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Unmanned Vehicles

HANDBOOK 2008

The concise global industry guide

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Unmanned Vehicles HANDBOOK 2008

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COVER: The US Air Force has been conducting combat missions with the General Atomics Aeronautical Systems MQ-9 Reaper in Afghanistan since 25 September 2007. The MQ-9 was developed in response to the Global War on Terrorism to provide a persistent hunter-killer capability against emerging targets. (USAF)

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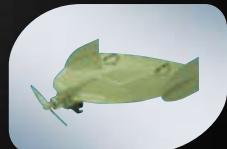
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Welcome to the 2008 edition of the Shephard *Unmanned Vehicles Handbook*, capably researched and updated for us this time by Ian Kemp.

The past year has seen UAVs continue to prove themselves operationally in Iraq and Afghanistan, being teamed with manned aviation assets such as armed helicopters paying real dividends in the fight against terrorists and insurgents, particularly in the counter-IED battle. Here, the UAV as sensor and the helicopter as shooter has emerged as a powerful combination of dogged, persistent surveillance and lethal firepower. Israeli operators might smile wryly at this, since they have developed their own very effective tactics using this combination in urban environments. One lesson that has emerged very strongly might well pass into military lore as 'who controls the sensor must also control the shooter'.

The UAV systems industry has also shown its ability to respond rapidly to urgent requirements generated by the war. General Atomics' new Warrior UAVs, a development of the successful Predator, are already making a difference in Iraq, while the BAE Systems HERI has been successfully trialed on operations in Afghanistan as part of Project Morrigan, an effort to integrate the system and develop tactics, techniques and procedures. This vehicle integrates a commercial glider airframe, a Rotax 914 engine and an advanced autonomous control system. It flew for the first time in December 2004 as one of six new UAVs BAES has flown over the last five years, demonstrating the power of rapid prototyping.

Success has fuelled numerous UAV system projects controlled and funded by many different organisations with the US military, provoking calls for rationalisation and the inevitable turf wars as those organisations vie for hegemony over powerful new capabilities and control of the budgets that go with them. That's business as usual in the internal politics of military establishments. The external politics of public acceptance in the civilian world are of more importance to the future development of the industry.

One big issue here is the seemingly age-old struggle to get UAVs accepted into civil airspace, of which the controlled portion occupied by airliners is oddly both more controversial and less technically challenging than the uncontrolled airspace populated with smaller general aviation aircraft including helicopters. This is because the required sense and avoid capability has to reside in the UAV rather than the infrastructure. Practical sense and avoid technology, based on expertise developed in anti-missile defences for military aircraft, has already been demonstrated, providing an opportunity for the UAV systems industry to take the lead in aviation safety if a means can be found to apply the technology universally.

Another emerging public acceptance issue revolves around police use of UAVs for surveillance, especially in the UK which already has more CCTV cameras than the rest of Europe put together, according to the Daily Telegraph. This feeds into the long running debate about balancing civil liberties with the fight against terrorism and crime. Civil success will depend on informed public consent.

Peter Donaldson, Editor, Handbooks
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US DOGFIGHT OVER UNMANNED VEHICLES

Ian Kemp examines the current debate within the Pentagon over the management of medium- and high-altitude unmanned aircraft systems.

The US Government Accountability Office (GAO) published a report in July 2007 entitled *Unmanned Aircraft Systems: Advance Coordination and Increased Visibility Needed to Optimize Capabilities*.

This was the third GAO report to examine the acquisition and operation of UAS by the Department of Defense (DoD) in a period of 20 months and this level of scrutiny is indicative of the huge investment in these systems by each of the services for deployment in the Global War on Terrorism. The latest report notes: "Ongoing military operations in Iraq and Afghanistan are being transformed by new intelligence, surveillance, reconnaissance (ISR), and strike capabilities, some of which have been achieved through the use of unmanned aircraft systems (UAS)."

In December 2005 the GAO reported that while commanders were experiencing mission success "challenges such as interoperability and limited communications bandwidth were hampering joint operations or preventing timely UAS deployment". In April 2006 the GAO reported that while the DoD "continues to request funds to support service plans for acquiring UAS, it lacks a viable strategic plan to guide UAS development and investment decisions".

THREE CLASSES OF UAS

For the July 2007 report the GAO was asked "to evaluate DoD's efforts to integrate UAS into ongoing operations while optimizing the use of all DoD ISR assets". The report's authors categorise UAS into three classes: manportable, tactical and theatre. US forces, and their allies, engaged in the Global War on Terrorism are supported by ISR UAS platforms that are operated by:

- ▶ US intelligence agencies such as the National Security Agency, the National Reconnaissance Office and the National Geospatial-Intelligence Agency which provide intelligence to various government organisations including the DoD using theatre UAS.
- ▶ DoD assets operating at the theatre level which are operated and controlled by the Joint Forces Air Component Commander to support the priorities of the theatre combatant commander.

- ▶ Manportable and tactical UAS which are flown in direct tactical support of conventional and special operations forces from the squad to brigade levels.
- ▶ UAS fielded by the Joint Improvised Explosive Device Defeat Organization for the specific mission of supporting operations to identify and eliminate improvised explosive devices.
- ▶ A small but growing number of manportable and tactical UAS operated by US allies.

SUPPORT IN DEMAND

Demand for UAS is growing at all levels. DoD funding for UAS increased from US \$363 million in Fiscal Year 2001 to \$2.23 billion in FY07 and the DoD has requested \$2.54 billion for FY08. From fewer than 50 UAS in 2000, the DoD inventory numbered more than 3,900 aircraft in February 2007, most of which were supporting operations in Afghanistan and Iraq.

A DoD official stated in mid-April 2007 that over the previous 12 months UAS, excluding hand-launched systems, had flown 'well over' 160,000 hours in support of Operations *Enduring Freedom* and *Iraqi Freedom*, compared with 100,000 hours over the previous 12 months. Despite this astonishing growth in capability the GAO report notes that the DoD still lacks sufficient assets to meet all requests from combatant commanders.

Moreover, "DoD's approach to allocating and tasking its ISR assets, including UAS, hinders its ability to optimize the use of these assets because it does not consider the capabilities of all available ISR assets."

The US Central Command (CENTCOM), responsible for operations throughout Southwest Asia, has developed procedures to ensure the services coordinate their plans prior to deploying UAS to CENTCOM's theatre of operations. Recognising the need to better plan and control its ISR assets, the DoD has recently completed a 'Persistent ISR Capabilities Based Assessment Study'.

To mitigate the challenges in integrating UAS, and other ISR assets, into combat operations the report makes three recommendations for executive action:

- ▶ Establish DoD-wide requirements for coordinating with the combatant commanders in advance of bringing UAS into the theater of operations.
- ▶ Develop a plan for communicating those requirements throughout DoD.
- ▶ Establish a mechanism to ensure the services comply with these requirements.



(Photo: USAF)

AVOIDING DUPLICATION OF EFFORT

Chief of Staff of the US Air Force, General T Michael Moseley presented a memorandum on 5 March to senior defence officials proposing that the USAF be designated the executive agency (EA) for medium- and high-altitude UAS, which are defined as any UAS operating at 3,500 feet above ground level and higher. Two years earlier, in June 2005, a 'Tiger Team' of representatives from across the services concluded that such an agency was not necessary but recommended the creation of a UAS Center of Excellence; the recommendation was approved and the Joint UAS Center of Excellence was established at Creech Air Force Base, Nevada.

The explosive growth in the deployment of UAS in the aftermath of 9/11 has led to a multitude of UAS types being acquired by each of the services. "In light of increasing resource constraints, the Services do not have the luxury of duplicating multiple UAV programme offices, duplicating multiple independent training operations, duplicating multiple logistics and maintenance operations, duplicating multiple intelligence support facilities, sustaining multiple procurement contracts, etc.," Lieutenant General David Deptula, USAF's Deputy Chief of Staff, Intelligence, Surveillance and Reconnaissance, told the US House of Representatives Air and Land Forces Subcommittee in April 2007. Gen Deptula said the proposal



» The US Marine Corps' decision to acquire the RQ-7B Shadow as its Tier III UAS was a significant step toward rationalisation across the American UAS fleet. (US Army)

to create an EA would offer three major benefits: "Achieving efficiencies in acquisition; increasing warfighting effectiveness in designing an optimal medium- and high-altitude UAV concept of operations; and enhancing UAV interoperability by directing common, synchronized architectures, data links, radios, etc."

RATIONALISING PROCUREMENT

Several efforts to rationalise UAS procurement are underway, such as the procurement of the RQ-11B Raven B as a common Small UAS by the US Army, US Marine Corps and the US Special Operations Command to replace the Raven A, Pointer and Dragon Eye SUAS. Another was the decision by the US Marine Corps to replace its RQ-2B Pioneer Tier III UAS with the RQ-7B Shadow which was already in service with the US Army.

The USMC's Shadows will be controlled by the US Army's One System Ground Control Station (OSGCS) which the Army is acquiring to direct all of its tactical Unmanned Aircraft Systems, including the Hunter, Shadow and Air Warrior. General Moseley believes that much more can still be done.

The primary focus of the executive agency would be on near-term investments in projects such as the USAF's MQ-1 Predator, MQ-9 Reaper and RQ-4 Global Hawk, the Army's MQ-1C Warrior and the US Navy's Broad Area Maritime Surveillance (BAMS) system. As the USAF has the most experience in developing and fielding medium- and high-altitude UAS, Gen Moseley contends that it is the

logical choice to be the EA, especially as the systems being developed for the other services in these categories are derivatives of technology demonstrators initially produced and fielded by the USAF.

The USAF proposal was rejected by both the Army and Navy. The acrimonious wrangle over the control of UAS is comparable to interservice feuds which occurred in the US and several other countries concerning the employment of new technology after the First World War over the 'ownership' of aircraft and from the 1950s onwards over helicopters.

Deputy Secretary of Defense Gordon England on 13 September rejected the proposal to form an EA, although he established a task force to examine areas where cooperation can be improved among the services and directed the Joint Requirements Oversight Council to coordinate UAS training and operations. He also ordered that the Air Force Predator and Army Warrior projects be "combined into a single acquisition program, to include a common data link, in order to achieve common development, procurement, sustainment and training activities". The USAF said such a move would result in savings of about 10%.

Supporters of Moseley's stance and critics of the Army's Warrior project contend the Army will not derive best value from the UAS. The Army plans to field 11 Warrior companies each consisting of 12 aircraft with payloads, five OSGCS units and support equipment. One Warrior company will be tasked primarily with training and the others will be affiliated to each of the Army's ten manoeuvre divisions.

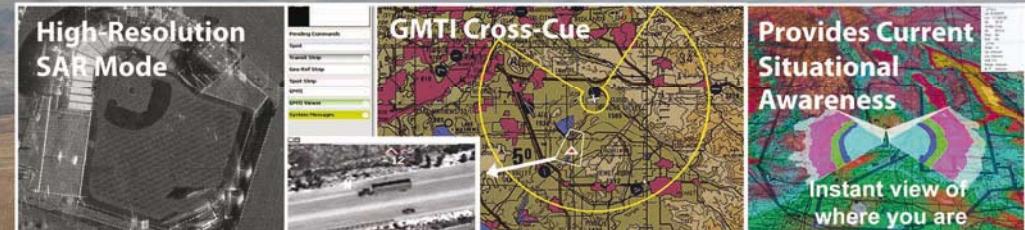
The Army's standard rotation cycle involves one unit preparing for operations, a second unit deployed on »

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» US Air Force leaders argue that its experience with UAS such as the new MQ-9 Reaper make it the logical service to be the Executive Agency for medium-and high-altitude UAS throughout the DoD. (USAF)

operations and a third unit recovering from operations. This would enable the service to maintain three companies, and possibly even four at a stretch, on extended operations.

The USAF's operational concept of using static Predator Operations Centers located in the USA and small forward detachments enables the service to employ more than 80% of its Predator fleet.

Whatever the eventual fate of the still rumbling EW proposal, the DoD is under Congressional and budgetary pressure to rationalise its UAS projects from top to bottom.

The UAS Planning Task Force within the Office of the Undersecretary of Defense for Acquisition, Technology and Logistics is developing an updated version of the *UAS Roadmap* last published in August 2005. Originally scheduled to be published 'on or about August 31 2007', release of the *Roadmap* has slipped as a result of the many issues to be addressed. The *Roadmap* should make for very interesting reading. ♦



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SYSTEMS PRODUCTION UNMANNED AIRCRAFT

In reflecting changes in terminology concerning the unmanned aviation sector - led by the USA - this section samples most of the unmanned aircraft (UA) systems that are currently in a full rate of production, as well as those at a low rate of production worldwide. Entries are arranged alphabetically by UA name.

Note: In accordance with the current thinking, ballistic or semi ballistic vehicles, cruise missiles and artillery projectiles are not considered to be UA systems and therefore are not included.

AIRCRAFT SYSTEMS -
IN PRODUCTION

AIRCRAFT SYSTEMS -
IN DEVELOPMENT

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MUA, UCAVS AND
LETHAL UA SYSTEMS

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AEROLIGHT

interchangeable workstations for internal pilots and payload operators / LRS - minimized control station with full UAV and Payload control.

Use(s): ISTARtrainer UAV. **Manufacturer and Country:** Aeronautics Defense Systems Ltd, Israel **Powerplant:** 11 hp 2-Stroke 106 cc. **Dimensions:** Length 2.56 m, Height 0.96 m, Wingspan 4 m **Weight:** MTOW 40 kg, Max payload 8 kg **Performance:** speed 100 kt; endurance 4 hr; ceiling 10,000 ft; mission radius 150 km **Payload:** Capable of carrying any payload up to 8 kg. **Datalink:** LOS up to 150 km. **Guidance/Tracking:** UMAS avionics. Real time UAV and Payload control, full autonomous navigation and in flight programmable navigation. **Launch:** Conventional wheeled, ATOL optional. **Recovery:** Conventional wheeled, ATOL optional. **Structure Material:** composite **Ground Control Station:** Various configurations: NOAV GCS- generic interchangeable workstations for internal pilots and payload operators / LRS - minimized control station with full UAV and Payload control.

AEROSTAR

Use(s): AISR - Aerial Intelligence Surveillance and Reconnaissance. **Manufacturer and Country:** Aeronautics Defense Systems Ltd, Israel **Powerplant:** Zanzotteria 498 ia 38 hp **Dimensions:** Length 4.5 m, Height 1.2 m, Wingspan 6.5 m **Weight:** MTOW 250 kg, Max payload 50 kg **Performance:** speed 110 kt; endurance <12 hr; ceiling 18,000 ft; mission radius 200 nm **Payload:** Capable of carrying any payload up to 50 kg (VISINT, COMMINT, etc) multiple payload capability. **Datalink:** LOS up to 200 km. **Guidance/Tracking:** UMAS avionics. Real time UAV and Payload control, full autonomous navigation and in flight programmable navigation. **Launch:** Conventional wheeled, ATOL optional. **Recovery:** Conventional wheeled, ATOL optional. **Structure Material:** Composite **Ground Control Station:** Various configs: GCS - generic interchangeable workstations for internal pilots and payload operators / LRS - minimised control station with full UAV and payload control, enables range extension for GCS ops deployment / RPCS (level III RVT).

AEROSKY

GCS - generic interchangeable workstations for internal pilots and payload operators / LRS - minimised CS with full UAV and payload control, enables range extension for GCS ops deployment / RPCS (level III RVT).

Use(s): AISR - Aerial Intelligence Surveillance and Reconnaissance. **Manufacturer and Country:** Aeronautics Defense Systems Ltd, Israel **Powerplant:** 15 hp 2-stroke 150 cc **Dimensions:** Length 3.05 m, Height 1.1 m, Wingspan 4.5 m **Weight:** MTOW 70 kg, Max payload 18 kg **Performance:** speed 100 kt; endurance 5 hr; ceiling 10,000 ft; mission radius 150 km **Payload:** Capable of carrying any payload up to 18 kg. **Datalink:** LOS up to 150 km. **Guidance/Tracking:** UMAS avionics. Real time UAV and Payload control, full autonomous navigation and in flight programmable navigation. **Launch:** Conventional wheeled, ATOL optional. **Recovery:** Conventional wheeled, ATOL optional. **Structure Material:** Composite **Ground Control Station:** Various configurations: GCS - generic interchangeable workstations for internal pilots and payload operators / LRS - minimised CS with full UAV and payload control, enables range extension for GCS ops deployment / RPCS (level III RVT).

ALO

Use(s): reconnaissance, surveillance, target acquisition, fire detection and monitoring **Manufacturer and Country:** Instituto Nacional De Técnica Aeroespacial (INTA), Spain **Powerplant:** 6.5 CV **Dimensions:** Length 1.75 m, Wingspan 3.03 m **Weight:** MTOW 20 kg, Max payload 6 kg **Performance:** speed 200 kph **Payload:** TV or FLIR **Guidance/Tracking:** pre-programmed **Launch:** launcher **Recovery:** parachute

AEROSONDE 4

landing. **Structure Material:** composite **System Components:** Staging box, personal computer, GPS and radio antenna. **Electrical Power:** Up to 75w available for payload. **Ground Control Station:** AAI One System Ground Control Station.

Use(s): Environmental Observations, Tactical Surveillance **Manufacturer and Country:** Aerosonde Pty Ltd, a division of AAI Corporation, AAI Corporation, USA, Australia and USA **Powerplant:** 24 cc H type 1 kW unleaded petrol Fuel injected. **Dimensions:** Length 2.1 m, Height 0.6 m, Wingspan 2.9 m, Rotor diameter 0.5 m, Fuselage length 1.4 m **Weight:** Empty weight 9 kg, MTOW 15 kg, Max payload 5 kg **Performance:** speed 40 - 60 kt; endurance >24 hr; ceiling >6000 m; mission radius >1000 m **Payload:** EO or IR standard. **Datalink:** LOS and/or Iridium satellite communications. **Guidance/Tracking:** Autonomous under base command **Launch:** Autonomous launch via 10g catapult or car top launch. **Recovery:** Autonomous or manual belly

APID 55

Use(s): Civil: Aerial photography, forest fire assessment, environmental monitoring, power line inspection, search and rescue, border patrol and day/night traffic surveillance. Military: EW, surveillance, target acquisition and designation, and ordnance survey. **Manufacturer and Country:** CybAero AB, Sweden **Powerplant:** Hirth E18H 41 kW Gasoline, sep oil inj. 22-stroke 2-cyl, water-cooled. **Dimensions:** Length 3.20 m, Height 1.20 m, Rotor diameter 3.30 m **Weight:** Empty weight 95 kg, MTOW 150 kg, Max payload 55 (incl. fuel) kg **Performance:** speed 48 kt; endurance 6 hr; ceiling 9800 ft; mission radius 27 nm; endurance speed 32 kt **Payload:** Optional customised payload control system. **Datalink:** Operational radius (max) .27 n miles (50 km; 31 miles). **Guidance/Tracking:** Vehicle stabilised and navigated by advanced, self-contained FCS-52 flight control system. Positioning and self-navigation via pre-programmed waypoints, which can be altered during flight. Fully autonomous mode or semi-manually operated by joystick. **Launch:** VTOL **Recovery:** VTOL **Structure Material:** Titanium, Aluminium, Glass & carbon fibre. **Electrical Power:** 12 - 24 V alternators. Back-up power batteries. **Ground Control Station:** Graphical user interface and optional customized Payload Control System. Both systems are normally housed in the transport vehicle but can be operated at any desired location.

ASN-206

Use(s): day/night reconnaissance, battlefield surveillance
Manufacturer and Country: Xi'an ASN Technology Group, China
Powerplant: 37.3 kW HS-700 4 cylinder, two stroke piston engine
Dimensions: Length 3.8 m, Height 1.4 m, Wingspan 6 m **Weight:** MTOW 222 kg, Max payload 50 kg **Performance:** speed 210 kph; endurance 4-8 hr; ceiling 6,000 m **Payload:** variety of optional mission payloads including photographic camera, IR, TV, detective target locating and artillery shooting adjustments **Guidance/Tracking:** flight control and flight path management system **Launch:** rocket booster, zero length launch **Recovery:** parachute

AUTONOMOUS RMAX

Use(s): reconnaissance, surveillance, observation, law enforcement and others **Manufacturer and Country:** Yamaha Motor Co Ltd, Japan
Powerplant: 21 hp gasoline and oil mixture (50:1) 246 cc, liquid cooled, 2-stroke horizontal opposed **Dimensions:** Length 3.63 m, Height 1.22 m, Rotor diameter 3.11 m, Fuselage length 2.75 m **Weight:** MTOW 85 kg
Performance: endurance 1.5 hr **Payload:** attitude sensors (geomagnetic azimuth sensor, three rated gyros, three accelerometers), comms modem, RTK type GPS **Datalink:** spread spectrum comms **Guidance/Tracking:** autonomous program mode, operation dialogue mode, stick input mode and auto return mode **Launch:** VTOL **Recovery:** VTOL

BAT 3

Use(s): Short range surveillance, Aerial mapping **Manufacturer and Country:** MLB Company, USA **Powerplant:** hp gasoline 23 cc, 2-stroke engine **Dimensions:** Length 4.5 ft, Height 1.5 ft, Wingspan 5 ft **Weight:** MTOW 15 to 20 lb **Performance:** endurance 6 hr **Payload:**

Automatically steered turret w/ visible and IR video cameras. Digital still camera mounted in wing. **Datalink:** 900 MHZ spread spectrum **Guidance/Tracking:** MLB flight controller with GPS and IMU. Fully autonomous flight guidance. **Launch:** Autonomous launch using bungee powered catapult **Recovery:** Autonomous landing on wheels **Structure Material:** Kevlar, carbon fiber, foam, epoxy **System Components:** MLB flight control avionics and ground station system

Electrical Power: Lithium Ion Batteries **Ground Control Station:** MLB suitcase sized ground station with point and click moving map interface.

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BLUE HORIZON II

Use(s): Surveillance and reconnaissance **Manufacturer and Country:** E.M.I.T. Aviation Consultants Ltd, Israel **Powerplant:** WAE-342 25 hp 2-stroke engine **Dimensions:** Length 3.2 m, Wingspan 6 m, Fuselage length 3.2 m **Weight:** Empty weight 84 kg, MTOW 180 kg, Max payload 37 kg **Performance:** speed 130 kt; endurance 17 hr; ceiling 18,000 ft; endurance speed 70 kt **Payload:** EO (day/night) **Guidance/Tracking:** auto navigation **Launch:** launcher or wheeled **Recovery:** parachute or wheeled (tailhook) **Structure Material:** composite / carbon-fibre **Electrical Power:** 28v 200 W

BLUEYE

Use(s): Military mapping and civilian applications **Manufacturer and Country:** BlueBird Aero Systems Ltd, Israel **Powerplant:** 2-stroke engine **Dimensions:** Length 1.7 m, Width 37 cm, Wingspan 4.5 m **Weight:** 55 kg **Performance:** Range 50 km, endurance 9 hr **Payload:** 15 kg, day/IR stabilised payload, photogrammetric payload **Guidance/Tracking:** Fully autonomous **Launch:** Wheeled **Recovery:** Wheeled **Structure Material:** Composite **Ground Control Station:** Backpack GCU, video tracking

BORDER EAGLE

& Telemetry: ID-TM6 GPS and data telemetry module with software graphics interface display. **Launch:** Wheeled. **Recovery:** Wheeled or parachute. **Structure Material:** All composite. **System Components:** Air Vehicles x 4; Stabilized Daylight camera payloads x 4; Ground Control Station (GSE); Antenna Tracking System (ATS); Field Support Subsystem (FSS); Ground Support Equipment (GSE). **Electrical Power:** 6V/12V/13.8VDC Li-Po or Li-Ion batteries. **Ground Control Station:** Portable, small vehicle mounted.

CAMCOPTER S-100

Use(s): Surveillance and reconnaissance, target acquisition and designation, communications relay, precision delivery, aerial survey, Land and sea operations. **Manufacturer and Country:** Schiebel Elektronische Geraete GmbH, Austria **Powerplant:** 55 hp AVGas 100 LL. 293 cc Rotary Engine. **Dimensions:** Length 3.09 m, Height 1.04 m, Rotor diameter 3.4 m **Weight:** Empty weight 220 lb, MTOW 440 lb, Max payload 110 lb **Performance:** speed 120 kt; endurance 6 (with 55lb payload) hr; ceiling 18,000 ft; mission radius 150 km; endurance speed 55 kt **Payload:** Universal payload mount allows for a wide variety of payloads - EO/IR/ laser designation and ground penetrating radar. **Datalink:** C-band **Guidance/Tracking:** DGPS / INS **Launch:** VTOL. **Recovery:** VTOL. **Structure Material:** Carbon fibre. **System Components:** 2 AVs (Aerial Vehicles), 1 GCS (Ground Control Station). **Electrical Power:** 500 W @ 28 V DC **Ground Control Station:** 2 network-based mission planning / control and payload workstations, tracking antenna, UHF backup antenna, GPS reference module, PCU (Pilot Control Unit), CUBE.

CL-289

Use(s): Surveillance and reconnaissance, target detection and localisation, target classification and identification, strike damage assessment. **Manufacturer and Country:** EADS Defence and Security Systems / Military Air Systems, Germany **Powerplant:** 1x BMW Rolls-Royce (KHD) T 117 hp 1100 N, turbojet. **Dimensions:** Length 3.48 m, Wingspan 1.32 m **Weight:** Empty weight 127 kg, MTOW 240 kg, Max payload 30 kg **Performance:** speed 740 km; ceiling 125 - 5000 m; endurance speed 740 kt **Payload:** Daylight optical camera Zeiss KRB 8/24D and/or IR-Linescanner SAT Corsaire. **Datalink:** Real-time downlink for IR-Images, removable command and control data link (for flight training only). **Guidance/Tracking:** Pre-programmed; autopilot navigation with INS/GPS, terrain following. **Launch:** Booster rocket from truck-mounted zero-length ramp. **Recovery:** Parachute and airbag. **Ground Control Station:** Mobile GCS for mission planning, map visualisation, digital realtime image exploitation, additional command and control station with datalink to the drone for flight training.

COBRA

Use(s): Concept and payload test platform **Manufacturer and Country:** Raytheon Company, USA **Powerplant:** DA-150 16.5 hp gasoline Air-cooled, 2-cycle, 2 cylinder opposed **Dimensions:** Length 9.33 ft, Height 3.08 ft, Wingspan 10.16 ft **Weight:** Empty weight 55 lb, MTOW 105 lb, Max payload 27 lb **Performance:** speed 95 kt; endurance 3+ hr; ceiling 12,000+ ft; range 55-60 kt; endurance speed 45-50 kt **Payload:** Variable **Datalink:** Microhard MHX-910 **Guidance/Tracking:** Motorola M12 GPS **Launch:** Runway **Recovery:** Runway **Structure Material:** Carbon and glass composite **Electrical Power:** Sullivan Genesys 500 Watt **Ground Control Station:** Raytheon multi-vehicle control systems (MVCS), Cloud Cap Piccolo (either or both)

COYOTE

Use(s): Surveillance, monitoring, research. **Manufacturer and Country:** Advanced Ceramics Research Inc. (ACR), USA **Powerplant:** Hacker Electric, 955 RPM/Volt. **Dimensions:** Length 0.79 m, Height 0.4 m **Weight:** Empty weight 5.4 kg, MTOW 6.4 kg, Max payload 1.36 kg **Performance:** endurance 1.5 hr; ceiling 9,144 (MSL) m; mission radius 20 nm; endurance speed 102 kph **Payload:** Sony IX-1A or FLIR Photon **Datalink:** 1.0 Watt UHF Data Modem. **Guidance/Tracking:** GPS/DGPS/INS. **Launch:** Standard A-Size Sonobuoy Tube. **Recovery:** Expendable. **Structure Material:** Aluminum/Carbon Fiber. **System Components:** Coyote AV, ACS. **Electrical Power:** 16 AH Lithium-Polymer Rechargeable Pack. **Ground Control Station:** Airborne Control Station (ACS).

CRECERELLE

Use(s): Tactical reconnaissance, surveillance, target acquisition, ECM. **Manufacturer and Country:** SAGEM SA (SAFRAN), France **Powerplant:** 26 hp 1 x piston engine **Dimensions:** Length 2.75 m, Height 0.71 m, Wingspan 3.30 m **Weight:** Empty weight 45.4 kg, MTOW 150 kg, Max payload 35 kg **Performance:** speed 135 kt; endurance >5 hr; ceiling 3,500 m; mission radius 80 km **Payload:** SAGEM Cyclope 2000 IRLS; FLIR; EW/ECM **Datalink:** TTL radio command uplink, real-time video downlink **Guidance/Tracking:** pre-programmed; RF and GPS navigation (AV position better than 10m CEP) **Launch:** catapult from trailer-mounted zero-length launcher **Recovery:** parachute or belly skid landing **Structure Material:** composite **Ground Control Station:**

Internal 4 or 2 workstations (mission planning, management, mission monitoring) with 2 flat screens (mouse trackball, keyboard). External container: standard ISO. 20 x 15 x 10 ft (HxWxD) 19 inch rack containers. Mobile

D-1E

Use(s): Magnetic survey to support mining and other projects. **Manufacturer and Country:** Dara Aviation Inc, USA **Power plant:** Fuji 50 CC **Dimensions:** length 79 in, span 129 in, height 28 in **Weight:** 76 lb **Performance:** 12 hr on 3.5 gal unleaded fuel, max altitude 4,500 ft **Payloads:** 8 lb, magnetic surveyor system **Datalink:** 900 Mhz, RF modem **Guidance/Tracking:** GPS and Dynon Avionics Autopilot AP-1

Launch: Car top launcher. **Recovery:** Conventional landing via manual mode. **Structure Material:** Composite and fibreglass **Ground Control Station:** DA-GS-2

SCHIEBEL

The S-100 is a vertical take-off and landing (VTOL) system, built around a compact helicopter aerial vehicle. Controlled by a triple-redundant flight computer based on proven flight control methods and algorithms, it provides advanced capabilities and operations like Day & Night Surveillance, Area & Event Security, Border Patrol, Maritime Security and Precision Survey & Mapping.

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D-1G

Use(s): Used primarily for atmospheric pollution surveys **Manufacturer and Country:** Dara Aviation Inc, USA **Powerplant:** Fuji 50 CC **Dimensions:** length 69 in, span 129 in, height 20 in **Weight:** 74 lb **Performance:** Up to 3 hr on 0.5 gal unleaded fuel, max altitude 4,000 ft **Payloads:** 30 lb of atmospheric and electronic equipment, located in nose section and mid fuselage **Datalink:** 900 Mhz, RF Modem **Guidance/Tracking:** GPS and Dynon Avionics Autopilot AP-1 **Launch:** car top launcher **Recovery:** Conventional landing via manual mode **Structure Material:** Composite and fibreglass **Ground Control Station:** DA-GS-2

EAGLE 1

Use(s): Medium Altitude Long Endurance Strategic UAV **Manufacturer and Country:** EADS Defence & Security Systems / Military Air Systems, France **Powerplant:** Rotax 914 115 hp **Dimensions:** Length 9.3 m, Wingspan 16.6 m **Weight:** MTOW 1250 kg, Max payload 250 kg **Performance:** speed 112 kt; endurance 24 hr; ceiling 25,000 ft **Payload:** EO/IR payload, SAR/MTI, MPR (Maritime Patrol Radar), Laser Designator payloads, SATCOM, voice relay and new generation Mission Control Centres. **Datalink:** SATCOM+Line of Sight **Guidance/Tracking:** GPS/INS **Launch:** wheeled, Automatic Take Off **Recovery:** wheeled, Automatic Landing **Structure Material:** composite

E-HUNTER

Use(s): medium altitude, long endurance UAV system, surveillance, reconnaissance, target acquisition, artillery adjustment and/or missions based on customer furnished payloads **Manufacturer and Country:** IAI Malat, Israel **Powerplant:** 68 hp dual, 4 stroke, 2 cycle **Dimensions:** Length 7.52 m, Wingspan 15.24 m **Weight:** MTOW 954 kg, Max payload 114 kg **Performance:** speed 106 kt; endurance 25 hr; ceiling 6,000 m; range 200km **Payload:** MOSP (TV and IR combi) and/or customer furnished payloads **Datalink:** Hunter control and datalink subsystems, direct LOS and/or UAV airborne data relay for beyond-line-of-sight datalink, dual real-time command uplink, dual real-time data and video downlink **Guidance/Tracking:** real-time payload and UAV control, GPS based interruptible airborne mission controller, autonomous return on datalink loss. Advanced universal UAV mission ground control centre (compatible with all MALAT systems) and remote video terminals. **Launch:** wheeled take-off **Recovery:** wheeled landing

FALCO

Use(s): Persistent Surveillance (Homeland Security, Peace Keeping and Peace Enforcing). **Manufacturer and Country:** Galileo Avionica S.p.A., Italy **Powerplant:** UAV Engines 75 hp **Dimensions:** Length 5,25 m, Height 1,80 m, Wingspan 7,20 m **Weight:** MTOW 420 kg, Max payload 70 kg **Performance:** speed 140 kt; endurance 8-14 hr; ceiling 5,000 m **Payload:** EO/IR, Laser designator, SAR, Maritime Surveillance Radar, ESM, NBC sensors, hyper spectral sensor. **Datalink:** Function of configuration. **Guidance/Tracking:** Manual or Automatic. **Launch:** Conventional Automatic STOL or Pneumatic Launcher, depending on configuration. **Recovery:** Conventional Automatic STOL or Parachute recovery. **Structure Material:** Composite Aluminium Alloy, Carbon Fibre. **Electrical Power:** Function of configuration. **Ground Control Station:** Made by Galileo Avionica.

FULMAR

Use(s): Medium-range, long endurance reconnaissance system. **Manufacturer and Country:** Aerovision Vehiculos Aereos S.L., Spain **Powerplant:** Dimensions: Length 1.2 m, Height 0.5 m, Wingspan 3 m **Weight:** MTOW 20 kg, Max payload 8 kg **Performance:** endurance 8 hr; ceiling 2000 m; mission radius 800 km; range 100 kph **Payload:** EO and video **Guidance/Tracking:** Fully automatic. **Launch:** Catapult. **Recovery:** Skid landing on land or water.

GLOBAL HAWK (RQ-4)

Use(s): High altitude, long endurance ISR. **Manufacturer and Country:** Northrop Grumman Corporation, USA **Powerplant:** Rolls-Royce AE3007H Turbofan, lb **Dimensions:** Length 14.5 m, Height 4.6 m, Wingspan 39.9 m **Weight:** MTOW 14,628 kg, Max payload 1360 kg **Performance:** endurance 36 hr; ceiling 60,000 ft; endurance speed 310 (TAS) kt **Payload:** Raytheon: Synthetic Aperture Radar, Electro-Optical, Infrared. **Datalink:** Ku SATCOM, CDL LOS. **Guidance/Tracking:** UHF SATCOM/LOS, INMARSAT. **Launch:** wheeled **Recovery:** wheeled **Structure Material:** Main fuselage is standard aluminium, semi-monocoque construction. **System Components:** More than half the system's components are constructed of lightweight, high-strength composite materials, including its wings, wing fairings, empennage, engine cover, engine intake, and three radomes. **Electrical Power:** 25 KVA **Ground Control Station:** Launch & Recovery Element, Mission Control Element.

HERMES 180

External (container): 2.19 x 2.23 x 4.38 m (HxWxL) S-820 shelter (mobile). Weight: 2.8 tonnes.

Use(s): ISTAR (Brigade to Division level) **Manufacturer and Country:** Elbit Systems Ltd UAV Division, Israel **Powerplant:** UEL 38 hp gasoline rotary engine **Dimensions:** Length 3.47 m, Wingspan 6 m, Fuselage length 4.43 m **Weight:** MTOW 195 kg, Max payload 32 kg **Performance:** speed 105 kt; endurance >10 hr; ceiling 15000 ft; mission radius 100 nm **Payload:** EO, IR and Laser designator, SAR GMTI **Datalink:** LOS **Guidance/Tracking:** fully autonomous or manual flight **Launch:** dual system - catapult and/or runway **Recovery:** dual system - parachute and air bag and/or runway **Structure Material:** fully composite **Ground Control Station:** Internal: 2 interchangeable workstations comprising 1x situation & 1x observation display, stick, mouse, trackball & keyboard.

