receiver and AN/ALQ-131 electronic countermeasures”. http://www.designationsystems.net/dusrm/app2/q-3.html
**RQ-5 - Hunter**

“The Hunter, originally known as JIMPACS (Joint Improved Multimission Payload Aerial Surveillance, Combat Survivable), was based on the Israeli Aircraft Industries (IAI) impact UAV. TRW provided systems integration and management of the Hunter in the USA. In March 1991, the evaluation of Sky Chief and Hunter began. The tasks included "relay flights", in which one vehicle would relay the signals between the ground and another vehicle, which was flying the actual mission. In June 1992, the Hunter was declared the winner of the UAV SR competition, and in February 1993, TRW received a contract for seven complete Hunter systems, with an average of eight vehicles per system. None of the reserved QM149 and QM150 designations was used, however, and Hunter became the BQM-155A instead. The BQM-155A is powered by two Moto Guzzi two-cylinder piston engines. It takes off from normal runways, but booster-assisted zero-length launches are also possible. The major payload items are a combined TV/FLIR (Forward Looking Infrared) sensor, and a data relay system. Mission radius for single vehicle flights is about 150 km (90 nm), which can be extended to 300 km (160 nm) using a second Hunter as airborne relay. Maximum endurance is about 12 hours. The BQM-155A can fly autonomous preprogrammed missions, but can also be controlled from the ground station. The UAV lands like a conventional aircraft (it can optionally use its retractable hook to engage arrestor wires), but a parachute system is available for emergencies.”

[http://www.designation-systems.net/durm/app2/q-14.html](http://www.designation-systems.net/durm/app2/q-14.html)

**RQ-7 - Shadow**

“The Shadow 200 short-range TUAV (Tactical UAV) was developed by AAI Corp. in the 1990s. When the RQ-4 Outrider TUAV ran into continued trouble in the 1997/98 time frame, the U.S. Army decided to conduct a competitive evaluation between the Outrider and Shadow 200 TUAV systems in 1999. The latter was declared winner of this competition, and AAI subsequently received a first LRIP (Low Rate Initial Production) contract to provide Shadow 200 systems for further testing and evaluation. The UAV itself was officially designated RQ-7A. Between April 2001 and late 2002, the RQ-7A (Initial Operational Test & Evaluation) phase of the program was conducted successfully, and in October 2002 the Shadow 200 was approved for full-rate production. The RQ-7A is a twin-boom pusher layout as several other battlefield UAVs, like e.g. the RQ-2 Pioneer and the RQ-5 Hunter. It is powered by a UEL AR-741 rotary engine, and has a non-retractable tricycle landing gear for conventional wheeled take-off and landing. The RQ-7A can also be launched from a catapult and has a tailhook to catch arresting cables for a shorter landing run. A Shadow 200 system consists of four RQ-7A air vehicles and the associated equipment. The latter includes two GCIs (Ground Control Stations), from where the operators have full control over the UAVs and their sensors. Both LOS (Line-Of-Sight) and non-LOS datalinks are provided for command uplink and sensor data downlink. The Shadow 200 UAV can be equipped with a GPS-based navigation system for fully autonomous operations. The UAV’s tasks include day/night reconnaissance, surveillance, target acquisition and BDA (Bomb Damage Assessment). The primary mission payload for the initial (Block 1) RQ-7A production vehicles is an IAI Tamam POP (Plug-In Optronic Payload) IR/EO (Infrared/Electro-Optical) sensor turret, but Block 2 vehicles are planned to use an improved Wescam EO/IR sensor. Other payloads are also under consideration, including a SAR/MTI (Synthetic Aperture Radar/Moving Target Indicator) unit.”

[http://www.designation-systems.net/durm/app2/q-7.html](http://www.designation-systems.net/durm/app2/q-7.html)

**RQ-11 - Raven**

“The operation of a Raven system is effectively identical to Pointer... The Raven UAV weighs about 1.9 kg (4.2 lb), has a flight endurance of 85 minutes and an effective operational radius of about 10 km (6.2 miles). Flying speed is 45-95 km/h (28-60 mph) at typical operating altitude between 30 m and 300 m (100-1000 ft). The RQ-11A can be either remotely controlled from the ground station or fully autonomously controlled from the ground station for completely autonomous missions using GPS waypoint navigation. The UAV can be ordered to immediately return to its launch point simply by pressing a single command button. Standard mission payloads include CCID color video and an infrared camera.”

