

## **UNMANNED AERIAL VEHICLES**

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**Camcopter**

This Austrian design was widely marketed throughout the civilian world for roles ranging from fire spotting to supplemental camera work in motion picture production and news production. It was originally designed by radio-control hobbyists, but then marketed to the Austrian government, who saw the virtues of the design. Military use included the Austrian military and the US Air Force, who used it to test defenses of airbases. Other users include the limited use by the US Army for urban warfare, the German Army, the Egyptian Navy, the British military, and the US Coast Guard. The Camcopter, as its name suggests, is a mini-copter. There is a small hardpoint under its fuselage, usually equipped with extra sensors, or bomblets or smoke grenades in military use.

Twilight 2000 Notes: During the war, many civilian models were pressed into military and militia use for reconnaissance.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$4,800	G, AvG	8 kg	68 kg	2	4	Image Intensification

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
60	110	5/50	11	1.8	3000

Guidance/Control	Sensors/Equipment	Armament	Takeoff/Landing
GPS, Autonomous Function, Manual Control (Radio Link, 19 km)	Video Camera, Still Camera, Real-Time Camera Link, (Military Only) Secure Radio	1 Hardpoint	6m Primitive Runway

**Epervier**

Notes: This Belgian-made drone is a small, but fast and maneuverable reconnaissance drone used for quick reconnaissance of enemy rear areas, and launched from ships for spotting of shipboard weapons. The vehicle is powered by a small turbojet engine, which can be switched off and on during flight to conserve fuel. When the engine is off, power is supplied by an auxiliary battery. This vehicle is an old design dating from the mid 1970s, which has been continually updated to meet changing needs and technology, including a change from propeller power to jet power for quicker response times.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$10,200	AvG	19.96 kg	142 kg	3	4	FLIR, Image Intensification

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
310	515 (145)	NA 245 8/4 80/40	24	12.4	4000

Guidance/Control	Sensors/Equipment	Takeoff/Landing
Autonomous Function, Autopilot, Manual Control (Radio Link, 93 km)	Video Camera, Still Camera, Real Time Camera Link, Secure Radio	Takeoff: Rail with RATO booster; Landing: Parachute w/Airbag

**Phoenix**

Notes: This British drone is a reasonably typical UAV, except that the engine is mounted in the front instead of having a pusher propeller. This means that the sensors have to be carried in a pod slung below the fuselage, as the forward propeller tends to obstruct the sensor package in a more normal forward-mounted sensor configuration. It is also unusual in that, when it is recovered, parachutes upside down, the shock of impact being taken up by a crushable hump on top of the fuselage. It is mostly made of Kevlar and carbon fiber plastics and is rather a tough little bird.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$12,600	G, AvG	50 kg	175 kg	3	4	FLIR

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
100	170 (70)	NA 80 6/3 60/30	36.5	7.3	2750

Guidance/Control	Sensors/Equipment	Takeoff/Landing
GPS, Autonomic Function, Autopilot, Manual Control (Radio Link, 60 km)	Day/Night Video Camera, Day/Night Still Camera, Real-Time Camera Link, Secure Radio, Armored Body	Takeoff: Catapult; Landing: Parachute

**CL-89**

Notes: The Canadians, and especially the company of Canadair, have proved enthusiastic about UAVs, designing the first one in 1961, the CL-89. However, orders and production did not start until the early 1970s, at first from the US Army, and then from Canada and Germany. The CL-89 was designed for completely autonomous operation, following a preprogrammed course, without human intervention (indeed, the capacity for manual control was not even built into the vehicle). It is launched from a rail on a truck using a RATO booster, and then recovered by parachute, with airbags deploying to soften the landing. They are very fast for UAVs, using a small turbojet engine. The CL-89 has a modular design with components easily replaced by other sensors and equipment packages; a typical package is shown below.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$7,700	AvG	18.14 kg	108 kg	2	4	Passive IR

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
540	960 (320)	NA 460 4/2 40/20	61	92	1000

Guidance/Control	Sensors/Equipment	Takeoff/Landing
Autonomous Function, Homing Beacon	Day Still Camera, Night Still Camera, 6xIllumination Flares	Takeoff: Rail w/RATO; Landing: Parachute

**CL-289**

This was the follow-on to the CL-89, and very quickly replaced that vehicle, with orders from the US Army, Canada, Germany, and France. It is similar to the CL-89, but is larger, and the winglets have a leading edge sweep. There is an alternate sensor package that is quite often used with this vehicle, consisting of a receiver for pilots' survival radios and a relay for them, along with a camera pack. As this version was not taken into service until 1990, it is much more common than the older CL-89.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$15,700	AvG	34.02 kg	220 kg	2	4	Passive IR, Image Intensification

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
525	935 (300)	NA 450 4/2 40/20	92	138	1000

Guidance/Control	Sensors/Equipment	Takeoff/Landing
Autonomous Function, Homing Beacon	Video Camera, Still Camera, 6xIllumination Flares, Secure Radios, Real-Time Video Link	Takeoff: Rail w/RATO; Landing: Parachute

**CL-327 Guardian**

Notes: This is a Canadian drone used by many NATO countries. It is an unusual-looking craft with two mushroom-shaped lobes above and below the rotor blades. It is commonly known as the "Peanut" due to its shape. It is popular with navies due to its small size and footprint, as well as its exceptional handling in high winds and bad weather, and it can also be used from very rough fields and tight forest clearings, or takeoff and land from vehicles as small as a HMMWV. Another user of this vehicle was the US Border Patrol, who purchased 25 of them. The US DEA also purchased a number of them.

Twilight 2000 Notes: During the Twilight War, the Border Patrol Guardians were typically used to monitor Mexican troop movements.

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Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$25,000	AvGas	52 kg	349.27 kg	2	3	FLIR, Radar

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
260	340	20/165	198	32	5485

Guidance/Control	Sensors/Equipment	Takeoff/Landing
GPS, Inertial Navigation, Autopilot, Target Tracking (Lock-on), Manual Control (Radio Link, 220 km)	Synthetic Aperture Radar, ECM, Video/Still Camera, Real-Time Video Link, Secure Radios, Armored Body	4m Primitive Runway

**ASN-206**

Notes: This is one of the few indigenously produced Chinese UAVs. It is a large UAV that is normally air-launched, but can be launched from a rail on the ground using a RATO booster. Missions for the ASN-206 include general reconnaissance, battlefield surveillance, targeting, artillery observation, NBC reconnaissance, and disaster survey. To this end, it carries a wide variety of sensors.

Twilight 2000 Notes: Turkey also used the ASN-206 in small numbers during the Twilight War.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$21,400	G, AvG	50 kg	221.81 kg	3	3	FLIR, Image Intensification

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
160	215 (80)	NA 100 7/4 70/40	175	87.5	5975

Guidance/Control	Sensors/Equipment	Takeoff/Landing
Autopilot, Manual Control (Radio Link, 131 km)	Still Camera, Video Camera, Geiger Counter, Chemical Sniffer	Takeoff: Aircraft drop, rail w/RATO booster; Landing: Parachute

**Sojka III**

Notes: This Czech UAV is one of the few Warsaw Pact drones produced and designed outside of Russia. It is a reconnaissance drone with a secondary role as an EW platform. It is a simple yet powerful solution for battlefield reconnaissance duties.

Twilight 2000 Notes: NATO troops grew to loathe the Sojka III, since the appearance of one over the battlefield usually meant that an attack was imminent, normally by rockets or artillery.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$10,300	G, AvG	30 kg	145 kg	2	2	Image Intensification

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
145	250 (75)	NA 120 6/3 60/30	73	97	2010

Guidance/Control	Sensors/Equipment	Armament	Takeoff/Landing
Autonomous Function, Manual Control (Radio Link, 87 km)	Still Camera, Video Camera, Real-Time Camera Link, Secure Radio, Radio Direction Finder, Radar Homer, SIGINT Gear, Radio Jammer, Radar Jammer	1 Hardpoint	Takeoff: Runway (475m); Landing: Runway (360m); Primitive Runway



**Chacal-2**

Notes: This is a small, quick, agile French drone for use in reconnaissance, target designation and acquisition, and meteorological data acquisition. Despite its small size, the Chacal-2 is packed with sensors, ranging from cameras to a laser designator to weather data sensors. It is small enough for tactical use, yet sophisticated enough for more involved missions. It is also a stealth aircraft; all attempts to use radar or radar homing weapons against it are two levels harder than normal, and all IR attempts against it are one level harder than normal.

Twilight 2000 Notes: The Chacal-2 has the unusual distinction of having never crashed until the first one was shot down during the Twilight War.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$8,000	AvG	20 kg	75 kg	3	4	FLIR, Image Intensification

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
500	890 (100)	NA 425 7/5 70/50	34	34	3050

Guidance/Control	Sensors/Equipment	Takeoff/Landing
Autonomous Function, Autopilot, Manual Control (Radio Link, 44 km), GPS	Still Camera, Video Camera, Real Time Camera Link, Laser Designator, Meteorological Sensors, Secure Radio	Takeoff: Rail launch with RATO boost, Runway (585m); Landing: Parachute, Runway (435m); Primitive Runway

**Crecerelle**

Notes: This drone is used alongside the CL-289, the Hunter, and some other French UAVs in French service. It is a delta-winged vehicle similar in appearance to a small fighter, but with a pusher propeller engine. It is launched from a rail on a truck and recovered by parachute, and has no landing gear. Airbags deploy when landing to soften the impact.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$8,600	G, AvG	34.93 kg	120 kg	3	4	Passive IR, Image Intensification

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
170	305 (120)	NA 145 5/2 50/20	37.4	7.5	3050

Guidance/Control	Sensors/Equipment	Takeoff/Landing
GPS, Autopilot, Manual Control (Radio Link, 90 km)	Video Camera, Still Camera, 6xIR Flares, Real-Time Video Link	Takeoff: Rail w/RATO booster; Landing: Parachute

**Dragon**

Notes: This is an unusual UAV in that it is not used for reconnaissance, but is instead used for jamming of radio and radar. It is thus often carried by aircraft for use in target zones, or launched above battlegrounds. When this drone is present above a battle area, all enemy radio communication and radar usage is two levels more difficult than normal in a radius of 10 kilometers. The Dragon may be set to jam a specific set of frequencies before launching, depending on the origin of the enemy's equipment. Like the Crecerelle, it has no landing gear and is rail-launched using RATO and recovered via parachute with airbags deploying before impact.