HERMES 450

1x situation & 1x observation display, stick, mouse, trackball & keyboard. External (container): 2.19 x 2.23 x 4.38 m (HxWxL) S-820 shelter (mobile). Weight: 2.8 tonnes.

Use(s): ISTAR, SIGINT, Comm relay and other (Division to Corp level) **Manufacturer and Country:** Elbit Systems Ltd UAV Division, Israel **Powerplant:** UEL 52 hp rotary engine **Dimensions:** Length 6.1 m, Wingspan 10.5 m **Weight:** MTOW 450 kg, Max payload 150 kg **Performance:** speed 95 kt; endurance >20 hr; ceiling 18,000 ft **Payload:** dual capability (EO, IR and Laser designator, SAR, GMTI and other) **Datalink:** LOS and/or Satellite comm **Guidance/Tracking:** fully autonomous or manual flight **Launch:** prepared and semi prepared runways **Recovery:** prepared and semi prepared runways or parachute **Structure Material:** fully composite **Electrical Power:** 1.6 kW **Ground Control Station:** Internal: 2 interchangeable workstations comprising

HERON / MACHATZ 1

Tracking: real time payload and UAV control, GPS based interruptable airborne mission controller, full autonomous flight, autonomous return on datalink loss or end of mission program. Advanced universal UAV mission ground control centre and remote video terminals. **Launch:** wheeled take-off **Recovery:** wheeled landing

Use(s): medium altitude and long endurance UAV systems surveillance, reconnaissance, target acquisition, artillery adjustment and/or missions based on customer furnished payloads. **Manufacturer and Country:** IAI Malat, Israel **Powerplant:** 100 hp 4 cycle, 4 cylinder with turbo charge **Dimensions:** Length 8.5 m, Wingspan 16.6 m **Weight:** MTOW 1,150 kg, Max payload 250 kg **Performance:** speed 125 kt; endurance 40-50 hr; ceiling 7,750 m; range 200 km **Payload:** customer furnished payloads, EL/M 2022 Maritime Patrol Radar and/or IAI electro-optical TV/IR payload **Datalink:** direct line-of-sight datalink and/or UAV airborne data relay for beyond-line-of-sight datalink, dual real time command uplink, single real time data and video downlink **Guidance/**

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HERTI

Use(s): Aerial Surveillance & Reconnaissance **Manufacturer and Country:** BAE Systems, UK **Powerplant:** ROTAX 914F 115 hp Av 97 / unladen. Prop, 4 cylinder, 4 stroke. **Dimensions:** Length 5.1 m, Height 1.7 m, Wingspan 12.6 m **Weight:** MTOW 500 kg, Max payload 150 kg **Performance:** speed 120 kt; endurance 24 hr; ceiling >20,000 ft; mission radius 1500 km **Payload:** ICE - EO, IR, SAR, Video. **Datalink:** Duplex vehicle / system information link plus independent duplex imagery datalink. **Guidance/Tracking:** Differential GPS. **Launch:** Wheeled from paved or grass. (Feasibility rail launch test complete) **Recovery:** Wheeled onto paved or grass. **Structure Material:** Glass fibre / composites. **Electrical Power:** Dual redundant powergen system.

Ground Control Station: Mission Manager, Image Extraction Manager.

HUNTER

Use(s): Tactical-close range UAV system, surveillance, reconnaissance, target acquisition, artillery adjustment and/or missions based on customer furnished payloads **Manufacturer and Country:** IAI Malat, Israel **Powerplant:** 68 hp dual, 4-stroke, 2-cylinder **Dimensions:** Length 6.90 m, Wingspan 8.90 m **Weight:** MTOW 727 kg, Max payload 114 kg **Performance:** speed 110 kt; endurance 12 hr; ceiling 4,500 m; range 100-200km **Payload:** MOSP (TV & IR Combi) and/or customer furnished payloads **Datalink:** fully compatible with Hunter control and datalink subsystems, direct line-of-sight datalink and/or UAV airborne data relay for beyond-line-of-sight datalink, dual real-time command uplink, dual real-time data and video downlink **Guidance/Tracking:** real-time payload and UAV control, GPS based interruptible airborne mission controller, autonomous return on datalink loss. Advanced universal UAV mission ground control centre and remote video terminals. **Launch:** fully automatic wheeled take-off or rocket assisted take-off **Recovery:** fully automatic wheeled landing, emergency parachute

**HORNET MK-V**

Use(s): Surveillance / Aerial target UAV. **Manufacturer and Country:** Integrated Dynamics, Pakistan **Powerplant:** 22 hp Twin-cylinder engine. **Dimensions:** Length 2.95 m, Height 0.89 m, Wingspan 3.87 m **Weight:** Empty weight 25 kg, MTOW 60 kg, Max payload 15 kg **Performance:** endurance 4 hr; ceiling 5,000 ft; range 132-240 kph **Payload:** Up to 4 smoke flares. Up to 6 infra-red flares. Combinations of flares may be carried and activated as required. Surveillance, real-time camera module, acoustic and Doppler radar MDI. System payloads may be mixed and most carried simultaneously. **Datalink:** UHF/L/S Bands. **Guidance/Tracking:** Stabilization: IFCS-6000 Integrated Flight Control System. Tracking & Telemetry: ID-TM6 GPS and data telemetry module with software graphics interface display. **Launch:** Wheeled. **Recovery:** Wheeled or parachute. **Structure Material:** Composites. **System Components:** Air Vehicles x 4; Ground Control Station (GSE); Antenna Tracking System (ATS); Field Support Subsystem (FSS); Ground Support Equipment (GSE). **Electrical Power:** 6V/12V/13.8VDC **Ground Control Station:** Portable, vehicle mounted.

with software graphics interface display. **Launch:** Wheeled. **Recovery:** Wheeled or parachute. **Structure Material:** Composites. **System Components:** Air Vehicles x 4; Ground Control Station (GSE); Antenna Tracking System (ATS); Field Support Subsystem (FSS); Ground Support Equipment (GSE). **Electrical Power:** 6V/12V/13.8VDC **Ground Control Station:** Portable, vehicle mounted.

HUNTER (MQ-5B)

Use(s): Reconnaissance, surveillance and target acquisition, battle damage assessment, and strike capabilities **Manufacturer and Country:** Northrop Grumman Corporation, USA **Powerplant:** Northrop Grumman - APL 55 hp JP-8 (HFE) 3-cylinder inline piston, 880 cc (two each) **Dimensions:** Length 7.01 m, Height 2.16 m, Wingspan 10.44 m, Rotor diameter 1.36 m **Weight:** Empty weight 659 kg, MTOW 886 kg, Max payload 226.8 (fuel + payload) kg **Performance:** speed 110 (Dash) kt; endurance 21.3 (with EO/IR payload) hr; ceiling 18,000+ (above MSL) ft; mission radius 250+ (in relay mode) km; endurance speed 60-80 kt **Payload:** Tamam's 770mm /3d Gen FLIR EO/IR MOSP. Demonstrate more than 40 payloads for DoD customers including communications relay; SIGINT, ELINT, COMINT collectors and jammers; NBC detection sensors; SAR/MTI; and non-lethal and lethal munitions. **Datalink:** LOS data link (C-band or customer specific) plus airborne relay. **Guidance/Tracking:** GPS and LN-25I inertial navigation. **Launch:** Currently with external pilot. Differential GPS auto-takeoff and landing system (ATLS) under development for future integration. **Recovery:** Differential GPS auto-takeoff and landing system (ATLS) is under development for future integration. **Structure Material:** Composite **Electrical Power:** 3kW available for payloads. **Ground Control Station:** US Army One System GCS.

**HUMA-1**

Use(s): Short range multipurpose system. **Manufacturer and Country:** Integrated Defense Systems, Pakistan **Power plant:** 22 BHP two cylinder two stroke engine **Dimensions:** Length 0.7885m (2ft 7in) (not including shock damper), Height 4.4m (14ft 5in), Wingspan 3.7535 m (12ft 4in) **Weight:** MTOW130 kg (286 lb) **Performance:** maximum speed 180 km/hr, range 500 km, endurance 5-6 hr, cruise altitude 9,842 ft, endurance, operational radius 58 km **Payload:** 20 kg (44 lb) **Datalink:** Real-time video transmission system **Guidance/Tracking:** GPS based auto piloting system with return home mode in case of GPS loss **Launch:** Rocket booster assisted **Recovery:** Parachute landing **Structure Material:** Composite structure

I-GNAT

Use(s): Reconnaissance, surveillance, communications relay. **Manufacturer and Country:** General Atomics Aeronautical Systems Inc. (GA-ASI), USA **Powerplant:** Rotax 914 hp Turbo. **Dimensions:** Length 19 ft, Wingspan 42 ft **Weight:** Empty weight 900 lb, MTOW 1,650 lb, Max payload Internal: 200 lb, External: 300 lb **Performance:** speed 125 kt; endurance 40+ hr; ceiling 30,000 ft **Payload:** EO/IR, SAR, data link relay, ESM. **Datalink:** C-Band LOS. **Guidance/Tracking:** INS/GPS. **Launch:** Conventional wheeled. **Recovery:** Conventional wheeled. **Structure Material:** Semi-monocoque composite using pre-impregnated bi-directional graphite skin and Nomex honeycomb stiffening panels.



I-GNAT ER

Use(s): Reconnaissance, surveillance, target acquisition/designation, weapons delivery, communications relay, EW, SIGINT. **Manufacturer and Country:** General Atomics Aeronautical Systems Inc. (GA-ASI), USA. **Powerplant:** Rotax 914. Turbo. **Dimensions:** Length 27 ft, Wingspan 55 ft. **Weight:** Empty weight 1,250 lb, MTOW 2,300 lb, Max payload Internal: 450External: 300 lb. **Performance:** speed 120 kt; endurance 40 hr; ceiling 25,000 ft. **Payload:** EO/IR, SAR, Hellfire missiles, communications relay. **Datalink:** C-band LOS, Ku-band BLOS SATCOM. **Guidance/Tracking:** INS/GPS. **Launch:** Conventional wheeled. **Recovery:** Conventional wheeled. **Structure Material:** Semi-monocoque composite using pre-impregnated bi-directional graphite skin and Nomex honeycomb stiffening panels.

JASOOS II

Use(s): Tactical reconnaissance, surveillance, damage assessment and various civil applications. **Manufacturer and Country:** SATUMA, Pakistan. **Powerplant:** 22-35 hp gasoline 2-cylinder, 2-stroke engine. **Dimensions:** Length 3.59 m, Wingspan 4.92 m. **Weight:** MTOW 125 kg, Max payload 20-30 kg. **Performance:** speed 130 kph; endurance 4-5 hr; ceiling 10,000 ft. **Payload:** EO, customer furnished. **Datalink:** real-time double datalink. **Guidance/Tracking:** remote control/pre-programmed autonomous navigation. **Launch:** wheeled. **Recovery:** wheeled. **Structure Material:** composites. **Electrical Power:** 12V, 700W. **Ground Control Station:** 3 console, truck mounted.

KESTREL II

Use(s): reconnaissance and surveillance. **Manufacturer and Country:** Chung-Shan Institute of Science and Technology, Taiwan. **Powerplant:** Limbach L275E unleaded gasoline +5% lubrication oil. **Dimensions:** Length 4 m, Wingspan 5 m. **Weight:** MTOW 120 kg, Max payload 25-30 kg. **Performance:** speed 70-100 kt; endurance 5 hr; ceiling 8,000 ft. **Payload:** gimbaled CCD camera. **Guidance/Tracking:** autopilot-remote control equipment, GPS, camera. **Launch:** conventional wheeled. **Recovery:** conventional wheeled.

KINGFISHER 1

Use(s): Flight element of the UAV Experimentation System (UES - Multi-UAV research and experimentation system); S&R Experimentation; TUAV Conops and Architecture development. **Manufacturer and Country:** BAE Systems Australia, Integrated Autonomous Systems, Australia. **Powerplant:** Desert Aircraft DA-150 12.3 kW gasoline Horizontally opposed 2-stroke. **Dimensions:** Length 3.73 m, Wingspan 4.23 m. **Weight:** MTOW 66 kg, Max payload 1 - 12 kg. **Performance:** speed 80 kt; endurance 2 hr; mission radius 30 km; range 55 - 80 kt; endurance speed 55 kt. **Payload:** Modular, interchangeable mission payloads including EO; EO/LRF; flight control sensors; DGPS, IMU, Pitot Static; DNP (DDF Node Processor). **Datalink:** Air-Ground (control/telemetry) spread spectrum UHF radio modem. Air-Air (Experimentation) Wireless LAN. **Guidance/Tracking:** Fully autonomous take-off and landing; fully autonomous navigation, guidance and control during flight; pre-programmed and in-flight updateable waypoint. **Launch:** Wheeled. **Recovery:** Wheeled. **Structure Material:** Fibre glass, aluminium, carbon fibre and plywood. **Electrical Power:** Battery, provision for alternator/generator. **Ground Control Station:** COTS PC-based, conforms to ISR Management System (IMS) architecture.

KINGFISHER 2

Use(s): Flight element of the UAV Experimentation System (UES - Multi-UAV research and experimentation system); S&R Experimentation; TUAV/MALE Conops and TUAV/MALE Architecture development. **Manufacturer and Country:** BAE Systems Australia, Integrated Autonomous Systems, Australia. **Powerplant:** UEL AR 74-1025 38 hp Rotary. **Dimensions:** Length 4.20 m, Wingspan 4.23 m. **Weight:** MTOW 130 kg, Max payload 30 kg. **Performance:** speed 95 kt; endurance 4 hr; mission radius 50 + km; range 60 - 95 kt. **Payload:** Modular, interchangeable mission payloads up to 30kg; including COTS gimballed EO/IR turret (12 inch); EO/LRF; flight control sensors; DGPS, IMU, Pitot Static; DNP (DDF Node Processor), SNP (SLAM Node Processor); Mini-ESM payload (BAE Systems development). **Datalink:** Air-Ground (control/telemetry) spread spectrum UHF radio modem (optional redundant system). C-Band planned. Air-Air (Experimentation) Wireless LAN. **Guidance/Tracking:** Fully autonomous take-off and landing; fully autonomous navigation, guidance and control during flight; pre-programmed and in-flight updateable waypoint. **Launch:** Wheeled. **Recovery:** Wheeled (wheel brakes). **Structure Material:** Aluminium, carbon fibre and plywood. **Electrical Power:** Battery and alternator/generator. **Ground Control Station:** COTS PC-based, conforms to ISR Management System (IMS) architecture.

KZO

Use(s): Target localisation, reconnaissance, damage assessment. **Manufacturer and Country:** Rheinmetall Defence Electronics GmbH, Germany. **Powerplant:** 24 kW 2 stroke, 2 piston engine, pusher propeller. **Dimensions:** Length 2.25 m, Height 0.9 m, Wingspan 3.42 m. **Weight:** MTOW 161 kg, Max payload 35 kg. **Performance:** speed 220 kph; endurance >3.5 hr; ceiling (ASL) 3,500 m; mission radius 100+ km; endurance speed 150 kph. **Payload:** Up to 35 kg (IR camera (12 m)), 3 axis stabilisation platform, deotation. **Datalink:** J-Band, highly jam resistant. **Guidance/Tracking:** DL-Rho/Theta, GPS, map matching, pre-programmed autonomous with in-flight redirection. **Launch:** Rocket booster from truck-mounted container. **Recovery:** Parachute and airbag. **Structure Material:** Radar and IR stealth design and material. **Ground Control Station:** 3 workstations with map and video display, recorder for data and video, connection to H.Q.

LUNA



Use(s): Surveillance, reconnaissance and target acquisition and location in real time. **Manufacturer and Country:** EMT, Germany
Powerplant: 5 kW 2-cylinder 2-stroke fuel injection. **Dimensions:** Length 2.36 m, Height 0.87 m, Wingspan 4.17 m **Weight:** MTOW < 40 kg
Performance: speed 70 kph; endurance 4 hr; ceiling 3,500 (ISA) m; mission radius 80 km **Payload:** 3-axis tilttable sensor platform with color zoom and IR video cameras, forward looking pilot color video camera. Optional: Data link relay payload for beyond line-of-sight reconnaissance, Mini-SAR sensor. **Datalink:** Control and video/telemetry in real time, jamming resistant. **Guidance/Tracking:** Autonomous GPS waypoint navigation, manual flight mode, provision for autonomous return to base. **Launch:** Bungee catapult. **Recovery:** Autonomous net or parachute landing.

Structure Material: Glass fibre composite. **Electrical Power:** Battery backed generator. **Ground Control Station:** Modular design to fit in any vehicle or container.

MANTA



Use(s): Surveillance, Monitoring, Research. **Manufacturer and Country:** Advanced Ceramics Research Inc. (ACR), USA **Powerplant:** 3W 5.5 (@ 6800 RPM) hp 100:1 Gasoline (87 Octane MOGAS) / Oil Pre-Mix. 2 Cylinder Boxer, 2 Stroke. **Dimensions:** Length 1.9 m, Height 0.7 m, Wingspan 105 in **Weight:** Empty weight 20.4 kg, MTOW 27.7 kg, Max payload 6.8 kg **Performance:** endurance Up to 9 hr; ceiling 4,870 (MSL) m; mission radius 20 nm; endurance speed 148 kph **Payload:** EO/IR Gimbal or Hyperspectral. **Datalink:** 1.0 Watt UHF Data Modem. **Guidance/Tracking:** GPS/DGPS/INS. **Launch:** Rolling Take-off or Catapult Launch. **Recovery:** Wheeled or Skid Type Gear. **Structure Material:** Fibre Glass. **System Components:** Rail Launcher, iGCS, Air Vehicle, Tracking Antenna. **Electrical Power:** 2X BA5590/U. **Ground Control Station:** ACR iGCS.

MUKHBAR



Use(s): Medium Range Tactical reconnaissance, surveillance, damage assessment and various civil applications. **Manufacturer and Country:** SATUMA, Pakistan **Powerplant:** 120 cc 2 cylinder, 2 stroke gasoline engine **Dimensions:** Length 2.87 m, Wingspan 3.56 m **Weight:** MTOW 40 kg, Max payload 5 kg **Performance:** speed 120 kph; endurance 1.5 hr; ceiling 7,000 ft **Payload:** EO, customer furnished **Datalink:** Real time double datalink **Guidance/Tracking:** Remote control/pre-programmed autonomous navigation **Launch:** Wheeled **Recovery:** Wheeled **Structure Material:** Composites **Electrical Power:** 12V, 100W **Ground Control Station:** 3 console, truck mounted

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NEPTUNE (RQ-15)

controller, and the payload controller. Other configurations are available as a customer option.

Use(s): Military tactical operations over land or water **Manufacturer and Country:** DRS Unmanned Technologies Inc, USA **Powerplant:** AV gas/MO gas **Dimensions:** Length 6 ft, Height 20 in, Wingspan 7 ft **Weight:** MTOW 140 lb, Max payload 20 lb **Performance:** speed 85 kt; endurance 4 hr; ceiling 8,000 ft **Payload:** DRS GS-207 two axis stabilised EO/IR gimbal **Datalink:** Digital S-Band up link and L-Band downlink **Guidance/Tracking:** GPS Navigation **Launch:** zero length pneumatic launcher **Recovery:** Autonomous parachute recovery land or water **Structure Material:** Carbon Fibre Composite **Electrical Power:** 24 VDC **Ground Control Station:** Portable computer terminal interfaced with the communications module, an optional AV hand

NIGHT INTRUDER 300

wheeled take-off or hydropneumatic rail **Recovery:** wheeled landing or parafoil **Structure Material:** composite

Use(s): reconnaissance, surveillance, target acquisition, battle damage assessment and artillery adjustment **Manufacturer and Country:** Korea Aerospace Industries Ltd, Republic of Korea **Powerplant:** UAV Engines AR801R 38.8 kW Rotary engine **Dimensions:** Length 4.8 m, Height 1.47 m, Wingspan 6.4 m **Weight:** Empty weight 215 kg, MTOW 290 kg, Max payload 45 kg **Performance:** speed 185 kph; endurance 6 hr; ceiling 15,000 ft; mission radius >200 km; endurance speed 120-150 kph **Payload:** EO/IR or any payload to meet customer requirements **Datalink:** adjustable frequencies in C-band & UHF, digital datalink with encryption & anti-jamming **Guidance/Tracking:** Pre-programmed or remote control, autonomous return on datalink loss, GPS **Launch:**

NISHANT

Use(s): battlefield surveillance, reconnaissance and target acquisition **Manufacturer and Country:** Aeronautical Development Establishment (ADE), India **Powerplant:** pusher propeller system driven by IC engine **Dimensions:** Length 4.6 m, Height 1.2 m, Wingspan 6.5 m **Weight:** Empty weight 252 kg, MTOW 350 kg, Max payload 60 kg **Performance:** speed 180 kph; endurance 4 hr; ceiling 4 km **Payload:** Electro-optic visible/IR sensor and laser range finder on gimbal platform, mini panoramic film camera, ESM sensors **Datalink:** Microwave, digital **Guidance/Tracking:** Manual/autonomous **Launch:** mobile hydro-pneumatic short length launcher **Recovery:** parachute or net **Structure Material:** composite

PCHELA - IT

Use(s): battlefield surveillance, EW **Manufacturer and Country:** AS Yakovlev OKB, Russia **Powerplant:** 32 hp 1 x Samara (SKBM) P-032 piston engine **Dimensions:** Length 2.78 m, Height 1.10 m, Wingspan 3.25 m **Weight:** MTOW 138 kg, Max payload 70 kg **Performance:** speed 97 kt; endurance 2 hr; ceiling 3,000 m; mission radius 60 km **Payload:** daylight TV camera; IRLS; EW jammer **Datalink:** radio command uplink; real-time video downlink **Guidance/Tracking:** remote control **Launch:** container launch by rocket boost from vehicle-mounted rail **Recovery:** parachute

PHOENIX

Use(s): battlefield surveillance, target acquisition and artillery fire adjustment **Manufacturer and Country:** BAE Systems, UK **Powerplant:** 1x TTL WAE 342.25 hp piston engine **Dimensions:** Length 3.76 m, Height 1.67 m, Wingspan 5.50 m **Weight:** Empty weight 157.2 kg, MTOW 209.2 kg, Max payload 52 kg **Performance:** speed 86 kt; endurance >4 hr; ceiling 3000 m; mission radius 50 km **Payload:** turret-mounted IR in ventral pod **Datalink:** maintains a two-way using J band frequencies **Guidance/Tracking:** flight control by commanded autonomous manoeuvres **Launch:** truck-mounted pneumatic/hydraulic catapult **Recovery:** parachute and impact-absorbing airbag **Structure Material:** GRP construction **System Components:** AV, GCS, GDT, launch vehicle, recovery vehicle and forward maintenance facility

PIONEER (RQ-2B)

Use(s): tactical close range UAV system, surveillance, reconnaissance, target acquisition and artillery adjustment, battle damage assessment **Manufacturer and Country:** Pioneer UAV Inc, USA **Powerplant:** Sachs SF2 - 350 26 hp 1 x piston engine **Dimensions:** Length 4.26 m, Height 1.2 m, Wingspan 5.11 m **Weight:** MTOW 203 kg, Max payload 45 kg **Performance:** speed 95 kt; endurance 6 hr; ceiling 3,660 m **Payload:** Wescam day/night sensor 12DS, IAI-Tamam Moked 200A daylight TV camera or 400C FLIR, chemical and mine detection payloads **Datalink:** radio command uplink, near real-time imagery/data downlink **Guidance/Tracking:** real-time payload and UAV control, autonomous flight, autonomous return on data link loss **Launch:** runway or rocket assisted (RATO), pneumatic launcher (truck mounted) **Recovery:** wheeled landing with tailhook and arresting cable or net (for shipboard operation), CARS-equipped

PREDATOR (MQ-1)

skin and Nomex honeycomb stiffening panels.

Use(s): Reconnaissance, surveillance, target acquisition/designation, weapons delivery, communications relay, SIGINT. **Manufacturer and Country:** General Atomics Aeronautical Systems Inc. (GA-ASI), USA **Powerplant:** Rotax 914 hp Turbo. **Dimensions:** Length 8.23 m, Height 1 m, Wingspan 14.84 m **Weight:** Empty weight 1,250 lb, MTOW 2,300 lb, Max payload Internal: 450 lb External: 300 lb **Performance:** speed 120 kt; endurance 40 hr; ceiling 25,000 ft **Payload:** EO/IR, SAR, SIGINT, Finder, Hellfire missiles, Stinger. **Datalink:** C-band LOS, Ku-band BLOS SATCOM. **Guidance/Tracking:** INS/GPS. **Launch:** Conventional wheeled. **Recovery:** Conventional wheeled. **Structure Material:** Semi-monocoque composite using pre-impregnated bi-directional graphite

PREDATOR B (MQ-1B)

Recovery: Conventional wheeled. **Structure Material:** Semi-monocoque composite using pre-impregnated bi-directional graphite skin and Nomex honeycomb stiffening panels.

Use(s): Reconnaissance, surveillance, target acquisition/designation, weapons delivery, communications relay, EW, SIGINT. **Manufacturer and Country:** General Atomics Aeronautical Systems Inc. (GA-ASI), USA **Powerplant:** Honeywell TPE 331-10T KW Turboprop. **Dimensions:** Length 36 ft, Wingspan 66 ft **Weight:** Empty weight 3,700 lb, MTOW 10,500 lb, Max payload Internal: 800 lb External: 3,000 lb **Performance:** speed 240 kt; endurance 30+ hr; ceiling 50,000 ft **Payload:** EO/IR, SAR, ESM maritime surface search radar, communications relay, ELINT, Hellfire missiles, GBU-12 laser guided bombs, GBU-38 JDAM. **Datalink:** C-Band LOS, Ku-band BLOS SATCOM. **Guidance/Tracking:** INS/GPS. **Launch:** Conventional wheeled.

PROSPECTOR

Use(s): ISR, Communications, EW. **Manufacturer and Country:** Teledyne Brown Engineering (under licence from Rheinmetall Defence Electronics, Germany), USA **Powerplant:** 24 kW 2-Stroke, 2-cylinder engine, push propeller. **Dimensions:** Length 2.3 m, Height 0.9 m, Wingspan 3.4 m **Weight:** MTOW 161 kg, Max payload 35 kg **Performance:** speed 125 kt; endurance 6 hr **Datalink:** J-Band **Guidance/Tracking:** DL-Rho/ Theta, GPS, map matching, pre-programmed autonomous with in-flight redirection. **Launch:** Catapult or Rocket Assist. **Recovery:** Parachute/ Air Bag **Structure Material:** Composite with Radar and IR stealth design. **Ground Control Station:** Compatible with US GCS/ TCS and NATO systems.

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PW 2 UNMANNED AERIAL VEHICLE

Use(s): All-weather reconnaissance and surveillance, artillery fire assist, data relay, environmental monitoring, scientific research. **Manufacturer and Country:** China National Precision Machinery Import & Export Corp. (CPMIEC), China **Dimensions:** **Weight:** MTOW 210 kg, Max payload 30 kg **Performance:** endurance 6 -7 hr; ceiling 4,600 m; mission radius 200 km; endurance speed 140 - 160 kph **Datalink:** Real-time flight state telemetry and image signal transmission. **Guidance/Tracking:** Autonomous, plus GPS mode. **Launch:** Rocket assisted from launcher. **Recovery:** Parachute. **System Components:** UAV, launcher, transportation vehicle, GCS, additional ground support equipment.

RANGER

Use(s): Tactical reconnaissance and surveillance, artillery fire adjustment, target acquisition. **Manufacturer and Country:** RUAG Aerospace, Switzerland **Powerplant:** 1x Gobler-Hirth F-31 31.5 kW Avgas 100 LL piston engine **Dimensions:** Length 4.61 m, Height 1.13 m, Wingspan 5.71 m **Weight:** MTOW 285 kg, Max payload 45 kg **Performance:** speed 130 kt; endurance up to 8 hr; ceiling 15,000 ft; mission radius up to 180 km **Payload:** Different payload configurations available such as: TV, FLIR, combi TV/FLIR with and without laser designator, comms relay. **Datalink:** Jam-resistant microwave band (primary) and UHF-Band (secondary) uplink; real-time secured video and telemetry downlink. **Guidance/Tracking:** Pre-programmed, autonomous or direct control, GPS/INS navigation. **Launch:** Hydropneumatic catapult (air transportable trailer or truck version). **Recovery:** Fully automated skid landing on grass or concrete runway (wheeled gear optional), parachute for emergency recovery. **Structure Material:** Fully composite. **System Components:** UAV, launcher, GCS, RCT, MRS (optional). **Electrical Power:** 2x 1000W

RMAX TYPE II

Use(s): paddy cultivation tasks, chemical spray and remote agricultural sensing **Manufacturer and Country:** Yamaha Motor Co Ltd, Japan **Powerplant:** 21 hp gasoline and oil mixture (50:1) 246 CC, liquid cooled, 2-stroke horizontal opposed **Dimensions:** Length 3.63 m, Height 1.08 m, Rotor diameter 3.11 m **Weight:** Empty weight 58 kg, Max payload 30 kg **Performance:** endurance 1 hr **Payload:** GPS **Datalink:** manual flight control with YACS **Guidance/Tracking:** three fibre-optic gyroscopes and three accelerometers linked to on-board computer regulating three dimensions **Launch:** VTOL **Recovery:** VTOL

RPH 2A

Use(s): Observation **Manufacturer and Country:** Fuji Heavy Industries Ltd, Japan **Powerplant:** 83.5 hp 2-stroke engine **Dimensions:** Length 5.3 m, Height 1.8 m **Weight:** MTOW 330 kg, Max payload 100 kg **Performance:** endurance 1 hr; ceiling 2000 m **Payload:** Two-axis gimbled camera: Electro-optical(EO) or Infrared(IR) camera **Datalink:** VHF and S-band uplink, S-band downlink **Guidance/Tracking:** autonomous flight (pre-programmed flight), overridden hovering command, manual flight, Return To Base (RTB) mode and Fully automated take-off/landing **Launch:** VTOL **Recovery:** VTOL **Ground Control Station:** Flight Planning/ Route Monitoring Station, UAV Control Station, Camera Controller, Ground Data Terminal and Portable Control Unit

SCANEAGLE

Use(s): Land or sea-based long-endurance intelligence, surveillance and reconnaissance **Manufacturer and Country:** Boeing and The Insitu Group, USA **Powerplant:** 3W-Modellmotoren 3W-24 1 kW unleaded auto gasoline Single-cylinder, two-stroke, spark-ignited, loop-scavenged piston engine **Dimensions:** Length 1.2 m, Height 0.5 m, Wingspan 2.9 m **Weight:** Empty weight 11.1 kg, MTOW 15.4 kg, Max payload 4.3 kg **Performance:** speed 122 kph; endurance >15 hr; ceiling 5,000 m; range 104 km; endurance speed 86 kph **Payload:** 25:1 zoom video or fixed-zoom IR camera in inertially-stabilized, full pan and tilt turret. Multipath network communication nodal radio. **Datalink:** Digital uplink/downlink **Guidance/Tracking:** Fully autonomous, D-GPS navigation from launch to retrieval **Launch:** Autonomous launch via 12g catapult; or vehicle roof rack **Recovery:** Autonomous recovery via patented "Skyhook" wingtip rope-snag; or belly landing **Structure Material:** Composite **Electrical Power:** 60 Watts power available for additional payloads. **Ground Control Station:** Laptop-based ground control system

SEARCHER MK II

Use(s): tactical-operational multi-payload UAV system, surveillance, reconnaissance, target acquisition and artillery adjustment **Manufacturer and Country:** IAI Malat, Israel **Powerplant:** 73 hp rotary engine **Dimensions:** Length 5.85 m, Wingspan 8.55 m **Weight:** MTOW 426 kg, Max payload 100 kg **Performance:** speed 108 kt; endurance 15 hr; ceiling 6,090 m **Payload:** MOSP (TV and IR Combi) or SAR EL/M 2055 or customer furnished payloads **Datalink:** direct line-of-sight datalink and/or UAV airborne data-relay for beyond-line-of-sight datalink, dual real-time command uplink, single real-time data and video downlink **Guidance/Tracking:** real-time payload and UAV control, GPS based interruptible airborne mission controller, autonomous return on datalink loss. Advanced universal UAV mission ground control center (compatible with all MALAT systems) and remote video terminals **Launch:** wheeled take-off **Recovery:** wheeled landing

SEASCAN

Use(s): Land or Sea-Based Long-Endurance Survey and Surveillance. **Manufacturer and Country:** Insitu Inc., USA **Powerplant:** kW 2-stroke piston engine. **Dimensions:** Length 1.2 m, Height 0.5 m, Wingspan 2.9 m **Weight:** Empty weight 12 kg, MTOW 18 kg, Max payload Up to 6 kg **Performance:** speed 63 kt; endurance >15 hr; ceiling 5000 m; mission radius 1500 km; range 104 kph; endurance speed 50 kt **Payload:** 25:1 zoom video or fixed-zoom IR camera in inertially-stabilized, full pan and tilt turret. Multipath network communication nodal radio. **Datalink:** Digital uplink/downlink. **Guidance/Tracking:** Fully autonomous, D-GPS navigation from launch to retrieval. **Launch:** Autonomous launch via 12g Catapult; or Car Top Launcher. **Recovery:** Autonomous recovery via patented "SkyHook" wingtip rope-snag; or belly landing. **Structure Material:** Composite. **System Components:** Aircraft, pneumatic SuperWedge launcher, SkyHook retrieval system, GCS with optional modules including video exploitation and distribution, antennas with automatic tracking, and other communications enhancements. **Electrical Power:** 80 Watts power available for additional payloads. **Ground Control Station:** Laptop-based ground control system.

SEEKER II

GPS navigation **Launch:** wheeled take-off standard **Recovery:** wheeled landing and arrester wire **Ground Control Station:** Internal: 3x workstations = 2x screens, trackball, keyboard and joystick, instrumentation, electronic map and video window. External: (Mobile) MCU = 2470x2350x4450 mm (HxWxD). Environmental = -15 to +50 degrees C. Weight = 3500kg.

SHADOW 200 (RQ-7B)

Use(s): Reconnaissance and surveillance. **Manufacturer and Country:** AAI Corporation, USA **Powerplant:** UEL AR-741 rotary, 38 hp, AVGAS **Dimensions:** Length 11.2 ft, Wingspan 14 ft **Weight:** MTOW 375 lb, Max payload 45 to 60 lb (depending on mission profile). **Performance:** Maximum speed 110 kt, loiter speed 60-70 kt, endurance 5-7 hr, ceiling 15,000 ft, datalink range 125 km **Payload:** EO/IR/Laser spotter (Tamam POP-300) **Datalink:** LOS: Frequency S-band, UHF and C-band. **Guidance/Tracking:** IMU/GPS navigation sensors **Launch:** Hydropneumatic rail (no external pilot required). **Recovery:** Automatic (wheeled), no external pilot required. **Structure Material:** Various composite materials. **System Components:** One System Ground Control Station, LOS datalink, Shadow air vehicles, payloads, portable ground control station, remote video terminals, and automatic launch and recovery hardware. **Electrical Power:** +28 vdc in air vehicle, 120 vac for ground equipment **Ground Control Station:** AAI's One System Ground Control Station.

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SHADOW 400

Structure Material: Various composite materials **Electrical Power:** +28 vdc in air vehicle, 120 vac for ground equipment **Ground Control Station:** AAI's One System Ground Control Station.