[http://www.designation-systems.net/durm/app2/q-11.html](http://www.designation-systems.net/durm/app2/q-11.html)

**RQ-14 - Dragon Eye**

“In early 2001, the Naval Research Laboratory and the Marine Corps Warfighting Laboratory designed and built the Dragon Eye hand-launched reconnaissance mini-UAV to fulfill the U.S. Marine Corps’ I-SURSS (Interim Small Unit Remote Scouting System) requirement. Initial tests of prototypes by USMC units occurred in June 2001, and in July that year development and preproduction contracts were awarded to BAI Aerosystems and AeroVironment. After the initial phase of the program was conducted successfully, and in October 2002 the Shadow 200 was approved for full-rate production. The RQ-7A is a twin-boom pusher layout as several other battlefield UAVs, like e.g. the RQ-2 Pioneer and the RQ-5 Hunter. It is powered by a UEL AR-741 rotary engine, and has a non-retractable tricycle landing gear for conventional wheeled take-off and landing. The RQ-7A can also be launched from a catapult and has a tailhook to catch arresting cables for a shorter landing run. A Shadow 200 system consists of four RQ-7A air vehicles and the associated equipment. The latter includes two GCIs (Ground Control Stations), from where the operators have full control over the UAVs and their sensors. Both LOS (Line-Of-Sight) and non-LOS datalinks are provided for command uplink and sensor data downlink. The Shadow 200 UAV can be equipped with a GPS-based navigation system for fully autonomous operations. The UAV’s tasks include day/night reconnaissance, surveillance, target acquisition and BDA (Bomb Damage Assessment). The primary mission payload for the initial (Block 1) RQ-7A production vehicles is an IAI Tamam POP (Plug-In Optronic Payload) IR/EO (Infrared/Electro-Optical) sensor turret, but Block 2 vehicles are planned to use an improved Wescam EO/IR sensor. Other payloads are also under consideration, including a SAR/MTI (Synthetic Aperture Radar/Moving Target Indicator) unit.”

[http://www.designation-systems.net/durm/app2/q-14.html](http://www.designation-systems.net/durm/app2/q-14.html)
RQ15 - Neptune

“The Neptune was developed by DRS Technologies as a Maritime UAV (MUAV), which is specially suited for operations over water. The first flight occurred in January 2002, and in March that year the first production contract was awarded by the U.S. Navy. In early 2007, the UAV was officially designated as RQ-15A. The RQ-15A is a mini-UAV powered by a small piston engine. It is transported in three easy to assemble parts in a container (183 x 76 x 51 cm³, 72” x 30” x 20”), which can be transformed into the pneumatic zero-length launcher. The UAV design is optimized for water landings, using a high-mounted engine and payload/bay protected from water intrusion. Over land, the Neptune can be recovered with a conventional landing or by parachute. The UAV is equipped with a GPS waypoint navigation system for autonomous operation, and a two-way UHF datalink for remote control and sensor data transmission. The datalink is also optimized for over-water operations, having provisions to cope with multiple signal paths caused by water reflections. The operator uses a computer terminal for mission planning, in-flight mission update, sensor management and real-time data observation. The payload is either a color camera or a thermal imaging device”.

RQ16 - T-Hawk

“The Honeywell MAV (Micro Air Vehicle) originated from the DARPA “Organic Air Vehicle” (OAV) program in the early 2000s, which evaluated - among others - ducted-fan VTOL micro-UAV designs of various sites. The prototype of the design that eventually evolved into the RQ-16 made its first tethered flight in January 2005, and the first free flight occurred in June that year. This was followed by an extensive evaluation by the U.S. Army infantry. The air vehicle was also known as G-MAV (the “G” denoting a gasoline engine), and has since been named T-Hawk (short for “Tarantula Hawk”, a wasp species) by Honeywell. The T-Hawk backpackable UAV is to be used at platoon level for short-range surveillance, reconnaissance, target acquisition and battle management. The initial military evaluation focused on the detection of IEDs (Improvised Explosive Devices). The current design features two pods on the outside of the duct, which house flight control electronics, video camera, GPS receiver and radio”.

Sagem Sperwer

“Sperwer unmanned aerial system (UAS) is designed to support Intelligence, Surveillance, Target Acquisition and reconnaissance (ISTAR) at the battlegroup level (brigade to division). The Sperwer system comprises three aerial vehicles, ground control station (GCS), transportable hydraulic catapult and ground data terminal (GDT) housed in the communications shelter carried on high mobility vehicles. The entire system can be transported in two C-130 aircraft and operate from unprepared sites using catapult-launch, and parachute and airbags recovery. The system supports simultaneous control of two aircraft, from a single GCS. Furthermore, several GCSs can control multiple missions, and can hand-over UAVs between each other. The ground station is provided with advanced mission planning tools, including 3D terrain modeling and flight path presentation on a geographical data system, image processing, interpretation and connection to C4I networks and compatibility with NATO datalinks and communications networks. Sperwer is designed to carry the Sagem OLOSP FLIR payload, providing high resolution day and night imagery and target geolocation with an accuracy of 20 meters. Other payloads designed for Sperwer include ELINT, COMINT, communications relay and SAR. The aircraft is equipped with a digital J band datalink (15GHz) and transponder/IFF (Mode 3C) and VHF relay for easy integration in controlled airspace. Sperwer B will be able to carry multiple payloads (EO/IR and SAR or EO/IR and relay etc.) It will also be equipped with two underwing hardpoints, to carry external loads of up to 30kg each. Sagem has already demonstrated the integration of Sperwer B with the SPIKE LR missile and is cooperating with GIAT, to test a new smart munition delivery system, based on the Bonus submunition. According to Sagem, the armed configuration requires the reduction of up to 20 kg of fuel, thus limiting the endurance of the armed Sperwer”.