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Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$10,750	G, AvG	NA	150 kg	2	5	None

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
130	230 (90)	NA 110 6/3 60/30	47	5.88	2000

Guidance/Control	Sensors/Equipment	Takeoff/Landing
GPS, Autopilot, Manual Control (Radio Link, 50 km)	Radio Jammers, Radar Jammers, 6xChaff Bundles	Takeoff: Rail w/RATO Boost; Landing: Parachute

### Fox AT1

Notes: This is a French reconnaissance drone first introduced in 1988, and used by France, various NATO countries, and UN forces, as well as various civilian companies and governmental agencies for projects as diverse as espionage work to fire spotting. It is lightweight and capable for its size, but short-ranged. It is a very small and quiet machine, unlikely to be detected at its normal operating altitude. The Fox AT1 can carry small droppable loads on 4 hardpoints under the wings; these may be small weapons, but are usually sensors such as tracking units or sonobuoys.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$6,450	G, AvG	15 kg	90 kg	3	3	FLIR (Optional)

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
145	275 (80)	NA 130 7/4 70/40	39.75	26.5	3000

Guidance/Control	Sensors/Equipment	Armament	Takeoff/Landing
Autopilot, Manual Control (Radio Link, 150 km)	Day Video Camera or Video w/FLIR, Optical Chemical Sniffer, Geiger Counter, Meteorological Sensors	4 Hardpoints	Takeoff: Catapult; Landing: Parachute w/Airbag

### Fox AT2

Notes: This is a larger version of the Fox AT1, with larger fuel tanks for greatly improved range, a larger payload, better cameras, and better sensors. It is deployed by the same countries and agencies as the AT1, and was introduced at the same time.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$9,675	G, AvG	30 kg	135 kg	3	3	FLIR (Optional), Image Intensification

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
145	275 (80)	NA 130 7/4 70/40	79.5	8.7	3000

Guidance/Control	Sensors/Equipment	Armament	Takeoff/Landing
Autopilot, Manual Control (Radio Link, 150 km)	Day Video Camera or Video w/FLIR, Still Camera, Synthetic Aperture Radar, Optical Chemical Sniffer,	4 Hardpoints	Takeoff: Catapult; Landing: Parachute

Geiger Counter, Meteorological Sensors

w/Airbag

**Fox-TX**

Notes: This is another French-built electronic warfare UAV, built for a slightly different mission. The Fox-TX is designed to intercept enemy radio communications and relay them to intelligence units, detect enemy radar and radios, and then jam them. When in jamming mode, any enemy radio and radar units operate at two levels more difficult. The frequencies of jamming may be programmed before launch to deal with equipment of varying origin. The Fox-TX has two hardpoints under the wings to carry small weapons extra electronics, or suchlike, and can also be equipped with an internal warhead and used as an antiradar missile.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$9,700	G, AvG	30 kg	135 kg	3	5	None

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
130	230 (80)	NA 110 7/4 70/40	42.4	8.5	3000

Guidance/Control	Sensors/Equipment	Armament	Takeoff/Landing
GPS, Autopilot, Manual Control (Radio Link, 150 km)	Radio Direction Finder, Radar Detector, Radio Jammer, Radar Jammer, SIGINT Gear, Radar Homer, Home-On-Jam, Secure Radios, Radio Relay	2 Hardpoints	Takeoff: Rail w/RATO boost; Landing: Parachute w/Airbag

**Heliot**

Notes: Though normally operated as a UAV, the French Heliot may also take up to two crewmembers. Due to this capability, it was sometimes used as a rescue vehicle for downed aircrews, though its slow speed and relative fragility as well as its short range limited this type of employment. Its more normal use was as a multipurpose UAV, able to perform reconnaissance, electronic warfare, or decoy roles. In the reconnaissance role, it carries cameras and vision gear; in the EW role, radio and radar jammers, and in the decoy role, flare and chaff dispensers. In the rescue role, it carries nothing other than its guidance equipment and its occupants. Unlike most RPVs, it is a mini-helicopter.

Price	Fuel Type	Load	Veh Wt	Ground Crew/Crew	Mnt	Night Vision
\$32,000	AvG	120 kg	450 kg	3/2	5	Image Intensification

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
75	135	30/65	132.45	53	3000

Guidance/Control	Sensors/Equipment	Takeoff/Landing
GPS, Autopilot, Manual Control Radio Link, 100 km), Direct Pilot Control	(Rescue Mode) None; (Reconnaissance Mode) Video Camera, Still Camera, Real-Time Video Link; (EW Mode) Radio Jammer, Radar Jammer, Radio Direction Finder, Radar Detector; (Decoy Mode) 10 Chaff Bundles, 10 IR Flares	13m Primitive Runway

**Vigilant**

Notes: This is a small French-made mini-copter that is used for primarily immediate local reconnaissance, but can also carry other payloads for custom missions (common ones are laser designation and artillery spotting). The payload package is modular and easy to change between missions. Its drawback is that the vehicle is slow, but it is also a stable platform for intelligence gathering,

and its small size and quiet engine makes it hard to spot.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$2,850 (S/R)	G, AvG	8.16 kg	40 kg	2	3	Optional Depending on Payload

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
60	100	10/50	11.75	11.75	1830

Guidance/Control	Sensors/Equipment	Takeoff/Landing
Autopilot; Autonomous Function, Manual Control (Radio Link, 28 km)	(Typical Packages) Video Camera and Still Camera w/Real-Time Link; Video Camera w/Image Intensification and Real-Time Link; Radio Jammer; Radar Jammer; Laser Designator; all w/Secure Radio	4.5m Primitive Runway

**K-100**

Notes: This is a mini-UAV intended for use by forward battlefield commanders for immediate intelligence and reconnaissance. It comes in two variants, the K-100/R reconnaissance variant and the K-100/A electronic warfare vehicle. The K-100/R carries imaging equipment, and the K-100/A carries a low-power radar homer that, with a small warhead, turns the K-100 into an antiradar missile.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$1,650	G, AvG	4.99 kg	28 kg	2	3	Image Intensification

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
170	300 (100)	NA 145 8/5 80/50	3.3	6.6	1000

Guidance/Control	Sensors/Equipment	Takeoff/Landing
GPS, Autopilot, Manual Control (Radio Link, 15 km)	(K-100/R) Video Camera, Real-Time Video Link, Secure Radio; (K-100/A) Radar detector	Takeoff: Rail w/RATO; Landing: Parachute or Belly Landing (145m); Primitive Runway

**Seamos**

Notes: This is a large mini-copter used by the US Navy for naval warfare and reconnaissance. It is one of the smallest vehicles able to carry nuclear weapons, with only certain missiles being smaller. The Seamos was developed and greatly improved from the Dash series, vehicles that were plagued by crashes and equipment failures. The Seamos is much more reliable and is more capable. The Seamos has two hardpoints that can carry weapons or other stores, including nuclear depth charges.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$76,000	AvG	220 kg	1.06 tons	3	6	FLIR, Image Intensification

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
145	250	25/120	291	73	4000

Guidance/Control	Sensors/Equipment	Armament	Takeoff/Landing
Autonomous Function, Autopilot, Manual Control (Radio Link, 100 km)	(Recon Package) 2xVideo Camera, 2xStill Camera, Synthetic Aperture Radar, Secure Radio; (Antiship Package) Radar, Sonar, 5xSonobuoys, Secure Radio	2 Hardpoints	10m Primitive Runway

**Nishant**

Notes: This Indian RPV was designed with a great deal of Israeli help, but manufactured entirely in India. It is a reconnaissance drone, with a complete set of sensors including equipment for electronic eavesdropping and includes a computer for the breaking of codes and encryption routines. It has several control methods, including manual, autonomous, and GPS.

Twilight 2000 Notes: These were heavily used in actions against Pakistan and China during the Twilight War, but their fragility meant that they were vulnerable to ground fire.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$22,000	G, AvG	45 kg	300 kg	3	4	FLIR, Image Intensification

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
215	360 (100)	NA 170 6/4 60/40	63	15.7	3995

Guidance/Control	Sensors/Equipment	Takeoff/Landing
Autonomous Function, Autopilot, GPS, Manual Control (Radio Link, 87 km)	Video Camera, Still Camera, Real-Time Camera Link, Secure Radio, SIGINT Gear, Radar Homer, Radio Direction Finder	Takeoff: Runway (515m), Landing: Runway (380m); Primitive Runway

**Aerosonde Mark 3**

Notes: Originally designed for weather reconnaissance and research, the US/Australian Aerosonde has developed into a capable platform for purposes ranging from agricultural research to military surveillance. The Aerosonde was the first unmanned aircraft to cross the Atlantic, and has made flights lasting as long as 35 hours. It has the advantage of being made largely of Kevlar, making it a tough vehicle for its size.