Use(s): reconnaissance, observation, targeting, surveillance **Manufacturer and Country:** AAI Corporation, USA **Powerplant:** AR741 rotary, 38 hp, AVGAS or MOGAS **Dimensions:** Length (12.5 ft) 3.82 m, Height (3.7 ft) 1.12 m, Wingspan (16.8 ft) 5.15 m **Weight:** Empty weight (324 lb) 147 kg, MTOW (465 lb) 211 kg, Max payload 30 kg **Performance:** Max speed 100 kt; endurance 5 hr; ceiling 11,000 ft (3,657 m); datalink range 200 km; loiter speed 65-75 kt **Payload:** EO/IR-SAR or any payload to meet customer requirements **Datalink:** LOS: Frequency C-band and UHF **Guidance/Tracking:** GPS and vertical gyro plus back-up tracking via R/F ranging and antenna pointing **Launch:** Hydropneumatic rail or wheeled or RATO **Recovery:** Net or wheeled

SHADOW 600

Various composite materials **Electrical Power:** +28 vdc for air vehicle, 120 vac for ground equipment **Ground Control Station:** AAI Mission Planning Control station (MPCS)

Use(s): Reconnaissance, observation, targeting and surveillance **Manufacturer and Country:** AAI Corporation, USA **Powerplant:** UEL AR-801 rotary, 52 hp, AVGAS or MOGAS **Dimensions:** Length (15.7 ft) 4.8 m, Height (3.7 ft) 1.2m, Wingspan (22.4 ft) 6.83m **Weight:** Empty weight (456 lbs) 206.8 kg, MTOW (585 lb) 265.4kg, Max payload (91 lb) 41 kg **Performance:** Max speed 108 kt, endurance 12-14 hr; ceiling (16,000 ft) 4,877 m; max datalink range 200 km; loiter speed 75 kt **Payload:** EO/IR-SAR or any payload to meet customer requirements **Datalink:** LOS; Frequency C-band, UHF **Guidance/Tracking:** GPS & Vertical Gyro plus back-up tracking via R/F ranging and antenna pointing **Launch:** Wheeled **Recovery:** Wheeled **Structure Material:**

SKYEYE (R4E-50 AND R4E-100)

command link (jam-resistant optional), real-time video/telemetry downlink. **Guidance/Tracking:** Autonomous navigation or remote control. **Launch:** Pneumatic/hydraulic catapult. **Recovery:** Guided parafoil, Conventional (skid landing gear), Unguided parachute. **Structure Material:** Graphite/Kevlar/fiberglass/honeycomb. **System Components:** Aircraft, Ground Control Station, 4ft X 6ft tracking antenna, launcher. **Electrical Power:** (R4E-50) 1.5 kW(R4E-100) 3.0 kW **Ground Control Station:** (R4E-50) truck mounted S-280 shelter, (R4E-100) HMMWV mounted shelter.

Use(s): Multimission capabilities such as persistent surveillance, reconnaissance (day/night) target acquisition, artillery correction, damage assessment and close air support precision Strike. **Manufacturer and Country:** BAE SYSTEMS, USA **Powerplant:** UEL (R4E-50) 50(R4E-100) 98 hp (R4E-50) (R4E-100) mogas, avgas, Rotary. **Dimensions:** Length (R4E-50) 161 in, Height (R4E-50) 48 in, Wingspan (R4E-50) 240 in **Weight:** Empty weight (R4E-50) 540 lb, MTOW (R4E-50) 780 lb, Max payload (R4E-50) 135 lb **Performance:** speed (R4E-50) 90 kt; endurance (R4E-50) 8 hr; ceiling (R4E-50) 15,000 ft **Payload:** Multiple payload capability to meet specific mission requirements, L3 Wescam MX-14 standard, weight and space available for customer defined payloads. **Datalink:** RF

SKYLYNX II

Use(s): Multi mission capability such as persistent and tactical reconnaissance (day/night, SAR/MTI), surveillance, target acquisition, and target designation. **Manufacturer and Country:** BAE Systems, USA **Powerplant:** UAV Engines Ltd - AR741 38 hp gasoline/oil premix (heavy fuel variant in development). Capability for other engines **Dimensions:** Length 13.9 ft, Height 3.3 ft, Wingspan 18.4 ft **Weight:** Empty weight 205 lb, MTOW 330 lb, Max payload 70 lb **Performance:** endurance 16 hr; ceiling 18,000 ft; mission radius 120 nm; range 45-110 kt **Payload:** Multiple payload capability to meet specific mission requirements. EO/IR with rangefinder or designator as well as SAR or other mission specific. **Datalink:** LOS datalink with TCDL capability. **Guidance/Tracking:**

Integrated GPS/inertial navigation system / range and bearing measurement by Ground Data Terminal. **Launch:** Wheeled take-off or catapult launch. **Recovery:** Wheeled conventional landing or under powered/steerable parafoil. **Structure Material:** Carbon-fibre and fibreglass epoxy composite. **System Components:** Aircraft; GCS; GDT; launcher (optional); ground support equipment (engine starter, fueler/defueler, etc). **Electrical Power:** 900W (1500W optional). **Ground Control Station:** STANAG 4586 Level of Interoperability (LOI) 5 compliant.

SNOWGOOSE (CQ-10 A)

Use(s): Cargo, Communications, ISR. **Manufacturer and Country:** Mist Mobility Integrated Systems Technology Inc. (MMIST), Canada **Powerplant:** Rotax 914 UL 84 kW Avgas - 100 LL Turbocharged flat-four engine - driving a three blade composites pusher propeller. **Dimensions:** Length: 2.90 m, Height: 1.50 m **Weight:** Empty: 340 kg, MTOW 608.7 kg, Max payload 260 kg **Performance:** speed 32.39 kt; endurance ground launch: 17 hr. Air Launch: 15 hr; Max ceiling 7,630 m; mission radius Max 450 (Zero Wind Conditions) km **Payload:** EO/IR camera; Line of sight communications relay; Meteorological sensing unit; Wind sonde dispenser; Security Loudspeaker; FM radio broadcast, amongst others. **Datalink:** SATCOM for BLOS RF for LOS. **Guidance/Tracking:** Fully Autonomous Flight - GPS/Satellite Communication. **Launch:** Air launched from various transport aircraft, or ground launched from a HMMWV or logistic trailer. Four air vehicles can be deployed in-flight from one C-130. **Recovery:** Fully autonomous landings over a wide variety of unprepared surfaces. **Structure Material:** Aluminium Air Frame; Composite Cowlings **System Components:** Air Vehicle; Ground Launch and Air Launch Parachutes; Ancillaries package, Initial spares package, Shipping Containers. **Electrical Power:** Basic AV: 800 Watts. : Upgrade: 1500 Watts. **Ground Control Station:** The flight plan is programmed on an industry-standard laptop computer with map underlay and uploaded into the AGU before launch or via the SATCOM data link.

SOJKA III / TVM 3.12

Use(s): Tactical reconnaissance and surveillance **Manufacturer and Country:** VTUL a PVO Praha, Czech Republic **Powerplant:** AR 74-1180 28 kW gasoline **Dimensions:** Length 3.8 m, Height 1.1 m, Wingspan 4.5 m, Fuselage length 2.5 m **Weight:** Empty weight 97 kg, MTOW 145 kg, Max payload 25 kg **Performance:** speed 210 kph; endurance 4.5 hr; ceiling 4,000 m; mission radius 100 km; endurance speed 160 kph **Payload:** 3x daylight TV cameras and digital cassette video recorder **Datalink:** real-time video and telemetry downlink **Guidance/Tracking:** remote control and/or pre-programmed; INS and GPS navigation **Launch:** rocket boost from vehicle-mounted launcher **Recovery:** belly skid and/or parachute **Structure Material:** fibreglass fuselage, carbon composite wing and tail unit **Electrical Power:** alternator 550 W / 900 W (with rotary engine)

SPARROW

Ground Control Station: Portable mini-GCS

Use(s): ISR, situational awareness, force protection ad security. **Manufacturer and Country:** E.M.I.T. Aviation Consults Ltd, Israel **Powerplant:** gasoline 2 cylinder, 2 stroke engine **Dimensions:** Length 2.14 m, Wingspan 2.44 m **Weight:** MTOW 45 kg, Max payload 12 kg **Performance:** speed 100 kt; endurance 6 hr; mission radius >20 (omni ant.)>120 (directional ant.) km **Payload:** Day/night EO **Datalink:** 2RF command uplinks, real-time data and video downlink (encryption) **Guidance/Tracking:** Pre-planned waypoints which can be overridden, preprogrammed and resumed in flight auto return to launch point. **Launch:** Catapult/pneumatic **Recovery:** Parachute, buoy **Structure Material:** Composite / carbon fibre **Electrical Power:** 28V, 300W

SPERWER

Use(s): Tactical reconnaissance, surveillance, target acquisition. **Manufacturer and Country:** Sagem Défense Sécurité, France **Powerplant:** 65 hp 2-stroke engine **Dimensions:** Length 3.5 m, Wingspan 4.2 m **Weight:** MTOW 330 kg, Max payload 45 kg **Performance:** speed 90 kt; endurance 6+ hr; ceiling up to 15,000 ft; mission radius up to 180 km **Payload:** Orientable stabilized line-of-sight payload including IR and CCD camera, SAR (option), ESM/ELINT (option). **Datalink:** Real-time digital video, J-band 15 GHz - Transponder/IFF mode 3C and VHF ATC radio. **Guidance/Tracking:** Pre-programmed, INS and GPS navigation. **Launch:** Compressed air catapult. **Recovery:** Parachute and airbags. **Structure Material:**

Composite (carbon fibre) aluminium, titanium. **System Components:** Aircraft, Ground Control Station, Ground Data Terminal (housing the digital data radio link terminal), catapult launcher. **Ground Control Station:** Internal: 3 workstations (mission planning, mission monitoring, payload control).

SR 200

Use(s): Surveillance. **Manufacturer and Country:** Rotomotion LLC., USA **Powerplant:** 121 cc Premium gasoline, 2-Stroke **Dimensions:** Length 3,050 mm, Height 780 mm, Rotor diameter 3,000 mm **Weight:** Empty weight 22 kg, Max payload (Depending on options) 50 kg **Performance:** endurance 4 hr **Guidance/Tracking:** Fully autonomous. **Launch:** VTOL **Recovery:** VTOL

VECTOR P

Use(s): Tactical Fire Monitoring, Search & Rescue, Range Control, Precision Agriculture, Border Patrol, Training & Development. **Manufacturer and Country:** IntelliTech Microsystems Inc., USA **Powerplant:** 7.5 hp Gas/oil mix, 2-stroke engine. **Dimensions:** Length 2.5 m, Wingspan 2.6 m **Weight:** Empty weight 23 kg, MTOW 34 kg, Max payload 11.3 kg **Performance:** speed 100 kt; endurance 6 hr; ceiling 10,000 ft **Payload:** Various EO/IR, comm. Relay, etc. **Datalink:** 900MHz, 2.4GHz (typ.). **Guidance/Tracking:** GPS. **Launch:** Rolling take-off. **Recovery:** Conventional wheel landing. **Structure Material:** Composite. **Electrical Power:** 18.5 +/- 4VDC @ 2.5 amps 12 Ah.

VECTOR/SHADOW MK-1

Use(s): Surveillance. **Manufacturer and Country:** Integrated Dynamics, Pakistan **Powerplant:** 22 hp Twin-cylinder piston engine. **Dimensions:** Length 2.95 m, Height 0.89 m, Wingspan 5.2 m **Weight:** Empty weight 55 kg, MTOW 90 kg, Max payload 25 kg **Performance:** endurance 6 hr; ceiling 12,000 ft; range 75-208 kph **Payload:** Integrated Dynamics GSP-4AF Surveillance, real-time camera module, experimental mission payloads. System payloads may be mixed and most carried simultaneously. **Datalink:** UHF/L/S Bands. **Guidance/Tracking:** Stabilization: IFCS-7000 Integrated Flight Control System. Tracking & Telemetry: ID-TM6 GPS and data telemetry module with software graphics interface display. **Launch:** Wheeled. **Recovery:** Wheeled or parachute. **Structure Material:** Composites. **System Components:** Air Vehicles x 4; GSP-4AF day/night EO payloads x 4; Ground Control Station (GSE); Antenna Tracking System (ATS); Field Support Subsystem (FSS); Ground Support Equipment (GSE). **Electrical Power:** 6V/12V/13.8 VDC **Ground Control Station:** Portable, vehicle mounted.

VIGILANTE 502

Use(s): VTOL, reconnaissance, target acquisition, self protection, comms relay **Manufacturer and Country:** SAIC, USA **Powerplant:** Rotax 914 turbo 115 hp avgas 4-cylinder vee, 4-stroke, turbocharged, electronic ignition **Dimensions:** Length 19.9 ft, Height 8 ft, Rotor diameter 23 ft, Fuselage length 19.9 ft **Weight:** Empty weight 650 lb, MTOW 1,100 lb, Max payload 230 lb **Performance:** speed 117 kt; endurance 7 hr; ceiling 12,000 ft; mission radius 210 nm; range 70 kt; endurance speed 50 kt **Payload:** EO/IR, SAR, ESM, search and rescue package, hyperspectral, NBC and attack package **Datalink:** redundant 900 MHz and 2.4 GHz TCDL option **Guidance/Tracking:** fully autonomous pre-programmed waypoints or pilot directed using DGPS/INS, autonomous return to base capability **Launch:** VTOL auto **Recovery:** VTOL auto **Structure Material:** composite and steel tube **Electrical Power:** 5 Kw

VIKING 100

Use(s): The expendable MAKO UAV is suited to fulfill many mission requirements ranging from reconnaissance to payload delivery. **Manufacturer and Country:** L3 BAI Aerosystems, USA **Powerplant:** 16 hp Gas/oil mix. 150 cc 2-stroke. **Dimensions:** Length 8 ft, Wingspan 12 ft **Weight:** Empty weight 105 lb, MTOW 150 lb, Max payload 20 lb **Performance:** speed 65 kt; endurance 6-8 hr; mission radius 40 nm; endurance speed 50 kt **Payload:** BAI Series 66 EO or IR. **Datalink:** UHF, L-Band, S-band, C-band. **Guidance/Tracking:** GPS. Fully Autonomous. **Launch:** Conventional or Pneumatic launcher. **Recovery:** Conventional or optional Parafoil. **Structure Material:** Composite. **Electrical Power:** 500 w on-board alternator.

VISION MK-I

Use(s): Surveillance. **Manufacturer and Country:** Integrated Dynamics, Pakistan **Powerplant:** 6.5 hp Single-cylinder engine. **Dimensions:** Length 2.25 m, Height 0.64 m, Wingspan 3.22 m **Weight:** Empty weight 18 kg, MTOW 35 kg, Max payload 10 kg **Performance:** endurance 3 hr; range 75-207 kph **Payload:** Surveillance, real time camera module Integrated Dynamics GSP-1AF. **Datalink:** UHF/L/S Bands. **Guidance/Tracking:** Stabilization: ID-AP4 Digital Gyro Autopilot with Heading and Height-lock. Tracking & Telemetry: ID-TM6 GPS and data telemetry module with software graphics interface display. **Launch:** Conventional wheeled. **Recovery:** Conventional wheeled and parachute. **Structure Material:** All composite. **System Components:** Air Vehicles x 4; Stabilized camera payloads x 4; Ground Control Station (GSE); Antenna Tracking System (ATS)Field Support Subsystem (FSS); Ground Support Equipment (GSE). **Electrical Power:** 6V/12V/13.8VDC.

VISION MK-II

Use(s): Surveillance. **Manufacturer and Country:** Integrated Dynamics, Pakistan **Powerplant:** 22 hp Twin-cylinder engine. **Dimensions:** Length 2.9 m, Height 0.80 m, Wingspan 4.51 m **Weight:** Empty weight 55 kg, MTOW 80 kg, Max payload 15 kg **Performance:** endurance 4 hr; range 75-208 kph **Payload:** Integrated Dynamics GSP-4AF Surveillance, real-time camera module. Experimental payloads may be mixed and most carried simultaneously. **Datalink:** UHF/L/S Bands. **Guidance/Tracking:** Stabilization: IFCS-7000 Integrated Flight Control System. Tracking &Telemetry: ID-TM6 GPS and data telemetry module with software graphics interface display. **Launch:** Wheeled. **Recovery:** Wheeled or parachute. **Structure Material:** All composite. **System Components:** Air Vehicles x 4; Gsp-4AF stabilized EO payloads x 4; Ground Control Station (GSE); Antenna Tracking System (ATS); Field Support Subsystem (FSS); Ground Support Equipment (GSE). **Electrical Power:** 6V/12V/13.8 VDC. **Ground Control Station:** Portable, vehicle mounted.

VULTURE

Use(s): Tactical UAV for brigade level operations, focused at battlefield surveillance, target localisation and artillery fire correction. Day/night reconnaissance. **Manufacturer and Country:** Advanced Technologies and Engineering Co (Pty) Ltd (ATE), South Africa **Powerplant:** 38 hp fuel injected, twin cylinder engine. **Dimensions:** Length 3.1 m, Height 0.7 m, Wingspan 5.2 m **Weight:** MTOW 150 kg, Max payload 35 kg **Performance:** speed 97.2 kt; endurance over 3 hr; ceiling 5,000 m; mission radius 60 - 200 km **Payload:** near-infrared optimised TV camera, laser rangefinder, autotracker (FLIR and colour daylight TV is optional) **Datalink:** secure hybrid video/datalink (DSSS uplink, multi-channel FM downlink with scrambling) **Guidance/Tracking:** full autonomous pre-programmed mission (optional semi automatic capability using a navigator) **Launch:** automatic atmospheric catapult from vehicle-mounted rail (all-terrain deployment in 30 mins) **Recovery:** automatic laser-based approach with capture of air vehicle in energy absorption device (all-terrain) **Structure Material:** composite carbon fibre (modular)

X-SIGHT

Use(s): Still-/Video photography / Near-Mid range Aerial Target Drone. **Manufacturer and Country:** UAV Services and Systems, Germany **Powerplant:** Zenoah, 2.2 (@ 12.000 rpm) hp Gasoline/oil mix. Piston. **Dimensions:** Length 1.9 m, Height 0.322 m, Wingspan 2.649 m **Weight:** Empty weight 9 kg, MTOW 13 kg, Max payload 6 kg **Performance:** speed 120 kph; endurance 3 hr; ceiling 3,000 m; mission radius 5-15 km **Payload:** CCD daylight 20x optical zoom / SONY. **Datalink:** Telecommand: UHF narrow band 4,5 Watt. Telemetry: onboard SHF Video Transmitter 5 Watt, 10 channel / 8 bit, GPS transmission: reduced NMEA-protocol. **Guidance/Tracking:** DP-DAP20 Autopilot. GPS 12 channel. **Launch:** Car launch @ 90km/h. **Recovery:** Belly landing (standard). Belly landing (standard). Optional: parachute. **Structure Material:** Fuselage: glassfibre/carbon reinforced Epoxy. Wing: Abachi wood / glass fibre. **System Components:** X-SIGHT Airframe (including DP-DAP20 Autopilot), GCS, SIGHT pilot panel software installed on a laptop. **Electrical Power:** 3x onboard batteries (7,2V/12V/4,8V). **Ground Control Station:** Pilot Panel laptop based software ("Cockpit"). Customized PC with communication link control /aerial video panel including 2x10,4 inch color TFT Displays. SHF downlink receiver box with 2.4GHz omnidirectional antenna.

XTM

Use(s): Surveillance, Reconnaissance, Training. **Manufacturer and Country:** Iron Bay, USA **Powerplant:** Evolution 4 hp Gas/Oil Premix 2-stroke **Dimensions:** Length 10 ft, Height 34 in, Wingspan 17 ft **Weight:** Empty weight 36 lb, MTOW 60 lb, Max payload 25 (fuel) lb **Performance:** endurance 8 hr; ceiling 10,000 ft; range 25-75 kt **Payload:** EO PTZ, Sony **Datalink:** 1.2ghz **Guidance/Tracking:** Piccolo **Launch:** Runway. **Recovery:** Runway. **Structure Material:** Composite. **Electrical Power:** 5V, 12V **Ground Control Station:** Piccolo/Iron Bay.

HERON TP

Use(s): All weather medium altitude long endurance Multi mission/Multi Payload UAV system - surveillance, reconnaissance, target acquisition and/or missions based on customer furnished payloads. **Manufacturer and Country:** IAI Malat, Israel **Powerplant:** 1,200HP turboprop **Dimensions:** Length 14 m, Wingspan 26 m **Weight:** MTOW 4,650kg, Max payload 1,000 kg **Performance:** endurance 36 hr; ceiling 45,000ft **Payload:** Customer furnished payloads, EL/M 2022 Maritime Patrol Radar, IAI electro-optical TV/IR & Laser and ESM payloads. **Datalink:** Line of sight and SATCOM. **Guidance/Tracking:** real time payload and UAV controls, GPS-based interruptible airborne mission controller, full autonomous flight, autonomous return on data link loss or end of mission program. **Launch and Recovery:** Wheeled automatic take-off and landing. **Structure Material:** Composite **Ground Control Station:** Advanced universal UAV mission ground control centre and remote data terminals.

REAPER (MQ-9)

Use(s): Hunter/killer UAS **Manufacturer and Country:** General Atomics Aeronautical Systems, USA **Power Plant:** Honeywell TPE331-10GD turboprop engine **Dimensions:** Length 11 m, Wingspan 20.1 m, Height: 3.8 m **Weight:** MTOW 4,760 kg, payload 1,701 kg **Performance:** cruise speed 230 mph, ranger 3,682 miles, ceiling up to 50,000 ft **Payload:** Combination of AGM-114 Hellfire missiles, GBU-12 Paveway II and GBU-38 Joint Direct Attack Munitions. **Datalink:** C-band LOS, Ku-band BLOS SATCOM. **Guidance/Tracking:** INS/GPS. **Launch:** Conventional wheeled. **Recovery:** Conventional wheeled. **Structure Material:** Semi-monocoque composite using pre-impregnated bi-directional graphite skin and Nomex honeycomb stiffening panels.



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IN PRODUCTION

AIRCRAFT SYSTEMS -
IN DEVELOPMENT

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SYSTEMS DEVELOPMENT UNMANNED AIRCRAFT

This section incorporates most unmanned aircraft (UA) that are either in their developmental stage and/or undergoing flight-testing. All UA listed have the potential to play a part in either the military, civil or commercial markets of the future. Entries are arranged alphabetically by UA name.

Note: In accordance with current thinking, ballistic or semi ballistic vehicles, cruise missiles and artillery projectiles are not considered to be UA and, therefore, are not included.

While every effort has been made to provide accurate information, the publishers cannot be held responsible for errors or omissions. If you have any comments, additions or corrections you would like to be made please contact the editor.

A-160 HUMMINGBIRD

Use(s): Intelligence, Surveillance and Reconnaissance (ISR); attack; communications/data relay; precision re-supply; personnel evacuation; and remote delivery of Unmanned Ground Vehicle/Unmanned Ground Sensors. **Manufacturer and Country:** Boeing, USA **Powerplant:** 390 hp Gasoline Modified 6-cylinder internal combustion automobile engines. **Dimensions:** Length 35 ft, Height 9.7 ft, Rotor diameter 36 ft **Weight:** Empty weight 4,000 lb, MTOW 5,000 lb, Max payload >300 lb **Performance:** speed 140 kt; endurance >24 hr; ceiling 30,000 ft **Payload:** EO/IR and SAR **Launch:** VTOL **Recovery:** VTOL **Structure:** Material: Composite. **Ground Control Station:** GCS provides autonomous vehicle flight control with flight waypoint control or vehicle vector control and assessment of most efficient flight path.

A3F MANTA

Use(s): Aerodynamic design for high performance in both, high and lowspeed displacements. **Manufacturer and Country:** Hydra Technologies, Mexico **Powerplant:** Dual 5 hp 4 strokes gasoline engines **Dimensions:** Wingspan 150 in **Weight:** MTOW (With standard payload) 88 lb, Max payload 25 lb **Performance:** endurance 4.5 hp; ceiling (ASL) 12,000 ft **Launch:** Conventional Wheeled **Recovery:** Conventional Wheeled **Structure Material:** 100% Carbon fiber, Kevlar and fiberglass in epoxymatrix. **Electrical Power:** Regulated 5V and 12V outputs up to 300 Watts.

AEROBOT (MODEL A20M-350)

Use(s): Surveillance. **Manufacturer and Country:** Moller International, USA **Powerplant:** Rotapower 8x60 hp Heavy fuels (Diesel 2/JP-8). Rotary IC engine. **Dimensions:** Rotor diameter (Fan) 8x20 in **Weight:** Max payload 350 lb **Performance:** **Payload:** User supplied sensor package. **Launch:** VTOL. **Recovery:** VTOL. **Structure Material:** Carbon fibre.

ALTAIR

Use(s): High-altitude system for scientific research. **Manufacturer and Country:** General Atomics Aeronautical Systems, Inc. (GA-ASI), USA **Powerplant:** Honeywell TPE 331-10T Turboprop. **Dimensions:** Length 36 ft, Wingspan 86 ft **Weight:** Empty weight 3,540 lb, MTOW 8,000 lb, Max payload (Internal) 800 lb (External) 1,200 lb **Performance:** speed 220+ kt; endurance 30+ hr; ceiling 52,000 ft **Payload:** EO/IR, SAR, maritime surface search radar, multi-spectral fire sensor, NOAA UCATS, NASA Argus, REVEAL, and other scientific sensors. **Datalink:** C-band LOS, Ku-band BLOS SATCOM. **Guidance/Tracking:** INS/GPS. **Launch:** Conventional wheeled. **Recovery:** Conventional wheeled. **Structure Material:** Semi-monocoque composite using pre-impregnated, bi-directional graphite skin and Nomex honeycomb stiffening panels.

AUTOCOPTER

Use(s): Aerial photography, surveillance, pipeline and utility line inspection, and crop/timber monitoring. **Manufacturer and Country:** Neural Robotics Inc. (NRI), USA **Powerplant:** 5.75 hp Regular unleaded / oil mixture 2 cylinder, 2 stroke air cooled. **Dimensions:** Length 86 in, Height 26 in, Rotor diameter (Main) 72 in **Weight:** Max payload 15 lb **Performance:** endurance 0.5 hr **Guidance/Tracking:** Operated directed / autonomous. **Launch:** VTOL. **Recovery:** VTOL.

B-4

Use(s): Reconnaissance, target acquisition, artillery fire correction, landmine detection. **Manufacturer and Country:** Soko ZI, Croatia **Powerplant:** AR741 25 kW **Dimensions:** Length 4.2 m, Wingspan 6 m **Weight:** MTOW 200 kg, Max payload 50 kg **Performance:** endurance >10 hr; mission radius 150-200 km; endurance speed 120 kph

BATELEUR

Use(s): Medium-Altitude Long-Endurance (MALE) surveillance UAV system. **Manufacturer and Country:** Denel Aerospace Systems, South Africa **Powerplant:** Rotax 914 or Subaru EA-82T **Dimensions:** Wingspan 15 m **Weight:** MTOW 1000 kg, Max payload Up to 200 kg **Performance:** endurance 18 to 24 hr; ceiling 25,000+ ft; mission radius Up to 750 km **Payload:** ARGOS-410 or GOSHAWK-350 EO payloads. Thermal imaging system (TIS). ELINT (ESM) and SAR. **Launch:** Automatic. Conventional wheeled. **Recovery:** Automatic. Conventional wheeled. **Structure Material:** All composite. Modular. Fits into 6m ISO container.

BAYKUS

Use(s): Surveillance. **Manufacturer and Country:** TAI-TUSAS Aerospace Industries Inc., Turkey **Powerplant:** 2x JPX DC320. 95 octane gasoline. 2-cyl, 2-str engine, tractor and pusher configuration. **Dimensions:** Length 6 m, Wingspan 7 m **Weight:** Empty weight 100 kg, MTOW 250 kg, Max payload 80 kg **Performance:** endurance 12 hr; ceiling 15,000 ft; mission radius (LOS) 27 nm; endurance speed 110 kt **Payload:** EO/IR. Customer options. **Datalink:** Dual redundant omnidirectional LOS datalink. **Guidance/Tracking:** Full autonomous modes and stability augmentation modes, fail-safe modes. INS/GPS navigation. Dual redundant flight sensors, processors and flight critical components. Real time telemetry and telecommand. **Launch:**

Conventional wheeled. **Recovery:** Conventional wheeled. **Structure Material:** Full composite airframe, modular structure. Composite/Metal twin tail booms. Integral fuel tank. **System Components:** 1 aircraft, 1GCS (integral GDT and mission consoles), 1 set of GSE. **Electrical Power:** Li-Po batteries - primary electrical power source. **Ground Control Station:** 3 swappable consoles featuring full monitoring and piloting, mission planning and diagnostics features. Peculiar to type auxiliary mission consoles. GCS is able to operate any TAI UAV platform.

BUSARD

Use(s): Research and development platform used by Onera and Sagem in France which has been fitted with two pods used for electronic development. **Manufacturer and Country:** Stemme S10-VT, Germany **Powerplant:** Rotax 914F 115 hp **Dimensions:** Length 8.42 m, Height 1.80 m, Wingspan 23 m **Weight:** Empty weight 660 kg, MTOW 850 kg **Performance:** endurance 20 hr; ceiling 9,140 m; endurance speed (MSL) 225 kph **Launch:** Conventional wheeled **Recovery:** Conventional wheeled **Structure Material:** Composite

Cer^Tainty

from Aerial to
Close Range
UAV missions



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TURNA-G

C1000

Use(s): Local aerial work: Advertising, Crowd/perimeter monitoring, Pollution/chemical monitoring **Manufacturer and Country:** Skyships Ltd., UK **Powerplant:** RCV IC Engines 2 x 1000 W electric engines **Dimensions:** Length 9 m, Height 3.05 (including gondola) m **Weight:** MTOW 30 kg, Max payload 7 (MSL) kg **Performance:** speed 30 kt; endurance 1 hr; ceiling 400 ft; mission radius 2.5 km **Payload:** Gyro-stabilised camera, precision particle and gas sensors, light weight banners available. **Datalink:** Control and telemetry link 2402 - 2475MHz, Video downlink 1394MHz. **Guidance/Tracking:** Autonomous with waypoint navigation and pre-programmed manoeuvres. Independent Manual override. **Launch:** Hand launch **Recovery:** Hand recovery **Structure Material:** Composite Gondola and ducted fans, Polyurethane coated ripstop nylon envelope. **Electrical Power:** 75 Watts **Ground Control Station:** MP Horizon

CYBEREYE

Use(s): Reconnaissance and surveillance. **Manufacturer and Country:** Cyberflight Ltd., UK **Powerplant:** Dimensions: Length 106 in, Wingspan 100 in **Weight:** Empty weight 20 kg, MTOW 45 kg, Max payload 25 kg **Performance:** speed 90 mph; endurance 5-6 hr; ceiling 10,000 ft **Payload:** Any camera system that meets the payload criteria can be supplied or a combination of cameras and other sensors ie Thermal, Image Intensifier or low light CCD. **Datalink:** Transmitter: 36DB uplift amplifier (4 watt); Receiver: 4 channel; Frequency: 2.4 GHz or any other specified frequency. **Guidance/Tracking:** Autonomous. **Launch:** Conventional wheeled. **Recovery:** Conventional wheeled. **Structure Material:** Composite. **Ground Control Station:** Man portable in rucksack carrier; high bright screen monitor; digital recording facility; Manual and computerised controls; receiver and patch antennae, and own power source.

D-1

Use(s): Endurance UAV, currently used for atmospheric science and resource survey missions **Manufacturer and Country:** Dara Aviation Inc, USA **Powerplant:** 2.6 kW Gasoline engine **Dimensions:** Length 1.76 m, Height 0.4 m, Wingspan 3.29 m **Weight:** MTOW 35 kg, Max payload 10 kg **Performance:** endurance 17 hr **Payload:** Customer specific **Datalink:** UHF / LEO Satellite **Guidance/Tracking:** Dynon Development autopilot **Launch:** Runway (prepared or unprepared) or car-top launch **Recovery:** Landing gear on runway (prepared or unprepared) **Structure Material:** Composite **Electrical Power:** 100 W generator **Ground Control Station:** Portable ground station with electronic flight instrumentation and control system through UHF link with aircraft

DAKOTA

Use(s): Multi-mission autonomous operations airborne testbed **Manufacturer and Country:** Geneva Aerospace, USA **Powerplant:** 22 hp **Dimensions:** Wingspan 15 ft **Weight:** MTOW 180 kg, Max payload 40 kg **Performance:** endurance >2 hr; mission radius 60 nm **Payload:** modular payload interface **Datalink:** spread spectrum C2, programmable to 900 MHz or 2.4 GHz, S-Band video downlink (optional) **Guidance/Tracking:** mode C transponder, RS232 communication with GCS **Launch:** wheeled **Recovery:** wheeled **Structure Material:** modular carbon fibre **Electrical Power:** >300 watts

DOMINATOR

Use(s): Reconnaissance, surveillance and target acquisition **Manufacturer and Country:** Aeronautics Defense Systems Ltd, Israel **Powerplant:** Lycoming 160 hp **Dimensions:** Length 8 m, Wingspan 8 m **Weight:** MTOW 800 kg, Max payload max 300 kg **Performance:** speed 150 kt; ceiling 25,000 ft **Payload:** COMINT, VISINT etc. Capable of carrying multiple payloads. **Datalink:** LOS data link range 200km and/or SatCom/UAV or other airborne data relay. **Guidance/Tracking:** UMAS avionics, fully autonomous, flight programmable nav, camera guided flight. **Launch:** Wheeled auto **Recovery:** Wheeled auto **Structure Material:** Composite **Ground Control Station:** Various configurations - generic interchangeable workstations / RPCS (Level III RVT)

DP-4X

Use(s): reconnaissance and surveillance, television and film production **Manufacturer and Country:** Dragonfly Pictures, USA **Powerplant:** Quadra-Arrow QA200 two-stroke 200cc engine **Dimensions:** Length 3 m **Weight:** MTOW 64 kg, Max payload 29 kg **Performance:** speed 160 kph; endurance 1.5 hr **Payload:** laterally retractable landing skids allow 360 deg coverage from belly situated sensor position **Launch:** VTOL **Recovery:** VTOL

DP-5X



Use(s): Tactical reconnaissance, surveillance, and target acquisition (RSTA) and communication relay platform. **Manufacturer and Country:** Dragonfly Pictures, USA **Powerplant:** (At SL) 97 hp Heavy fuel. TPR 80-1 **Dimensions:** Length 11 ft, Rotor diameter 10.5 ft **Weight:** MTOW 475 lb, Max payload 75 lb **Performance:** speed 100 kt; endurance 5.5 hr; ceiling 10,000 ft **Launch:** VTOL **Recovery:** VTOL

DP-6 WHISPER



Use(s): Tactical reconnaissance, surveillance, and target acquisition (RSTA) and communication relay platform. **Manufacturer and Country:** Dragonfly Pictures, USA **Powerplant:** (At SL) 97 hp Heavy fuel. TPR 80-1 **Dimensions:** Length 11 ft, Rotor diameter 10.5 ft **Weight:** MTOW 475 lb, Max payload 75 lb **Performance:** speed 100 kt; endurance 5.5 hr; ceiling 10,000 ft **Launch:** VTOL **Recovery:** VTOL

DP-11 BAYONET



Use(s): Tactical reconnaissance, surveillance, and target acquisition (RSTA) and communication relay platform. **Manufacturer and Country:** Dragonfly Pictures, USA **Powerplant:** (At SL) 97 hp Heavy fuel. TPR 80-1 **Dimensions:** Length 11 ft, Rotor diameter 10.5 ft **Weight:** MTOW 475 lb, Max payload 75 lb **Performance:** speed 100 kt; endurance 5.5 hr; ceiling 10,000 ft **Launch:** VTOL **Recovery:** VTOL



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DP-12 RHINO

Use(s): Tactical reconnaissance, surveillance, and target acquisition (RSTA) and communication relay platform. **Manufacturer and Country:** Dragonfly Pictures, USA **Powerplant:** (At SL) 97 hp Heavy fuel, TPR 80-1 **Dimensions:** Length 11 ft, Rotor diameter 10.5 ft **Weight:** MTOW 475 lb, Max payload 75 lb **Performance:** speed 100 kt; endurance 5.5 hr; ceiling 10,000 ft **Launch:** VTOL **Recovery:** VTOL

DRAGON WARRIOR

Use(s): Reconnaissance and surveillance **Manufacturer and Country:** Naval Research Laboratory, USA **Powerplant:** Dimensions: Length 2.13 m, Rotor diameter 2.44 m **Weight:** MTOW 113 kg, Max payload 16 kg **Performance:** speed 100 kt; endurance 5 hr **Payload:** EO/IR sensors **Guidance/Tracking:** Autonomous DGPS navigation **Launch:** VTOL **Recovery:** VTOL

EAGLE ARV

Use(s): reconnaissance, surveillance, EW, SAR, fire assessment, comms relay **Manufacturer and Country:** Composite Technology Research Malaysia Sdn Bhd, Malaysia **Powerplant:** TCM 10 240 125 hp **Dimensions:** Length 6.492 m, Height 2.324 m, Wingspan 7.163 m **Weight:** Max payload 60 kg **Performance:** speed 240 kph; endurance 10 hr; ceiling 4876.8 m **Payload:** EO/IR **Launch:** wheeled **Recovery:** wheeled **Structure Material:** composite

persistent strike



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EAGLE EYE

Use(s): Surveillance, search & rescue, reconnaissance, contaminated area operations, communications relay, real-time situational awareness for ground and airborne forces, and others. **Manufacturer and Country:** Bell Helicopter Textron Inc, USA **Powerplant:** Pratt & Whitney 200/55 heavy fuel **Dimensions:** Length 17 ft, Height 5.7 ft, Wingspan 15.2 ft, Rotor diameter 10 ft **Weight:** Empty weight 1825 lb, MTOW 3000 lb, Max payload (Total useful) >1000 lb **Performance:** speed 220 kt; endurance 6 hr; ceiling 20,000 ft **Payload:** EO/IR, SAR, Mine Detection, EW, NBC, others **Datalink:** TCDL, others **Guidance/Tracking:** Autonomous Flight, Mission Plan/Way Point Following, Digitized map, GPS/INS Navigation **Launch:** Automatic VTOL - No launch and recovery equipment needed for land based operations. UCARS compatible for sea-based operations. **Recovery:** Automatic VTOL - No launch and recovery equipment needed for land based operations. UCARS compatible for sea-based operations. **Structure Material:** Metallic/Composite Structure **Electrical Power:** 11 kW **Ground Control Station:** Ship Integrated or Sheltered Stand-alone

EXTENDED RANGE MULTI-PURPOSE SKY WARRIOR UAS (MQ-1C)

Use(s): Wide area reconnaissance, surveillance, target acquisition, communications relay and attack missions. **Manufacturer and Country:** General Atomics Aeronautical Systems, Inc, USA **Powerplant:** Thielert Centurion heavy fuel turboprop engine **Dimensions:** length: 28 ft (8 m), wingspan: 56 ft (17 m), height: 3.8 m **Weight:** MTOW 3,200 lb (1,451 kg), payload 575 lb internal (261 kg), 500 lb external (227 kg) **Performance:** max speed 135 kts, range 300 km, ceiling up to 29,000 ft, endurance 30 hr with a 250 lb payload **Payload:** Electro-optical/infrared, synthetic aperture radar/ground moving target indicator, AGM-114 Hellfire missiles, **Datalink:** C-band LOS, Ku-band BLOS SATCOM. **Guidance/Tracking:** INS/GPS. **Launch:** Conventional wheeled. **Recovery:** Conventional wheeled. **Structure Material:** Semi-monocoque composite using pre-impregnated bi-directional graphite skin and Nomex honeycomb stiffening panels. **Ground Control Station:** US Army One System Ground Control Station

EXPERIMENTAL UAV X-13

Use(s): Ship or land based surveillance, reconnaissance and target acquisition and location in real time. **Manufacturer and Country:** EMT, Germany **Powerplant:** 35 hp Heavy fuel pusher engine. **Dimensions:** Wingspan 5.10 m **Weight:** MTOW 130 kg **Performance:** endurance >5 hr; ceiling 10000 ft; mission radius 200 km **Payload:** EO/IR video cameras, high resolution still camera and Synthetic Aperture Radar (SAR), data link relay **Datalink:** Jamming resistant control and video/telemetry data up-and-down links. **Guidance/Tracking:** Pre-programmed, autonomous or direct control INS/GPS navigation. **Launch:** Pneumatic catapult. **Recovery:** Net landing with autonomous approach control.