Scan Eagle

“ScanEagle, developed in partnership with Boeing, is currently in service with the U.S. Department of Defense, the Australian Defence Force, and other allied foreign militaries. Because of its light weight and small system footprint, the ScanEagle UAS has low personnel requirements—only two operators are necessary. Insitu’s aircraft control software is user-friendly, and advanced automatic object tracking technology greatly reduces operator workload.” The scan eagle has: AIS for Maritime Domain Awareness, Heavy Fuel Engine with 32 Hours Endurance, Hush Engine for Reduced Acoustic Signature, Mid Wave IR Sensor for Increased Nighttime Resolution, Mode C Transponder for Aircraft Deconfliction, ROVER Support.
<table>
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<tr>
<th>UAV Type</th>
<th>Description</th>
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<tr>
<td>Sentry HP</td>
<td>“The DRS Sentry HP is a reconnaissance UAV that was developed in the United States in the late 1980s by S-TEC. The program was acquired by Meggitt in 2000 and subsequently by DRS in 2002. Although the aircraft shares the name “Sentry” with a previous S-TEC design, the Sentry HP is a completely different machine, with a broad wing and a v-tail. The Sentry HP is larger, with greater payload capacity and an underwing stores capability. It is powered by a variant of the same engine as the Sentry. It can be ordered with an option for fixed landing gear to permit conventional takeoff and recovery”.</td>
<td><img src="http://en.wikipedia.org/wiki/DRS_Sentry_HP" alt="Sentry HP" /></td>
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<td>SH-60B Seahawk</td>
<td>“The SH-60B is a twin-engined medium lift utility helicopter. It is equipped with a single 4-bladed rotor and a single 4-bladed tail rotor. The basic crew compliment for the SH-60B is three; pilot, co-pilot/ATO (Airborne Tactical Officer), and an enlisted electronic systems operator. The SH-60B was designed as an Anti-Submarine Warfare (ASW), Anti-Surface Warfare (ASUW), Anti-Ship Surveillance and Targeting (ASSIST) support helicopter. In addition, the SH-60B is capable of performing utility missions such as vertical replenishment and communications relay, and as such was developed for operation off of the Navy’s fleet of frigates, destroyers, and cruisers. The Seahawk is equipped with a reward sliding and lockable door on the right side of the cargo compartment. The SH-60B is equipped with an externally mounted 600-pound rescue hoist located on the right-hand side of the airframe. As with the UH-60, the SH-60B is equipped with a centrally mounted external cargo hook rated to 6,000 pounds. External weapons and auxiliary systems are mounted on a pair of weapon pylons mounted aft of the cargo/crew compartment. The right-hand wing will accommodate a single weapon or external fuel tank, while the left-hand pylon will accommodate two weapons”.</td>
<td>![SH-60B Seahawk](<a href="http://tech.military.com/iq/wpme">http://tech.military.com/iq/wpme</a> nt/view/152549/sh-60b-seahawk.html)</td>
<td>[<a href="http://tech.military.com/iq/wpme">http://tech.military.com/iq/wpme</a> nt/view/152549/sh-60b-seahawk.html](<a href="http://tech.military.com/iq/wpme">http://tech.military.com/iq/wpme</a> nt/view/152549/sh-60b-seahawk.html)</td>
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<td>SIDM Sirpa</td>
<td>“The Harfang [1] formerly known as Système interarmes de drone MALE (SIDM, “Interim medium-altitude, long-endurance drone system”) is a drone system used by the French Air Force, supplementing the RQ-5 Hunter. The Harfang drone is an unmanned airplane propelled by a rear-mounted turbo-supercharged water-cooled flat-four engine, driving a pusher propeller. It features a flapped high wing with anti-icing system, and has a twin boom tail with two vertical surfaces. With a take-off mass of 1.2 tonnes, the Harfang can carry a 250-kg payload to height of 7500 metres for a duration of 24 hours. The mission pack is a three-sensor sphere stabilised by gyroscopes mounted under the forward part of the fuselage. It contains optic and IR sensors, a laser designator that doubles as a rangefinder, and a high-resolution, fixed echo suppressing synthetic aperture radar. The radar can be used to observe vehicle movement on the ground under any meteorological condition. The antenna is mounted on the centre of the body. The Harfang carries an inertial measurement unit with GPS recalibration, and a differential GPS that provides for automatic take-off and landing capabilities. In case of loss of communications, the drone follows a path that brings it back to its start point, while trying to re-establish contact. The drone carries an IFF transponder and a flight recorder. The Harfang lacks electromagnetic sensors and is wanting in terms of manoeuvrability. Its limited speed of 80 knots (148 km/h) makes it slow to reach its mission area. It is also limited by bad weather, notably by icing or high humidity conditions”.</td>