Twilight 2000 Notes: These UAVs were often requisitioned from civilian applications and pressed into military service in the Twilight War.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$1,350	G, AvG	2.27 kg	14 kg	3	4	FLIR, Image Intensification, Radar

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
150	200 (75)	NA 95 6/3 60/30	6.62	0.33	6000

Guidance/Control	Sensors/Equipment	Takeoff/Landing
GPS, Automatic Storm/Front Tracking, Manual Control (Radio Link, 1500 km), Autopilot	Weather sondes, wind sensor, still camera, video camera, temperature, icing, surface wind and waves, atmospheric chemistry, laser rangefinder, Geiger counter	Takeoff: vehicle roof rack, catapult; Landing: Belly skid, 100m Primitive Runway

**Brevel**

Notes: This drone was the result of a collaboration between France and Germany. Work was begun as early as 1980, but the first flight was not until 1994. The Brevel has stealth characteristics; attempts to spot the drone or guide weapons by radar are 2 level more difficult than normal, and attempts to spot using IR, thermal Imaging, or FLIR, or to guide weapons using IR, are three levels more difficult than normal. The French declined to purchase copies of this vehicle, but the Germans bought some 50-60 of the Brevel.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$17,400	G, AvG	30 kg	150 kg	3	4	FLIR, Image Intensification

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
155	280 (110)	NA 135 5/3 50/30	47	12	4000

Guidance/Control	Sensors/Equipment	Takeoff/Landing
Autonomous Function, Autopilot, Manual Control (Radio Link, 200 km)	Day/Night Video Camera, Day/Night Still Camera, Real-Time Camera Link, Secure Radio	Takeoff: Rail with RATO booster; Landing: Parachute

**Luna**

Notes: This mini-UAV is built by an international European consortium and used by several NATO countries as well as Italy and Greece. It is used for immediate battlefield intelligence and reconnaissance, and being small and quiet, can often go unnoticed above a battlefield.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
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\$1,440	G, AvG	3.18 kg	20 kg	2	2	Image Intensification
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Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
120	205 (80)	NA 100 7/4 70/40	5.6	1.4	2740

Guidance/Control	Sensors/Equipment	Takeoff/Landing
Autonomous Function, Manual Control (Radio Link, 20 km)	Video Camera, Still Camera, Secure Radio	Takeoff: Bungee Catapult; Landing: Parachute or Parafoil



**Eye-View**

Notes: Though the Israelis possessed excellent tactical reconnaissance UAVs, they realized there was a need for a lighter, short-ranged, easy-to-use UAV for local battlefield reconnaissance for commanders. The Eye-View is a basic platform for feeding still and video information to a commander in real time. It may be launched from a runway, roadway, or a truck-mounted catapult. These UAVs were also sold to several foreign countries, including South Africa, India, and several South American countries, and dozens were also sold to fire departments throughout the US for fire spotting duties.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision
\$7,470	G, AvG	14.97 kg	104 kg	2	2	Image Intensification

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
140	240 (90)	NA 115 6/3 60/30	52	8.7	1525

Guidance/Control	Sensors/Equipment	Takeoff/Landing
Manual Control (Radio Link, 50 km), Autopilot	Video Camera, Still Camera, Secure Radio, Real-Time Video Link	Takeoff: Catapult, Runway (405m); Landing: Parachute, Net, Runway (305m); Hardened Runway

**Hermes 450**

Notes: This long-endurance UAV was designed by the Israeli firm Silver Arrow. It was bought by the Israeli Air Force, and there were a large number of sales around the globe, and it can be found in almost every area of the planet. It may be fitted with a day-night camera system or a maritime search radar/sonar system. It may be launched from land bases or ships.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$57,500	AvG	150 kg	800 kg	3	4	FLIR, Image Intensification; or Radar, Sonar

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
120	245 (95)	NA 120 6/3 60/30	331	13.8	6100

Guidance/Control	Sensors/Equipment	Takeoff/Landing
GPS, Autonomous Function, Autopilot, Manual Control (Radio Link, 200 km)	2xVideo Cameras, 2xStill Cameras, Synthetic Aperture Radar, Secure Radio, Satcom Radio; or 20xSonobuoys, Video Camera, Still Camera, Secure Radio, Satcom Radio	Takeoff: Catapult, Runway (530m); Landing: Runway (370m); Hardened Runway

**Hermes 1500**

Notes: This is a large endurance UAV that can easily be mistaken for any number of private twin-engine passenger aircraft. It is in fact a well-appointed UAV for long-range surveillance and tactical reconnaissance. These aircraft were not used by the Israelis, but were bought by several Israeli allies and business interests, most notably the South Africans, Argentines, and Singapore, as well as some civilian scientific agencies for land survey and mapmaking.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$108,000	AvG	350 kg	1.5 tons	4	6	FLIR, Image Intensification, Radar

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
240	490 (120)	NA 240 7/4 70/40	620	21	9150

Guidance/Control	Sensors/Equipment	Takeoff/Landing
GPS, Autonomous Function, Autopilot, Manual Control (Radio Link, 200 km)	2xVideo Cameras, 2xStill Camera, Synthetic Aperture Radar, Mapping System, Satcom Radio; (Military Models Only) Secure Radio, Laser Designator	630/440m Hardened Runway

### Heron

Notes: This is an Israeli very-long-endurance UAV designed for long-term surveillance of enemy rear areas, preparation work for special operations, and surveillance of enemy leadership. It resembles a small civilian aircraft, and if observed, can be easily mistaken for such an aircraft. The sensor suite is comprehensive, and it is a solid reconnaissance platform. It is equipped with long range and satellite communications. The Heron may be equipped with RATO bottles to shorten the takeoff length by 50%, and can use arrestor wires for a shorter landing zone.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$79,000	AvG	200 kg	1.1 tons	4	5	FLIR, Image Intensification, Radar

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
155	315 (125)	NA 155 6/3 60/30	288	5.75	10700

Guidance/Control	Sensors/Equipment	Takeoff/Landing
GPS, Autonomous Function, Autopilot, Manual Control (Radio Link, 230 km)	3xVideo Cameras, 2xStill Cameras, Synthetic Aperture Radar, Laser Designator, Secure Radio, Satcom Radio, 3xChaff Bundles, 3xIR Flares	715m/495m Hardened Runway

### Hunter SR/E-Hunter

Notes: These medium UAVs were developed by the Israelis in 1991, and were used extensively in that country's struggles with its neighbors, with the Palestinians. They were also used by Belgium and France, and in small numbers by the US Navy and Army. The Hunter SR (Short Range) is the base model; it may be converted to the E-Hunter (Endurance) in three hours by adding wing extensions. Early versions of the Hunter were plagued by crashes, with over 20 in the year after adoption and had inadequate sensors and radios, but improvements were made and the system was fielded. The Hunter can be used with the catapult and arresting systems of naval carriers and amphibious assault ships, and can be equipped with RATO bottles to shorten the takeoff length by 50%.

Vehicle	Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
Hunter SR	\$52,000	G, AvG	68 kg	726 kg	3	4	Passive IR, Image Intensification
E-Hunter	\$68,000	G, AvG	152 kg	953 kg	3	4	Passive IR, Image Intensification

Vehicle	Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
Hunter SR	130	265 (125)	NA 130 5/2 50/20	190	16.4	4570

E-Hunter	130	265 (105)	NA 130 5/2 50/20	190	8	9070
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Vehicle	Guidance/Control	Sensors/Equipment	Armament	Takeoff/Landing
(Both)	Autopilot, Manual Control (Radio Link, 265 km), GPS	Video Camera, Still Camera, Artillery Plotting System, Satcom System, Secure Radios	2 Hardpoints	Takeoff: Catapult, Runway (610m); Landing: Parachute, Runway (460m); Hardened Runway

### **Mastiff**

Notes: This is one of the earliest modern battlefield drones, being developed by the Israelis in 1975, and first used by them in 1982. A later version of this drone was developed by the US Air Force and Navy into the Pioneer. It is a basic drone, still used by the Israelis for low-priority work, and by Third World nations. They may take off and land on a runway conventionally, or use a catapult for takeoff and land using arrestor wires or a net.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$9,900	G, AvG	37 kg	138 kg	2	3	Image Intensification

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
140	240 (95)	NA 115 6/3 60/30	38.42	5.12	4480

Guidance/Control	Sensors/Equipment	Takeoff/Landing
Manual Control (Radio Link, 75 km), Autopilot	Video Camera, Still Camera, Secure Radios	Takeoff: Catapult, Runway (395m); Landing: Parachute, Net, Runway (300m); Hardened Runway

### **Micro-V**

Notes: This Israeli design is meant to be used by commanders down to company level. It is lightweight, lacking in many of the refinements of larger UAVs, but is cheap and able to be easily operated. It is launched by a bungee catapult from a small vehicle such as a HMMWV or Land Rover, and parachute-landed. It can provide valuable information about the enemy without exposing friendly troops to danger.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$3,600	G, AvG	8.2 kg	50 kg	2	2	Image Intensification

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
135	240 (80)	NA 115 5/2 50/20	14	2.8	4570

Guidance/Control	Sensors/Equipment	Takeoff/Landing
Manual Control (Radio Link, 50 km), Autopilot	Video Camera, Still Camera, Secure Radio	Takeoff: Catapult; Landing: Parachute

### **Scout**

Notes: This is an upgraded version of the Mastiff, first used in the mid-1980s, and retired from active Israeli service in the early 1990s, when they were sold off to countries like South Africa and some Third World nations. It is designed to run completely

autonomously, carrying out reconnaissance missions without input from ground controllers except in emergencies. It has a more powerful engine, more responsive flight controls, and is somewhat larger.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$11,400	G, AvG	38.1 kg	159 kg	2	3	Image Intensification

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
135	230 (95)	NA 110 7/4 70/40	33.12	4.73	4575

Guidance/Control	Sensors/Equipment	Takeoff/Landing
Manual Control (Radio Link, 100 km), Autopilot, Autonomous Function	Video Camera, Still Camera, Secure Radios	Takeoff: Catapult, Runway (430m); Landing: Parachute, Net, Runway (315m); Hardened Runway

### Searcher/Searcher II

Notes: These are the standard medium-duty UAVs of the Israeli forces, often used to find SAM sites and keep tabs of terrorist camps and troop movements and emplacements. It looks similar to the Scout, but is well over twice the size of that vehicle. Its systems are equipped with multiple redundancies to enable it to keep operating in the face of anti-aircraft and small arms fire. The Searcher II is an even larger version of the Searcher, with larger fuel tanks for increased flight time. The Searcher may be equipped with a RATO bottle to decrease takeoff length by 50%, but cannot be catapult launched.