FAT BOY

Use(s): Surveillance. **Manufacturer and Country:** Cyberflight Ltd., UK **Powerplant:** Dimensions: Length 106 in, Wingspan 100 in **Weight:** Empty weight 30 kg, MTOW 70 kg, Max payload 40 kg **Performance:** speed 90 mph; endurance 5-6 hr; ceiling 10,000 ft **Payload:** Any camera system that meets the payload criteria can be supplied or a combination of cameras and other sensors i.e. Thermal, Image Intensifier or low light CCD. **Datalink:** Transmitter: 36dB uplift amplifier (4 watt). Receiver: 4 channel. Frequency: 2.4 GHz or any other specified frequency. **Guidance/Tracking:** GPS. Autonomous. **Launch:** Conventional wheeled. **Recovery:** Conventional wheeled. **Structure Material:** Composite. **Ground Control Station:** Man portable in rucksack carrier; high bright screen monitor; digital recording facility; manual and computerised controls; receiver and patch antennae, and own power source.

FIRE SCOUT (MQ-8B)

Use(s): Provides situational awareness and precision targeting support for the U.S. Navy and U.S. Army of the future. **Manufacturer and Country:** Northrop Grumman Corporation, USA **Powerplant:** Rolls-Royce Model 250-C20W, 420 shp Heavy Fuel JP 4, 5, or 8. **Dimensions:** Length 7 m, Height 2.9 m, Rotor diameter 8.4 m **Weight:** MTOW 1,428.8 kg, Max payload 600 lb **Performance:** speed 125+ kt; endurance 8+ (Total Flight Time with Baseline Payload). hr; ceiling 20,000 ft; mission radius 150 nm **Payload:** Flir Systems Inc. Brite Star II electro-optical camera/infrared camera/laser designator and targeting system: ARC-210 UHF / VHF/singhars radios; coastal battlefield mine and reconnaissance system (COBRA) mine detector. **Datalink:** Tactical common data link (TCDL). **Guidance/Tracking:** Kearfott Navigation System. **Launch:** VTOL **Recovery:** VTOL **Electrical Power:** 120/208 VAC, 3 phase 50/60 Hz. **Ground Control Station:** Navy: Tactical Control System integrated into Littoral Combat Ship or standalone capability; Army: Future Combat System Designed Ground Control Station or One System.

GFS UAV

Use(s): Tactical reconnaissance, surveillance, damage assessment **Manufacturer and Country:** GFS Projects, UK **Powerplant:** Prototype electric; production IC engine **Dimensions:** Diameter from 0.6m **Payloads:** Forward and downward surveillance cameras **Guidance/Tracking:** Prototype operator control **Launch:** VTOL **Recovery:** VTOL **Structure Material:** Carbon fibre **Ground Control Station:** Prototype - operator control, production - autonomous FCS

GLOBAL OBSERVER

Use(s): Telecommunications infrastructure, imaging, mapping and remote sensing, High Altitude Long Endurance (HALE) UAV. Development program for various government, civil, and commercial applications. **Manufacturer and Country:** AV Inc, USA **Powerplant:** Liquid Hydrogen Propulsion System Powering electric motor propeller system. **Dimensions:** Length Not Available (Scaleable) Wingspan 150 up to 250 (Scaleable) ft **Weight:** MTOW Up to 10,000 lb, Max payload Up to 1,000 lb **Performance:** endurance Up to 2 weeks depending on payload ceiling 70,000 ft **Payload:** ISR, Communication Relay, Remote Sensing. **Launch:** Conventional wheeled **Recovery:** Conventional wheeled **Structure Material:** Composite

GOLDEN EYE

Use(s): Reconnaissance, surveillance and target acquisition **Manufacturer and Country:** Aurora Flight Sciences Corp, USA **Powerplant:** heavy fuel 1 x rotary **Dimensions:** Length 5.42 ft, Wingspan 9.6 ft **Weight:** Empty weight 124 lb, MTOW 150 lb, Max payload 26 lb **Performance:** speed 115 mph; endurance 10 hr; ceiling 20,000 ft; endurance speed 140 kt **Payload:** FLIR Systems, EO/IR cameras, laser designator, laser rangefinder **Datalink:** LOS **Guidance/Tracking:** Athena Guidestar **Launch:** VTOL **Recovery:** VTOL **Structure Material:** Graphite composite / Kevlar **Ground Control Station:** GDRS soldier machine interface

GULL (SUAV 24)

Use(s): Reconnaissance, surveillance, coastal special ops. **Manufacturer and Country:** Warrior (Aero-Marine) Ltd, UK **Powerplant:** 3.6 hp **Dimensions:** Wingspan 2.4 m **Weight:** MTOW 16 kg, Max payload 5 kg **Performance:** endurance 5 hr; endurance speed 55 kt

HADA (HELICOPTERO ADAPTATIVO AVION)

Use(s): Reconnaissance and Surveillance. **Manufacturer and Country:** INTA, Spain **Powerplant:** 130 kW Diesel Reciprocating Engine. **Dimensions:** Length 9 m, Height 2 m, Rotor diameter 6 m **Weight:** Empty weight 220 kg, MTOW 380 kg, Max payload 100 kg **Performance:** speed 230 kt; endurance 6 hr; ceiling 6,000 (ASL) m **Payload:** Mini-SAR EO/IR. **Datalink:** LOS; S- BAND/UHF; SATLINK; KU band. **Guidance/Tracking:** GPS/INS. **Launch:** VTOL. **Recovery:** VTOL. **Structure Material:** Composite/Advanced Alloys. **Electrical Power:** 5 kW. **Ground Control Station:** Common To Siva System.

HAWKEYE

Use(s): Precise, overt/covert, day/night, adverse weather, immediate resupply in the highest threat environment to support special operation forces (SOF), and combat search and rescue (CSAR). **Manufacturer and Country:** AV Inc, USA **Powerplant:** Glider. **Dimensions:** Length 2.29 m, Wingspan 3.7 m **Weight:** Empty weight 18 (68 additional payload capacity) kg **Performance:** endurance 1.5 hr; ceiling 30,000 ft; endurance speed 91 kt **Payload:** 150 lbs (68 kg) capacity emergency supplies: food, water, batteries, small arms, ammunition, blood plasma, emergency medical kit, chemical/biological protective equipment, and survival gear. **Datalink:** uplink / downlink. **Guidance/Tracking:** GPS-based autonomous waypoint navigation with laptop mapping and optional Manual Control. **Launch:** Air Launch Drop. **Recovery:** Parachute. **Structure Material:** Composite. **System Components:** Aircraft, Low Signature (Audio/Visual/RCS), inexpensive/expendable airframe, removable/reusable avionics module, autonomous flight control system with man-in-the-loop control, SAASM GPS-based autonomous waypoint navigation, common operating GCS. **Ground Control Station:** Common Operating SUAV Ground Control Station (Wasp, Raven, PUMA, Swift and Pointer) with FalconView mission planning / mapping software.

HERMES 450B

Use(s): ISTAR, SIGINT, Comm relay and other (Division to Corp level) **Manufacturer and Country:** Elbit Systems Ltd UAV Division, Israel **Powerplant:** UEL 52 hp rotary engine **Dimensions:** Length 6.1 m, Wingspan 10.5 m **Weight:** MTOW 450 kg, Max payload 150 kg **Performance:** speed 95 kt; endurance >20 hr; ceiling 18,000 ft **Payload:** dual capability (EO, IR and Laser designator, SAR, GMTI and other) **Datalink:** LOS and/or Satellite comm **Guidance/Tracking:** fully autonomous or manual flight **Launch:** prepared and semi prepared runways **Recovery:** prepared and semi prepared runways or parachute **Structure Material:** fully composite **Electrical Power:** 1.6 kW **Ground Control Station:** Internal: 2 interchangeable workstations comprising 1x situation & 1x observation display, stick, mouse, trackball & keyboard. External (container): 2.19 x 2.23 x 4.38 m (HxWxL) S-820 shelter (mobile). Weight 2.8 tonnes.

HERMES 900



1x situation & 1x observation display, stick, mouse, trackball & keyboard. External (container): 2.19 x 2.23 x 4.38 m (HxWxL) S-820 shelter (mobile). Weight 2.8 tonnes.

HERMES 1500



shelter (mobile). Weight: 2.8 tonnes.

Use(s): ISTAR, SIGINT, Comm relay and other (Division to Corp level)
Manufacturer and Country: Elbit Systems Ltd UAV Division, Israel
Powerplant: UEL 52 hp rotary engine **Dimensions:** Length 6.1 m, Wingspan 10.5 m **Weight:** MTOW 450 kg, Max payload 150 kg
Performance: speed 95 kt; endurance >20 hr; ceiling 18,000 ft
Payload: dual capability (EO, IR and Laser designator, SAR, GMTI and other) **Datalink:** LOS and/or Satellite comm **Guidance/Tracking:** fully autonomous or manual flight **Launch:** prepared and semi prepared runways **Recovery:** prepared and semi prepared runways or parachute **Structure Material:** fully composite **Electrical Power:** 1.6 kW **Ground Control Station:** Internal: 2 interchangeable workstations comprising

Use(s): ISTAR, SIGINT, comm relay, other (Corps to Command level)
Manufacturer and Country: Elbit Systems Ltd UAV Division, Israel
Powerplant: 2x Rotax 914 100 hp **Dimensions:** Length 9.4 m, wingspan 18 m **Weight:** MTOW 1650 kg, Max payload 350 kg **Performance:** speed 130 kt; endurance >26 hr; ceiling 33,000 ft **Payload:** multi-payload capability **Datalink:** LOS and/or Satellite comm **Guidance/Tracking:** fully autonomous or manual flight **Launch:** runway **Recovery:** runway **Structure Material:** fully composite **Electrical Power:** 9.8 kW **Ground Control Station:** Internal: 2 interchangeable workstations comprising 1x situation & 1x observation displays, stick, mouse, trackball & keyboard. External (container): 2.19 x 2.23 x 4.38 m (HxWxL) S-820



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INVENTUS S-1

Use(s): Reconnaissance, remote delivery **Manufacturer and Country:** Lew Aerospace, USA **Powerplant:** 5 hp 87 octane gasoline **Dimensions:** Wingspan 3.2 m **Weight:** Empty weight 11.3 (dry) kg, Max payload 22.7 (in wing and/or under wing) kg **Performance:** ceiling 10,000 ft; endurance speed 112 kph **Datalink:** Northrop Grumman PRB microwave **Guidance/Tracking:** Northrop Grumman PRB microwave; complete autonomous flight **Launch:** Tri-cycle landing gear; Catapult **Recovery:** Tri-cycle landing gear; Parachute **Structure Material:** Light weight composite **Electrical Power:** LiPO Batteries **Ground Control Station:** Northrop Grumman PRB microwave

I-VIEW

Use(s): Close-range tactical UAV system for reconnaissance and surveillance, target acquisition and artillery adjustment missions. **Manufacturer and Country:** IAI Malat, Israel **Dimensions:** Length 4.10 m, Wingspan 5.70 m **Weight:** MTOW 125-165 kg, Max payload 20-30 kg **Performance:** endurance 4-6 hr; ceiling 20,000 ft **Payload:** EO/IR **Datalink:** Direct LOS; real-time command up-link; real-time data and video downlink. **Launch:** Automatic catapult assisted. **Recovery:** Automatic precision parafoil.

JORDAN FALCON

Use(s): Surveillance, reconnaissance, remote sensing and target acquisition up to a range of 50km. **Manufacturer and Country:** Jordan Advanced Remote Systems, Jordan **Powerplant:** 200 cc Gas/oil mix. 2-stroke engine. **Dimensions:** **Weight:** Empty weight 40 kg, MTOW 60 kg, Max payload 6 kg **Performance:** endurance 4 hr; endurance speed 120 (SLS) kph **Payload:** EO/IR. **Datalink:** 5-watt video/telemetry microwave datalink. **Guidance/Tracking:** Heading, altitude and waypoint navigation controlled by GPS. **Launch:** Auto-up launcher or catapult. **Recovery:** Automatic parachute. **Structure Material:** Composite. **System Components:** Several UAVs, onboard sensors, one or more GCS with datalink terminals, field support equipment and spare parts.

Electrical Power: 900 W (Buffer storage battery: 240W -h). **Ground Control Station:** Table-top or shelter mounted configurations with microwave receiver.

KILLERBEE

Use(s): Low Altitude Long Endurance ISR. **Manufacturer and Country:** Northrop Grumman Corporation (and Swift Engineering), USA **Dimensions:** Wingspan Scalable Wingspan 6.5 - 17.5. ft **Weight:** MTOW 43 - 360, depending upon wingspan. lb, Max payload 7 -120, depending upon wingspan **Performance:** endurance 12-14 hr; ceiling 18,000 - 20,000 ft; endurance speed 67 mph **Payload:** Electro-Optical, Infrared. Optional: Laser Range Finder/Designator, Mini SAR, Hyperspectral. **Launch:** Pneumatic-catapult launcher, air, land or sea-based. **Recovery:** Net recovery. **Structure Material:** Composite structural units. **Ground Control Station:** IP based ground control station.

KINGFISHER II

Use(s): Designed to provide organic tactical support to surface ships: Littoral combat ship (LCS); Expeditionary strike group (ESG), and Destroyer (DD). Folds to fit in 11-meter rigid hull inflatable boat (RHIB) space. **Manufacturer and Country:** Vought Aircraft Industries Inc., USA **Powerplant:** PW545B (Thrust) 4,100 lb **Dimensions:** Length 38 ft, Wingspan 41 ft **Weight:** Empty weight 4,360 lb, MTOW 9,500 lb, Max payload 2,500 lb **Performance:** speed 345 kt; ceiling 45,000 ft; endurance speed (At 25,000 ft) 250 kt **Launch:** Skids on water **Recovery:** Skids on water

MARINER

Use(s): Reconnaissance, surveillance, communications relay, SIGINT. **Manufacturer and Country:** General Atomics Aeronautical Systems Inc. (GA-ASI), USA **Powerplant:** Honeywell TPE 331-10T. Turboprop. **Dimensions:** Length 36 ft, Wingspan 86 ft **Weight:** Empty weight 4,000 lb, MTOW 11,000 lb, Max payload Internal: 1,150 External: 2,000 lb **Performance:** speed 240 kt; endurance 49 hr; ceiling 52,000 ft **Payload:** EO/IR, maritime surface search radar, ELINT, communications relay. **Datalink:** C-band LOS, Ku-band BLOS SATCOM. **Guidance/Tracking:** INS/GPS. **Launch:** Conventional wheeled. **Recovery:** Conventional wheeled. **Structure Material:** Semi-monocoque composite using pre-impregnated bi-directional graphite skin and Nomex honeycomb stiffening panels.

MERCURY

Use(s): Battlefield/tactical surveillance and target acquisition
Manufacturer and Country: Universal Target Systems Ltd, UK
Powerplant: 6 hp piston engine **Dimensions:** Length 1.5 m, Height 0.35 m, Wingspan 2.5 m **Weight:** MTOW 30 kg, Max payload up to 11 kg
Performance: endurance 3 hr **Payload:** various option, including stabilised multi-camera mounts, miniature stabilised turret camera and line scanning system, day/night capability **Datalink:** real-time video downlink, RF uplink **Guidance/Tracking:** options include remote control and GPS pre-programmable **Launch:** catapult or miniature truck-mounted launch system
Recovery: parachute landing with in-built shock attenuation

MINIFALCON

Use(s): Surveillance, Communication relay, EW **Manufacturer and Country:** Innocon, Israel **Powerplant:** 38 hp Direct injection heavy fuel engine **Dimensions:** Length 3.3 m, Height 1 m, Wingspan 5.3 m **Weight:** Empty weight 55 kg, MTOW 110 kg, Max payload 20 kg **Performance:** speed 120 kt; endurance >10 hr; ceiling >20,000 ft **Payload:** EO/IR POP 200 Communication relay, EW **Datalink:** Range 100-150km with LOS. Analog or secured digital link. The uplink consists of 4 uplink channels. **Guidance/Tracking:** Miniature Integrated Avionics Suite (MIAS) by Innocon. MIAS consists of airborne unit that is INS/GPS based **Launch:** Runway, Catapult **Recovery:** Automatic Parafoil recovery **Structure Material:** Graphite epoxy composite **Electrical Power:** 28VDC 800W generator, 24VDC 7AH backup batteries **Ground Control Station:** Ground part of MIAS

MUCKE

Use(s): EW, UHF/VHF jammer **Manufacturer and Country:** Rheinmetall Defence Electronics GmbH, Germany **Powerplant:** 24 kW 1x piston engine **Dimensions:** Length 2.28 m, Height 0.96 m, Wingspan 3.42 m **Weight:** MTOW 168 kg **Performance:** speed 250 kph; endurance >3.5 hr; ceiling 4,000 m; mission radius 100 km **Payload:** ECM **Datalink:** real-time, jamming resistant command and control HF up/downlink **Guidance/Tracking:** pre-programmed autonomous with in-flight redirection **Launch:** rocket booster from truck-mounted container **Recovery:** parachute and airbags **Structure Material:** RADAR and IR stealth design and material

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NASNAS MK 1

Use(s): reconnaissance, pipeline inspection **Manufacturer and Country:** Tunisia Aero Technologies (TAT), Tunisia **Powerplant:** 25 hp flat twin engine **Dimensions:** Length 2.8 m, Height 1.3 m, Wingspan 3.80 m **Weight:** Empty weight 43 kg, MTOW 125 kg, Max payload 25 kg **Performance:** speed 70 kt; endurance 14 hr; ceiling 5,000 m **Payload:** FLIR or TV camera, scientific instrumentation **Guidance/Tracking:** telemetry command via autopilot and GPS (production version) **Launch:** conventional wheeled or catapult **Recovery:** conventional wheeled or parachute

NB-X2

Use(s): Strategic reconnaissance, surveillance **Manufacturer and Country:** SATUMA, Pakistan **Powerplant:** 22-35 hp gasoline 2x 2-stroke engines **Dimensions:** Length 3.72 m, Wingspan 3.98 m **Weight:** MTOW 180 kg, Max payload 50 kg **Performance:** speed 140 kph; endurance 8 hr; ceiling 18,000 ft **Payload:** EO/IR, customer furnished **Datalink:** real-time double datalink **Guidance/Tracking:** remote control/pre-programmed autonomous navigation **Launch:** wheeled **Recovery:** wheeled **Structure Material:** composites **Electrical Power:** 28V, 900W **Ground Control Station:** 3 console, truck mounted

NIBBIO

Use(s): Fast Tactical Drone. **Manufacturer and Country:** Galileo Avionica S.p.A., Italy **Powerplant:** MicroTurbo TRS18 160 kg JP4, JP5, JP8, Turbojet. **Dimensions:** Length 4.07 m, Height 0.89 m, Wingspan 2.30 m **Weight:** MTOW 360 kg, Max payload 870 kg **Performance:** speed 650 mph; endurance 1.5 hr; ceiling 12,500 m; mission radius 350 nm **Payload:** EO/IR, SAR, ESM, Jammers, Chaff/Flares dispenser, NBC sensors. **Datalink:** real-time / delayed imagery / data **Guidance/Tracking:** Manual and/or Fully Automatic (no emissions). **Launch:** 2 JATO Boosters. **Recovery:** Parachute for ground (airbags) or sea (flotation kit) recovery. **Structure Material:** Composite Aluminium Alloy and Carbon Fibre.

OBSERVER

Use(s): short range reconnaissance **Manufacturer and Country:** Cranfield Aerospace Ltd / QinetiQ, UK **Powerplant:** BH88 4.6 kW gasoline/oil two stroke **Dimensions:** Length 1.68 m, Height 0.3 m, Wingspan 2.4 m, Fuselage length 1.68 m **Weight:** Empty weight 37 (less fuel, incl batteries & payload) kg, MTOW 45 kg, Max payload 6 kg **Performance:** endurance 2.5 hr; ceiling 5000 (at ISA +25) m; mission radius 25 km **Payload:** four camera roll steered, EO CCD video with image footprint of 500m below AV increasing to 1000m at 1500m ahead of AV, at a flight altitude of 300m AGL. Alternate payload: two camera roll and pitch steered uncooled thermal imaging unit **Datalink:** Telemetry in Video (TIV) system enabling four TV camera image information plus telemetry data to be transmitted via a single UHF datalink. **Guidance/Tracking:** de-skilled operation using touch screen input to map and imagery displays to select 'waypoints' for route and 'points of interest' (POI) for observation. AV steers itself and the payload to track the POI. **Launch:** catapult **Recovery:** automated recovery using parachute airbag. **Structure Material:** carbon/kevlar epoxy composite **Electrical Power:** primary/secondary batteries

ONYX AUTONOMOUSLY GUIDED PARAFOIL SYSTEM

Use(s): Logistical re-supply. **Manufacturer and Country:** Atair Aerospace Inc., USA **Dimensions:** Length 45 ft, Wingspan 38 ft **Weight:** MTOW 2,300 lb, Max payload 2,200 lb **Performance:** speed 70 kt; endurance varies; ceiling 35,000 ft **Launch:** Airdrop **Recovery:** Parafoil

OPALE

Use(s): Medium-altitude, long-endurance optionally piloted Aircraft, Law enforcement, search and rescue, border patrol, surveillance and reconnaissance system. **Manufacturer and Country:** Rheinmetall Defence Electronics GmbH, Germany **Powerplant:** Thielert TAE125, 99 kW Liquid cooled common rail diesel/kerosene engine. **Dimensions:** Length 8.6 m, Height 2.5 m **Weight:** Empty weight 2,780 lb, MTOW 3,750 lb, Max payload 970 lb **Performance:** endurance > 12 hr; ceiling 18,000 ft; mission radius 100 (Direct link) nm; endurance speed 140 [TAS] kt **Payload:** Various payloads for day and night operations as well as all-weather operations. Equipped with standard TV/IR sensors. Customer options. **Datalink:** VHF, UHF, Ku, SAT. **Guidance/Tracking:** Dual GPS receivers, dual VOR/LS receivers, dual VHF communications transceivers, a transponder, and an integrated annunciation system. GPS is backed-up by ground data-link tracking. **Launch:** Conventional and automatic wheeled take-off. **Recovery:** Conventional and automatic wheeled take-off. **Structure Material:** Carbon Fibre Reinforced Plastic (CFRP) fuselage (semi monocoque moulded construction). **System Components:** Ground control and the airborne segment. Simulator. **Electrical Power:** 3KW/28 V DC. **Ground Control Station:** A shelter based interoperable command and control station; 3 operator consoles.

OPTICA

Use(s): Optionally manned/unmanned system, can be used with a wide range of payloads. **Manufacturer and Country:** Merlin Integrated Solutions Consortium (platform provided by BLAC), UK **Powerplant:** Avgas **Dimensions:** Length 8.16 m, Height 2.31 m, Wingspan 12 m **Weight:** MTOW 1315 kg **Performance:** speed 140 kt; endurance 8 hr; mission radius 1046 km; range 103 kt

ORION HALL

Use(s): ISR / atmospheric science **Manufacturer and Country:** Aurora Flight Sciences Corp, USA **Powerplant:** liquid hydrogen IC engine **Dimensions:** Length 39.1 ft, Wingspan 110.75 ft **Weight:** MTOW 5,200 lb, Max payload 400 lb **Performance:** speed 288 m; endurance 100 hr @ 65,000 ft; ceiling 65,000+ ft **Payload:** Various **Datalink:** LOS / satcom **Launch:** conventional **Recovery:** conventional **Structure Material:** Graphite / glass composite

ORKA 1200

Use(s): Medium VTOL UAV system for detection, reconnaissance, identification, tracking & over the horizon targeting. **Manufacturer and Country:** EADS Defence and Security, France **Dimensions:** Length 6.22 m, Height 5.40 m, Rotor diameter 7.2 m **Weight:** MTOW 680 kg, Max payload 180 kg **Performance:** speed 195 kph; endurance 8 hr; ceiling > 3,600 ft **Payload:** Modular mission payload (EO/IR, TV, ESM/ECM, Radar, Laser Designator). **Datalink:** Secured datalinks for real time transmission. **Guidance/Tracking:** Autonomous flight guidance and navigation. **Launch:** ATOL. **Recovery:** ATOL. **Structure Material:** Composite.

PATHFINDER PLUS

Use(s): carbon fibre and epoxy composite structure, Kevlar, styrofoam leading edge, plastic film - with two-blade, wide chord, laminar-flow propellers designed for high altitudes **Manufacturer and Country:** AV Inc, USA **Powerplant:** 2 hp 8 x brushless direct-current electric motors **Dimensions:** Length 3.6 m, Wingspan 36.3 m **Weight:** MTOW 340 kg, Max payload 45 kg **Performance:** speed 17-20 mph; endurance 15 hr; endurance speed 15-18 kt **Payload:** varies with altitude, approx. 100 lb to 65,000 ft; 50 lb to 80,000 ft

PELIKAN

Use(s): Surveillance and Training. **Manufacturer and Country:** TAI-TUSAS Aerospace Industries Inc., Turkey **Powerplant:** 2x ZENOAH G-38. 2-cyl, 2-str engine, tractor and pusher configuration. **Dimensions:** Length 3 m, Wingspan 3.6 m **Weight:** Empty weight 20 kg, MTOW 35 kg, Max payload 6 kg **Performance:** endurance 6 hr; ceiling 5,000 ft; mission radius (LOS) 15 km; endurance speed 65 kt **Payload:** EO/IR. Customer options. **Datalink:** Dual redundant omni-directional LOS datalink. **Guidance/Tracking:** Full autonomous modes and stability augmentation modes, fail-safe modes. INS/GPS navigation. Dual redundant flight sensors, processors and flight critical components. Real time telemetry and telecommand. **Launch:** Conventional wheeled. **Recovery:** Conventional wheeled. **Structure Material:** Full composite airframe. Metal twin tail booms. **System Components:** 1 aircraft, 1GCS (integral GDT), 1 set of GSE. **Electrical Power:** Li-Po batteries as primary electrical power source **Ground Control Station:** Hand held transmitter. 3 swappable consoles featuring full monitoring and piloting, mission planning and diagnostics features. Peculiar to type auxiliary mission consoles. GCS is able to operate any TAI UAV platform.



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REMOEYE H-120

Composite. **System Components:** 4 Air Vehicles with Mission Payloads, 1 GCS. **Electrical Power:** 28VDC. **Ground Control Station:** Portable GCS.

ROBOCOPTER 300

Use(s): Industrial use **Manufacturer and Country:** Kawada Industries Inc, Japan **Powerplant:** Lycoming HO-360 124 kW auto gasoline **Dimensions:** Length 7.37 m, Height 2.65 m, Rotor diameter 8.18 m **Weight:** Empty weight 500 kg, MTOW 794 kg, Max payload 294 kg **Payload:** IR sensor, CCD camera, volcanic ash collector system **Datalink:** COTS can be installed **Guidance/Tracking:** pre-programmed flight using RTK-GPS and inertia sensors **Launch:** VTOL **Recovery:** VTOL **Structure Material:** steel pipe frame and aluminium-alloy structure

RV-160 UADP (UNIVERSAL APPLICATION DEVELOPMENT PLATFORM)

Use(s): Research and development platform **Manufacturer and Country:** A2TECH - Advanced Aviation Technology, USA **Power plant:** Two electric, gasoline or turbine engines **Dimensions:** Length 2.5 m, wingspan 3 m **Weight:** MTOW 18 kg **Performance:** Endurance up to 4 hr, speed 60-100 km/h **Payload:** Pan-tilt EO pilot camera, other customer specific **Datalink:** Video downlink, CANaerospace data uplink/downlink **Guidance/Tracking:** DARVIN-A3 flight control system with autopilot functions **Launch System:** Conventional wheeled STOL **Recovery:** Conventional wheeled STOL **Ground Control Station:** RealityVISION Universal Ground Control Cockpit, remote video terminal, mission laptop

Use(s): Surveillance/Targeting/Communications. **Manufacturer and Country:** Cyber Defense/Techsphere Systems, USA **Powerplant:** Two Centurion 1.7 Engines. **Dimensions:** Fuselage length 60 (Diameter) ft **Weight:** Max payload 500 lb **Performance:** endurance 10 hr; endurance speed 35 mph **Guidance/Tracking:** Manual and RPC. **Launch:** Self Launch lighter than air vehicle with VTOL. **Recovery:** Self landing VTOL.

**SA 60 LAA****SA 90 MAA**

Use(s): Surveillance/Targeting/Communications. **Manufacturer and Country:** Cyber Defense/Techsphere Systems, USA **Powerplant:** Four Centurion 1.7 Engines. **Dimensions:** Fuselage length (Diameter) 90 ft **Weight:** Max payload 1,000 lb **Performance:** endurance 48 hr; ceiling (MSL) 20,000 ft; endurance speed 35 mph **Guidance/Tracking:** Manual and RPC. **Launch:** Self Launch lighter than air vehicle with VTOL. **Recovery:** Self landing VTOL. **Electrical Power:** 5 Kw

SCORPIO 6

Use(s): Multi purpose light VTOL UAV system for detection & identification, observation and surveillance. **Manufacturer and Country:** EADS Defence and Security, France **Powerplant:** Dimensions: Length 1.7 m, Height 0.75 m, Rotor diameter 1.8 m **Weight:** MTOW 13 kg **Performance:** speed 35 kg; endurance 1 hr; ceiling > 2,000 m **Payload:** Versatile payload (EO/IR, TV, ...) **Datalink:** Secured datalinks for real time transmission. **Guidance/Tracking:** Autonomous flight guidance and navigations. **Launch:** ATOL **Recovery:** ATOL **Structure Material:** Composite.

SCORPIO 30

Use(s): Multi-purpose light VTOL UAV system in urban, maritime, day and night environment for tactical intelligence missions. **Manufacturer and Country:** EADS Defence and Security, France **Powerplant:** Dimensions: Length 2 m, Height 0.75 m, Rotor diameter 2.2 m **Weight:** MTOW 38 kg **Performance:** speed 50 kph; endurance 2 hr; ceiling > 2,000 m **Payload:** Versatile payload (EO/IR, TV) **Datalink:** Secured datalinks for real time transmission. **Guidance/Tracking:** Autonomous flight guidance and navigation. **Launch:** ATOL. **Recovery:** ATOL. **Structure Material:** Composite.

SENTRY HP

Use(s): Tactical Military and civilian applications **Manufacturer and Country:** DRS Unmanned Technologies Inc, USA **Powerplant:** 38 hp two-stroke **Dimensions:** Length 11 ft, Wingspan 12.8 ft **Weight:** Empty weight 180 lb, MTOW 420 lb, Max payload 75 lb **Performance:** speed 100 kt; endurance 6+ hr; ceiling 10,000 ft; endurance speed 75 kt **Payload:** Electro-Optical or Infrared (EO/IR) drop, relay or a host of other external or internal carried payloads. **Datalink:** Digital S-Band up link and L-Band downlink **Guidance/Tracking:** GPS Navigation **Launch:** Wheels **Recovery:** Wheels or emergency parachute **Structure Material:** Carbon fibre composite **Electrical Power:** 24 VDC **Ground Control Station:** A portable computer terminal interfaced with the

communications module, an optional AV hand controller, and the payload controller. An optional Remote Terminal Receiver allows reception of video away from the ground station.

SERAPH

Use(s): A low-observability, high-speed stealth drone, designed to carry out deep penetration reconnaissance missions and autonomous strike operations. **Manufacturer and Country:** Denel Aerospace Systems, South Africa **Powerplant:** Dimensions: Length 5.7 m, Height 0.7 m, Wingspan 3 m **Weight:** Max payload 80 kg **Performance:** endurance 1.4 hr; ceiling 10 to 12 000 m **Payload:** SAR, IRLS, ESM. **Guidance/Tracking:** Telemetry link up to 250km. Ability to fly autonomously to a pre-programmed mission profile. **Recovery:** Three inflatable airbags. **System Components:** Three to six Seraph drones Payloads. Ground control stations. Ground support equipment. Transport and handling vehicles. **Ground Control Station:** Operator work bays, control interfaces, telecommand and telemetry equipment, and a mission planning capability.