<td>![SIDM Sirpa](<a href="http://en.wikipedia.org/wiki/SADS_H">http://en.wikipedia.org/wiki/SADS_H</a> arfang)</td>
<td>[<a href="http://en.wikipedia.org/wiki/SADS_H">http://en.wikipedia.org/wiki/SADS_H</a> arfang](<a href="http://en.wikipedia.org/wiki/SADS_H">http://en.wikipedia.org/wiki/SADS_H</a> arfang)</td>
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<td>Silver Fox</td>
<td>“The Office of Naval Research originally developed the Silver Fox reconnaissance UAV in 2002 to spot whales in naval operating areas to keep them out of harm’s way before beginning a naval exercise. However, in January 2003, the ONR was asked by the Marine Corps to rapidly build Silver Fox systems for use as tactical RISTA (Reconnaissance, Intelligence, Surveillance and Target Acquisition) UAVs for small units. ONR teamed with Advanced Ceramics Research Inc., and within two months the first six Silver Fox UAVs were delivered. The Silver Fox is of modular construction, and is powered by a small model airplane piston engine. It can be equipped with straight wings of various sizes, allowing to trade duration and payload weight for speed or vice versa. The 12 kg (26 lb) UAV can be launched by hand, but normally a compressed-air driven launcher is used. It is equipped with a GPS navigation system to fly fully autonomous missions of up to ten hours duration. The mission is pre-planned using the laptop computer of the ground control station. Operational radius of the baseline UAV is determined by the 37 km (20 nmi) range of the system’s line-of-sight datalink. Typical mission altitude is 150-365 m (500-1200 ft) above ground. The current Silver Fox vehicles are equipped with infrared and high-resolution color zoom video cameras, which send their imagery in real-time to the operator’s display screen. However, the vehicle could also employ other sensors with a weight of up to 1.8 kg (4 lb) in its payload section”.</td>
<td>![Silver Fox](<a href="http://www.designation">http://www.designation</a> systems.net/dusrm/app4/silverfox.html)</td>
<td>[<a href="http://www.designation">http://www.designation</a> systems.net/dusrm/app4/silverfox.html](<a href="http://www.designation">http://www.designation</a> systems.net/dusrm/app4/silverfox.html)</td>
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In June 2000, the Defense Advanced Research Projects Agency (DARPA) awarded the first study contracts for a carrier-based unmanned combat aircraft - labeled UCAV-N (Unmanned Combat Air Vehicle - Naval) - to Northrop Grumman and Boeing. At that time, Northrop Grumman was already privately developing its Pegasus UCAV demonstrator, which was completed in July 2001. In June, it had received the official military designation X-47A (Boeing's UCAV-N was designated as X-46A). The X-47A was extensively tested on the ground during 2001 and 2002 (including taxiing), and the first flight finally occurred on 23 February 2003. The X-47A was a stealth design with no vertical control surfaces, yaw control being achieved by differential movements of surfaces in the wings. The all-composite airframe was powered by a single Pratt & Whitney JT15D turboprop. The vehicle's computer-based control system performed flight control, navigation, mission control and other tasks. The Pegasus was equipped with a U.S. Navy Shipboard Relative GPS navigation system, which would have been necessary for automatic pin-point landings on a moving aircraft carrier deck. On its first flight, the X-47A tested that system by making an exact landing on a pre-designated spot on the runway.

The airframe of the X-47B has not much in common with that of the X-47A. It is significantly larger, has a more powerful P&W F100 turboprop engine, and redesigned outer wing sections and intake/exhaust configurations. The wing extensions provide for longer range and better low-speed characteristics, and are foldable to reduce parking space on the aircraft carrier. The payload capacity for J-UCAS was to be 2040 kg (4500 lb), representing two GBU-31/B JDAM (Joint Direct Attack Munition) GPS/INS-guided bombs. Northrop Grumman was under contract to build two (originally three) X-47Bs, and flight testing, together with the rival Boeing X-45C, was expected to begin in 2007. The J-UCAS development effort was defined in terms of "spirals". The X-45A UCAV demonstrator was "Spiral 0", while the X-45C and X-47B represented "Spiral 1". Later spirals were to further enhance the mission capabilities of the system by integrating more sensor and weapon options. The ultimate goal had been labelled J-UOS (J-UCAS Objective System) by DARPA.