Vehicle	Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
Searcher	\$28,700	G, AvG	63.05 kg	400 kg	2	4	FLIR, Image Intensification
Searcher II	\$34,400	G, AvG	63.05 kg	500 kg	2	4	FLIR, Image Intensification

Vehicle	Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
Searcher	150	260 (100)	NA 125 7/4 70/40	119	9.92	5180
Searcher II	150	260 (100)	NA 125 7/4 70/40	252	11.9	6100

Vehicle	Guidance/Control	Sensors/Equipment	Takeoff/Landing
(Both)	Manual Control (Radio Link, 120/150 km), Autopilot, Autonomous Function, Target Track (Lock-On)	2xVideo Camera, 2xStill Camera, Secure Radios, Fire Solution Computer, Secure Radio	Takeoff: Runway (735m); Landing: Parachute, Net, Runway (540m); Hardened Runway

### Sniper

Notes: This UAV was designed by the Israeli firm Silver Arrow to compete with the Eye-View, but lost in that competition. Silver Arrow found customers in various other countries, including South America, South Africa, and Southeast Asia. Some were also sold to the US Border Patrol, Drug Enforcement Agency, and Bureau of Alcohol, Tobacco, and Firearms. It is similar in concept to the Eye-View, if not design (it looks like a miniature private aircraft). The vehicle cannot be catapult-launched, but a RATO bottle may be attached to allow a takeoff in 50% the normal length.

Twilight 2000 Notes: The plans were also stolen by Iranian spies and Snipers showed up in the Middle East during the Twilight War.

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Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$11,000	G, AvG	25 kg	155 kg	2	2	Image Intensification

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
130	225 (85)	NA 110 6/3 60/30	78	7.8	4575

Guidance/Control	Sensors/Equipment	Takeoff/Landing
Manual Control (Radio Link), Autopilot	Video Camera, Still Camera, Secure Radio, Real-Time Video Link	Takeoff: Runway (520m); Landing: Parachute, Runway (390m); Primitive Runway

**Mirach 26**

Notes: This is an Italian combat surveillance drone that is also used for extended observation of enemy rear areas. It has a handicap in that its engine is very loud, but as a camera platform is rock-solid. Like many UAVs, it has no landing gear, being launched from a truck-mounted rail with a RATO assist, and recovered by parachute. It is rather large, but this means that it can carry a large amount of added sensors and equipment.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$14,400	G, AvG	50 kg	200 kg	3	3	FLIR, Image Intensification

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
135	225 (95)	NA 110 6/3 60/30	41.7	7	3500

Guidance/Control	Sensors/Equipment	Takeoff/Landing
GPS, Autonomic Function, Autopilot, Manual Control (Radio Link, 50 km)	Day/Night Video Camera, Day/Night Still Camera, Real-Time Video/Still Link, Secure Radios	Takeoff: Rail w/RATO booster; Landing: Parachute

**Mirach 150**

Notes: This Italian multipurpose drone is derived from a target drone, the Mirach 100. The Mirach 150 can carry a reconnaissance package or an EW package; if the EW package is carried, the drone jams all enemy radio and radar signals within 25 km, making their use 2 levels harder. As the Italians mostly use Western equipment, the EW package may be programmed to jam only certain frequencies, before launch.

Twilight 2000 Notes: The quality of the reconnaissance package is excellent, and because of this, several Mirach 150s were delivered to Russia, Greece, and Poland after Italy came over to the Warsaw Pact side.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$24,800	AvG	50 kg	345 kg	3	5	FLIR, Image Intensification, Radar

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
525	875 (250)	NA 425 5/2 50/20	65	50	9150

Guidance/Control	Sensors/Equipment	Takoff/Landing
GPS, Autonomic Function, Autopilot, Manual Control (Radio Link, 250 km)	(Recon Package) 2xDay/Night Video Cameras, 2xDay/Night Still Cameras, Synthetic Aperture Radar, Real-Time Camera Link, Secure Radios; (EW Package) Radar/Radio Jammers, Radio Direction Finder, Radar Detector, SIGINT Gear, Secure Radios	Takeoff: Rail with RATO booster; Landing: Parachute

**IDS Huma**

Notes: The Huma I is a reconnaissance and surveillance drone designed for use by ground forces for medium-length missions. An interesting feature of the Huma I is the use of composite radar-absorbing materials and radar-absorbing paint in its construction. To simulate this in game terms, reduce the chance of detection by radar by one level (average becomes difficult, etc.). The Huma I and II have been flying with the Pakistani Army since 2003.

The Huma I has reasonable performance for a tactical UAV, and operates with partial autonomous guidance – the normal operation is autonomous by waypoint (measured by compass headings and measurement of the travel time). Any evasive movements or changes to its course have to be done by the operator. The operator can usually do nothing to dodge hostile action; the controls aren't designed for that, and it takes a very skilled operator to manage tactical maneuvers. Any competent operator, on the other hand, can break the Huma I's flight course to take a better look at something interesting.

The Huma I is normal used at the brigade-level and above – its launch is by rail on a medium truck and is boosted by rocket, resulting in a spectacular display at launch. The rocket falls away when the Huma has reached its minimum speed for flight, which takes a little over a second. Recovery occurs when the Huma I is at the end of its battery life – the Huma I pops a parachute and the UAV descends to the ground, nose down. The Huma I is designed to fall apart to an extent; only high wind landings will normally damage the Huma I beyond repair. Otherwise, the parts are put together again and the battery charged; at this point, the Huma I is ready for another mission. Charging normally takes 45 minutes to an hour and a half depending upon the source of charging used.

The Huma II is a larger version of the Huma I, able to carry more sensors, larger and heavier equipment, or more complicated sensors. Its performance is otherwise similar to the Huma I for game purposes.

Vehicle	Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
Huma I	\$28,740	Battery	20 kg	130 kg	1-2	2	Image Intensification, Passive IR
Huma II	\$29,671	Battery	25 kg	163 kg	1-2	2	Image Intensification, Passive IR

Vehicle	Tr Mov	Com Mov	Mnvr/Acc	Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
Huma I	360	90/18	NA 51	4/2 40/20	N/A	6 Hours Flight Time	3027
Huma II	360	90/23	NA 51	4/2 40/20	N/A	6 Hours Flight Time	3027

Vehicle	Guidance/Control	Sensors/Equipment	Armament	Takeoff/Landing
Huma I	Ground Control (Range 100km) or Semi-Autonomous	CCD TV Camera, 2xPassive IR Cameras, Gyrocompass	None	Rocket/Parachute
Huma II	Ground Control (Range 100km) or Semi-Autonomous	CCD TV Camera, 2xPassive IR Cameras, GPS, Radio Detector	None	Rocket/Parachute

**IDS Uqab**

Notes: The Uqab I is a small-form tactical UAV system designed to provide reconnaissance at the company level and above. Like many such UAVs, it looks like an RC aircraft, if a bit large. Takeoff and landing is as a rough-field aircraft – it has non-retractable wheels. The Uqab I is designed primarily for battlefield reconnaissance, as well as to spot for artillery. The main camera has a battlesight reticle to assist in precise artillery coordinates. As the Uqab is very quiet, the enemy forces very well may not notice they are being observed. The Uqab I is also designed for civilian use, useful for fire spotting, damage assessments, mob control, and search and rescue. Like most such UAVs, it normally navigates via pre-programmed waypoints and by duration and direction of travel, but it can also navigate via GPS and up to 1000 waypoints can be defined. The Uqab can be programmed to automatically return to its start point if damaged or has an equipment fault, and while in flight, the operator can take direct control of the Uqab, or reprogram it to loiter over a target or otherwise go into a holding pattern. Another feature is that if the operator desires, he can land the Uqab by remote control at any time, or order the Uqab to pop a parachute at any time and land that way. The Uqab normally records the data from its CCD TV automatically for the entire flight duration, but this can be programmed to record only certain points of its journey. Recording is to a 2.5-inch ruggedized hard drive with data encryption.

The Uqab II is designed for strategic reconnaissance at Brigade-level and above. Its primary difference is that it is a larger UAV with more carrying capability, range, and speed. In addition, if the Uqab II goes down, is damaged, or has a fault, it automatically broadcasts its position to its ground station.

Vehicle	Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
Uqab I	\$50,766	Battery	10 kg	158 kg	1-2	*	Image Intensification, Passive IR
Uqab II	\$53,916	Battery	25 kg	163 kg	1-2	2	Image Intensification, Passive IR

Vehicle	Tr Mov	Com Mov	Mnvr/Acc	Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
Uqab I	240	60/9	NA 48	4/2 40/20	N/A	3 Hours Flight Time	3048
Uqab II	300	75/15	NA 60	4/2 40/30	N/A	6 Hours Flight Time	3048

<b>Vehicle</b>	<b>Guidance/Control</b>	<b>Sensors/Equipment</b>	<b>Armament</b>	<b>Takeoff/Landing</b>
Uqab I	Ground Control (Range 100km) or Semi-Autonomous	Gimbaled CCD TV Camera, 2xPassive IR Cameras, GPS, Digital Recording (3h)	None	12m/4d6 Unimproved
Uqab II	Ground Control (Range 150km) or Semi-Autonomous	CCD TV Camera, 2xPassive IR Cameras, GPS, Passive Radio Detector, Passive Radar Detector, Digital Recording	None	15m/4d10 Unimproved



**Expert**

Notes: This Russian mini-RPV is made for use at company-level and above for immediate reconnaissance of battlefields and avenues of approach. It is a light system with capabilities far outweighing its size, almost equal in capability to many Western UAV in the same class.