Use(s): tactical UAV for surveillance and target acquisition in real-time, RSTA, fire fighting and coastal surveillance **Manufacturer and Country:** INTA, Spain **Powerplant:** 48 hp four cylinder, 2-stroke **Dimensions:** Length 3.8 m, Wingspan 6.8 m **Weight:** MTOW 290 kg, Max payload 49 kg **Performance:** speed 180 kph; endurance 7 hr; ceiling 4,000 m **Payload:** two axis gimbal, FLIR, CCD TV **Datalink:** PCM telecommand and telemetry links **Guidance/Tracking:** fully autonomous with GPS/IMU **Launch:** pneumatic ramp (optional zero length rocket booster) **Recovery:** parachute and under fuselage air bags

**SKELDAR V-150**

Use(s): Surveillance and natural disaster observation. **Manufacturer and Country:** SAAB, Sweden **Powerplant:** Water-cooled, 2-cylinder, 2-stroke, fuel-injected engine. **Dimensions:** Length 4 m, Rotor diameter 3.3 m **Weight:** MTOW 95 kg, Max payload 55 (Combined fuel and payload) kg **Performance:** speed 100 kph; endurance Up to 5 hr; mission radius 100 km **Payload:** EO/IR, SAR and EW. **Datalink:** UHF - direct links containing sensor and C2 data. **Launch:** VTOL. **Recovery:** VTOL. **Structure Material:** Carbon Fibre, Titanium and Aluminium. **Ground Control Station:** UAV Control Station (UCS) enables integration into a number of hardware platforms.

SKYAGENT I

Use(s): Tactical reconnaissance, surveillance, target acquisition, signal intelligence, Ordnance and Sensor delivery. **Manufacturer and Country:** BAE Systems, USA **Powerplant:** UAV Engines Ltd. 38 hp Gasoline/Oil premix. Single-Rotor air-cooled Wankel. **Dimensions:** Height 5 ft, Wingspan Optional 8 ft, Rotor diameter 22 in **Weight:** Empty weight 95 lb, MTOW 125 lb, Max payload 15 lb **Performance:** endurance 1 hover, > 2 with optional wings. hr; ceiling >3000 m; mission radius 40 km **Payload:** Customer specified payloads. BAI Series 52 Gimbaled EO/IR/Laser Range Finder, Fixed EO Video, Signal INTelligence (SIGINT) payloads. **Datalink:** Real-time command and control up and down links, Real-time payload control uplink and imagery downlink. **Guidance/Tracking:** Integrated GPS/Inertial Navigation system. **Launch:** VTOL **Recovery:** VTOL **Structure Material:** Carbon Fiber and Kevlar Composite construction. **System Components:** Number of Aircraft dependent on mission requirements, Ground Control Station, Ground Support Equipment (engine starter, fueler/defueler, etc). **Electrical Power:** 200 W (battery) - optional alternator. **Ground Control Station:** Portable ruggedized laptop based with integrated Moving Map, Aircraft Status display and streaming payload data imagery.

SKYBLADE IV



Use(s): Reconnaissance, Battlefield surveillance, Damage assessment, Search and rescue, Artillery fire support, Target tracking and Maritime and coastal patrol. **Manufacturer and Country:** Singapore Technologies Aerospace and DSO, Singapore **Powerplant:** Dimensions: Length 2 m, Wingspan 3.5 m **Weight:** MTOW 50 kg, Max payload 12 kg **Performance:** endurance 6 -12 hr; ceiling Up to 15,000 ft; range 50 - 80 kt **Payload:** Reconfigurable payload. **Guidance/Tracking:** Fully autonomous. Inflight redirection. **Launch:** Catapult. **Recovery:** Net parachute / Airbag, Belly.

SKYFORCE



Use(s): Consists of four main components: autonomous air vehicles; a primary mission management ground control station; mobile ground control user terminals and quick change payloads. Three types: SkyWatcher, SkyRaider and SkyLifter **Manufacturer and Country:** Proxy Aviation Systems Inc., USA **Powerplant:** Heavy fuel propulsion options. **Dimensions:** Length 20 ft, Height 7.9 ft, Wingspan 32 ft **Weight:** Empty weight 1,800 lb, MTOW 4,000 lb, Max payload 330 - 1000 lb **Performance:** speed: 175 Dash - 110 kt; endurance 20 -30 hr; ceiling 24,000 ft; mission radius 100 nm **Payload:** User Defined, Adaptable, SAR, EO, IR, SigInt, ComInt, Communications Relay.

Datalink: Real-time upload/download, Video download. **Guidance/Tracking:** Autonomous, GPS/Inertial, Remote Control/Pre-programmed Autonomous. **Launch:** ATOL. **Recovery:** ATOL. **Structure Material:** All Composite. **Electrical Power:** 5.6 Kw. **Ground Control Station:** Control Van or Remote User Terminal.

SKYRAIDER



Use(s): Persistent intelligence, ISR, DBA, communications relay and requiring the carriage and release of external stores. **Manufacturer and Country:** Proxy Aviation Systems Inc., USA **Powerplant:** Lycoming IO-540, 250 hp 100LL. **Dimensions:** Length 20 ft, Height 7.9 ft, Wingspan 32 ft **Weight:** Empty weight 1,800 lb, MTOW 4,000 lb, Max payload 330 - 1000 lb **Performance:** speed 175 Dash - 110 kt; endurance 20 -30 hr; ceiling 24,000 ft; mission radius 100 nm **Payload:** User Defined, Adaptable, SAR, EO, IR, SigInt, ComInt, Communications Relay.

Datalink: Real-time upload/download, Video download. **Guidance/Tracking:** Autonomous, GPS/Inertial, Remote Control/Pre-programmed Autonomous. **Launch:** ATOL. **Recovery:** ATOL. **Structure Material:** All Composite. **Electrical Power:** 5.6 Kw. **Ground Control Station:** Control Van or Remote User Terminal.

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SKYTOTE

Control Station: Prototype engineering Ground Station.

Use(s): Payload delivery to ground forces, VTOL UAV with high speed dash capability. Scale-able concept demonstrator program in development for USAF. **Manufacturer and Country:** AV Inc, USA
Powerplant: Rotary IC engine. **Dimensions:** Length 2.3 m, Wingspan 2.4 m **Weight:** MTOW 113 kg, Max payload 23 kg **Performance:** speed Speed stationary hover to 350 kph; endurance 1.20 hr; ceiling (max operating) 10,000 ft **Payload:** Re-supply materials. **Datalink:** Prototype engineering datalink. **Guidance/Tracking:** Prototype autonomous flight control with pilot interrupt / redirect. **Launch:** Vertical take-off and hover, transition to level flight. **Recovery:** Transition from level flight to hover and vertical descent. **Structure Material:** Composite. **Ground**

SKYWATCHER

Power: 5.6 Kw. **Ground Control Station:** Control van or remote user terminal.

Use(s): Persistent surveillance, ISR operations, battle damage assessment (BDA), communications data relay. **Manufacturer and Country:** Proxy Aviation Systems Inc., USA **Powerplant:** Lycoming IO-540, 250 hp 100LL. **Dimensions:** Length 20 ft, Height 7.9 ft, Wingspan 31 ft **Weight:** Empty weight 1,900 lb, MTOW 2,900 lb, Max payload 330-650 lb **Performance:** speed 150 Dash - 110 kt; endurance 8-15 hr; ceiling 20,000 ft; mission radius 100 nm **Payload:** User defined, adaptable, SAR, EO, IR, SigInt, ComInt, communications relay. **Datalink:** Real-time upload/download, video download. **Guidance/Tracking:** Autonomous, GPS/inertial, remote control/pre-programmed autonomous. **Launch:** ATOL. **Recovery:** ATOL. **Structure Material:** All composite. **Electrical**

SMALL AERIAL RECONNAISSANCE DEMONSTRATOR (SARD)

Use(s): Flight testing and demonstration of autonomous flight systems using a Bergen Industrial Twin Helicopter **Manufacturer and Country:** The Charles Stark Draper Laboratory, USA **Powerplant:** Bergen Twin gasoline 2-stroke **Dimensions:** Rotor diameter 6 ft **Weight:** MTOW 35 lb **Performance:** endurance 0.20 hr **Payload:** EO camera **Datalink:** RF uplink/downlink, 2.4 GHz imagery downlink **Guidance/Tracking:** fully autonomous flight **Launch:** Autonomous vertical take-off **Recovery:** Autonomous vertical landing **Structure Material:** G10 composite frame **Electrical**
Power: 16.8 volt battery power **Ground Control Station:** Portable, laptop-based ground control unit with embedded DGPS, communication modems, battery operated/28V external/or AC external power

SPERWER B

Use(s): long-endurance, multi-payload multi-mission Tactical UAV (including weapon carrying). **Manufacturer and Country:** Sagem Défense Sécurité, France **Powerplant:** 70 hp 2-stroke engine. **Dimensions:** Length 3.9 m, Wingspan 6.8 m **Weight:** Max payload 100 kg **Performance:** speedceiling 20,000 ft; endurance speed 80 kt **Payload:** EO/IR/SAR, transmission relay, EW (ELINT, COMINT), weapon carrying. **Datalink:** 150 km LOS secured data link (Ku band), beyond LOS secured redundant data link (satellite), VHF relay with ATC. **Guidance/Tracking:** INS/GPS navigation, automated take off and landing. **Launch:** Pneumatic catapult (same as Sperwer STD). **Recovery:** Parachute and airbags. **Structure Material:** Composite, metal. **System Components:** Ground control station, a Ground Data Terminal (housing the digital data radio link terminal), a catapult launcher, air vehicles. **Ground Control Station:** Internal: 4 or 2 workstations (mission planning, management, mission monitoring, geographical information system) with 2 flat screens (mouse, trackball, keyboard). External container: standard ISO; 20x15x10 ft (HxWxD), 19 inch rack containers. Mobile.

SPERWER-LE

Use(s): Long endurance tactical UAV, surveillance, target acquisition, transmissions, EW, weapon capable. **Manufacturer and Country:** SAGEM SA (SAFRAN), France **Powerplant:** 70 hp 2-stroke engine **Dimensions:** Length 3.5 m, Wingspan 6.5 m **Weight:** Max payload 100 kg **Performance:** speedceiling 20,000 ft **Payload:** EO/IR, SAR, transmission relay, EW (ELINT, COMINT), weapon carrying capability 60+ kg **Datalink:** Digital Ku band (15 GHz) data link; transponder/IFF mode 3 C and VHF relay with ATC **Guidance/Tracking:** preprogrammed navigation INS and GPS, automated take off and landing **Launch:** catapult pneumatic launcher **Structure Material:** composite (carbon fibre) aluminium, titanium **Ground Control Station:** Internal: 4 or 2 workstations (mission planning, management, mission monitoring with 2 flat screens (mouse, trackball, keyboard). External container: standard ISO. 20 x 15 x 10 ft (HxWxD) 19 inch rack containers. Mobile.

STD-5

Use(s): Surveillance. **Manufacturer and Country:** Steadicopter Ltd., Israel **Powerplant:** 46 cc Petroleum octane 98. 2 x twin cylinder Zenoah G-23. **Dimensions:** Length 1498.6 mm, Height 559 mm, Rotor diameter 1,800 mm **Weight:** Empty weight 8 kg, Max payload 8 kg **Performance:** endurance 2 hr **Guidance/Tracking:** Fully autonomous. PC-based Navigation software enables the control and navigation by a GPS system. semi-autonomous; manual, and emergency (auto homing). **Launch:** VTOL - fully autonomous or manual offset options. **Recovery:** VTOL - fully autonomous or manual offset options. **Ground Control Station:** PC - IBM. Real time video can be displayed on the computer screen or an external TV screen.

SUPER RANGER

Use(s): TACMALE, Multi-payload long endurance UAV system for reconnaissance, surveillance, target acquisition and artillery fire adjustment missions. **Manufacturer and Country:** RUAG Aerospace, Switzerland **Powerplant:** 4 cylinder 4 stroke piston engine. **Dimensions:** Length 6.74 m, Wingspan 9.48 m **Weight:** MTOW 500 kg **Performance:** speed 130 kt; endurance up to 20 hr; ceiling 20,000 ft; mission radius up to 180 km **Payload:** EO/IR payloads, Synthetic Aperture Radar, Laser Designator or customer furnished payloads.

Datalink: C, S or Ku-Band link (primary) and UHF-band link (secondary). **Guidance/Tracking:** Pre-programmed, autonomous or direct control, GPS/INS navigation. **Launch:** Conventional wheeled or hydropneumatic catapult.

Recovery: Conventional wheeled or skid landing system (fully automated). **Structure Material:** Radar and IR stealth shape, fully composite. **System Components:** UAV, launcher, GCS, RCT, MRS (optional).

SURVEYOR 600

Use(s): High speed multi sensor and multi mission tactical UAV - Intelligence reconnaissance with deep penetration in hostile environment. **Manufacturer and Country:** EADS Defence and Security, France **Powerplant:** MicroTurbo TMS 18. **Dimensions:** Length 4.06 m, Wingspan 2.3 m **Weight:** MTOW 350 kg **Performance:** range 400 - 800 kph **Payload:** Modular mission payload (EO/IR, TV, ESM/ECM, Radar, Laser Designator). **Datalink:** Secured datalinks for real time transmission. **Guidance/Tracking:** Autonomous - Re-taskable. **Launch:** Pneumatic launcher or booster. **Recovery:** Parachute or piloted parafoil - Automatic/Manual. **Structure Material:** Composite + Aluminium.

SURVEYOR 2500

Use(s): Endurance tactical UAV system for reconnaissance and surveillance. **Manufacturer and Country:** EADS Defence and Security, France **Powerplant:** Rotax 914 **Dimensions:** Length 5.5 m, Height 1.5 m, Wingspan 6.9 m **Weight:** MTOW 450 kg, Max payload 100 kg **Performance:** endurance 12 at 200 km hr **Payload:** Modular mission payload (EO:IR, TV, ESM/ECM, Radar, Laser Designator). **Datalink:** Real time imagery. **Guidance/Tracking:** Autonomous with or without GPS, or Assisted-Re-taskable. **Launch:** Runway take-off or catapult. **Recovery:** Runway landing or parachute- optional ATOL. **Structure Material:** Carbon. **Electrical Power:** 2 kW

SWAN

Use(s): Surveillance, auto-lockup optical remote sensing, research. **Manufacturer and Country:** RMRL, National Cheng Kung University, Taiwan **Powerplant:** 2.1 hp FS-120S **Dimensions:** Length 1.56 m, Height 0.65 m, Wingspan 2.7 m **Weight:** Empty weight 7 kg, MTOW 12 kg **Performance:** speed 80 kph; endurance 2 hr **Payload:** CCD camera in 2-axis platform. **Datalink:** RF command and control up/downlink; real-time video downlink. **Guidance/Tracking:** Autonomous flight, GPS/AHRS navigation. **Launch:** Conventional wheeled **Recovery:** Conventional wheeled **Structure Material:** Composite.

T-15

Use(s): Designed for high duty cycle applications. **Manufacturer and Country:** Arcturus, USA **Powerplant:** Honda 31 cc 4 stroke **Dimensions:** Length 6 ft, Wingspan 10 ft **Weight:** MTOW 36 lb **Performance:** speed 60 kt; endurance 12+ hr; endurance speed 40-50 kt **Guidance/Tracking:** Piccolo Plus auto pilot. **Launch:** Conventional wheeled. **Recovery:** Conventional wheeled. **Structure Material:** Modular. Composite fibreglass.

TAG M65

Use(s): Surveillance. **Manufacturer and Country:** Tactical Aerospace Group (TAG), USA **Powerplant:** 5.2 hp 66 cc 2-stroke twin. **Dimensions:** Length 71.65 in, Height 36.22 in, Rotor diameter 98.4 in **Weight:** Empty weight 24.25 lb, Max payload 30.86 (at sea level) lb **Performance:** speed 110 kph; endurance 4.5 hr; ceiling > 4000 m; endurance speed 100 kph **Payload:** FLIR; SIGINT; SAR Systems; ECW and Jamming. **Datalink:** GPS/Telemetry. **Guidance/Tracking:** Video Downlink/Repeater. **Launch:** VTOL. **Recovery:** VTOL. **Structure Material:** Carbon fibre, composites, aircraft aluminium. **Electrical Power:** 250 amps @ 500 vdc.

TIHA



Use(s): Medium Altitude Long Endurance ISTAR. **Manufacturer and Country:** TAI-TUSAS Aerospace Industries Inc, Turkey **Powerplant:** Single Turboprop, pusher configuration. **Dimensions:** Length 12 m, Wingspan 20 m **Weight:** Empty weight 1,368 kg, MTOW 3,500 kg, Max payload 500 kg **Performance:** endurance 24 hr; ceiling 30,000 ft; mission radius (LOS) 200 km; endurance speed 200 kt **Payload:** ASELSAN ASELFLIR 300T and SAR/GMTI. Electro-optic payload being the primary mission equipment, secondary payload varies. **Datalink:** Dual redundant scalable Ku band LOS datalink. **Guidance/Tracking:** Full autonomous modes and stability augmentation modes, fail-safe modes. INS/GPS navigation. Redundant flight critical systems. Real time telemetry and telecommand. **Launch:** Conventional wheeled automatic or manual. **Recovery:** Conventional wheeled automatic or manual. **Structure Material:** Full composite airframe, modular structure. **System Components:** 4-6 reconfigurable aircraft, mission payloads, 1GCS, 2 GDT, 1 Image Exploitation System, 1 Remote Video Terminal, 1 set of GSE. **Electrical Power:** 28VDC, dual redundant power bus. **Ground Control Station:** NATO ACEIII sheltered GCS. 3 consoles featuring full monitoring and piloting, mission planning and diagnostics features.

UNMANNED LITTLE BIRD DEMONSTRATOR



Use(s): Re-supply, target identification and tracking, communication relay, weapons delivery. **Manufacturer and Country:** The Boeing Company, USA **Powerplant:** Rolls Royce 250-C30R/3M. 800+ hp JP-4 / JP-5. Turboshaft. **Dimensions:** Length 23 ft, Height 8 ft, Rotor diameter 27.5 ft **Weight:** Empty weight 2300 lb, Max payload over 2000 lb **Performance:** speed 130 kt; ceiling 14,000 ft; mission radius 400 nm **Payload:** MX-15, MX-15D and others. **Datalink:** Ku band TCDL. **Guidance/Tracking:** EGI and GPS. **Launch:** VTOL. Autonomous waypoint control. **Recovery:** VTOL. Autonomous waypoint control. **Structure Material:** Aluminium fuselage. **Electrical Power:** 7500 W. **Ground Control Station:** Boeing developed + VSM to other STANAG 4586 systems.

XD-04E "WRAITH E"



Use(s): Reconnaissance. Surveillance platform for industries such as forestry, agriculture, as well as search and rescue. **Manufacturer and Country:** Global Aerial Surveillance Inc., USA **Powerplant:** Lithium Ion batteries. Brushless electric motor. **Dimensions:** Length 51 in, Wingspan 108 in **Weight:** MTOW 4.8 lb **Performance:** endurance 3 hr **Payload:** Can be loaded with different sensor packages for taking air samples for nuclear radiation, chemical agents, and biological warfare. **Datalink:** Transmitting that data in real time. **Guidance/Tracking:** Fully autonomous. Internal autopilot and GPS guidance system **Structure Material:** Carbon and kevlar composite. **Electrical Power:** 14.7 V **Ground Control Station:** Can be linked up to 10 aircraft simultaneously operated by a single operator.

XD-06SW 'SEA WRAITH'



Use(s): Long range reconnaissance and surveillance, nuclear and chemical detection package. **Manufacturer and Country:** Global Aerial Surveillance Inc, USA **Powerplant:** 7 hp 2 x gasoline engines **Dimensions:** Length 10 ft, Wingspan 20 ft **Weight:** Empty weight 150 lb, Max payload 40 lb **Performance:** speed 130 mph; endurance 12- 24 hr; ceiling > 15,000 ft; endurance speed 75 mph **Payload:** HD camera, IR, Laser designator, Nuclear/chemical detection. **Launch:** Water launch from port / conventional wheeled. **Recovery:** Water land in port / conventional wheeled.

YABHON-M



Use(s): Reconnaissance and surveillance. **Manufacturer and Country:** Advanced Target Systems (ATS), part of the ADCOM Group, UAE **Powerplant:** 50 hp **Dimensions:** Length 4.3 m, Height 1.8 m, Wingspan 5.7 m **Weight:** Empty weight 180 kg, MTOW 280 kg, Max payload 30 kg **Performance:** speed 240 kph; endurance 13 hr; ceiling 1800 m; endurance speed 210 kph **Payload:** LOS video and datalink, EO/IR, LDRF. **Launch:** Conventional wheeled **Recovery:** Conventional wheeled, Emergency parachute. **Structure Material:** Fiber glass epoxy **Electrical Power:** 24 volts

YABHON-R

Use(s): Reconnaissance and surveillance. **Manufacturer and Country:** Advanced Target Systems (ATS), part of the ADCOM Group, UAE
Powerplant: Rotax 912 UL 80 hp 4-cylinder, 4-stroke **Dimensions:** Length 5 m, Height 2.12 m, Wingspan 6.56 m **Weight:** Empty weight 320 kg, MTOW 500 kg, Max payload 30-50 kg **Performance:** speed 250 kph; endurance 30 hr; ceiling 4500 m; endurance speed 220 kph
Payload: EO/IR, LDRF, options available. **Launch:** Conventional wheeled. **Recovery:** Conventional wheeled. Emergency parachute. **Electrical Power:** 24 volts

ZEPHYR / MERCATOR

Use(s): Observation and Communications. **Manufacturer and Country:** QinetiQ, United Kingdom **Powerplant:** 1 (x2) kW Solar-electric 2 x Brushless electric/propeller. **Dimensions:** Length 7.5 m, Height 1 m, Wingspan 18 m **Weight:** Empty weight 32 kg, MTOW 32 kg, Max payload Up to 3 kg **Performance:** speed 12 (EAS) kt; ceiling 50,000 ft; mission radius: Unlimited km **Payload:** Various observation/communications. **Datalink:** Control/telemetry/data/imageries. **Guidance/Tracking:** Autonomous or directed. **Launch:** Conventional. **Recovery:** Conventional. **Structure Material:** Lightweight Carbon. **System Components:** Air vehicle, payload, ground segment. **Electrical Power:** Solar electric. **Ground Control Station:** Zephyr dedicated.

ZOND

Use(s): Zond: air traffic control, comms relay. Zond-2: radar and electro-optical monitoring of the Earth's surface. Zond 3: low level reconnaissance. **Manufacturer and Country:** Sukoi, Russia **Powerplant:** AI-222 (Zond 1 and 2) 2 turbofan engines **Dimensions:** **Weight:** MTOW 12,000 (Zond 1 and 2) kg, Max payload 1,500 kg **Performance:** endurance 18 (Zond 1 and 2) hr; ceiling 14-16 (Zond 1 and 2) km **Payload:** Dependent upon mission



AIRCRAFT SYSTEMS -
IN PRODUCTION

AIRCRAFT SYSTEMS -
IN DEVELOPMENT

AERIAL TARGETS

MUA, UCAVS AND
LETHAL UA

PAYLOADS

GUIDE TO SUPPLIERS

PRODUCT GUIDE

EVENTS CALENDAR

SYSTEMS AERIAL TARGETS

Aerial targets (ATs) are required to replicate a wide range of threats including aircraft, helicopters, anti-ship missiles, cruise missiles and UAVs. They thus play an important role in realistic training.

This section, although not an exhaustive list, describes a range of jet and propeller-driven ATs now in production or development.

While every effort has been made to provide accurate information, the publishers cannot be held responsible for errors or omissions. If you have any comments, additions or corrections you would like to be made please contact the editor.

ALKYON

Use(s): Basic Performance Target Drone for Anti Aircraft Artillery/ MANPAD missile testing, training and evaluation to include low signature UAV Threat representation (e.g. Asymmetric Threat Representation). **Manufacturer and Country:** EADS-3SIGMA S.A. Aeronautical and Electronic Systems, Greece **Powerplant:** 11 hp Mogas, AVGAS. Piston engine. **Dimensions:** Length 2.15 m, Wingspan 2.07 m **Weight:** Empty weight 24 kg, MTOW 43 kg, Max payload 14 kg **Performance:** endurance 1.1 hr; ceiling 12,000 ft; range 70 - 124 kt **Payload:** RCS enhancement: All passive and active means. IR radiation: Natural IR/UV emission from engine exposition, IR Flares. Counter Measure: All Mechanical-Electronic. Visual: Smoke Cartridges. Other: IFF, Visual / IR Cameras, MDI, etc. **Datalink:** Real time command and control up and downlink, or Tele command. **Guidance/Tracking:** Autonomous pre-programmed GPS waypoint navigation with in-flight redirection capability and/or visual navigation. **Launch:** Electromechanical launcher. **Recovery:** Two stage parachute system. **Structure Material:** Composite. **Electrical Power:** Rechargeable battery packs. **Status:** In Production

BANSHEE

composite wing. **Electrical Power:** Battery **Status:** In Production

BQM-34 FIREBEE

Use(s): High performance aerial target system. **Manufacturer and Country:** Northrop Grumman Corporation, USA **Powerplant:** GE J-85-100 2850 lbs (45.4 kg) thrust. **Dimensions:** Length 6.9 m, Height 2.1 m, Wingspan 3.9 m **Weight:** Empty weight 975.3 kg, MTOW 1046.2 kg **Performance:** endurance Up to 1.9 hr; ceiling 60,000 ft **Payload:** Wing tip IR or 100 lb ECM pods, Vector scoring with telemetry, Chaff dispensing, IFF and locator beacons, Internal/External Radar augmentation. **Launch:** Land-based or Shipboard. **Recovery:** Parachute. **Status:** In Production

BQM-74E

Use(s): Subsonic Aerial Target. **Manufacturer and Country:** Northrop Grumman Corporation, USA **Powerplant:** JJP-5/8 or Jet A-1. Jet powered. **Dimensions:** Length 4 m, Wingspan 1.8 m **Weight:** MTOW 455 lb **Performance:** speed >515 (ASL) kt; endurance >1 hr; ceiling 40,000 ft **Payload:** Passive or Active Radar augmentation, Seeker simulation, IR augmentation, Tow system, Scoring system, IFF, ECM. **Guidance/Tracking:** GPS / IMU **Launch:** Ground and Ship launched. **Recovery:** Parachute. **Status:** In Production

BQM-74F

Use(s): Subsonic Aerial Target. **Manufacturer and Country:** Northrop Grumman Corporation, USA **Powerplant:** Jet Fuel. Jet powered. **Dimensions:** Length 4.5 m, Wingspan 2.1 m **Weight:** MTOW 281 kg **Performance:** speed >600 (ASL) kt; endurance >2 hr; ceiling 40,000 ft **Payload:** Passive or Active Radar augmentation, Seeker simulators, IR augmentation, tow system, scoring systems, IFF, ECM. **Guidance/Tracking:** GPS/IMU avionics system. **Launch:** Ground and Ship launched. **Recovery:** Parachute. **Status:** In Production

CHUKAR III

Use(s): High-Subsonic Aerial Jet Target. **Manufacturer and Country:** Northrop Grumman Integrated Systems, USA **Powerplant:** JP-4/5/8 **Dimensions:** Length 4 m, Wingspan 1.8 m **Weight:** MTOW 206.4 kg **Performance:** speed >525 (ASL) kt; endurance >1.1 hr; ceiling 40,000 ft **Payload:** Passive or Active Radar augmentation, Seeker simulators, IR augmentation, Tow systems, Scoring systems, Decoy and Chaff dispensers. **Guidance/Tracking:** GPS Way Point **Status:** In Production

DO-DT25 IR

Use(s): Cost-efficient mid subsonic target drone for firings with IR-guided weapon systems. **Manufacturer and Country:** EADS Defence and Security Systems / Military Air Systems, Germany **Powerplant:** 2 Jet engines. **Dimensions:** Length 3.15 m, Wingspan 2.55 m **Weight:** MTOW 144 kg **Performance:** endurance 1.4 hr; ceiling 25,000 ft **Payload:** Radar amplifier (D to K-band), SETA-3 Radar MDI, IFF transponder, IRCM dispenser, Smoke cartridges, Chaff dispenser. **Datalink:** UHF. **Guidance/Tracking:** Autonomous preprogrammed GPS waypoint navigation with inflight redirection capability. **Launch:** Pneumatic catapult. **Recovery:** Parachute. **Structure Material:** Composite. **Status:** In Production

DO-DT 35

Use(s): Cost-efficient high-speed target drone for firings with radar-guided weapon systems. **Manufacturer and Country:** EADS Defence and Security Systems / Military Air Systems, Germany **Powerplant:** 2 Jet engines. **Dimensions:** Length 1.8 m, Wingspan 1.5 m **Weight:** MTOW 50 kg **Performance:** endurance 1 hr; ceiling 25,000 ft **Payload:** Radar amplifier (D to K-band), SETA-3 Radar MDI. **Datalink:** UHF. **Guidance/Tracking:** Autonomous preprogrammed GPS waypoint navigation with inflight redirection capability. **Launch:** Pneumatic Catapult. **Recovery:** Parachute. **Structure Material:** Composite. **Status:** In Production

DO-DT55



Use(s): Cost-efficient high-speed air-launched target drone for the presentation of ARM (Anti Radiation Missile), TASM (Tactical Air-to-Surface Missile) and cruise missiles. **Manufacturer and Country:** EADS Defence and Security Systems / Military Air Systems, Germany **Powerplant:** Jet engine. **Dimensions:** Length 1.65 m, Wingspan 0.6 m **Weight:** MTOW 22 kg **Performance:** ceiling 25,000 ft **Datalink:** UHF. **Guidance/Tracking:** Autonomous preprogrammed GPS waypoint navigation with inflight redirection capability. **Launch:** Air launch. **Recovery:** Parachute. **Structure Material:** Composite. **Status:** In Production

DOLPINE MATS-C



Use(s): R/C target drone for light/medium testing and training platform. **Manufacturer and Country:** PRS Stephansen, Norway **Powerplant:** 25 cc single cylinder, 4.5 hp two-stroke engine. **Dimensions:** Length 1.85 m, Height 0.5 m, Wingspan 1.80 m **Weight:** Empty weight 8.6 kg, MTOW 12 kg, Max payload 2 kg **Performance:** speed 210 (ASL) kph; endurance 0.45 hr; endurance speed 175 (ASL) kph **Payload:** Special proximate hit indicator and wing level system. **Launch:** Hand **Recovery:** Parachute or skid landing (land or sea). **Structure Material:** Carbon and glass fiber composite. **Status:** In Production

GSAT-200



Use(s): Multi Role Free Flying Aerial target System. **Manufacturer and Country:** Universal Target Systems Ltd, UK **Powerplant:** 62 cc Piston engine. **Dimensions:** Length 1.8 m, Height 0.43 m, Wingspan 2.21 m **Weight:** Empty weight 10 kg, MTOW >14 kg **Performance:** speed 13-104 kt; endurance >0.5 hr; ceiling 2000 m **Payload:** 4 smoke tracking flares, 4 IR flares, Miss distance scoring system, laser reflector augmentation, Radar reflective mesh fitted as standard. **Launch:** Catapult **Recovery:** Parachute or skid landing **Status:** In Production

GT-4000



Use(s): Carried and reeled out as a standard towed target, then released. Pre-programmed flight **Manufacturer and Country:** Meggitt Defense Systems, USA **Powerplant:** Dimensions: Length 103.80 in, Wingspan 28.50 in **Weight:** MTOW 180 lb **Performance:** speed **Guidance/Tracking:** GPS. **Launch:** Towed. Learjet-35, Falcon-20 and Gulfstream compliant. **Recovery:** Parachute. **Status:** In Development

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IRIS JET

Use(s): High End Subsonic Target Drone for Air Defence missile testing, training and evaluation. **Manufacturer and Country:** EADS-3SIGMA S.A. Aeronautical and Electronic Systems., Greece **Powerplant:** JET A1, JP-4, JP-5, JP-8. Turbojet engine. **Dimensions:** Length 4.05 m, Wingspan 2.90 m **Weight:** Empty weight 100 kg, MTOW 200 kg, Max payload 50 kg **Performance:** endurance 1 hr; ceiling 40,000 ft; range 195-460 kt **Payload:** RCS enhancement: All passive and active means. IR radiation: Natural IR/UV Counter Measure: All Mechanical-Electronic. Visual: Smoke Cartridges. Other: Radio Altimeter, IFF, Visual / IR Cameras, MDI, etc. **Datalink:** Real time command and control up/down link. **Guidance/Tracking:** Autonomous pre-programmed GPS waypoint navigation with in-flight redirection capability. **Launch:** Electromechanical / Pneumatic Launcher. **Recovery:** Two Stage parachute system **Structure Material:** Composite. **Electrical Power:** Rechargeable battery packs / On board AC/DC Gen. **Status:** In Production

IRIS PROP

Use(s): Propeller Target Drone for Air Defence missile testing, training and evaluation. **Manufacturer and Country:** EADS-3SIGMA S.A. Aeronautical and Electronic Systems., Greece **Powerplant:** 38 hp Mogas, AVGAS. Reciprocal Engine. **Dimensions:** Length 3.35 m, Height 0.88 m, Wingspan 2.90 m **Weight:** Empty weight 60 kg, MTOW 110 kg, Max payload 45 kg **Performance:** endurance 1.5 hr; ceiling 16,000 ft; range 98-175 kt **Payload:** RCS enhancement: All passive and active means. IR radiation: Natural IR/UV emission from Jet engine exposition, IR Flares. Counter Measure: All Mechanical-Electronic. Visual: Smoke Cartridges. Other: Radio Altimeter, IFF, Visual / IR Cameras, MDI, etc **Datalink:** Real time command and control up/down link. **Guidance/Tracking:** Autonomous pre-programmed GPS waypoint navigation with in-flight redirection capability. **Launch:** Electromechanical Launcher. **Recovery:** Two Stage parachute system. **Structure Material:** Composite. **Electrical Power:** Rechargeable battery packs. **Status:** In Production

JORDAN ARROW

Use(s): Aerial target intended for defence weapon training and T&E for close-in and short-range weapon systems. **Manufacturer and Country:** Jordan Advanced Remote Systems, Jordan **Powerplant:** 38 hp Rotary engine. **Dimensions:** Length 3 m, Height 0.6 m, Wingspan 2.2 m **Weight:** MTOW 60 kg, Max payload 15 kg **Performance:** speed 450 (Rotary engine) kph; endurance 2 hr; ceiling 50 - 5000 m **Payload:** Visual augmentation for optical tracking, IR and active and passive augmentation, IR countermeasures, active/passive radar countermeasures, scoring equipment and other - IFF etc. **Guidance/Tracking:** Onboard digital automatic control system with GPS-based navigation. Pre-programmable autonomous mode, changeable in-flight. **Launch:** Pneumatic catapult. **Recovery:** Parachute (Floation equipment and emergency beacon for above water operations). **Structure Material:** Glass-fibre and aluminum. **System Components:** 4-8 UAVs, GCS, catapult launcher and ground support equipment. **Status:** In Production

KALKARA (MQM-107E)

Use(s): Subsonic Aerial Target. **Manufacturer and Country:** BAE SYSTEMS Flight Systems, USA **Powerplant:** TRI 60-5 Model 220 turbojet. Microturbo jet engine. **Dimensions:** Length 5.71 m, Height 1.54 m, Wingspan 3.02 m **Weight:** MTOW 662 (with booster) kg **Performance:** speed 548 kt; endurance >2 hr; ceiling 40,000 ft **Payload:** Advance Radar Missile Scorer (ARMS) vector scoring systems (with sensors fitted to the aircraft). MDI scoring system (with sensors fitted to the towed targets). Hayes Universal Towed Target System (HUTTS), using TPT6A/7 IR Tows and TRX-17 RF Tows. **Guidance/Tracking:** GPS **Status:** In Production

KEKLIK

Use(s): Aerial Target System for Tracking/Training Exercises. **Manufacturer and Country:** TAI-TUSAS Aerospace Industries Inc., Turkey **Powerplant:** 2.5 hp 1x SuperTigre G90 glow fuel engine. Alternative: 2.8hp OS-Max 91Fx engine. **Dimensions:** Length 1.37 m, Height 0.32 m, Wingspan 1.6 m **Weight:** Empty weight 7 kg, MTOW 10 kg **Performance:** speed 150 kph; endurance 1 hr **Payload:** RCS enhancement. **Datalink:** VHF uplink (UHF video downlink optional). **Guidance/Tracking:** Visual Control within LOS **Launch:** Bungee Catapult launching as standard. Conventional wheeled TO and Landing optional. **Recovery:** Parachute landing. Landing on the belly skid is also possible. **Structure Material:** Delta wing, all composite airframe **Electrical Power:** 4.8V battery pack **Status:** In Production

LAKSHYA

Use(s): High performance, re-usable aerial target. **Manufacturer and Country:** Aeronautical Development Establishment (ADS), India **Powerplant:** Dimensions: Length 5.92 m, Wingspan 3 m **Weight:** MTOW 630 kg **Performance:** endurance >0.5 hr; ceiling 9000 (clean) m **Payload:** Carries two towed IR or RF signature augmented. Two-bodies can be fitted with a scoring system, acoustic or doppler. Miss Distance indicators. Visual augmentation - smoke generation. **Launch:** Zero length launcher ; Rocket assisted take-off. Land / ship launched. **Recovery:** Parachute. **Status:** In Production

LOCATS2

Use(s): High performance aerial target. Provides effective air defence training by simulating the speed and characteristics of the modern fighter and other aircraft. **Manufacturer and Country:** IST Dynamics, South Africa **Powerplant:** 38 kW 2-stroke 500cc. **Dimensions:** Wingspan 3.2 m **Weight:** MTOW 70 kg, Max payload 18 kg **Performance:** ; endurance Up to 1 hr; range 120 to 300 kph **Payload:** IR and/or Smoke Flares, Radar or Acoustic Scoring Systems, Laser Reflective Tape, Smoke Trail. **Launch:** Zero Length Pneumatic. **Recovery:** Parachute. **Status:** In Production

MINIATURE AIR LAUNCHED DECOY (MALD)

Use(s): The designated ADM-160B is a high-fidelity decoy target able to incorporate electronic packages that can mimic radar signatures of several different types of fast attack aircraft. Entry into service with the USAF is slated to be 2008. **Manufacturer and Country:** Raytheon Missile Systems, USA **Powerplant:** Turbojet engine **Dimensions:** Length 11.0 in, Height 14.7 in, Wingspan 53.8 in **Weight:** MTOW 250 lb **Performance:** speed **Payload:** Image sensor for strike damage assessment. Jamming payload. **Guidance/Tracking:** GPS. **Structure Material:** Composite. **Status:** In Development

MIRACH 100/5



Aluminium Alloy and Carbon Fibre. **Electrical Power:** 1.8 Kw **Status:** In Production

Use(s): High-Subsonic, Subscale Aerial Target & Threat Simulator.
Manufacturer and Country: Galileo Avionica S.p.A., Italy **Powerplant:** MicroTurbo JP4, JP5, JP8. Turbojet engine. **Dimensions:** Length 4,07 m, Height 0,89 m, Wingspan 2,3 m **Weight:** MTOW 330 kg, Max payload 60 kg
Performance: speed 0,85 m; endurance 1,5 hr; ceiling 12,500 m **Payload:** Active and passive RCS augmenters, IR augmenters, IR and chaff dispensers (IRCM/A and ICRM/M), simultaneous carriage of 2 Towed body systems (IR, active/passive RF Tow targets) or 2 Air Launched Autonomous expendable high-subsonic targets (Locusta), etc. **Datalink:** link control range > 120 Km
Guidance/Tracking: Manual or Automatic. **Launch:** 2x JATO Boosters
Recovery: Parachute, Sea or Ground. **Structure Material:** Composite

MSAT-500



Use(s): Multi-role free flying aerial target system. **Manufacturer and Country:** Universal Target Systems Ltd, UK **Powerplant:** UTS-320 Rotary or alternative **Dimensions:** Length 2.85 m, Height 0.62 m, Wingspan 2.60 m **Weight:** Empty weight 46 kg, MTOW >82 kg **Performance:** endurance >1.2 hr; ceiling >5000 m **Payload:** 16 smoke fracturing flares, 16 IR flares, Miss Distance Scoring System, laser reflector augmentation, chaff dispensers, 5 & 7.5 inch Luneberg lens, corner arrays, Radar transponder, sleeve towing, target towing. **Guidance/Tracking:** Optical, GPS or radar with full telemetry, flight data recording, multi-target and naval capability. **Launch:** Catapult or pneumatic. **Recovery:** Parachute or skid landing. **Status:** In Production

NISHAN MK-II



module. Acoustic and Doppler radar MDI. **Datalink:** UHF/L/S Bands. **Guidance/Tracking:** Stabilization: IFCS-6000 Integrated Flight Control System. Tracking & Telemetry: ID-TM6 GPS and data telemetry module with software graphics interface display. **Launch:** Pneumatic launcher. **Recovery:** Skid landing or parachute. **Structure Material:** All composite. **System Components:** Air Vehicles 4; Ground Control Station (GSE); Antenna Tracking System (ATS); Field Support Subsystem (FSS); Ground Support Equipment (GSE). **Electrical Power:** 6V/12V/13.8 VDC. **Status:** Production

NISHAN TJ-1000



Doppler Radar MDI system payloads may be mixed and carried simultaneously. **Datalink:** UHF/L/S Bands. **Guidance/Tracking:** Stabilization: IFCS-6000 Integrated Flight Control System. Tracking & Telemetry: ID-TM6 GPS and data telemetry module with data logging / display. **Launch:** Wheeled. **Recovery:** Skid Landing or Parachute. **Structure Material:** Composites. **System Components:** Air Vehicles x 4, Ground Control Station (GSE), Antenna Tracking System (ATS), Field Support Subsystem (FSS). Ground Support Equipment (GSE). **Electrical Power:** 6V/12V/13.8 VDC. **Status:** In Production

PERSEAS MULTI ROLE



Use(s): Mid subsonic Target Drone for Air Defence missile testing, training and evaluation (Single Jet (PSJ) and Twin Jet (PTJ) engine configuration).

Manufacturer and Country: EADS-3SIGMA S.A. Aeronautical and Electronic Systems., Greece **Powerplant:** JET A1, JP-4, JP-5, JP-8, Jet engine.

Dimensions: Length 2.93 m, Wingspan 2.21 m **Weight:** Empty weight 35 (PTJ) kg, MTOW 90 (PTJ) kg, Max payload 15 (PTJ) kg **Performance:** speed 135-230

All passive and active means. IR radiation: Natural IR/UV emission from Jet engine exposition, IR Flares. Counter Measure: All Mechanical-Electronic. Visual: Smoke Cartridges. Other: Radio Altimeter, IFF, Visual / IR Cameras, MDI, etc. **Datalink:** Real time command and control up/ down link. **Guidance/Tracking:** Autonomous pre-programmed GPS waypoint navigation with in -flight redirection capability. **Launch:** Electromechanical launcher. **Recovery:** Two Stage parachute system. **Structure Material:** Composite. **Electrical Power:** Rechargeable battery packs. **Status:** In Production

PHOENIX JET



Use(s): High speed aerial target **Manufacturer and Country:** Air Affairs, Australia **Powerplant:** Jet engine **Dimensions:** length 2.2 m, wingspan 2 m **Weight:** Dry 12kg, MTOW 55 kg **Performance:** Max speed 300 kt, endurance 60 min **Payload:** IR, continuous or pulsed smoke, MDI, radar lens **Guidance/Tracking:** UAV Navigation AP04 auto pilot **Launcher:** Bungee and pneumatic launcher **Recovery:** Parachute **Structure Material:** Composite **Electrical Power:** Battery **Status:** production

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PHOENIX TWIN JET

Use(s): High speed aerial target. **Manufacturer and Country:** Air Affairs, Australia. **Powerplant:** Two jet engines. **Dimensions:** length 2.2 m, wingspan 2 m. **Weight:** Dry 22 kg, MTOW 75 kg. **Performance:** Max speed 400 kt, endurance 110 minutes. **Payload:** IR, continuous or pulsed smoke, MDI, radar lens. **Guidance/Tracking:** UAV Navigation AP04 auto pilot. **Launcher:** Bungee and pneumatic launcher. **Recovery:** Parachute. **Structure Material:** Composite. **Electrical Power:** Battery. **Status:** Under Development, production due to start 2008.

SCRAB

Use(s): Target for Cannon & Missile. **Manufacturer and Country:** SCR / Sistemas de Control Remoto, Spain. **Powerplant:** Turbine. **Dimensions:** Length 1900 mm, Wingspan 1700 mm. **Weight:** MTOW 20 kg. **Performance:** endurance speed 360 kph. **Payload:** IR, smoke, radar lens, MDI. **Datalink:** Up & down to 40 km range. **Guidance/Tracking:** Autonomous GPS navigation system. **Launch:** 6m bungee launcher. **Recovery:** Parachute. **Structure Material:** Carbon fiber & PVC core. **Electrical Power:** 12 v. **Status:** In Production.

SKEETER (BQM-167A)

Use(s): Subsonic Aerial Target. **Manufacturer and Country:** Boeing and Composite Engineering Inc. (CEI), USA. **Powerplant:** Microturbo jet engines. **Dimensions:** Length 6.1 m, Wingspan 3.3 m. **Weight:** Performance: speed 650 mph; endurance 3 hr; ceiling 50,000 ft. **Payload:** Radar enhancers, IR sources, countermeasures, scoring devices, and towed targets. **Launch:** Rail. **Recovery:** Parachute. **Structure Material:** Carbon fibre composites. **Status:** In Production.

SKUA

Use(s): High-speed aerial target. **Manufacturer and Country:** Denel Aerospace Systems, RSA. **Powerplant:** Dimensions: Length 6 m, Wingspan 3.57 m. **Weight:** Max payload 70 (internal) kg. **Performance:** endurance 1 hr; ceiling 12,000 m. **Payload:** Two hardpoints available to carry tow-targets and signature enhancement equipment. **Guidance/Tracking:** Controllable range: 200 km (LOS). **Launch:** Rocket assisted. Zero-length launcher deployable on land or at sea. **Recovery:** Two stage parachute. **Structure Material:** Composite. **Status:** In Production.

SNIPE MK15

Use(s): Low speed aerial target. **Manufacturer and Country:** Meggitt Defence Systems Ltd. (MDS), UK. **Powerplant:** 62 cc Air-cooled, single cylinder, 2 stroke engine. **Dimensions:** Length 1.6 m, Wingspan 2.2 m. **Weight:** Performance: speed 60 - 200 kph; endurance > 0.5 (mixed throttle settings) hr. **Payload:** Up to 4 smoke tracking flares, Up to 4 infra red flares, Mini doppler radar Miss Distance Indicator systems. **Guidance/Tracking:** Digital proportional PCM system. **Launch:** Lightweight Catapult Launcher or by hand. **Recovery:** Skid or Parachute. **Electrical Power:** Battery. **Status:** In Production.

SNIPE MK5

Use(s): Low - medium speed aerial target. **Manufacturer and Country:** Meggitt Defence Systems Ltd. (MDS), UK. **Powerplant:** MDS 342 342 cc 25 bhp 2 stroke engine. **Dimensions:** Length 2.67 m, Wingspan 3.2 m. **Weight:** Performance: speed 70 - 287 kph; endurance <1.1 hr. **Payload:** Up to 16 smoke tracking flares, Up to 8 infra red flares, Chaff and IR decoy dispensers, 2 x 190mm (7.5in) Luneberg lenses, Acoustic and doppler radar Miss Distance Indicator systems, Towed target banners and sleeves. **Guidance/Tracking:** Digital real-time telemetry data link with integrated GPS receiver. **Launch:** Catapult Launcher. **Recovery:** Skid or Parachute. **Electrical Power:** Battery. **Status:** In Production.

TUNDER

Use(s): Target Drone, Missile evaluation and testing. **Manufacturer and Country:** SATUMA, Pakistan. **Powerplant:** 38 hp gasoline Ix two stroke. **Dimensions:** Length 2.83 m, Wingspan 3.05 (Delta wing) m. **Weight:** MTOW 68 kg, Max payload 15 kg. **Performance:** speed 300 kph; endurance 1.5 hr. **Payload:** Up to 16 smoke or IR flares (or a combination). **Datalink:** Command Link. **Guidance/Tracking:** Remote control/Optical. **Launch:** Catapult launcher. **Recovery:** Parachute/Belly landing. **Structure Material:** Composites. **Status:** In Production.

TURNA /S AND /G

Use(s): Aerial Target System for Tracking and Live Firing. **Manufacturer and Country:** TAI-TUSAS Aerospace Industries Inc., Turkey. **Powerplant:** UEL AR741 wankel 38 hp Ix engine. **Dimensions:** Length 2.6 m, Height 0.57 m, Wingspan 2.3 (S) ; 2.7 (G) m. **Weight:** Empty weight 45 kg, Max payload (onboard) 15 ; (towed) 10 kg. **Performance:** speed 400 kph; endurance 1.5 hr. **Payload:** IR Flares, Smoke Generators, Missed Distance Indicator, IRS/RCS Enhancement, Target Sleeve. **Datalink:** VHF uplink, UHF telemetry and video downlink. **Guidance/Tracking:** Visual Control and stability augmentation for /S version. GPS Guidance for /G version, nose camera optional. **Launch:** Bungee Catapult launching as standard. Conventional wheeled TO and Landing optional. **Recovery:** Parachute landing. Landing on the belly skid is also possible. **Structure Material:** Delta wing, V-tail, all composite airframe. **Electrical Power:** 12V battery. **Status:** In Production.

VINDICATOR



Datalink: Line of sight RF communications at 9600 baud, with Video at 2300-2400 MHz. **Guidance/Tracking:** Guidance and tracking assisted through 12 Channel GPS signals at both the avionics and Control station. 3 axis Vertical Gyro is used for Attitude control. **Launch:** Generally with Pneumatic Catapult **Recovery:** Parachute or Skid/Belly landing **Structure Material:** 90% Fiberglass with wood and plastic structural members. **Electrical Power:** 196 Watt (28 V and 7A) Alternator **Status:** In Production

VOODOO



Electrical Power: Battery **Status:** In Production

Use(s): Target, UAV, Test platform for new avionics. **Manufacturer and Country:** Meggitt Defence Systems Canada, Canada **Powerplant:** UAV Aero engine - AR731 35 hp **Dimensions:** Length 2.72 m, Height 0.51 m, Wingspan 2.59 m **Weight:** Empty weight 68 kg, MTOW 84 kg **Performance:** speed 322 kph; endurance 1.5 hr; ceiling 3000 (with Radar alt.) **Payload:** Flares, smokes, Radar transponders, MDI scoring systems, Radar altimeters, Radar reflectors, laser reflectors, Cameras and HRSS-Helicopter Radar Signature Simulator.

Use(s): High speed Aerial Target, threat simulation for air defence weapon systems training, on land and sea. **Manufacturer and Country:** Meggitt Defence Systems Ltd. (MDS), UK **Powerplant:** "Fury" 955 cc 145 bhp 4 stroke engine. **Dimensions:** Length 3.65 m, Height 1.03 m, Wingspan 3.90 m **Weight:** Empty weight 155 kg, MTOW 230 kg **Performance:** speed 90 - 311 k; endurance >2.5 hr **Payload:** Adjustable radar cross section through passive and active devices. Pyrotechnic and black body IR augmentation. Integral, smoke plume visual augmentation. IR and chaff decoy dispensing pods. Radar altimeter, sea-skimming module. **Datalink:** Digital Telemetry. **Guidance/Tracking:** GPS **Launch:** Pneumatic Launcher. **Recovery:** Parachute. **Structure Material:** High proportion carbon composite materials. Composite wing. **Electrical Power:** Battery **Status:** In Production



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PAYLOADS

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EVENTS CALENDAR

SYSTEMS MUA, UCAV, LETHAL UA

Micro/minи unmanned aircraft (MUA) are playing a significant role in the Global War on Terrorism. Most of the MUA incorporated in this section have the common factor of being able to be launched by hand and/or bungee.

At the other end of the cost equation from MUA are the unmanned combat aerial vehicles (UCAVs) and lethal unmanned Aircraft. UCAVs listed here are all in different stages of development and testing and when they ultimately enter service will carry their munitions internally. It is worth noting that almost all these entries form part of a programme that will become the final UCAV product.

Lethal UA are classed as those vehicles that have a single built in warhead but do not carry additional munitions internally or externally. These aircraft can loiter in-theatre and select a target, if not pre-programmed to strike.

While every effort has been made to provide accurate information, the publishers cannot be held responsible for errors or omissions. If you have any comments, additions or corrections you would like to be made please contact the editor.

ALADIN

Use(s): Surveillance, reconnaissance and target acquisition and location in real time. **Manufacturer and Country:** EMT, Germany **Powerplant:** W Electric motor. **Dimensions:** Length 1.4 m, Wingspan 1.46 m **Weight:** MTOW (approx.) 3 kg **Performance:** speed 45-90 kph; endurance 0.5 hr; ceiling 3,000 (ISA) m; mission radius >5 km **Payload:** Colour or IR video cameras. **Datalink:** Control and video/telemetry in real time, jamming resistant. **Guidance/Tracking:** Autonomous GPS waypoint navigation, manual flight mode, provision for autonomous return to base. **Launch:** Hand or bungee launch. **Recovery:** Deep stall. **Structure Material:** Glass fibre composite. **Electrical Power:** Rechargeable Lithium-Polymer batteries. **Status:** In Production

AVATAR P2

Use(s): Tactical surveillance and reconnaissance; Communications relay; Search and rescue. **Manufacturer and Country:** Codarra Advanced Systems Pty Ltd, Australia **Powerplant:** Li-Po rechargeable battery 1x brushless electric motor. **Dimensions:** Length 1.65 m, Wingspan 2.55 m **Weight:** MTOW 5.5 kg **Performance:** endurance 1 hr; ceiling 300 m; endurance speed 55 kph **Payload:** Modular options: Colour CCD video downlink; Remotely actuated high resolution digital camera with video downlink; Real-time IR video Modular options: Colour CCD video downlink; Remotely actuated high resolution digital camera with video downlink. **Datalink:** RF TTL up/downlink, L-band. **Guidance/Tracking:** GPS, autonomous waypoint navigation with programmable loiter patterns. Can be preprogrammed and retasked in flight. **Launch:** Hand.

Recovery: Parachute. **Structure Material:** Carbon Fibre. **Electrical Power:** 10Ah, 18.5V nom. **Status:** In Production

AZIMUT 2

Use(s): close range surveillance and aerosonde **Manufacturer and Country:** ALCORE Technologies SA, France **Powerplant:** 600 W lithium polymer brushless electric motor **Dimensions:** Length 1.82 m, Height 0.30 m, Wingspan 2.90 m **Weight:** MTOW 9 kg, Max payload 2 kg **Performance:** speed 120 kph; endurance 2 hr; ceiling 300 m; mission radius 10 km; endurance speed 60 kph **Payload:** ILL or CDD on 2 axes gimble piloted with real-time video down-link. **Datalink:** S band and analogic **Guidance/Tracking:** Auto-pilot and GPS **Launch:** Hand launcher or automatic catapult for take-off **Recovery:** skid landing **Structure Material:** composite materials, epoxy Kevlar carbon **Status:** In Production

BAYRAKTAR

Photo: Flight International

Use(s): Reconnaissance and surveillance. **Manufacturer and Country:** Kalebaykar, Turkey **Powerplant:** Li-Po battery. **Dimensions:** Length 1.2 m, Wingspan 1.6 m **Weight:** Empty weight 3.5 kg, MTOW 5 kg, Max payload 1 kg **Performance:** speed 50 kt; endurance 1 (cruise) hr; ceiling 15,000 ft **Payload:** Analogue and digital cameras. IR camera. **Datalink:** Spread spectrum frequency, 128 Bit encrypted digital radio signal, 902-928 MHz ISM band. 20 km LOS comms. **Guidance/Tracking:** Waypoint navigation (GPS, D-GPS, INS) **Launch:** Autonomous hand launch. **Recovery:** Autonomous belly landing or parachute. **Structure Material:** Composites. **Status:** In Production

BIODRONE

Use(s): close range surveillance and aerosonde. Biomimetic raptor. **Manufacturer and Country:** ALCORE Technologies SA, France **Powerplant:** 1,200 W Lithium polymer batteries brushless electric motor **Dimensions:** Length 1.8 m, Height 0.3 m, Wingspan 3.4 m, Fuselage length 1 m **Weight:** Empty weight 6 kg, MTOW 9 kg, Max payload 3 kg **Performance:** speed 70 kt; endurance 2 hr; ceiling 300 m; mission radius 20 km; endurance speed 32 kt **Payload:** IL or colour CCD camera with real-time video down link **Datalink:** S-band **Guidance/Tracking:** remote control and GPS **Launch:** butterfly system **Recovery:** skid landing **Status:** In Development

BIRD EYE 400

Use(s): Real time day/night imagery data for law enforcement and "Over-the-Hill" reconnaissance and surveillance. **Manufacturer and Country:** IAI Malat, Israel **Powerplant:** Dimensions: Length 0.8 m, Wingspan 2.2 m **Weight:** MTOW 5.6 kg, Max payload 1.2 kg **Performance:** endurance 1 hr; ceiling 1000 (AGL) ft **Payload:** Gimbaled Video Camera. **Launch:** Hand or bungee launch. **Electrical Power:** Electrical. **Status:** In Production

BIRD EYE 500

Use(s): Provides real-time day/night imagery data for law-enforcement and over the hill reconnaissance/surveillance. **Manufacturer and Country:** IAI Malat, Israel **Powerplant:** Electric. **Dimensions:** Length 1.6 m, Wingspan 2 m **Weight:** MTOW 5 kg **Performance:** speed 60 kt; endurance 1 hr; mission radius 10 km **Payload:** Gimbaled video camera **Launch:** Hand or bungee **Status:** In Development

BOOMERANG

Use(s): Long endurance, medium range tactical system **Manufacturer and Country:** BlueBird Aero Systems, Israel **Powerplant:** Electrical (batteries and fuel cells) **Dimensions:** Length 1 m, Width 25 cm, Wingspan 2.75 m **Weight:** 9 kg **Performance:** Range 40 km, endurance 6 hr **Payloads:** 1.2 kg, day/IR stabilised payload with tracker **Datalink:** Secure digital **Guidance/Tracking:** Fully autonomous **Launch:** Catapult **Recovery:** Parachute system with airbag **Structure Material:** Composite **Ground Control Station:** Backpack GCU

BOOMERANG V2

Use(s): Surveillance / Reconnaissance. **Manufacturer and Country:** BlueBird Aero Systems, Israel **Powerplant:** Electric. **Dimensions:** Length 1.1 m, Height 0.3 m, Wingspan 2.4 m **Weight:** MTOW 5 kg, Max payload 1.2 kg **Performance:** speed 120 km; endurance 2.5 hr; ceiling 500 m **Payload:** EO/IR - pan, tilt and zoom. **Guidance/Tracking:** Autonomous. **Launch:** Hand or catapult. **Recovery:** Parachute. **Status:** In Development

BUSHMASTER

Use(s): Reconnaissance / Surveillance. **Manufacturer and Country:** Cyberflight Ltd, United Kingdom **Powerplant:** Dimensions: Length 0.9 m, Height 0.11 m, Wingspan 2 m **Weight:** Empty weight 2 kg, MTOW 2 kg, Max payload 250 (Body camera) g **Performance:** speed 70 kt; endurance 1.5 hr; ceiling 16,500 (MSL) ft **Payload:** Wing and body mounted cameras **Datalink:** Multi 4 channel microwave down-link. **Guidance/Tracking:** GPS. **Launch:** Hand. **Recovery:** Parachute. **Status:** In Development

BUSTER

Use(s): Reconnaissance / Surveillance / Comms Relay **Manufacturer and Country:** Mission Technologies, Inc, USA **Powerplant:** 0.5 cu in **Dimensions:** Length 40 in, Wingspan 48 in **Weight:** Empty 9 lb, MTOW 13 lb, Max payload 3 lb **Performance:** speed 65 kt; endurance 4+ hrs; ceiling 12,000 ft; mission radius 20nm; endurance speed 35 kt **Payload:** Video EO/IR **Datalink:** Real Time Telemetry and Control **Guidance/Tracking:** GPS / Altitude Heading Reference System **Launch:** Man Portable Rail Launch **Recovery:** Parachute / Skid **Structure Material:** Composite Kevlar / Glass **System Components:** Aircraft, Ground Control Station, Antennas **Electrical Power:** 12 volt/50 watt **Status:** In Production

CAROLO P330

Use(s): Surveillance and reconnaissance. **Manufacturer and Country:** Mavionics GmbH, Germany **Powerplant:** 350 W Battery. Electrical brushless motor. **Dimensions:** Length 1.35 m, Height 0.30 m, Wingspan 3.3 m **Weight:** Empty weight 4.5 kg, MTOW 5 kg, Max payload 0.5 kg **Performance:** speed 60 kt; endurance 1.5 hr; ceiling 7,000 m; mission radius 65 km **Payload:** Digital still camera. **Datalink:** Bi-directional, > 8 km range. **Guidance/Tracking:** "Carolo" Autopilot (GPS/INS). **Launch:** Hand. **Recovery:** Skid. **Structure Material:** Glass/carbon fibre. **System Components:** Aircraft, ground control notebook with antenna. **Electrical Power:** 170 W. **Status:** In Production

CAROLO P50

Use(s): Reconnaissance and surveillance. **Manufacturer and Country:** Mavionics GmbH, Germany **Powerplant:** 50 W Lithium polymer battery. Electric motor. **Dimensions:** Length 0.4 m, Wingspan 0.5 m **Weight:** MTOW 550 g **Performance:** speed 40 kt; endurance 0.5 hr; ceiling >1,500 ft **Payload:** Video camera **Datalink:** Bi-directional data & command link, separate down-link for real-time imagery. **Guidance/Tracking:** Mavionics Autopilot: GPS/INS-based flight control system, autonomous waypoint navigation with emergency management. **Launch:** Hand **Recovery:** Skid **Structure Material:** Composite **Status:** In Development

CAROLO T200

Use(s): surveillance, reconnaissance, georeferenced imaging, meteorological measurements. **Manufacturer and Country:** Mavionics GmbH, Germany **Powerplant:** 2 x 250 W Battery, or twin electrical brushless motor. **Dimensions:** Length 1.37 m, Height 0.34 m, Wingspan 2 m **Weight:** Empty weight 4.5 kg, MTOW 6 kg, Max payload 1.5 kg **Performance:** speed 35 kt; endurance 1 hr; ceiling > 4,000 m; mission radius 40 km **Payload:** Digital still camera, video camera, thermal camera, meteorological sensor suite. **Datalink:** Bi-directional, > 8 km range. **Guidance/Tracking:** "Carolo" Autopilot (GPS/INS). **Launch:** Hand and bungee launch. **Recovery:** Skid **Structure Material:** Glass/carbon fibre. **System Components:** Aircraft, ground control notebook with antenna. **Electrical Power:** up to 345 W. **Status:** In Production

CASPER

Use(s): Description: Tactical surveillance and reconnaissance, special operations, law enforcement, perimeter security, target acquisition.. **Manufacturer and Country:** Top I Vision, Israel **Powerplant:** Electric. **Dimensions:** Length 1.7 m, Wingspan 2 m **Weight:** MTOW 4.7 kg, Max payload 240 g **Performance:** speed 38 kt; endurance 1.5 hr; ceiling 250 m; mission radius 10 km **Payload:** EO / IR **Datalink:** Real time continues video & telemetry data transmission. **Launch:** Hand. **Recovery:** Soft flare to belly. **Structure Material:** Composite. **Status:** In Development

CASPER 420

Use(s): Tactical surveillance and reconnaissance, special operations, law enforcement, perimeter security, target acquisition. **Manufacturer and Country:** Top I Vision, Israel **Powerplant:** 50 cc **Dimensions:** Length 2.5 m, Wingspan 4.2 m **Weight:** MTOW 12 kg **Performance:** speed 60 kt; endurance 4 hr; mission radius 50 km **Payload:** EO, IR **Datalink:** Real time continues video & telemetry data transmission. **Launch:** Catapult / wheels **Status:** In Production

COPTER 1B



Use(s): Aerial photography and movies, inspection and control of installations and equipment, reconnaissance, surveillance and control, protection and surveillance of sensitive sites, borders and urban areas, public safety missions, missions in polluted areas. **Manufacturer and Country:** SURVEY Copter, France **Powerplant:** 26cc petrol engine **Dimensions:** Length 2 m, Height: 0.75 m, Wingspan: 1.8 m **Weight:** MTOW 15 kg, Max payload 5 kg **Performance:** Cruising speed 40 kph; endurance 45 min; ceiling 4,920 ft; range 5 km **Payload:** Daylight and IR **Datalink:** Digital **Guidance/Tracking:** Waypoint, assisted mode, automatic return **Launch:** Vertical and automatic **Recovery:** Vertical and automatic **Structure material:** Aluminium and composite **Ground control station:** Yes **Status:** In production

COPTER 4



Use(s): Aerial photography and cinema, inspection and control of installations and equipment, reconnaissance, surveillance and control, protection and surveillance of sensitive sites, borders and urban areas, public safety missions, missions in polluted areas. **Manufacturer and Country:** SURVEY Copter, France **Powerplant:** 2 x 26cc petrol engine **Dimensions:** Length 2 m, Height: 0.9 m, Rotor diameter: 2.2 m (Height of Sky Sight: 1.1 m) **Weight:** MTOW 25 kg, Max payload 10 kg **Performance:** Cruising speed 40 kph; endurance 1.5 hr; ceiling 4,920 ft; range 8 km **Payload:** Daylight and IR **Datalink:** Digital **Guidance/Tracking:** Waypoint, assisted mode, automatic return **Launch:** Vertical and automatic **Recovery:** Vertical and automatic **Structure material:** Aluminium and composite **Ground control station:** Yes **Status:** In production

CYBERBUG



Use(s): Surveillance and targeting. **Manufacturer and Country:** Cyber Defense Systems Inc, USA **Powerplant:** Rechargeable battery Electric. **Dimensions:** Length 30 to 60 in, Wingspan 55 in **Weight:** MTOW 7.5 lb, Max payload 2 to 5 lb **Performance:** endurance 1.5 hr; endurance speed 35 mph **Guidance/Tracking:** Autonomous. **Launch:** Hand. **Recovery:** Auto Skid. **Status:** In Production

CYBER SCOUT



Use(s): Surveillance and targeting. **Manufacturer and Country:** Cyber Defense Systems Inc., USA **Powerplant:** Electric and Gas Turbine. **Dimensions:** Length 96 in, Wingspan 96 in **Weight:** Max payload 6 to 45 (including batteries and fuel) lb **Performance:** speed 75 (Electric) and 250 (Gas turbine) mph; endurance 75 hr **Payload:** EO/IR sensors or explosives. **Guidance/Tracking:** Autonomous. **Launch:** VTOL. **Recovery:** Auto VTOL. **Structure Material:** Composite. **Status:** In Development

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DESERT HAWK FPASS

Use(s): Force protection, sub-tactical reconnaissance & surveillance. **Manufacturer and Country:** Lockheed Martin (Skunk Works), USA **Powerplant:** Electric Motor **Dimensions:** Length 32 in, Wingspan 52 in **Weight:** MTOW 6.5 - 7.0 lb **Performance:** endurance 1 hr; ceiling 500 ft **Payload:** Electro-Optical or Infrared video **Datalink:** US Military Frequencies **Guidance/Tracking:** Lockheed Martin autopilot **Launch:** Bungee **Recovery:** Automatic Landing **Structure Material:** Durable Foam **Electrical Power:** Aircraft-batteries; GCS-batteries or AC input **Status:** In Production

DVF-2000

Use(s): Reconnaissance, surveillance and control, protection and surveillance of sensitive sites, borders and urban areas, public safety missions, missions in polluted areas. **Manufacturer and Country:** SURVEY Copter, France **Powerplant:** Electrical **Dimensions:** Length 1.2 m, Height: 0.3 m, Wingspan: 3 m **Weight:** MTOW 7.8 kg, Max payload 1 kg **Performance:** Cruising speed 60 kph; endurance 1.5 hr; ceiling 8,200 ft **Payload:** Daylight and IR **Datalink:** Digital **Guidance/Tracking:** Waypoint, assisted mode, automatic return **Launch:** By hand or catapult **Recovery:** Automatic landing **Structure material:** Composite **Ground control station:** Yes **Status:** In production

DRAGON EYE

Use(s): USMC Light Infantry, Dismounted Urban Warfare. **Manufacturer and Country:** AV Inc., USA **Powerplant:** W 2 x 200W DC electric **Dimensions:** Length 0.9 m, Wingspan 1.1 m **Weight:** MTOW 2.7 kg **Performance:** endurance 0.5-1(Single Use Battery) hr; ceiling 10,000 ft; endurance speed 35 kt **Payload:** Daylight EO color payload, two cameras, Point-of-View switchable in flight: Forward look and Side look, fixed Field-of-View. Optional Night IR Microbolometer payload, single camera Point-of-View, Side look payload, fixed FOV. **Datalink:** Uplink / Downlink. **Guidance/Tracking:** Laptop Computer Mapping, In-Flight Re-Programming, Fully Autonomous Operation. **Launch:** 2-man Bungee Launch. **Recovery:** Autonomous Waypoint to Conventional Horizontal Landing.

Structure Material: Composite. **System Components:** Ruggedized Small Air Vehicle for use on land, 2-man Bungee-Launched, Fully Autonomous Flight Control System, C-Code GPS-based Autonomous Waypoint Navigation. **Status:** In Production

EASYCOPPER

Use(s): Surveillance. **Manufacturer and Country:** ALCORE Technologies SA, France **Powerplant:** 1x brushless electric engine rated at 180W. **Dimensions:** Length 0.65 m, Rotor diameter 0.65 m **Weight:** MTOW 1.6 kg **Performance:** endurance 0.15 hr **Payload:** Camera digital photos and day light video camera. **Datalink:** COTS, 1 km radius, or more. **Guidance/Tracking:** flight control with GPS and auto stabilisation. **Launch:** VTOL **Recovery:** VTOL **Structure Material:** Composites material, all carbon and polyurethane drive belts. **Electrical Power:** 12V LiPo batteries **Status:** In Production

Use(s): Prototype for close range reconnaissance and surveillance.