Twilight 2000 Notes: These were in short supply during the Twilight War, mostly used by Russian special operations forces and intelligence agents.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$2,875	G, AvG	11.25 kg	40 kg	2	3	Image Intensification

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
105	140 (55)	NA 65 6/4 60/40	12.5	2.1	4500

Guidance/Control	Sensors/Equipment	Takeoff/Landing
GPS, Autonomous Function, Manual Control (Radio Link, 40 km)	Video Camera, Still Camera, Mapping Camera, Secure Radio	Takeoff: Catapult; Landing: Parachute

**Ka-37**

Notes: This was the Russians' first VTOL UAV, first flown in 1993. It did not see much military use until the Twilight War, but hundreds were sold to farmers, who fitted them with belly tanks and agricultural sprayers for crop dusting. The Ka-37 was largely replaced in military service with the larger and more capable Ka-137.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$14,700	G, AvG	50 kg	250 kg	2	3	(Military Only) Image Intensification

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
110	190	15/90	30	40	2990

Guidance/Control	Sensors/Equipment	Armament	Takeoff/Landing
Autopilot, Manual Control (Radio Link, 6 km)	Video Camera, Still Camera	1 Hardpoint	9m Primitive Runway

**Ka-137**

This vehicle has often been described as toy-like, with a body shaped like a ball with four landing legs and a double rotor system. It is in a similar class with the CL-327, being an unconventional design. It is surprisingly fast and agile, and a good reconnaissance platform. It was used mainly by the Russian Navy and by border guards, as well as the KGB.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$16,500	G, AvG	50 kg	280 kg	3	4	Image Intensification, Passive IR

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling

120	210	5/100	33	8.25	3500
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Guidance/Control	Sensors/Equipment	Armament	Takeoff/Landing
Autonomous Function, Manual Control (Radio Link, 50 km)	Video Camera, Still Camera, Secure Radio, Real-Time Camera Link	1 Hardpoint	7m Primitive Runway

### **Pchela-1T**

Notes: This Russian reconnaissance drone was designed in the late 1980s, and saw extensive use in Chechnya. It is also known as the Yak-61 Shmel. The system was designed originally for use by Airborne and Naval Infantry troops, and the control center and launcher are mounted on BTR-D airborne combat vehicles. These vehicles are used for tactical reconnaissance as well as target designation.

Twilight 2000 Notes: Models of this vehicle were also supplied to the Iraqis, and used during the Twilight War. Captured models were also used by Kuwait.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$9,300	G, AvG	27.2 kg	129 kg	3	3	(Optional) FLIR

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
95	160 (65)	NA 75 6/4 60/40	27	13.5	2900

Guidance/Control	Sensors/Equipment	Takeoff/Landing
Autonomous Function, Autopilot, Manual Control (Radio Link, 50 km)	Video Camera, Still Camera, Real-Time Camera Link, Secure Radio, Laser Designator	Takeoff: Catapult; Landing: Parachute

### **Tu-141 Strizh**

Notes: This medium-range, high-speed UAV was first produced by Russia in the mid-1970s and was produced until 1983. After that, it was retired to Category 2 and 3 units and sold liberally to allied nations. Despite its size, the electronics in the Strizh are quite crude and basic.

Twilight 2000 Notes: This UAV was encountered quite frequently over the Middle East, Central America, China, and North Korea during the Twilight War.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$382,000	AvG	550 kg	5.38 tons	4	10	Passive IR, Radar

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
1030	1785 (350)	NA 870 4/2 40/20	2700	695	6000

Guidance/Control	Sensors/Equipment	Takeoff/Landing
Autonomous Function, Manual Control (Radio Link, 1000 km)	2xVideo Cameras, 2xStill Cameras, Geiger Counter, Real-Time Sensor Link	Takeoff: Rail w/RATO Booster; Landing: Parachute or Parafoil

### **Tu-143 Reis**

Notes: This is a more modern Russian reconnaissance drone, one that has also been liberally sold to allied countries throughout the world. It uses the VR-3 reconnaissance system, an upgrade of the VR-2 system used on the Strizh. It uses a more advanced guidance system able to use nap-of-the-earth flight, but not true TERCOM (the NOE guidance requires accurate preprogrammed mapping information). The Tu-143 was first flown in 1982, and over 1000 were produced in the next 7 years, before it was replaced in production by the Tu-243 Reis-D (q.v.). The Reis is a semi-stealth system, reducing the effectiveness of radar and radar-guided missiles by one level, and IR systems by one level.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$125,000	AvG	200 kg	1.6 tons	4	9	Image Intensification, Radar

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
865	1500 (295)	NA 730 5/3 50/30	800	960	2000

Guidance/Control	Sensors/Equipment	Takeoff/Landing
Autonomous Function, Autopilot, Manual Control (Radio Link, 95 km)	2xVideo Cameras, 2xStill Cameras, Geiger Counter, Chemical Sniffer, Real Time Sensor Link	Takeoff: Rail w/RATO Booster; Landing: Parachute or Parafoil

### Tu-243 Reis-D

Notes: This reconnaissance drone replaced the Tu-143 in Russian and Pact service, and was also used by Iraq, Iran, and India. It is an improved version of the Tu-143, with a more efficient engine, better stealth features (effectiveness of radar and IR reduced by two steps), and a better sensor package. At its normal cruising altitude of 500 meters, the Reis-D's cameras have a resolution of 0.15 meters, with resolution going down with increases in altitude. It can simultaneously take pictures through day and night channels.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$144,000	AvG	200 kg	1.6 tons	3	8	Thermal Imaging, Image Intensification, Radar

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
880	1525 (275)	NA 740 6/4 60/40	800	350	5000

Guidance/Control	Sensors/Equipment	Takeoff/Landing
Autonomous Function, Autopilot, TERCOM, Manual Control (Radio Link, 180 km)	2xVideo Cameras, 2xStill Cameras, Geiger Counter, Optical Chemical Sniffer, Motion Detector, Real Time Sensor Link, 4xChaff Bundles, 4xIR Flares	Takeoff: Rail w/RATO Booster; Landing: Parachute, Parafoil

### Yak-60

Notes: This is a battlefield reconnaissance and EW drone first flown by the Russians in 1983. It has long been retired from service in favor of the more capable Pchela-1T and Pchela-1M, but still equips Category 3 and Mobilization-Only units, as well as the countries of many allies and Third-World nations. It is a basic drone with day-only cameras that can also jam enemy radar and radio communications. (Enemy radar and radio units operate at one level greater difficulty within 15 km of the Yak-60.) The drone is launched and serviced from modified MT-LB armored personnel carriers.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision

\$7,300	G, AvG	24 kg	102 kg	3	4	None
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Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
170	290 (80)	NA 140 5/3 50/30	18	9	1000

Guidance/Control	Sensors/Equipment	Takeoff/Landing
Autonomous Function, Manual Control (Radio Link, 37 km)	Video Camera, Still Camera, Delayed Camera Link	Takeoff: Catapult; Landing: Parachute

**Seeker**

Notes: This South African RPV was designed with Israeli assistance in the mid 1980s, and went into service in 1987. It is a conventional-type UAV, similar in design to the Mastiff/Scout series. It is a relatively quick and agile UAV, with a good sensor suite, but requires a hardened runway for takeoffs and landings, though they often operate from improved roadways. This vehicle was also sold to Chile. The Seeker is equipped with an arrestor hook for landing on ships and runways equipped with arresting wires.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$18,300	G, AvG	40 kg	255 kg	3	3	Thermal Imaging, Image Intensification

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
150	260 (100)	NA 125 7/4 70/40	79.5	6.6	5400

Guidance/Control	Sensors/Equipment	Takeoff/Landing
Autonomous Function, Manual Control (Radio Link, 200 km)	2xVideo Camera, 2xStill Camera, Real-Time Camera Link, Secure Radio	Takeoff: Runway (600m); Landing: Runway (440m); Hardened Runway

**Expal Shepherd-MIL**

Notes: This UAV is designed for unmanned forward observation, particularly to provide data for artillery and mortar fires. While it does have a very quiet motor, its main defense against detection is a bit more tricky – it takes the form of one of various gliding birds that are known for their slow flight characteristics. Of course, if one sees the propeller all bets are off, and it does have several antennas as well as control surfaces. Under the bird shell, it is like many other such UAVs, having a secure radio link back to its controller, a GPS with a flight plan able to use up to 32 waypoints and with the ability to take a new waypoint on the fly, and the ability to be hand-flown by the controller. Launch is by simply throwing into the air; landing is by simply dragging on the ground until it comes to a stop – and it is designed to “fall apart” upon landing upon several designed-in split points. The controller has a tablet-type computer to control the UAV. The Shepherd-MIL has two day/night cameras; they can be programmed to look in two different directions or to use one to take high-resolution still photos. The battery takes 30 minutes to recharge. The Shepherd-MIL may skim the ground at 20 meters, or fly at up to 4000 meters, though practical limits (based on the resolution of the cameras) is 300 meters. The Shepherd-MIL cannot be launched if the launch site is greater than 2500 meters in altitude. The Shepherd-MIL is capable of operating in light rain and in winds up to 32 kilometers per hour. The Shepherd-MIL has a small computer onboard, allowing the UAV to give its measurements and coordinates in the system used by the customer.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$82,208	Battery	0.2 kg	2.8 kg	1	2	Image Intensification, Passive IR

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
77	15	NA 8 2/1 20/10	Rechargeable Battery – 60 Minutes Range	N/A	4000

Guidance/Control	Sensors/Equipment	Armament	Takeoff/Landing
Ground Control (Range – 20 km) or Autonomous Guidance	2xDay/Night Cameras, GPS	None	None

**Ranger**

Notes: This Swiss drone was used by the Swiss Army and sold all over the world, and it can thus be found in almost any corner of the globe. Initial design work was done by the Israeli company IAI Malut (designers of vehicles such as the Mastiff, Scout, Searcher, and Eye-View), but then the design was refined by Oerlikon. Israel also marketed the Ranger to many of its allies and business interests, as it is better suited to high altitude and bad weather than most of its products. The typical role for the Ranger is artillery spotting and weapons designation, but it is also used for general reconnaissance work. The Ranger has an arrestor hook for landing on ships or runways equipped with them.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$19,500	G, AvG	39 kg	270 kg	3	4	FLIR, Image Intensification

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
135	225 (95)	NA 110 7/4 70/40	56.3	11.25	4575

Guidance/Control	Sensors/Equipment	Takeoff/Landing
Autonomic Function, Autopilot, Manual Control (Radio Link, 100 km)	Day/Night Video Camera, Day/Night Still Camera, Real-Time Camera Link, Laser Designator, Secure Radio	Takeoff: Catapult; Landing: Parachute or Runway (420m); Primitive Runway

## AeroVironment RQ-11 Raven

Notes: The RQ-11 Raven's career in the US military began in 1999, when the US Army bought four FQM-151 Pointer UAVs for modification to use as short-range UAVs for use in urban warfare scenarios. The Pointer proved to be too large for use in the role envisioned (particularly its ground control equipment), but the Pointer did prove promising enough that the US Army continued the project with AeroVironment. AeroVironment not only developed a much smaller ground control station, but also made the UAV itself smaller, eventually becoming the Flashlight in 2001, and the Raven in 2002. The full-production Block II version went into service in 2003. The first Ravens approved for LRIP and combat testing proved to be somewhat unreliable in launching and flight stability, so a Block II version was designed to fix the problems of the Block I version. The Block II version is designated the RQ-11B, and also known as Raven B.

The Raven comes in 3 small cases that fit into a standard MOLLE or large ALICE rucksack; the ground station has its own case. The Raven's standard payload consists of a nose or side-looking CCD TV camera capable of panning and zooming, a nose-mounted IR camera, and a side-looking IR camera. Except for the CCD TV camera, the cameras do not have zoom capability, nor can any of them be locked onto a target, but the Raven is stable and quiet enough for discreet surveillance. The cameras are designed more to "take a look over the hill" than for detailed target surveillance. Other parts of the standard payload include a GPS receiver and the receiver/transmitter for signals from the ground operator, along with a small microprocessor; in addition, another 0.18 kilograms of equipment may be carried. Any part of the standard payload can be removed and replaced with other sensors or devices as required. The ground kit includes four extra batteries and a small charger for the batteries that can be plugged into a variety of vehicles and equipment (small folding solar panels are being considered for future deployment). The Raven can operate for 90 minutes on a rechargeable; a single-use battery is also available that will give the Raven 110 minutes of flight time.

The Raven can fly using pre-set GPS coordinates, a pre-set course programmed into it by the ground operator (which can be canceled in flight), or hand-flown by the ground operator using a setup similar to that of a video game. The only launching equipment is a hand and arm – another soldier simply throws turns on the engine and throws it into the air like some model airplanes. The Raven is entirely battery-powered, effective control range is 9.98 kilometers. The length of the Raven is a mere 1.1 meters when assembled, with a wingspan of 1.3 meters. Landing consists of simply allowing it to skid along the ground; the Raven is designed to simply fall apart at its assembly points to minimize or prevent damage during landing. The Raven can be flown or programmed to fly back to the operator, or land at a pre-programmed point. If a part of the airframe is damaged beyond the repair capabilities of the ground operator, the cases for the Raven include extra airframe components.

The ground station is not only used to fly the Raven; it can automatically record the pictures and video captured by the cameras for over 24 hours of operation. It includes a DVR that can operate without intervention of the ground operator, and has low-end video and photo editing software. The pictures captured can also be transmitted to other Raven ground stations or to other units if a radio connection is available.

Twilight 2000 Notes: The Raven is not available in the Twilight 2000 timeline.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$27,908	Battery	0.18 kg	1.91 kg	1-2		Image Intensification, Passive IR

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
81	162	NA 64 2/1 20/10	N/A	Rechargeable: 90 min; Non-Rechargeable: 110 min	4267

Guidance/Control	Sensors/Equipment	Armament	Takeoff/Landing
Ground Control (Range – 9.98km) or Autonomous Guidance	CCD TV Camera, 2xPassive IR Cameras, GPS	None	None

## BQM-145A MRUAV (Medium-Range Unmanned Aerial Vehicle)



Notes: This is an advanced, high-speed reconnaissance drone used when high performance and quick penetration are needed. The UAV includes 2 hardpoints that may be fitted with extra equipment, droppable sensors, or weapons. It can use a terrain-matching radar system similar to cruise missiles for guidance, or one of several other techniques. Payloads are multipurpose, with several missions often being performed during the same trip. An interesting payload sometimes carried by this vehicle is an EMP generator; this device has a range of 2 km and works in a 30-degree cone in front of the vehicle. On a roll of 8 on 1D20, any unshielded electronics in the cone are disabled immediately, and remain disabled until a repair using 1D6+2 parts has been performed. In addition to ground and ship-launchings, this UAV can be air launched from most aircraft that can carry the weight.

Twilight 2000 Notes: This vehicle was new in production at the start of the Twilight War, and is rather rare.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$78,000	AvG	207 kg	980 kg	4	7	FLIR, Image Intensification, Radar

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
1050	1770 (200)	NA 830 6/4 60/40	205	46	12200

Guidance/Control	Sensors/Equipment	Armament	Takeoff/Landing
TERCOM, GPS, Autonomous Function, Autopilot, Manual Control (Radio Link, 2400 km)	3xVideo Camera, 2xStill Camera, Synthetic Aperture Radar, Digital Video Recorder, ECM, Radar Jammer, Radio Jammer, 6xChaff Bundles, 6xIR Flares, Radio Direction Finder, Radar Detector, SIGINT gear, Secure Radio, Satcom Radio	2 Hardpoints	Takeoff: Rail w/RATO Booster; Landing: Parachute, Parafoil

### Condor

Notes: Condor is a HALE (High-Altitude, Long-Endurance) UAV built by Boeing in consultation with Dick Rutan, builder of many long-endurance aircraft, including the Voyager, the first aircraft to circle the earth nonstop on one tank of fuel. It is basically a powered sailplane, with a wingspan of over 60 meters, used for long-range surveillance and strategic reconnaissance. Built largely out of honeycomb ceramics and composites, it is very light for its size. The sensor suite is comprehensive, modified from satellite gear, and has a 0.2 meter resolution even from maximum altitude.

Twilight 2000 Notes: Only 5 Condors were built, and at least three were known to have been lost in the Twilight War, with one being shot down by a missile, one being brought down by a MiG-31, and one that crashed for unknown reasons.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$649,000	AvG	815 kg	9.07 tons	5	7	FLIR, Image Intensification, Radar

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
345	450 (90)	NA 220 3/2 30/20	7075	118	20000

Guidance/Control	Sensors/Equipment	Takeoff/Landing
GPS, Inertial Navigation, Autopilot, Autonomic Function, Manual Control (Radio Link, 3000 km)	3xVideo Cameras, 3xStill Cameras, Mapping Gear, Synthetic Aperture Radar, Real-Time Sensor Link, Secure Radios, Satcom Radio, AWACS/JSTARS Interface, Optical Chemical Sniffer, Geiger Counter, ECM, 8xChaff Bundles, 8xIR Flares	2275m/1700m Hardened Runway

### Darkstar

Notes: This was the result of a joint US Air Force/Navy "black" project, little known to the public until recently. It is a stealth UAV used for strategic reconnaissance and special operations preparatory work against highly defended sites. It is small and stealthy, and any attempt to locate is on radar or use radar-guided weapons against are three levels more difficult than normal. Attempts to locate with infrared methods, including active and passive IR, thermal imaging, or FLIR are likewise three levels more difficult than normal, as is attempting to use an IR-guided weapon against it. It is a fast, high-flying, difficult to detect vehicle that has the potential to yield a great deal of intelligence data for US forces. Experiments with this UAV are still ongoing.

Twilight 2000 Notes: The existence of this UAV was not known to the public until the Twilight War. It gathered a staggering amount of information on the enemy on the early phases of the war.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$280,000	AvG	450 kg	3.9 tons	5	7	FLIR, Image Intensification, Radar

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
520	930 (245)	NA 440 5/3 50/30	2015	168	15200

Guidance/Control	Sensors/Equipment	Takeoff/Landing
GPS, Autopilot, Autonomous Function, Manual Control (Radio Link, 3000 km)	3xVideo Camera, 3xStill Camera, Synthetic Aperture Radar, Laser Rangefinder/Designator, Secure Radio, Satcom Radio, JSTARS/AWACS Interface, ECM, IRCM, 6xChaff Bundles, 6xIR Flares	1295m/970m Hardened Runway

**DP-4**

Notes: This is a "VTOL UAV," a UAV that is essentially a miniature helicopter. It was originally designed for use in aerial cinematography, to take motion pictures under difficult conditions and to supplement pictures shot from manned aircraft and from cranes. It was quickly adapted to military use, with its ability to take stable video and feed it to ground stations very useful to battlefield commanders and intelligence personnel. In addition to the usual cameras, the DP-4 has a useful payload that can be used to carry other sensors and devices (a common such payload is a laser designator).

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$4,600	G, AvG	13.4 kg	63.5 kg	2	3	None

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
160	215	10/100	19.84	2.92	1220

Guidance/Control	Sensors/Equipment	Takeoff/Landing
Manual Control (Radio Link, 2 km)	Video Camera, Still Camera (others may be fitted)	6.5m Primitive Runway

**Dragon Drone**

Notes: This is a somewhat larger and more capable version of the Exdrone, fielded by the US Marines and Coast Guard in the early 1990s. It is of similar, but stronger construction, with a better sensor suite, including a color day camera instead of the black and white one on the Exdrone. It can carry out similar missions to the Exdrone, including stripping out the sensors and delivering packages to downed aircrews, though this was rarely done since the Dragon Drone is more expensive than the Exdrone.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision

\$3,400	AvG	12.1 kg	43 kg	3	3	Thermal Imaging, Image Intensification
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Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
150	200 (80)	NA 95 5/3 50/30	13.4	4.5	3000

Guidance/Control	Sensors/Equipment	Takeoff/Landing
GPS, Autonomous Function, Autopilot, Manual Control (Radio Link, 90 km)	Video Camera, Still Camera, Real-Time Camera Link, Laser Rangefinder, Secure Radio	Takeoff: Catapult; Landing: Net, Runway (60m); Primitive Runway

### Exdrone

Notes: This is a smaller UAV designed to provide capabilities similar to larger, costlier drones in a cheaper package. It is one of the most produced UAVs ever built, with nearly 1000 built by the turn of the century. It was used by the US Marines as early as the 1991 Gulf War, and it's low cost (Exdrone is short for Expendable DRONE), made it popular with many intelligence efforts. It can also be used to drop small sensors and other packages, such as trail bugs, expendable jammers, etc. Interesting alternate uses for Exdrones was to strip out all sensors and pack the open bays with survival equipment for downed pilots. The vehicle can be destroyed in flight to avoid capture. The Exdrone is of simple construction, built mostly of Styrofoam and balsa wood inside a thin plastic shell.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$2,900	G, AvG	11.34 kg	40.37 kg	3	4	Image Intensification