Manufacturer and Country: ALCORE Technologies SA, France **Powerplant:** high air pressure piston engine **Dimensions:** Length 15 in, Height 4 in, Wingspan 19 in **Weight:** MTOW 1 lb **Performance:** speed 22 kt; endurance 0.1 hr; ceiling 30 m; mission radius 1 km **Payload:** colour CCD camera with real-time video down link **Datalink:** 72 Mhz up, 400MHz down **Guidance/Tracking:** Handle control. Optical stabilisation or piezo gyro **Launch:** Hand launch **Recovery:** Skid landing **Structure Material:** Composite material. **Status:** In Development

EPSILON 1

Use(s): Surveillance and reconnaissance. **Manufacturer and Country:** L-3 BAI Aerostystems, USA **Powerplant:** Lithium battery 2 x Aveox electric. **Dimensions:** Length 38.5 in, Wingspan 64.5 in **Weight:** MTOW 8.2 lb, Max payload 1.5 (nose) lb **Performance:** speed >40 mph; endurance 1.5 hr; mission radius 8 km; endurance speed 30 kt **Payload:** EO, Chem-Bio detector/ collector, high-resolution infrared cameras. **Datalink:** 4-Channel UHF Uplink Receiver and antenna. 4-Channel Microwave (Video + Telemetry) transmitter and antenna. Onboard video switching system. **Guidance/Tracking:** Miniature GPS navigation autopilot. **Launch:** Bungee cord or hand-launch. Optional: rifle pneumatic launcher. **Recovery:** Deep stall or parachute. **Structure Material:** Composite. **System Components:** 3x AVs, nose payload, GCS with laptop, video goggles, RVT, Field repair kit, launcher, batteries and transport bag. **Electrical Power:** 10 cell Lithium battery pack. **Status:** In Production

EVOLUTION (XTS)

Use(s): Reconnaissance and surveillance in urban environment / indoor and outdoor. **Manufacturer and Country:** EMT, Germany **Powerplant:** Electric motors. **Dimensions:** Rotor diameter 0.5 m **Weight:** MTOW < 1.300 g **Performance:** endurance 0.2 (Perching > 2) hr; mission radius > 500 m **Payload:** Tilt daylight or infrared video cameras or high resolution still camera. **Guidance/Tracking:** Full & semi-autonomous. **Launch:** VTOL. **Recovery:** VTOL. **Structure Material:** Composite. **Electrical Power:** Rechargeable Lithium-Polymer batteries. **Status:** In Development

FANCOPTER

Use(s): Surveillance and reconnaissance; tagging, targeting, attack and battle damage assessment; chemical cloud detection and tracking; communications relay; inspection of industrial facilities; commercial aerial survey; ship-based decoy. **Manufacturer and Country:** Singapore Technologies Aerospace Ltd, Singapore **Powerplant:** 3.5 hp Two-stroke gasoline engine. **Dimensions:** Height 1.2 m, Rotor diameter 18 in **Weight:** MTOW 5.5 kg, Max payload 0.4 kg **Performance:** endurance 1 hr **Payload:** Colour video camera with optical zoom, pan/tilt or uncooled IR camera. **Datalink:** 2-in-1 digital data & videolink with video compression; up to 10km range. **Guidance/Tracking:** ST Aerospace miniature flight control computer with pre-programmed autonomous GPS waypoint navigation. **Launch:** VTOL for operational flexibility and launch from confined spaces. **Recovery:** VTOL for operational flexibility and launch from confined spaces. **Structure Material:** Modular carbon-fibre composite construction. **Electrical Power:** Lithium polymer & Ni-Cad. **Status:** In Development

FANTAIL 5000

GABBIANO

Use(s): Fire fighting support, Search and Rescue, surveillance, monitoring, civil, commercial, and military use. **Manufacturer and Country:** HI Aero Kft., Hungary **Powerplant:** Electric. **Dimensions:** Length 1.93 m, Wingspan 3.34 m **Weight:** Empty weight 4 kg, MTOW 4.5 kg, Max payload 0.5 kg **Performance:** endurance > 2 hr; ceiling 3,000 (AGL) m; mission radius 15 km; range 20 - 80 kt **Payload:** EO / IR. Other payloads available. **Guidance/Tracking:** Autonomous Autopilot with waypoint navigation. GPS tracking. **Launch:** Hand. **Recovery:** Deep stall. **Structure Material:** Carbon Fibre Composite. **System Components:** Platform: Airframe, propulsion, autopilot, and payload modularly designed to allow upgrade. GCS and data/comms packages. **Electrical Power:** LiPoly. **Status:** In Production

GOLDEN EAGLE

Use(s): Surveillance. **Manufacturer and Country:** Cradance Services Pte Ltd., Singapore **Powerplant:** rechargeable batteries brushless motor **Dimensions:** Length 770 mm, Wingspan 650 mm **Weight:** MTOW 850 g, Max payload 80 g **Performance:** endurance 1 hr; ceiling 200 m **Payload:** TV camera, gas analyser, microphone **Datalink:** Airborne transceiver and antenna **Guidance/Tracking:** Autonomous via GPS waypoints **Launch:** Pneumatic, hand or catapult **Recovery:** Deep stall **Status:** In Development

GOLDENEYE-50

Use(s): ISR **Manufacturer and Country:** Aurora Flight Sciences Corp., USA **Powerplant:** 1 x Cimmaster custom engine **Dimensions:** Length 2.25 ft, Wingspan 5 ft **Weight:** MTOW 16 lb, Max payload 3 lb **Performance:** speed 115 kt; endurance 0.75 hr; ceiling 5,000 ft **Datalink:** LOS **Guidance/Tracking:** Athena Guidestar **Launch:** VTOL **Recovery:** VTOL **Structure Material:** Graphite and fibreglass composite **Electrical Power:** 200 W **Status:** In Production

GRASSHOPPER

Composite Kevlar foam construction **Electrical Power:** provided by on board batteries **Status:** In Development

Use(s): Short range surveillance/reconnaissance. **Manufacturer and Country:** IAI Malat, Israel **Powerplant:** Dimensions: Length 1.82 m, Wingspan 2.90 m **Weight:** MTOW 7.5 kg, Max payload 0.8 g **Performance:** endurance 1 hr; ceiling 10,000 ft **Payload:** EO/IR **Launch:** Hand **Status:** In Development

**I-SEE**

Use(s): reconnaissance and surveillance **Manufacturer and Country:** L-3 BAI Aerostystems, USA **Powerplant:** gasoline single cylinder 2-stroke **Dimensions:** Length 6 ft, Height 1.7 ft, Wingspan 8 ft **Weight:** Empty weight 8.7 lb, MTOW 20.0 lb, Max payload 3.2 lb **Performance:** speed 20-65 mph; endurance 2 hr; ceiling 1000 ft **Payload:** stabilised colour pan-tilt-zoom (PTZ) TV camera, IR now under development **Datalink:** 1.8 GHz video with data sideband, 450 MHz uplink **Guidance/Tracking:** remote control/VFR, telemetry downlink, GPS/autonavigation **Launch:** hand, bungee, aerial release, rail launch **Recovery:** conventional skid **Status:** In Production

**JAVELIN**

Use(s): Aerial video and photographic information gathering **Manufacturer and Country:** Advanced Technologies and Engineering Co (Pty) Ltd, South Africa **Powerplant:** 400 W Electric **Dimensions:** Length 1.2 m, Wingspan 2.5 m **Weight:** MTOW 3 kg **Performance:** speed 50 kph; endurance 1 hr; mission radius 5 km **Payload:** Daylight wide field of view camera with zoom capabilities and still picture **Datalink:** Aerocomm and video transmitter **Guidance/Tracking:** Autopilot, GPS based **Launch:** Hand launch **Recovery:** Automatic belly landing **Structure Material:** Composite **System Components:** Fuselage, payload, wings, V-type elevators **Electrical Power:** Lithium polymer **Status:** In Development

**KIWIT**

Use(s): Surveillance. **Manufacturer and Country:** TAI-TUSAS Aerospace Industries Inc., Turkey **Powerplant:** OS 46 FX or Zenoh G-38, 2-cyl, 2-str engine, tractor configuration.

Dimensions: Length 1.2 m, Wingspan 2 m **Weight:** Empty weight 9 kg, MTOW 12 kg, Max payload 3 kg **Performance:** endurance 1 hr; ceiling 3,000 ft; mission radius 15 (range beyond vision) km; endurance speed 54 kt **Payload:** Underfuselage electro-optic camera; photographic camera. **Datalink:** Omni-directional LOS datalink **Guidance/Tracking:** Full autonomous modes and stability augmentation modes, fail-safe modes. INS/GPS navigation. Real time telemetry and telecommand. **Launch:** Conventional wheeled take-off and catapult launching. **Recovery:** Conventional wheeled landing and parachute recovery. **Structure Material:** Full composite airframe. **System Components:** 1 aircraft, IGCs (integral GDT), 1 set of GSE. **Electrical Power:** Li-Po batteries - primary power source. **Status:** In Development

**MARTI**

MAYA

Use(s): Research and experimentation **Manufacturer and Country:** ALCORE Technologies SA, France **Powerplant:** 600 W **Dimensions:** Height 340 mm, Rotor diameter 320 mm **Weight:** MTOW 2.5 kg, Max payload 0.5 kg **Performance:** endurance 0.5 hr; mission radius 1.5 km **Payload:** CCD drive by roll/heaving **Datalink:** Analogue FM **Guidance/Tracking:** autonomous and GPS **Launch:** VTOL **Recovery:** VTOL **Structure Material:** composite **Status:** In Development

MISQUITO

Use(s): Surveillance/ reconnaissance. **Manufacturer and Country:** IAI Malat, Israel **Powerplant:** Electric. **Dimensions:** Wingspan 1.3 ft **Weight:** MTOW 500 g **Performance:** endurance 1 hr; mission radius 1 km **Payload:** Video camera **Launch:** Hand. **Status:** In Development

MICRO AIR VEHICLE (MAV)

Use(s): Tactical reconnaissance, Surveillance, Battlefield situational awareness, Damage assessment, Target acquisition. **Manufacturer and Country:** Honeywell, USA **Powerplant:** JP-8 or gasoline, non-volatile lubricants. **Dimensions:** Length 15 in, Rotor diameter (Ducted fan) 13 in **Weight:** Empty weight 14 lb, MTOW 15 lb, Max payload Up to 2 lb **Performance:** endurance 0.40 hr; ceiling 10,500 ft; endurance speed 50 kt **Payload:** Forward and downward looking EO and IR imaging sensors. **Guidance/Tracking:** Autonomous flight with dynamic retasking and manual intervention. **Launch:** VTOL. **Recovery:** VTOL. **Status:** In Development

ORBITER

Use(s): Mini UAV for close-range ISR. **Manufacturer and Country:** Aeronautics Defense Systems Ltd., Israel **Powerplant:** Electric, battery powered pusher propeller. **Dimensions:** Length 1 m, Height 0.2 m, Wingspan 2.2 m **Weight:** MTOW 6.5 kg, Max payload 1.5 kg **Performance:** speed 75 kt, endurance 2 hr, ceiling 10,000 ft, mission radius 15/25/40 km in data link configuration **Payload:** Controp Stabilized Miniature Day or Night Payloads (D-STAMP, L-STAMP, U-STAMP). **Datalink:** LOS up to 10 km. **Guidance/Tracking:** UMAS avionics. Real time UAV and Payload control, full autonomous navigation and in flight programmable navigation. Camera guided flight. **Launch:** Catapult. **Recovery:** Parachute and airbag **Structure Material:** Composite. **System Components:** 2 UAV, Payloads, PGCS, launcher, backpacks. **Electrical Power:** Battery. **Status:** In Production

MICROB

Use(s): Short range reconnaissance **Manufacturer and Country:** Bluebird Aero Systems Ltd, Israel **Powerplant:** Electrical **Dimensions:** Length 60 cm, Width 10 cm, Wingspan 95 cm **Weight:** 1kg **Performance:** range 15 km, endurance 60 min **Payloads:** 200 gr, day/IR fixed payload, stabilised payload **Datalink:** Secure digital **Guidance/Tracking:** fully autonomous **Launch:** Micro catapult or gun launch **Recovery:** Parachute **Structure Material:** Composite **Ground Control Station:** Backpack GCU, video tracking

OVIWUN

Use(s): Surveillance and reconnaissance. **Manufacturer and Country:** Trek Aerospace Inc., USA **Powerplant:** Two x half hp Electric **Dimensions:** Length 11.12 in, Height 13.40 in **Weight:** MTOW 6.3 lb, Max payload 500 g **Performance:** speed 70 kph; endurance 0.5 hr; ceiling (MSL) 7200 m; mission radius 3000 m; endurance speed 50 kph **Status:** In Production

MIKADO

Use(s): Surveillance, reconnaissance and target acquisition and location in real-time. **Manufacturer and Country:** EMT, Germany **Powerplant:** Electric motor. **Dimensions:** Length 0.5 m, Wingspan 0.5 m **Weight:** MTOW <500 g **Performance:** speed 75 kph; endurance up to 1 hr; mission radius 1 km **Payload:** Daylight colour or low light b&w video. **Datalink:** Up-and-downlink for real-time imagery and control. **Guidance/Tracking:** Autonomous GPS way point navigation or manual flight mode, provision for autonomous return on data link loss. **Launch:** Hand launch or vertical take-off. **Recovery:** Autonomous deep stall landing. **Status:** In Development

PUMA

Use(s): Extended duration surveillance, light infantry military operations on Urbanized Terrain (MOUT), dismounted urban warfare. **Manufacturer and Country:** AV Inc, USA **Powerplant:** W 1 x 600W DC electric. **Dimensions:** Length 1.8 m, Wingspan 2.6 m **Weight:** MTOW 5.5 kg **Performance:** endurance 4 (Single Use Battery) hr; ceiling 10,000 ft; range 25 to 50 kt **Payload:** EO/IR, Four camera Point-of-View; 2 Standard resolution EO color cameras, Forward look and Side look payload, switchable in flight, fixed FOV, and 2 Night IR Microbolometer cameras, Forward look and Side look payload, switchable in flight, fixed FOV. **Datalink:** Uplink / Downlink. **Guidance/Tracking:** GPS-based Autonomous Waypoint Navigation with Laptop Mapping and optional Manual Control. **Launch:** Hand-Launched. **Recovery:** Deep-Stall Vertical Descent Controlled Landing, over land or water. **Structure Material:** Composite. **System Components:** Ruggedized and waterproof Small Air Vehicle for use on land and sea, Alternative Payload Configurations, Autonomous Flight Control System with Man-in-the-Loop Control, SAASM GPS-based Autonomous Waypoint Navigation, Common Operating GCS. **Status:** In Development

RAVEN (RQ-11B)

Use(s): Remote Reconnaissance & Surveillance, Target Acquisition, Force Protection & Convoy Security, Dismounted Warfighter and MOUT. **Manufacturer and Country:** AV Inc, USA **Powerplant:** W1 x 200W DC Electric. **Dimensions:** Length 0.9 m, Wingspan 1.4 m **Weight:** MTOW 1.9 kg **Performance:** endurance 1.5 (Rechargeable Battery) hr; ceiling 15,000 (ASL) ft; endurance speed 32 to 45 kt **Payload:** EO, 2x camera POV: Std res camera, fixed FOV, and Hi-res camera side looking with digital pan / tilt / zoom. Opt IR Microbolometer, 1x camera POV, side looking, Hi-res, fixed FOV, Laser Pointer. **Datalink:** Uplink / Downlink. **Guidance/Tracking:** GPS-based Autonomous Waypoint Navigation with Laptop Mapping **Tracking:** GPS-based Autonomous Waypoint Navigation with Laptop Mapping **Structure Material:** Composite. **System Components:** Ruggedized Small Air Vehicle for use on land, Autonomous Flight Control System with Man-in-the-Loop Control, SAASM GPS-based Autonomous Waypoint Navigation, Common Operating GCS. **Status:** In Production

RECCE D6

Use(s): Reconnaissance and surveillance. **Manufacturer and Country:** CE Stephansen, Norway **Powerplant:** 200 W LiPo battery. Brushless motor. **Dimensions:** Length 1.06 m, Height 0.26 m, Wingspan 1.42 m **Weight:** MTOW 2.8 kg, Max payload 0.5 kg **Performance:** speed 100 kph; endurance 0.55 hr; ceiling 1,000 ft; mission radius 10 km; endurance speed 70 kph **Payload:** CCD video camera, IR camera and other various options. **Datalink:** RF uplink/downlink, real time video downlink. **Guidance/Tracking:** Adaptive Flight Inc FCS20 control system **Launch:** Hand launch/ unprepared terrain. **Recovery:** Skid landing **Structure Material:** Composite **Electrical Power:** 12 VDC **Status:** In Development

REMOEYE 002

Electrical Power: 12VDC. **Status:** In Production

Use(s): Reconnaissance, Surveillance, Target Acquisition and Artillery Adjustment. **Manufacturer and Country:** Ucosystem, Republic of Korea **Powerplant:** Battery-powered Electric Motor, Two-blade Pusher Propeller. **Dimensions:** Length 1.3 m, Height 0.26 m, Wingspan 1.5 m **Weight:** Empty weight 1.3 kg, MTOW 2.7 kg, Max payload 0.17 kg **Performance:** endurance >1 hr; mission radius >10 km; range 50~70 kph **Payload:** Colour TV Camera or IR Thermal Imager. **Datalink:** S-band, UHF. **Guidance/Tracking:** Fully Autonomous, Preprogrammed Mission Flight with GPS Navigation and In-flight Mission Change in Real Time. **Launch:** Automatic Hand Launch. **Recovery:** Automatic Deep Stall Vertical Landing with Parachute. **Structure Material:** Composite. **System Components:** 4 Air Vehicles with Mission Payloads, 1 GCS.

REMOEYE 006

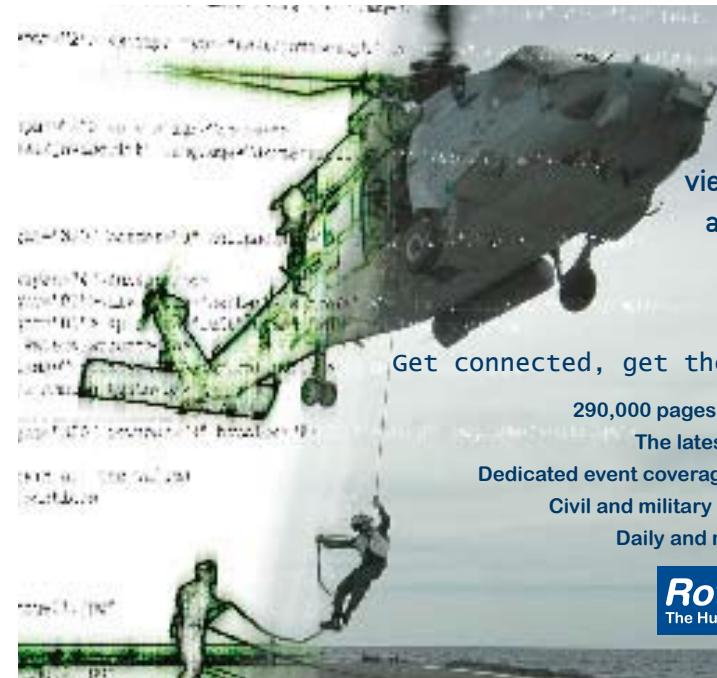
Use(s): Reconnaissance, Surveillance, Target Acquisition and Artillery Adjustment. **Manufacturer and Country:** Ucosystem, Republic of Korea **Powerplant:** Battery-powered Electric Motor, Two-blade Pusher Propeller. **Dimensions:** Length 1.55 m, Height 0.32 m, Wingspan 2.72 m **Weight:** Empty weight 4.2 kg, MTOW 6.5 kg, Max payload 0.17 kg **Performance:** endurance >1.5 km; mission radius >15 km; range 50~70 kph **Payload:** Colour TV Camera or IR Thermal Imager. **Datalink:** S-band, UHF. **Guidance/Tracking:** Fully Autonomous, Preprogrammed Mission Flight with GPS Navigation and In-flight Mission Change in Real Time. **Launch:** Automatic Hand/Bungee Launch. **Recovery:** Automatic Deep Stall Vertical Landing with Parachute & Air Bag. **Structure Material:** Composite **System Components:** 4 Air Vehicles with Mission Payloads, 1 GCS, 2 Remote Video Terminals. **Electrical Power:** 12VDC. **Status:** In Production

RV-02 EFR (EMERGENCY FIRST RESPONSE)

Use(s): Civil defence, emergency first response and disaster relief. **Manufacturer and Country:** A2TECH - Advanced Aviation Technology, USA **Powerplant:** Two FlyWARE electric brushless motors. **Dimensions:** Length 0.9 m, wingspan 1.4 m **Weight:** MTOW 1.9 kg **Performance:** Endurance 30-60 min, speed 40-70 km/h **Payload:** Pan-Tilt EO/IR camera, Chameleon chemical detector **Datalink:** Video downlink, CANaerospace data uplink/downlink **Guidance/Tracking:** GPS-assisted pilot-in-loop, GPS-based waypoint navigation **Launch:** Bungee-catapult or wheeled take-off **Recovery:** Wheeled or net **Ground Control Station:** RealityVISION Universal Ground Control Cockpit, remote video terminal, mission laptop **Status:** In Production

**SEEKER**

Use(s): Joint air, land and sea asset stand off surveillance and protection capabilities, ISTAR, UCAV, MOUT, ASW, SEAD, force multiplier and relocatable sensor. **Manufacturer and Country:** Autonomous Vehicles International Ltd (AVI), UK **Powerplant:** Hyperion. 3 kW Brushless Outrunner Electric Motors. **Dimensions:** Length 0.75 m, Height 0.69 m, Rotor diameter 0.29 m **Weight:** Empty weight 2.9 kg, MTOW 16 kg, Max payload 4.5 kg **Performance:** endurance up to 0.25 hr; ceiling 5,000 m; mission radius 10 km **Payload:** Dispensable lethal and non-lethal modular payloads. **Datalink:** GIG node with secure data-link, configurable. **Guidance/Tracking:** GPS & Inertial Navigation. **Launch:** Unaided VTOL via a backpackable canister [deployable from existing and future land, sea and aerial manned/unmanned platforms]. **Recovery:** Vertical descent to the canister. **Structure Material:** Composite. **Electrical Power:** Lithium Polymer Batteries. **Status:** In Development



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SENSOCOPTER



Use(s): MOUT Scenarios (both military and commercial). **Manufacturer and Country:** Diehl BGT Defence, Germany **Powerplant:** Electrical. **Dimensions:** Length 0.90 m, Height 0.40 m, Rotor diameter 0.35 m **Weight:** Empty weight 700 g, MTOW 900 g, Max payload 200 g **Performance:** speed 60 kph; endurance 0.5 hr; ceiling 500 m; mission radius 3 km **Payload:** Several EO/IR-cameras, including low-level-light-TV and uncooled IR (bolometer) cameras, payload pointable in elevation angle. **Datalink:** Standard 2.4GHz link, Video and digital data downlink. **Guidance/Tracking:** Standard Remote Control 35MHz and way-point programming. **Launch:** VTOL. **Recovery:** VTOL. **Structure:**

Material: Carbon Fibre. **System Components:** Flying platform with EO / IR-Sensor, GPS-receiver, flight control system, receiver / transmitter. Ground control station with laptop, receiver for video / digital data, interfaces to displays (CCIR, USB), remote control device, battery charger. **Electrical Power:** Interface (12 to 28V DC), 110V AC, 230 V AC. **Status:** In Production

SILVER FOX



BA5590/U **Status:** In Production

SKYBLADE II



Use(s): Commercial aerial survey; Inspection of industrial facilities, airbase and vital installation perimeters; Communications relay; Reconnaissance and surveillance; Tagging, targeting and battle damage assessment. **Manufacturer and Country:** Singapore Technologies Aerospace Ltd, Singapore **Powerplant:** Dimensions: Length 1.2 m, Wingspan 1.8 m **Weight:** Performance: speed 70 kt; endurance 1 - 2 hr; ceiling 458 m **Datalink:** Digital radio frequency. **Guidance/ Tracking:** Autonomous. **Launch:** Hand or bungee. **Recovery:** Parachute. **Status:** In Development

SKYLARK IV



Use(s): Tactical Surveillance and reconnaissance, Perimeter security, Law enforcement. **Manufacturer and Country:** Elbit Systems Ltd UAV Division, Israel **Powerplant:** Electric **Dimensions:** Length 2.2 m, Wingspan 2.4 m **Weight:** MTOW 4.5 kg **Performance:** speed 60 kt; endurance 1.5 hr; ceiling (ASL) 15,000 ft; mission radius 10 km **Payload:** Colour CCD camera, FLIR, other. **Datalink:** VSAT system enables real time live video transmission. **Guidance/ Tracking:** Autonomous. **Launch:** Hand **Recovery:** Deep stall **System Components:** 3 x AVs, MGCU, MDL + antenna tracker, back packs, field support tool kit. **Status:** In Production

Shephard

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SKYLITE B



Use(s): Intelligence, surveillance and reconnaissance **Manufacturer and Country:** Rafael, Israel **Powerplant:** Electrical. **Dimensions:** Length 1.15 m, Wingspan 2.40-3.00 m, MTOW 6.5-8 kg **Performance:** speed 70-100 km/h; endurance 1.5-2 hr; mission radius 12-35 km; range 70-100 kph **Payload:** Day - Controp D-STAMP, Night - Controp U-STAMP. **Datalink:** Digital command and control, analogue /digital video **Guidance/Tracking:** GPS, INS **Launch:** Catapult. **Recovery:** Parachute and air bag. **Structure Material:** Composite system **Components:** Air vehicle, GCS, communication, catapult. **Status:** In Production

SWIFT



Use(s): Light Infantry Military, Dismounted Urban Warfare, Remote Reconnaissance and Surveillance, Force Protection & Convoy Security. **Manufacturer and Country:** AV Inc., USA **Powerplant:** 2 x 200W DC electric. **Dimensions:** Length 0.9 m, Wingspan 1.1 m **Weight:** MTOW 2.8 kg **Performance:** endurance 1.1 (Single Use Battery) hr; ceiling 10,000 (ASL) ft; range 32 to 45 kt **Payload:** Daylight EO color payload, two cameras, Point-of-View switchable in flight: Forward look and Side look, fixed Field-of-View. Optional Night IR **Tracking:** GPS-based Autonomous Waypoint Navigation with Laptop Mapping and optional Manual Control. **Launch:** 2-man Bungee-Launch. **Recovery:** Autonomous Waypoint to Conventional Horizontal Landing. **Structure Material:** Composite. **System Components:** Ruggedized Small Air Vehicle for use on land, Bungee, Fully Autonomous Flight Control System with Man-in-the-Loop Control, SAASM GPS-based Autonomous Waypoint Navigation, Common Operating GCS. **Status:** In Production

WASP



Use(s): Organic Squad-Level Reconnaissance & Surveillance, Advanced Reconnaissance (Ship Pre-Boarding), and Light Infantry Military Operations on Urban Terrain (MOUT). **Manufacturer and Country:** AV Inc, USA **Powerplant:** W 1 X 10W DC electric **Dimensions:** Length 0.15 m, Wingspan 0.41 m **Weight:** MTOW 0.275 kg **Performance:** endurance 1 hr; ceiling 10,000 (ASL) ft; endurance speed 25 to 39 kt **Payload:** Daylight EO color payload, two cameras **Datalink:** Uplink / Downlink. **Guidance/Tracking:** GPS-based Autonomous Waypoint Navigation with Laptop Mapping and optional Manual Control. **Launch:** Hand-Launched or Optional One-man Hand-Held Bungee Launcher. **Recovery:** Autonomous waypoint to conventional horizontal landing over land or water. **Structure Material:** Composite. **System Components:** Ruggedized and waterproof Micro Air Vehicle for use on land and sea, One-Man Bungee Launched, Autonomous Flight Control System with Man-in-the-Loop Control, C-Code GPS-based Autonomous Waypoint Navigation, Common Operating GCS. **Status:** In Production

Shepard

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AVE-C AND D

Use(s): Flight Control System UAV demonstrator (AVE-C) and stealth UAV demonstrator (AVE-D). Forming part of the research and development programme initiated by the French government to develop a European UCAV demonstrator - NEURON. **Manufacturer and Country:** Dassault Aviation, France **Powerplant:** AMT twin jet engine **Dimensions:** Length 2.4 m, Wingspan 2.4 m **Weight:** Empty weight 35 kg, MTOW 60 kg **Performance:** speed Launch: Conventional wheeled. **Recovery:** Conventional wheeled **Structure Material:** Composite **Status:** In Development

CORMORANT

Use(s): Reconnaissance and surveillance. **Manufacturer and Country:** Lockheed Martin, USA **Powerplant:** 3,000 lb JP-5 **Dimensions:** Length 19 ft, Wingspan 16 ft **Weight:** MTOW 9,000 lb, Max payload 1,000 lb **Performance:** endurance 3 hr; ceiling 35,000 ft; mission radius 400-500 nm **Launch:** RATO **Recovery:** Splashdown **Status:** In Development

EXCALIBUR

Use(s): Unmanned tactical strike **Manufacturer and Country:** Aurora Flight Sciences Corp, USA **Powerplant:** Williams International turbine x 1, electric lift fans x 3 **Dimensions:** Length 23 ft, Height 7 ft, Wingspan 21 ft **Weight:** Empty weight 2,600 lb, MTOW 3,100 lb, Max payload 400 lb **Performance:** speed 400 ft; endurance 3 hr; ceiling 40,000 ft **Payload:** Various **Datalink:** LOS **Launch:** VTOL, STOL and STOVL **Recovery:** VTOL **Structure Material:** Graphite / glass composite **Status:** In Development

FILUR

Use(s): A low-signature UCAV demonstrator. The main objective of this technology programme is to develop stealth capabilities and evaluate what is feasible today in the area of radar signatures. The first autonomous flight is scheduled for 2005. **Manufacturer and Country:** SAAB Aerosystems, Sweden **Powerplant:** AMT HP Olympus JP-8 (MC-75), JET A-1 Turbojet. **Dimensions:** Length 2.2 m, Wingspan 2.5 m **Weight:** MTOW 55 kg **Performance:** speed 300 kph **Structure Material:** All composite (CFRP) airframe with integrated radar absorbing structures (RAS). **Status:** In Development

FUTURA UCAV

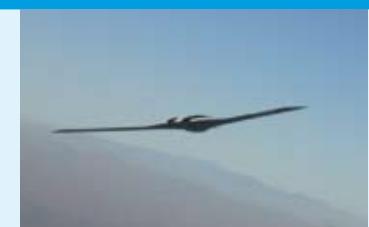
Use(s): Tactical reconnaissance, surveillance and attack system. **Manufacturer and Country:** ALCORE Technologies SA, France **Powerplant:** 50 lb 1x turbojet **Dimensions:** Length 2 m, Height 0.6 m, Wingspan 2 m **Weight:** Empty weight 20 kg, MTOW 70 kg, Max payload 10 kg **Performance:** speed 195 kt; endurance 1.1 hr; ceiling 300 m; mission radius 50 km **Payload:** IL or colour CCD camera with real-time video down link. **Datalink:** S-band **Guidance/Tracking:** Remote control and GPS. **Launch:** Catapult **Recovery:** Skid landing **Structure Material:** Composite **Status:** In Development

MORPHING UAV

Use(s): The programme is to create and advance enabling technologies and ultimately design, build, and demonstrate a seamless, aerodynamically efficient, aerial vehicle capable of radical change. **Manufacturer and Country:** Lockheed Martin - ADP, USA **Powerplant:** JetCat P200 Turbine engine. **Dimensions:** Length 6.5 ft, Wingspan (Unfolded) 9.1 m **Weight:** Performance: speed **Launch:** Conventional wheeled. **Recovery:** Conventional wheeled. **Structure Material:** Composite. **Status:** In Development

NEURON

Use(s): European UCAV demonstration programme - evaluate cutting-edge technology. First flight scheduled for 2009. **Manufacturer and Country:** SAAB Aerospace and Dassault Aviation, Sweden and France **Powerplant:** Dimensions: Wingspan 10 m, Fuselage length 10 m **Weight:** MTOW >5000 lb **Performance:** ; ceiling <10,000 m **Payload:** 1-2 GPS / Laser guided bombs. **Structure Material:** Composite. **Status:** In Development

POLECAT P-175

Use(s): Technology demonstrator. **Manufacturer and Country:** Lockheed Martin Skunk Works, USA **Powerplant:** 2x Williams International FJ-44-3E engines. Thrust 6,000 lb **Dimensions:** Wingspan 90 ft **Weight:** MTOW 9,000 lb, Max payload 1,000 lb **Performance:** ; ceiling 65,000 ft **Structure Material:** LTM45 low-temperature composites. **Status:** In Development

SHARC

Use(s): (Swedish Highly Advanced Research Swedish Highly Advanced Research Configuration - UAV Demonstrator. **Manufacturer and Country:** Saab Aerospace, Sweden **Powerplant:** AMT Olympys 440 lb JP-8 (MC-75), JET A-1 **Dimensions:** Length 2.5 m, Wingspan 2.1 m **Weight:** MTOW 60 kg **Performance:** speed 320 kph **Payload:** Pilot camera **Datalink:** Video down link, Control up and down link **Guidance/Tracking:** Autonomous and manual **Launch:** Conventional wheeled **Recovery:** Conventional wheeled **Structure Material:** Composite **Electrical Power:** Battery **Status:** In Development

SKY-X

Use(s): UAV research and demonstration platform. **Manufacturer and Country:** Alenia Aeronautica S.P.A, Italy **Powerplant:** Dimensions: Length 6 m, Wingspan 5.74 m **Weight:** Empty weight 550 kg, MTOW 1,000 kg, Max payload 300 kg **Performance:** ceiling 33,000 ft **Payload:** Cameras, radar systems, infra-red or other kind of sensors and weaponry may be hosted in identical modules to be installed in the bay. **Status:** In Development

SNARK

Use(s): Reconnaissance, Fleet protection, Submarine hunting, Personnel insertion, Medivac, Coastal or Fisheries protection patrol, Communications relay. **Manufacturer and Country:** TGR Helicorp Ltd, New Zealand **Powerplant:** Diesel **Dimensions:** Length 7.5 m, Height 3.7 m, Rotor diameter 8.8 m **Weight:** MTOW 1136 kg, Max payload (Wet) 682 kg **Performance:** speed 271 kph; endurance 24+ hr; ceiling 4,182 m; endurance speed 185 kph **Payload:** Multiple munition types (UCAV), 2 X personnel (Medivac & Insertion). 2 high resolution Infra-red cameras for 360 degree optical coverage. **Guidance/Tracking:** Autonomous **Launch:** Autonomous VTOL **Recovery:** Autonomous VTOL **Structure Material:** Kevlar and Carbon Fibre **System Components:** Transportation Container/Hangar/Base Station/Servicing Workshop. **Status:** In Development

TALON LASH

Use(s): All purpose Light Attack and Surveillance Helicopter (LASH): UAV and logistical re-supply. **Manufacturer and Country:** Global Aerial Surveillance Inc., USA **Powerplant:** 255 hp Heavy fuel Turbo shaft. **Dimensions:** Length 22 ft, Rotor diameter 25 ft **Weight:** Empty weight 780 lb, Max payload 800 lb **Performance:** speed 130 mph; endurance approx. 6 to 8 hr; ceiling 15,000 ft; endurance speed 110 mph **Payload:** Onboard munitions, EO/IR, GMTI **Guidance/Tracking:** Autonomous and in-flight re-programming. **Launch:** Autonomous VTOL **Recovery:** Autonomous VTOL **Status:** In Development

X-47B J-UCAS

Use(s): J-UCAS is a programme that will demonstrate the technical feasibility, military utility and operational value of a networked system of UAVs for USAF and Navy. SEAD; EA; ISR and Precision Strike. **Manufacturer and Country:** Northrop Grumman Integrated Systems, USA **Powerplant:** Dimensions: **Weight:** Max payload 4,500 lb **Performance:**; ceiling >40,000 ft; mission radius 1500+ nm **Payload:** Munitions (internal): JDAM, SDB etc. **Launch:** Conventional wheeled. **Recovery:** Conventional wheeled. **Structure Material:** Composite. **Status:** In Development

LETHAL UNMANNED AIRCRAFT**LOCAAS**

Use(s): Low Cost Autonomous Attack System (LOCAAS) munition **Manufacturer and Country:** Lockheed Martin, USA **Powerplant:** Hamilton Sundstrand TJ-45 Gemjet 50 lb turbojet **Dimensions:** Length 0.79 m, Height 0.18 m, Wingspan 1.18 m **Weight:** MTOW 38.5 kg, Max payload (warhead) 7.7 kg **Performance:** speed 200 kt; endurance 0.5 hr; ceiling 750 ft **Payload:** ATK multimode penetrator warhead **Guidance/Tracking:** GPS/INS navigation **Launch:** SUU-64 munition dispenser on ejector rack, external pylons **Recovery:** non-recoverable **Status:** In Development

SILENTEYES

Use(s): SUAV, battle damage assessment, comms relay, precision submunition deployment, SEAD, chemical agent detection, surveillance **Manufacturer and Country:** Raytheon Missile Systems, USA **Powerplant:** Dimensions: Length 0.5 m, Wingspan 0.7 m **Weight:** MTOW 4.5 kg **Performance:** speed 100 kt; endurance speed 80 kt **Payload:** CCD or IR camera, LADAR, laser-spot-tracker, ECM, unattended ground sensor, warhead **Datalink:** 100 nm LOS with 1-W transmitter at 345-365 MHz and transceiver **Guidance/Tracking:** autonomous GPS **Launch:** air or land **Status:** In Development

TARES

Use(s): Tactical Advanced Recce Strike System (TARES). Acquisition and attacking of high-value targets (armoured and non-armoured). **Manufacturer and Country:** Rheinmetall Defence Electronics GmbH, Germany **Powerplant:** 34 kW 1 x heavy fuel piston engine **Dimensions:** Length 2.09 m, Height 1.03 m, Wingspan 2.26 m **Weight:** MTOW 150 kg **Performance:** speed 145 kt; endurance >4 hr; ceiling 4,000 m; mission radius 250 km **Payload:** mmW - Synthetic Aperture Radar (target acquisition), warhead (shaped charge and fragments) **Datalink:** jamming resistant HF data link for command and control **Guidance/Tracking:** pre-programmed autonomous or guided mission with in-flight redirection **Launch:** rocket booster from truck-mounted launch, transport and storage container, divided into launches boxes **Recovery:** parachute and airbag **Status:** In Development

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Maritime
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EL/M-2055D
SAR/GMTI Radar
Payload



MOSP - Multi-Mission
Optronic Stabilized
Payload



POP - Plug-in
Optronic Payload

- Locate and classify targets and transmission sources
- Detect and classify sea surface targets
- Track moving ground targets
- Perform real-time situation assessment
- Flexible mission planning, management and re-tasking



On-the-Move
Satellite
Communication
(SATCOM) Antenna



AIRCRAFT SYSTEMS -
IN PRODUCTION

AIRCRAFT SYSTEMS -
IN DEVELOPMENT

AERIAL TARGETS

MUA, UCAVS AND
LETHAL UA

PAYLOADS

GUIDE TO SUPPLIERS

PRODUCT GUIDE

EVENTS CALENDAR

SYSTEMS

UNMANNED AIRCRAFT PAYLOADS

Electro-Optical (EO), Infrared (IR) and Synthetic Aperture Radar (SAR) sensors have been the predominant payloads of UAVs for reconnaissance and surveillance missions. More recently the mission envelope of UAVs has expanded to include communications relay, Electronic Warfare (EW) and direct action.