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
150	200 (80)	NA 95 5/2 50/20	12.6	2	3050

Guidance/Control	Sensors/Equipment	Takeoff/Landing
GPS, Inertial Navigation, Manual Control (Radio Link, 70 km), Autopilot	Video Camera, Laser Rangefinder, Secure Radios	Takeoff: Catapult; Landing: Skids, 60m Primitive Runway, or Parachute

### Firebee

Notes: This UAV was developed by the USAF and CIA in the mid-1960s. It has long been out of service with the US and its allies, but is still in common use, with upgrades, by China (copied from captured models), Pakistan, and some other Chinese trading partners. It is a very large UAV powered by a jet engine, and launched from under the wing of a large flying aircraft (the US used a variant of the C-130 Hercules transport called the DC-130). It is also controlled by crewmen of that aircraft. It is a "semi-stealth" aircraft, not being designed for stealth, but achieving it as a byproduct of its design, construction materials, and small size. Aircraft attempting to use radar or radar-guided weapons against the Firebee suffer a one level penalty.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$100,000	AvG	244 kg	1.74 tons	4	5	Radar, Image Intensification

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
540	925 (175)	NA 445 4/2 40/20	295	207	21335

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Guidance/Control	Sensors/Equipment	Takeoff/Landing
Manual Control (Radio Link, 1950 km), Autonomous Function, Autopilot	2xStill Cameras, Video Camera, IR Camera, Radio Direction Finder, SIGINT Gear, Radar Homer	Takeoff: Air drop  Landing: Aerial helicopter snatch from parachute

### **Firescout**

Notes: This vehicle is unusual in that it is an unmanned adaptation of a manned design, the Schweizer 330 light utility helicopter. Its large size as well as improvement of components over the years allows it to carry a sophisticated autonomous control system, with enough artificial intelligence to allow it to assign priority to targets and track or target certain ones based on threat level. The optics can identify a tank-sized target from 6.4 kilometers, and smaller or larger objects from proportionally closer or further distances. First deployment for the system was from US Navy Aegis cruisers in early 1997, followed by US Marine amphibious assault vessels.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$83,000	AvG	240 kg	1.16 tons	3	6	FLIR, Image Intensification, Radar

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
200	380	20/125	155	25.8	6095

Guidance/Control	Sensors/Equipment	Armament	Takeoff/Landing
GPS, Autonomous Function, Autopilot, Manual Control (Radio Link, 172 km)	3xVideo Cameras, 2xStill Cameras, Synthetic Aperture Radar, Laser Designator/Rangefinder, Optical Chemical Sniffer, Geiger Counter, Real-Time Sensor Link, Secure Radios, Satcom Radio	1 Hardpoint	16m Primitive Runway

### **Global Hawk**

Notes: This is currently the pinnacle of HALE UAV development. It is a long-range, long-endurance, high-speed stealth platform, used for strategic intelligence deep inside an enemy's borders. The sensor suite is comprehensive, and includes a long-range radio and data link that can interface directly with a variety of intelligence computer networks with an encrypted wireless connection at a data rate of over 50 Mbps. If a satellite is available, transmission range is potentially infinite. The synthetic aperture radar on the Global Hawk is so sensitive that it can detect moving targets at least the size of a main battle tank within a radius of 200 km, and is able to provide 6 meter resolution in an area of 37x110 km, 1.8-meter resolution in an area of 10 square kilometers, of zoom in to 0.2 meter resolution from maximum altitude. It is not a full stealth design, but radar detection and missile-guidance attempts against it are one level harder than normal, and IR detection and guidance attempts are two levels harder than normal.

Twilight 2000 Notes: It was Global Hawk aircraft that first detected the preparations of Russian for strategic nuclear strikes on the US and Europe; unfortunately, though some evacuations were made, not enough could be done to save most of the population hit, and panic and the resulting jam-ups took care of the rest. Throughout the Twilight War, the 20 Global Hawk UAVs gained valuable intelligence, particularly after the downing of much of NATO's satellite network. Two Global Hawks were also deployed by NATO (one by the British, and one by the Germans, dubbed "EuroHawks"), and one each was used by Israel and Saudi Arabia (called the "GulfHawk").

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$750,000	AvG	900 kg	10.4 tons	5	8	FLIR, Image Intensification, Radar

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling

610	1080 (250)	NA 515 6/4 60/40	7400	215	20000
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Guidance/Control	Sensors/Equipment	Armament	Takeoff/Landing
GPS, Inertial Guidance, TERCOM, Autonomous Function, Autopilot, Manual Control (Radio Link, 3500 km)	3xVideo Cameras, 4xStill Cameras, Synthetic Aperture Radar, Real-Time Sensor Link, Motion Detector, ECM, IRCM, 10xChaff Bundles, 10xIR Flares, ALE-50 Decoy Drone, Laser Rangefinder/Designator, Secure Radios, Satcom Radio, JSTARS/AWACS Interface, Optical Chemical Sniffer, Geiger Counter, Radio Direction Finder, Radar Detector, SIGINT Gear	2 Hardpoints	1615m/1215m Hardened Runway

**Gnat-750**

Notes: This drone was part of the first generation of "Endurance UAVs," drones with a very long flight time. Three versions of the Gnat are available, the basic Gnat-750, the Gnat-750XP, and the I-Gnat; in addition, the Predator (q.v.) is an advanced version of the Gnat-750. The Gnat-750 has been in use by the US since 1989, and later by Turkey, and was used extensively in the 1991 Gulf War. They were normally used to monitor troop movements and rear areas, since they are quiet and have a low radar and IR cross-section. An extensive user of this vehicle was the US Central Intelligence Agency. With a different electronics package, they can be used as a relay platform for radio and video signals, making it possible for personnel deep behind enemy lines to communicate with higher echelons. Gnat-750XP and I-Gnat actually have 2 hardpoints under each wing and can mount and use weapons, but these hardpoints are more commonly used for fuel tanks or extra sensors or laser designator pods.

Vehicle	Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
Gnat-750	\$36,850	AvG	64.86 kg	513 kg	3	5	Radar, FLIR, Image Intensification
Gnat-750XP	\$54,000	AvG	231 kg	748 kg	3	5	Radar, FLIR, Image Intensification
I-Gnat	\$59,000	AvG	295 kg	748 kg	3	5	Radar, FLIR, Image Intensification

Vehicle	Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
Gnat-750	205	270 (145)	NA 130 6/2 60/20	256	8.53	4875
Gnat-750XP	250	335 (125)	NA 160 6/2 60/20	300	7.5	6095
I-Gnat	275	365 (135)	NA 175 6/2 60/20	300	7.5	9295

Guidance/Control	Sensors/Equipment	Takeoff/Landing
Autopilot, Inertial Navigation, Manual Control (Radio Link, 465 km); (I-Gnat) add GPS	Video Camera, Still Camera, Laser Rangefinder, Synthetic Aperture Radar Imaging; (I-Gnat Only) 3xVideo/Still Cameras, Laser Rangefinder, Synthetic Aperture Radar Imaging, Real-Time Video Relay, Satcom Unit, Secure Radios	Hardened Runway; (Gnat-750) 745/560m, (Gnat-750XP, I-Gnat) 670/500m

**Javelin**

Notes: This tiny US UAV is intended to be used at the platoon or higher level by forward combat elements, including LRSU units and special operations forces. Instead of a normal takeoff, the drone's engine is started, and the vehicle hand-thrown into the air. The Javelin was also bought by several US television stations to get pictures from crowded airspace above disaster locations and areas where there are hazardous conditions. Some coastal US TV stations also used them to report on beach conditions and surf size.

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Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$400	G, AvG, Battery	1.45 kg	6.8 kg	2	2	None

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
105	185 (55)	NA 90 6/4 60/40	1.93 or 4 batteries	1.93 or 1 hour	305

Guidance/Control	Sensors/Equipment	Takeoff/Landing
Autonomous Function, Manual Control (Radio Link, 2 km)	Video Camera	Takeoff: Hand Thrown; Landing: Belly (60m); Primitive Runway (Hardened Runway Not Recommended)

### Pioneer

Notes: This US reconnaissance and artillery spotting drone was one of the first of the modern generation of drones used by the US, being deployed by the US Navy for naval artillery spotting from battleships such as the USS Iowa in late 1985, and having been steadily upgraded and used since then. It was developed from the Israeli Scout RPV (q.v.). Its two primary missions are artillery support and bomb damage assessment, though it is also used for general reconnaissance and tracking specific targets, due to its fine-resolution cameras, able to accurately photograph and track targets less than 200mm across from an altitude of over 4500 meters. Pictures from a Pioneer's video camera are featured in a very famous incident in the 1991 Gulf War, where an Iraqi squad tried to surrender to the drone. The primary users of the Pioneer are the US Navy and Marines (who use them for battlefield intelligence). The Pioneer is equipped with an arrestor hook and may be launched from standard carrier catapults.

Twilight 2000 Notes: The US Army operated 8 of them in the Twilight War and the 1991 Gulf War before that.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision
\$13,700	G, AvG	45 kg	190 kg	3	3	FLIR, Image Intensification

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
150	250 (95)	NA 120 7/4 70/40	45.65	7.6	4575

Guidance/Control	Sensors/Equipment	Takeoff/Landing
Autonomous Function, Autopilot, Manual Control (Radio Link, 185 km)	Video Camera, Still Camera, Real-Time Camera Link, Secure Radio, Laser Designator	Takeoff: Rail w/RATO booster, Catapult, Runway (455m); Landing Net, Runway (335m); Hardened Runway

### Pointer

Notes: This is a mini-RPV used by the US Marines, US Army, Oregon Army National Guard, and US Special Operations Command. It is a basic camera-carrying drone, so light that no special launching gear is used; the drone is simply thrown into the air by hand with the engine running. It is a tough little bird, made largely of Kevlar. No fuel is used, rechargeable NiCad batteries being used to power the UAV. It may carry only small loads, but is useful for basic immediate reconnaissance. The camera is in a fixed installation in its nose, and has a narrow range of vision; the vehicle must be pointed directly at the target to photograph it, and that is where the Pointer got its name.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$300	Batteries	0.27 kg	4.13 kg	2	1	None

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
65	110 (40)	NA 55 4/3 40/30	1 NiCad Battery	1 hour	915

Guidance/Control	Sensors/Equipment	Takeoff/Landing
Autonomous Function, Manual Control (Radio Link, 4 km)	Color Video Camera or Black and White Low-Light Video Camera, Real-Time Video Link, Secure Radio, Armored Body and Wings	Takeoff: Hand-Thrown; Landing: Belly (55m): Primitive Runway

### Predator

Notes: This was the US military's primary long-endurance reconnaissance UAV, first flying in 1994, and used extensively in the years leading up to the Twilight War and thereafter. It is a low-speed, but rock-steady platform for reconnaissance and intelligence work. A secondary function is to relay communications from special operations and intelligence assets behind enemy lines. It can interface directly with JSTARS intelligence and battle direction aircraft, and can provide real-time video, still camera, and synthetic aperture radar pictures at any range if satellites are available. Another use of the Predator is as an attack platform, with the capability to carry two Hellfire missiles. Predators normally worked closely with special operations personnel, relaying target information before raids or infiltration, and many were also operated by the CIA.

Twilight 2000 Notes: The Italian counterpart to the CIA acquired 6 Predators before hostilities started.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$75,200	AvG	204 kg	1.04 tons	4	6	FLIR, Image Intensification, Radar

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
105	175 (65)	NA 85 6/4 60/40	391	16.3	7600

Guidance/Control	Sensors/Equipment	Armament	Takeoff/Landing
TERCOM, GPS, Autonomous Function, Autopilot, Computer Link, Manual Control (Radio Link, 3500 km)	3xVideo Cameras, 3xStill Cameras, Synthetic Aperture Radar, Laser Rangefinder, Laser Designator, Laser Rangefinder, ECM, SIGINT Gear, Radio Direction Finder, Radar Detector, Optical Chemical Sniffer, Geiger Counter, Secure Radios, Satcom Radio, JSTARS/AWACS Interface	2 Hardpoints	1175m/865m Hardened Runway

### Scarab

Notes: This is the predecessor of the BQM-145A, flying for the US Air Force since the late 1980s. It is similar in design and performance to the BQM-145A, a bit larger and slower than that vehicle, and lacking in some of the more advanced features of the BQM-145A, as well as the hardpoints. It is basically a high-speed reconnaissance machine, used for pre-strike reconnaissance, target designation, and battle damage assessment.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$70,000	AvG	132 kg	1.13 tons	4	6	FLIR, Image Intensification, Radar

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
915	1540 (200)	NA 720 6/4 60/40	236	53	13100

Guidance/Control	Sensors/Equipment	Takeoff/Landing
GPS, Autonomic Function, Autopilot, Manual Control (Radio Link, 925 km)	2xVideo Camera, 2xStill Camera, Synthetic Aperture Radar, ECM, 5xChaff Bundles, 5xIR Flares, SIGINT Gear, Secure Radio, Satcom Radio	Takeoff: Rail w/RATO booster; Landing: Parachute

### Scorpion

Notes: This light UAV was used as a short-range reconnaissance drone by the US Army, British Army, and French Navy, as well as for research purposes by NASA's Goddard Flight Center. It is a VTOL aircraft, using "freewing" technology, where the fuselage with engine may rotate freely to match the needs of flight. The UAV may fly like an aircraft or hover over targets like a helicopter, and it is nearly impossible to stall. It may carry several different payloads, for basic reconnaissance, electronic warfare, and antisubmarine work. The EW suite jams enemy radio and radar within a 20 km radius.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$12,500	AvG	25.9 kg	174 kg	3	5	(Recon Mode) FLIR, Image Intensification; (EW Mode) None; (ASW Mode) Radar, Sonar

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
220	375	30/175	44	8.8	4570

Guidance/Control	Sensors/Equipment	Takeoff/Landing
Autonomous Function, Autopilot, Manual Control (Radio Link, 200 km)	(Recon Mode) Video Camera, Still Camera, Real-Time Camera Link, Laser Rangefinder, Secure Radio; (EW Mode) Radio Direction Finder, Radar Detector, Radar Jammer, Radio Jammer, SIGINT Gear, Secure Radio; (ASW Mode) 6xSonobuoys, 2 Hardpoints, Secure Radio	6m Primitive Runway

### Sentry

Notes: This UAVs manufacturing company, S-TEC, is one of the world's leading manufacturers of autopilot systems, so the Sentry has one of the best autopilot and autonomous function systems in the world of RPVs, providing a rock-steady camera platform and excellent maneuverability. Its customers include the US Military, from operational units to the research labs, and governmental agencies such as the CIA, NSA, Border Patrol, FBI, and DEA.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$8,100	G, AvG	34 kg	113 kg	3	3	Passive IR, Image Intensification

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
150	260 (80)	NA 130 5/3 50/40	36	4.5	4880

Guidance/Control	Sensors/Equipment	Takeoff/Landing
Autonomous Function, Autopilot, Manual Control (Radio Link, 370 km)	Video Camera, Still Camera, Real-Time Video Link, Secure Radio	Takeoff: Catapult or Runway (490m); Landing: Paraglider, Parachute, or Runway (360m); Primitive Runway

### Sentry HP



Notes: This is a larger and more capable version of the Sentry, with a better sensor suite and the capability to carry underwing stores on two hardpoints, and a slightly different design.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$11,000	G, AvG	42.5 kg	152 kg	3	4	FLIR, Image Intensification

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
160	275 (80)	NA 135 5/3 50/30	48	6	4880

Guidance/Control	Sensors/Equipment	Armament	Takeoff/Landing
Autonomous Function, Autopilot, Manual Control (Radio Link, 370 km)	2xVideo Cameras, Still Camera, Real-Time Camera Link, Radio Direction Finder, Secure Radio	2 Hardpoints	Takeoff: Catapult or Runway (560m); Landing: Paraglider, Parachute, or Runway (410m); Primitive Runway

### **Shadow 200**

Notes: This multipurpose drone was the fourth try for the US Army to develop a medium multipurpose UAV to replace earlier designs. It has two hardpoints, one other each wing, to carry weapons or extra electronics. It has a good suite of observation gear and can carry a wide variety of other equipment. When used as an EW vehicle, the Shadow 200 makes all enemy radio and radar use 2 levels harder within a radius of 20 kilometers.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$10,800	G, AvG	27.2 kg	149 kg	3	4	Image Intensification

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
195	335 (165)	NA 165 7/4 70/40	43.9	8.8	4575

Guidance/Control	Sensors/Equipment	Takeoff/Landing
Autonomous Function, Autopilot, Manual Control (Radio Link, 200 km)	(Recon Load) Video Camera, Still Camera, Real-Time Camera Link, Secure Radio; (EW Load) ECM, Radio Direction Finder, Radar Detector, Secure Radio, Radar Jammer, Radio Jammer	Takeoff: Rail w/RATO booster, Runway (505m); Landing: Net, Runway (370m); Primitive Runway

### **Shadow 600**

Notes: This is a larger, more capable version of the Shadow 200. It had more sales than the Shadow 200, in service with several US allies. Endurance is greatly increased, both by larger fuel tanks and more efficient engines. The sensor package is better, as is the load carrying capability. If an EW package is carried, the vehicle makes all enemy radio and radar use 2 levels more difficult in a radius of 30 km. In addition, this drone is sometimes used as an antiradar missile, jamming enemy radio and radar transmissions until its fuel runs out or it is commanded by ground control, then diving to hit an enemy radar with the cargo area taken up by a small warhead. The vehicle, like the Shadow 200, has two underwing hardpoints.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$19,200	AvG	38.6 kg	265 kg	3	4	FLIR, Image Intensification

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
180	315 (165)	NA 155 7/4 70/40	78	5.6	5180

Guidance/Control	Sensors/Equipment	Armament	Takeoff/Landing
Autonomous Function, Autopilot, Manual Control (Radio Link, 200 km)	(Recon Load) 2xVideo Cameras, Still Camera, Real-Time Camera Link, SIGINT Gear, Secure Radio; (EW Load) ECM, IRCM, Radio Direction Finder, SIGINT Gear, Radar Detector, Radar Jammer, Radio Jammer, Secure Radio	Internal Warhead Section	Takeoff: Rail w/RATO Booster, Catapult, Runway (715m); Landing: Net, Parachute, or Runway (525m); Primitive Runway

### Skyyeye

Notes: The initial version of this US RPV was first flown in 1982, but was not adopted until many improvements had been made, by the US Army in 1992. Since then, it has also been sold to Morocco, Egypt, Thailand, and Taiwan, as well as civilian agencies (it can be fitted with sprayer nozzles and tanks and used for insecticide spraying). Its military use is generally as a reconnaissance drone, though its ability to use sprayer mechanisms led it to be used late in the Twilight War to spray chemical agents on enemy troops. It is a medium-sized UAV with a moderate load-carrying ability. If not carrying a sprayer system, a hardpoint under each wing may carry weapons, extra equipment, or droppable intelligence devices.

Price	Fuel Type	Load	Veh Wt	Ground Crew	Mnt	Night Vision
\$25,400 (C/R)	G, AvG	82 kg	354 kg	3	4	FLIR

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
165	285 (110)	NA 140 5/3 50/30	60.1	7.5	4570

Guidance/Control	Sensors/Equipment	Armament	Takeoff/Landing
Autonomous Function, Manual Control (Radio Link, 185 km)	2xVideo Cameras, 2xStill Cameras, Secure Radios; or chemical sprayer Nozzles and Tanks	2 Hardpoints	Takeoff: Catapult or Runway (690m); Landing: Parachute, Paraglider, or Runway (505m); Primitive Runway