This section of the handbook has sub-sections covering Communications, EO Systems, EW Systems, FLIR/Thermal Imaging Systems, Integrated Systems and Radars. Weapon Payloads have been included in the individual entries earlier in the handbook for those UAVs used in the attack role.

COMMUNICATIONS

» CONTRO PRECISION TECHNOLOGIES LTD

APU-1 ANTENNA POSITIONING UNIT

A lightweight communication antenna pedestal, designed to provide single axis pointing capability in a compact and robust package. Contains a precision DC servo mechanical drive assembly, RF components, rotary joint, slipring and electronics circuits. The APU-1 can carry a large antenna with dimensions up to 40 x 60 cm under a wind load of up to 65 knots. The antenna can be pointed in azimuth according to manual commands or can track automatically according to Signal Strength (SS). Communication to the antenna pedestal is provided by means of RS-422 serial channel. **Weight:** 7.5 kg. **Dimensions:** (DxWxH) 282 x 247 x 359 mm. **Input Voltage:** +28 VDC, 1 Amp.

HRN-1

Airborne Data Link Directional Antenna Pedestal. **Performance:** Velocity: 30°/sec, Positioning Range: 360° x N, Positioning Accuracy: 0.7 deg. (σ), Operation Frequency: 4.4 to 5.1 GHz. Weight: 2.3 kg (including the C-Band Antenna). **Power:** Input Voltage: ±15V, 0.4 Amp, +5V, 0.5 Amp; +28V, 1Amp (for -54°C option only).

HRN-2

Airborne Dual Directional Antenna Pedestal. **Performance:** Velocity: Lower Antenna: 20°/sec, Upper Antenna: 30°/sec, Positioning Range: 360° x N. Positioning Accuracy: 0.7 deg. (σ). Operation Frequency: 4.4 to 5.1 GHz. Weight: 4.0 kg (including the C-Band Antennas). **Power:** Input Voltage: ±15V, 0.8 Amp, +5V, 0.5 Amp; +28V, 1.7 Amp (for -54°C option only).

» CUBIC DEFENSE SYSTEMS INC

HIGH INTEGRITY DATA LINK (HIDL)

Designed for NATO's Maritime Unmanned Aerial Vehicle programme. The HDL will assist operators in making safe UAV take-offs and landings on ships and also allow the transfer of sensor photos and data to naval vessels and other surface terminals for operators to study and disseminate. **Characteristics:** Uses any available RF channels, even if non-contiguous; Networked for multiple simultaneous users; Uses time and frequency diversity for resistance to jamming; Variable data rate from 3 Kbps to 20 Mbps and a back-up for Common Data Link, amongst others.

TACTICAL COMMON DATA LINK (TCDL)

Digital Signal Processing (DSP) - Driven CDL. Programmable data rates, adjustable in-flight. Modular packaging. Flexible interfaces (RS-422, Ethernet, Fibre Optic, RS-232). **Weight:** <10 lb **Power:** <125 W input power at 28 VDC, 2 W RF out. Available as a full duplex transmitter/receiver or a receive only remote data terminal. **Frequency Band:** Ku-, X-, or user selectable, and RF output power changeable.

» IAI/ELTA SYSTEMS LTD

EL/K-1865

Air Data Terminal lightweight, compact air terminal of ELTA's microwave communication data link network. **Dimensions:** Transceiver: 210 x 300 x 160 mm (WxDxH). Front end: 382 x 260 x 160 mm (WxDxH). Modular architecture. **Frequency range:** up to 1,500 MHz (baseline: 600 MHz). **Antennas:** Omnidirectional: +1dBi, Directional (optional): planar +15 dBi. Transmit power: 2 W, 10 W or 25 W. **Weight:** 2.5 to 10 kg (depending on config of selected options). **Power:** 100 to 250 W, Source: 28 VDC per MIL-STD-704.

» L-3 COMMUNICATIONS ADVANCED PRODUCTS & DESIGN

VIDEOSCOUT 130

VideoScout is a fully integrated, portable Commercial Off-the-Shelf (COTS) system designed to enable field deployed personnel to easily capture, analyse, enhance, annotate, and relay video intelligence via existing communication infrastructure.

Specifications: Operating System: Windows XP PRO. Laptop: CPU Intel Pentium M Processor 1.4 GHz, Memory 1 GB, HDD Removable 40 GB, Display 12.1" Touch Screen, High Contrast screen, Keyboard Waterproof keyboard, touch pad, PCMCIA Card 1 Type II. **Dimensions:** 10.8" x 9.4" x 2.9". **Weight:** 9.5 lbs. **Environmental Standard:** MIL-STD-810F. **Video/Image**

Processing: Video Capture I/O S-Video, NTSC, PAL, RS170, RS232, RGB(SVGA), TV Out; Ethernet; Audio. Compression/Decompression: MPEG-2.

VIDEOSCOUT 770

VideoScout is a fully integrated, portable Commercial Off-the-Shelf (COTS) system designed to enable field deployed personnel to easily capture, analyse, enhance, annotate, and relay video intelligence via existing communication infrastructure.

Specifications: Operating System: Windows XP PRO. Laptop: CPU Intel Pentium M Processor 1.6 GHz; Memory 1 GB; Bay 1 Modules DVD RW; HDD Removable 80GB; Display 12.1" Touch Screen, Sunlight readable LCD; Keyboard Waterproof keyboard, touch pad; PCMCIA Card Type III x 1 or Type II x 2; Battery Li-Ion Primary Smart battery for 5 hours. **Dimensions:** 310 (W) x 255 (D) x 70 (H) mm. **Weight:** 6.5 kg. **Video/Image** Processing: Video Capture I/O S-Video, NTSC, PAL, RS170, RS232, GB(SVGA), TV Out; Ethernet; Audio. Compression / Decompression MPEG-2.

» L-3 COMMUNICATIONS, TELEMETRY-WEST

VCS700

Real-time colour video compression system. Compression of full-motion video with no visible image degradation. Programmable compression ratios to 350:1. User-programmable video format via RS-232 port. NTSC and PAL colour. Composite or Y/C compatibility. Compact 20 cubic-inch airborne video compression unit. Options for multiple video inputs, telemetry data inclusion, audio and embedded encryption.

» NOVATEL

GPS-700 SERIES

The GPS-700 antenna series incorporates NovAtel's patented Pinwheel technology and is designed to enhance the performance of the OEM4G2 and OEM4-G2L GPS engines.

Performance: GPS-702: 3 dB Pass Band; L1 1575 -15/+30 MHz (typical); L2 1228 -15/+30 MHz (typical). Out-of-Band Rejection (fc = L1, L2): fc -30/+50 MHz 30 dBc (typical); fc -40/+80 MHz 50 dBc (typical); LNA Gain 27 dB (typical). Gain at Zenith (90°): L1 +5 dB (minimum) L2 +2 dBc (minimum). Gain Roll-Off (from Zenith to Horizon): L1 13 dB; L2 11 dB. Noise Figure .2.0 dB (typical). Altitude 9,000 m. Unless otherwise indicated, all specifications apply to both the GPS-702 and the GPS-701.

» RAYTHEON INTELLIGENCE AND INFORMATION SYSTEMS (IIS)

ACN (AIRBORNE COMMUNICATIONS NODE)

Autonomous communications payload that provides assured in-theater communications and out-of-theater reback connectivity and SIGINT (Signals Intelligence). Supports key communications requirements, including joint/coalition interoperability, on-the-move and beyond line-of-sight communications, multi-mission/ reprogrammable functionality and communications services. It is self-deployable to the extent that the airborne platform is. When deployed, it provides warfighters with instant communications capability for existing military radios on the ground, at sea, or in the air.

» TADIRAN SPECTRALINK LTD

STARLINK MARK I/MARK II

Full duplex digital data link for small and mini-UAVs. [Mark I (Frequency Division Duplexing - FDD) **Mark II** (Time Division Duplexing - TDD). **Bandwidth:** <20 MHz. Provides for very high spectrum efficiency, allowing uplink and downlink traffic to use the same frequency and enables adjusting the switching points of uplink and downlink flexibly to provide the best service capacity. Highly immune to jamming and interference. Air Data Terminal (ADT) very easy to integrate into the UAV; Ground Data Terminal (GDT) easily carried by a soldier in a backpack. The information received on the portable GDT can be displayed on a wide variety of ruggedized handheld computers or PDAs. **Frequency band:** S (C-band available). **Range:** Mark I: 8 km; Mark II: >12 km. **Weight:** <160 gr. **Power Consumption:** <8W.

TACTICAL VIDEO LINK (TVL-II)

Field Commanders receive Battlefield Intelligence, in real-time from a UAV. Tactical Video Link (TVL-II) eliminates the delay caused by the current process, in which video and telemetry data are first transmitted to HQ and then distributed to the field. With this latest innovation, field commanders and troops can benefit from real-time video and telemetry data for target tracking, situational awareness, damage assessment, over-the-hill reconnaissance and surveillance, and all-round support of battlefield management. No more roundabout system, wasting precious time and resources on today's dynamic and volatile battlefield. The TVL-II can be used with any video and telemetry data-receiving monitor. **Performance:** Frequency bands: S/C band. Range: >20 km (omni to omni). Weight: <1 kg. **Options:** A video transmitter can be integrated, enabling exchange of real-time imagery among attack helicopters operating in the same area.

» TEAC AEROSPACE TECHNOLOGIES

MDR-80

Digital mission recorder with plug-in application cards provide flexible operational configurations. **Digital Video:** 1553 Recording RT/BM; PCM Recording; Digital Video Transmit/Receive; ACMI, and 24+ GB memory.

» TEAC AMERICA INC

SOLID STATE MISSION DATA RECORDER (SSMDR)

Digital data recorder which records single or multiple imaging sensor and mission data (EO, IR & SAR). **Feature:** Fully integrated removable unit. AMPEX DCRsi interface, up to 50 Gigabytes of storage 480 MB/s transfer rate. **Weight:** 9 lb **Dimensions:** 8.7 in x 6.0 in x 3.75 in (< 200 cubic inches) **Power:** consumes <50 W.

ELECTRO-OPTICAL SYSTEMS

» BENTAL INDUSTRIES

MICROBAT 275

Co-operates with TeleFlight Technologies Ltd. in the development of this stabilized EO sensor. **Characteristics:** Extremely Small, lightweight, stabilized payload system 2.5/8" (67 mm), Hading, Bering stabilization axis, 800 microRad, mechanical resolution design. Controlled x 10 Optical zoom, x 4 digital zoom (EO). **Options:** Camera Roll Protection, Integrated High Resolution wireless Video Down-Link, Integrated Multi Drop bi-directional wireless telemetry link. **Weight:** 300gm. User Provisions for encryption, and user defined algorithms.

» CLOUD CAP TECHNOLOGY INC

TASE

A small inertially stabilized single camera PTZ gimbal for the UAV integrator. Gimbal provides stand alone operation with integrated inertial and GPS sensors. Video recording, object tracking and localization supported with GimbalUI software. Novel design minimizes turret size. **Performance:** Field of view: Continuous Pan; Tilt: 23 deg up, 203 deg down; 200 deg/sec slew rate; 0.05 deg pointing resolution. **Cameras:** Default camera is Sony FSB-EX480C 18X color zoom. LWIR and SWIR options available and custom payloads can be supported.

Weight: 900g including default daylight block camera

Dimensions: 4.4 inch diameter turret. Overall package size is 5 x 4.4 x 7 inches. **Power:** 9 V to 20 VDC, 18 W max

TASE DUO

An updated TASE gimbal which provides both a daylight and LWIR imager. Analogue video outputs are provided for both cameras. Mounting, mechanical performance, and electrical interfaces are identical to the TASE gimbal. **Performance:** Field of view: Continuous Pan; Tilt: 23 deg up, 203 deg down; 200 deg/sec slew rate; 0.05 deg pointing resolution. **Cameras:** Sony FSB-EX980 26X color zoom and FLIR Photon LWIR. Other payload options can be supported. **Weight:** 1.2 Kg including daylight and IR imagers **Dimensions:** 5.0 inch diameter turret. Overall package size is 5 x 5 x 7.7 inches. **Power:** 8 V to 20 VDC, 25W max

TASE II

The T2 gimbal provides a TASE option with significantly increased camera payload volume, performance, and configuration options to support advanced UAV operations.

Performance: Field of view: Continuous Pan; Tilt: 15 deg up, 195 deg down; 200 deg/sec slew rate; 0.025 deg pointing resolution.

Cameras: Default configuration will include daylight zoom, 14 deg 640x480 LWIR and laser pointers. SWIR, MWIR, range finders and designators can be supported. **Weight:** 2.5 Kg including default imagers **Dimensions:** 7 inch diameter turret. Overall package size is 7 x 5.8 x 8.9 inches. Power: 8 V to 20 VDC, 35W max

» CONTROP PRECISION TECHNOLOGIES LTD

DSP-1

Dual sensor stabilised payload. **Stabilised Platform:** Field of regard is +10° to -105° elevation and n x 360° azimuth. Four gimbals, better than 25 microradians RMS stabilisation. Pointing accuracy 0.7°. **Infrared sensor:** 3-5 micron, InSb, focal plane array detector, 22.5x continuous athermal FLIR zoom lens. FoVs: narrow 0.98° x 0.92°, wide 21.7° x 20.6°, IFOV 67 microradians. NTSC or PAL video formats. Will detect trucks at 25 km, recognise at 7.5 km. **Daylight channel:** 786 x 494 pixel CCD TV, 20x zoom lens. Fields of view: narrow 0.92° x 0.7°, wide 18.6° x 13.9°. Automatic gain control. Will detect trucks at 25 km and recognise at 10 km. **System Dimensions:** diameter 320 mm, height 500 mm, weight 26 kg. **Environmental specs:** -20 to +50°C, up to 95% humidity, 2.5 g (rms), 5 to 2,000 Hz vibration endurance, 15g/11 msec duration shock level. **Power:** 28 VDC, 110 W nominal. **Options:** ICCD, laser pointer, 8-12 micron FLIR (1st or 2nd gen), extended environmental conditions, video tracker, programmable graphics, interfaces for radar, 1553 databus, GPS.

ESP-600C

Stabilised daylight observation system with colour TV camera. **Platform:** Field of regard 360° continuous in azimuth, +10° to -110 in elevation, angular velocity up to 40°/sec, stabilisation better than 10 microradians, positioning accuracy, 0.7°, 3 gimbals. **Dimensions:** 300 mm diameter x 435 mm height, **Weight:** 12.3 kg. **TV camera:** two (2) high resolution color CCD Cameras: one with super wide fixed FOV (22.6 x17) for target detection and one with an x15 zoom lens (FOV: 0.75 x11.5) for target recognition and identification. **TV Tracker:** Combined Centroid and Correlation tracking algorithm. **Performance:** Truck recognition at 12 km, truck detection at 30 km **Environment:** -20°C to +55°C, vibration: 5-2,000 Hz, 2.5 g (rms), up to 95% humidity, shock, 15 g for 11 m/sec, acceleration up to 10 g. **Options:** 3-CCD Camera, Extended for Narrower FOV 6.35 (.26).

MINI-EYE

Miniature stabilised camera available for multiple uses such as S&R, damage assessment, surveillance and power line inspection. **Performance:** Field of regard: elevation +65 deg to -25 deg of Nadir, roll +55 deg to -55 deg of Nadir, angular velocity up to 35 deg / sec. **Camera:** high resolution colour CCD, lens x10 zoom, FOV 1.8 deg x 1.3 deg (narrowest) 17.6 deg x 13.3 deg (widest). **Weight:** 4.5 kg **Dimensions:** 418 x 182 x 196 mm (LxHxW) **Power:** 28 VDC, +15VDC. **Consumption:** 30 Watt (nominal) **Environmental:** -20 deg to +50 deg C.

STAMP: D, L AND U

Miniature, lightweight, electro-optical, stabilized, airborne sensors which are designed to be carried by a miniature UAV, for tactical "Over-the-Hill" reconnaissance in daylight and / or at night. D - STAMP - Daylight CCD, L - STAMP - Low Light Level CCD, U - STAMP - Uncooled IR. Weight from 650 gr. Dimensions from 125 mm x 130 mm **Electro-Mechanical:** Type: 2 or 3 gimbal stabilized system. Stabilization Level: Better than 150 .rad RMS. Angular Velocity: Up to 60°/sec in Roll. Up to 30°/sec in Pitch. Line of Sight Report: 1.0° (10) relative to A/C. **Environmental:** Temperature: -10°C to +45°C. Altitude: Limited by aerial platform. **Electrical Interface:** Voltage: 24 VDC & 12 VDC. Video Output: NTSC or PAL. **Communication Interface:** RS-232 (RS-422 optional).

» ELOP - ELECTRO OPTICS INDUSTRIES LTD

COMPASS

Compact Multi-Purpose Advanced Stabilized System used for day and night observation, aiming, range measurements and designation that may include a TV CCD camera, 3rd generation, 3-5 µm FLIR camera, Laser Aiming Pointer, Eyesafe Laser Rangefinder or Laser Designator and tracking capabilities. **Additional:** COMPASS has been designed for installation on UAVs, helicopters, aircrafts, maritime vessels and ground observation stations. It is distinguished by wide variety of interfaces, enabling, integration with various systems, such as Fire Control Systems (FCS), radar, GPS and tracking systems.

» THE INSITU GROUP

ALTI-CAM

Inertially stabilised camera and turret system. Turret operates as a pan over tilt over roll (option) system. Pan: continuous, Tilt: 135° down to 45° up, Roll: ±5° for stabilization and avoidance of gimbal lock in 2 axes version **Imager Specifications:** Camera: 680,000 pixel color CCD, NTSC video output, 45° horizontal FOV wide, Zoom 25x optical, 4x digital, Exposure 1/4sec to 1/10,000 sec, Aperture level 0.15 (or auto), Internal image stabilization, 3Hz to 30 Hz, with 20db vibration rejection at 10Hz **System Dimensions/weights:** Fits in 7 inch sphere/ 700gm **Power (volts/consumption):** +8VDC to +14VDC / 7W.

» L-3 COMMUNICATIONS BAI AEROSYSTEMS

MINIATURE PAN-TILT ZOOM DAYLIGHT COLOUR TV (EO) PAYLOAD

Pan left/right (360-degrees continuous), Tilt up/down (0-90 degrees). Sensors currently available: SONY EVI Electronically-stabilised TV. **Weight:** 2.8 lb **Dimensions:** 10x6x8 (LWXH) **Power:** 12 V (24 V optional) **Video Format:** RS-170 (Standard video, 12 V peak-to-peak) **Command data format:** Serial RS-232.

PAN-TILT-ZOOM CAMERA WITH LASER RANGEFINDER

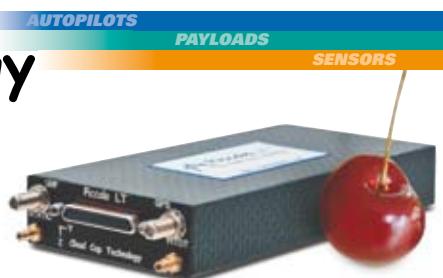
surveillance system with laser rangefinder **Performance:** 1/3 inch CCD colour sensor; NTSC or PAL format; resolution >380 lines horizontal x >350 lines vertical (NTSC) , >380 lines horizontal x 400 lines vertical (PAL); FOV 41.4° horizontal x 31.7° vertical to 3.7° horizontal x 2.8° vertical. **System dimensions/weight:** (lxwxh) 9 x 16 x 11 inch; 11.7 lb **Power (volts/consumption):** 12 V (nom) **Options:** 24 V.

» RAFAEL

TOPLITE

Highly Stabilized Multi-Role Multi-Sensor Optronic Payload. Toplite Day/Night observation and targeting payload is configured for naval, air and ground surveillance and targeting systems. Toplite is designed for a wide range of flexible and demanding missions, from law enforcement observation through surveying, and fire control to missile targeting. Designed for maximum performance in minimum space. The highly reliable Toplite can be easily installed and maintained on aircraft and helicopters, naval vessels and vehicles.

Cloud Cap Technology



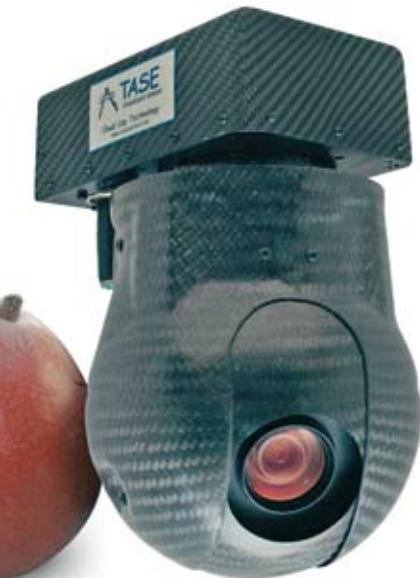
AUTOPILOTS

The Piccolo family provides full featured solutions for UAV integrators. Fixed wing and Rotary vehicles.

Piccolo LT Size Optimized for Smaller UAVs

Piccolo Plus Full Featured Autopilot

Piccolo II Advanced Autopilot with Most I/O Support



PAYLOADS

TASE stabilized gimbals that support multiple imager options. Additional NEW gimbals in development.

TASE 900g, 4.4" Turret, EO or IR imager configurations

TASE Duo 1060g, 5" Turret, EO and IR imagers included



SENSORS

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» Survey Copter's Survey 6 stabilised platform.

» SURVEY COPTER

SURVEY 6

A three axis stabilised platform, that can be equipped with high-tech video and photographic sensors to provide aerial images in the civilian, paramilitary and military fields. Payload: any payload of the user or on request; photographic unit, optical cameras, radar sensors, scanners, laser designation and telemetry systems. Platform: can be integrated to any moving vehicle, (car, helicopter, airplane, blimp, ULM, boat etc.) or on mini UAV (helicopter, airplane, etc) or to fixed installations. Dimensions (L x W x H): 410 x 210 x 440 mm Weight when empty: 5 kg Payload: 3 kg Power supply: 10 to 14V DC Pan: 360° with no stop Elevation: +20° - 90° Roll: +30° - 30° Maximum speed for pan, elevation and roll: 40°/s Stabilisation: Gyro stabilisation 3 axes

MINI SURVEY 6

A three axis stabilised platform, with the same characteristics as the SURVEY 6 but for smaller payloads. Weight when empty: 4 kg Payload: 2 kg

» TAMAM DIVISION - IAI

MOSP

2 or 3 sensor payloads featuring Day/Night, Day/Laser, Night Laser or Day/Night/Laser configurations. Multi-mission Optronic Stabilised Payload operates with TV cameras (FOVs between 18° x 13.7° and 0.5° x 0.3° H x V) and FLIRs in the spectrum ranges 3 - 5 or 8 - 12 µm (with standard EFL of 600 mm for the NFOV or even more for longer ranges). Other different configurations are in use. **Weight:** Depends on the specific sensor configuration, typically 80 lb. **Dimensions:** 14 in diameter, 21 in height. **Power:** typically 350 watts.

POP

Plug-In Optronic Payload operating in visible and infrared bands. **Weight:** 3lb and 1lb for hand controller. **Dimensions:** 10 in diameter, 15 in height. **Sensors:** 'day/night' configuration with color CCD and 3-5µm FPA InSb (Indium Antimonide), and 'night/ LRF' configuration with 3-5µm FPA InSb and Laser Range Finder. Slices: Sensor configurations are packaged in an stand alone Plug-in Slice which can be replaced in the field. **Power:** typically <100watts.

» EW SYSTEMS

» EDO CORPORATION

ULTRALIGHT ESM

Compact SIGINT system using single circular array interferometer (CAI) antenna for full 360 deg coverage **Frequency:** 2-18 GHz **Bandwidth:** 4 GHz **Direction Accuracy:** <2 deg **Sensitivity:** -65 to -75 dBm **Weight:** 24 kg.

» ELISRA ELECTRONIC SYSTEMS LTD

AES-210/V

Light weight, modular and easy to install, ELINT and ESM capability, Remote operation from a Ground Control Station (GCS) via existing data link channels, Fine DF by an advance digital phase interferometer, high sensitivity and POI, real-time intelligence gathering and dissemination to relevant consumers in different levels of information, state of the art multi channel superhet/IFM receiver, flexible and easy adaptation to real scenario, effective Windows - NT based MMI. **Performance:** Frequency: low band and high band, Envelope: -55 to +70 C. 30000 feet, soft cooling, Interface RS 422, LAN/ETHERNET interface in ground station, MIL-STD specifications. **System dimensions/weights:** approx weight 22 Kg **Power (volts/consumption):** 28VDC 250W.

» IAI/ELTA SYSTEMS LTD.

EL/K-7071 - INTEGRATED UAV COMINT/DF SYSTEM

The system is designed to cope with the challenges of modern dense communications network environments and to perform long-range, high endurance COMINT missions. The modular architecture, the compact size, the low power consumption and the flexible interfaces of the COMINT/DF UAV Payload enable its integration in a variety of UAVs, from Tactical to MALE/HALE UAVs. The airborne segment of the system includes the UAV, carrying a COMINT/DF Payload, with DF and Monitoring Receivers, and antennas. The ground segment of the system includes the UAV Ground Control Station and the Ground COMINT Operator Stations. Communication signals intercepted by the COMINT/DF Sensor (UAV Payload) are measured, filtered, pre-processed and transmitted to the Ground Station via the UAV data link.

EL/L-8385 - INTEGRATED UAV SM/ELINT SYSTEM (IUELIS)

The EL/L-8385 is a UAV Integrated Electronic Support Measures (ESM) and Electronic Intelligence (ELINT) System. The system is designed to cope with the challenges of modern dense radar environments and to perform long-range, high endurance ESM/ELINT missions. The modular architecture, the compact size, the low power consumption and the flexible interfaces of the ESM/ELINT UAV Payload enable its integration in a variety of UAVs, from Tactical to MALE/HALE UAVs.

» MRCM

MRX3500

A lightweight and low power electronic warfare support measures (ESM) and direction finder (DF) product range, designed to address the specific requirements for high performance man-portable and unmanned aerial vehicle (UAV) equipment. The MRX3500 provides the wide frequency range (10kHz to 3.5GHz) and high instantaneous bandwidth (up to 40MHz) required, and is capable of driving the latest generation 100Ms/s 14-bit analogue to digital converters (ADC) for spectral surveillance and software radio applications.

» RAFAEL ARMAMENT DEVELOPMENT AUTHORITY LTD

STRATUS AEROSTAT BORNE COMINT AND SURVEILLANCE SYSTEMS

The system is designed for coastal, air and ground surveillance gathering and over the horizon communication relays. The system provides continuous, wide frequency surveillance, at long range (up to 270km) in normal and adverse weather conditions. Its communications relay coverage up to the horizon range. The aerostat borne system is reliable, easy to deploy and maintain. STRATUS can be deployed for long-term coverage of up to 30 days.

TOP-SCAN

Airborne ELINT/ESM System. The Top Scan is a dual axis interferometer system which can localize RF emitters. The compact and low weight system is designed to detect, identify and locate radar emitters with high accuracy. Patented algorithms enable effective operation in a dense electromagnetic environment.

» SAAB AVITRONICS

ELECTRONIC SURVEILLANCE PAYLOAD (ESP)

ESM payload development to operate as a stand-alone ESM system integration on UAVs. ESP is based on the Emitter Location System (ELS) with an improved probability of intercept (POI) for emissions from search, tracking and fire control radars. Primary purpose of ESP is to provide the Enemy Electronic Order of Battle (EOB) through emitter identification, geo-location of emitters and detailed recording of emitter parameters for ESM/ELINT analysis. ESP consists of a controller which includes an acquisition and analysis receiver and a nose mounted interferometric antenna array **Frequency coverage:** 0.5-18 GHz **DF:** 1 deg RMS Class above 2 GHz and 35 deg RMS @ 700 MHz.

» THALES AIRBORNE SYSTEMS

COMPACT AIRBORNE THREAT SURVEYOR (CATS)

CATS is a modular and compact radar and surveillance system offering precise real-time threat detection and geo-location of radar emissions for UAVs, helicopters or transport aircraft. CATS provides: real time battlefield situation awareness, radar warning and immediate alert, for multiple simultaneous Pulse, Pulse Doppler and CW emitters associated with air and surface threats, ESM functions with on-board data recording, EW core system management with multi-sensor data fusion and optimisation of countermeasures. Its modular architecture features: low size and weight, minimal number of LRUs, interfaces with navigation equipment, compatible with off-board transmission and multi-platform cooperation. **Performance:** Frequency range: E-K band (C-K band optional). Azimuth: 360°. Elevation: +/-45°. Geo-location accuracy: Class 5% of actual distance within seconds. Library:>5000 modes **Dimensions:** Size (Processing unit): ARINC 600 (MCU) **Weight:** 15 kg. **Power:** 260 W (28 V DC).

A complete Solution from Bentel!

Any system Your UAV needs.

CUT TWO LINES PLEASE

Bental Industries Ltd. specializes in design and manufacture of innovative systems integrated into various platforms and applications.

- Propulsion Motors - High power, Low weight, High efficiency
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The company's ability to tailor cutting edge technology and innovative design enables it to welcome the most challenging demands.

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identify, localise ground-based radars and display tactical situation. Delivers either radar tracks for real time display and analysis or uses high capacity recording feature for post flight analysis. Works with Strategic emitter location system.

Frequency range: E to J (optional C to K), range accuracy better than 5 km at 100 km claimed. **Weight:** < 20 kg **Power:** <300 VA consumption.

» THALES COMMUNICATIONS

COMINT PAYLOAD

The COMINT payload is designed for MALE/HALE UAV or manned aircraft to provide Electronic Order of Battle through emitter identification and location. Wideband interception and direction finding provide automatic communications activity, alert, network analysis and targeting capabilities on VHF & UHF bands (30-3000 MHz). Real-time ground exploitation for interception and location is available through datalink. On-board wideband recording feature allows also off-line ground exploitation. **Performance:** wideband interception and direction finder **System dimensions/weights:** 19inch 9U; less than 50 kg **Options:** datalink and ground exploitation segment.

» THALES OPTRONIC SYSTEMS

VICON 78 SERIES 455

Family of lightweight chaff/flare dispensing systems that can be configured for helicopters, fast jets, large aircraft and UAVs. Manual, semi-automatic and fully automatic threat adaptive dispensing capability. The Vicon 78 is able to interface with a wide range of radar warning receivers, missile warning systems, and Defensive Aids Suite controllers. The system has the capability to control up to 24 countermeasures dispensers, which can be installed internally, semi-recessed, externally faired or on podded mountings. A dispenser module is able to accept interchangeable chaff and flare magazines containing up to 64 payloads, or Modular Expendable Blocks.

FLIRS/THERMAL IMAGING SYSTEMS

» BAE SYSTEMS ADVANCED TECHNOLOGIES

AURORA 600

Hyperspectral imaging (HSI) sensor for the ultra-violet, visible and near infrared (UV-VNIR) spectral range with real time processing. **Performance:** Sensor Model 600: Spectral channels (Max) 480; Cross track pixels 640; Frame rate 0 - 200 fps; Spectral range 600 nm, selectable within the 300 - 1050 nm window. Associated processor provides adaptive, real time, sub pixel ATR. **System dimensions/weight:** Hyperspectral sensor (WxLxH) 4.41" x 14.7" x 7.90"; weight 16 lbs; power 50 watts. Acquisition/Processing system (WxLxH) 8.5"x17.5"x17.25"; weight 70 lbs **Power (volts/consumption):** power 540 watts

» BAE SYSTEMS INFORMATION AND ELECTRONIC SYSTEMS INTEGRATION INC

SCC500 MICRO IR CAMERA CORES

High performance infrared imaging in a compact lightweight and configurable package. High performance, low cost IR camera cores aimed at the commercial and military OEM markets. Based on BAE SYSTEMS MicroIR Technology, they generate superior image quality over an extended operating temperature range with the wide dynamic range (14 bit) and real-time 60Hz frame rate.

» CONTROP PRECISION TECHNOLOGIES LTD

FOX: 250, 450 AND 720

Thermal Imaging Cameras with Continuous Zoom Lens. Observation units which may be used at night in total darkness. Can be supplied with an enclosure (FOX-ZE) or without an enclosure (FOX-Z). **Technical Characteristics:** Sensor Type: MWIR InSb 3rd Gen FPA. Spectral Range: 3-5 microns. Number of Pixels: 320x256. Lens Type: Continuous Zoom Lens- 250Z: WFOV: 27° x 20.2°, NFOV: 2.2° x 1.7°, Max magnification: X12.5-450Z: WFOV: 27° x 20.2°, NFOV: 1.2° x 0.9°, Max magnification: X22.5-720Z: WFOV: 27° x 20.2°, NFOV: 0.76° x 0.59°, Max magnification: X36.2-Axis 1 scan: Optional for 450Z/ZE and 720Z/ZE. Zoom Change: Remotely controlled. Focus: Automatic adjustment through zoom. Focus Adjustment: Remotely controlled. Uniformity Calibration: Internal or external 1 or 2 points. Video Format: CCIR or RS-170 (or 14 BIT digital). Cooling: Closed cycle stirling cooler. Cooldown Time: 8 minutes (nominal). Communication: RS-422A. Polarity: Black or White Hot. Gain/Level Control: Automatic or Manual or Local AGC. Reports: Zoom Position, Calibration and BIT Status.

» DENEL Optronics

ARGOS 410-Z

Military specification Airborne Surveillance System. Image quality is achieved by a sensor suite optimised for airborne applications and supported by state of the art stabilisation achieved by the four axis gimbal design. Qualified to MIL-810-D, MIL-461-C and RTCA/DO-160C. Software has been qualified to RTCA/DO-178B. Extensive work has been done to ensure the product is compatible with today's military aircraft from the point of view of EMC/EMI, vibration profiles, reliability/endurance, interfacing with on-board avionics and other important criteria. At the heart of the system is the High Resolution Zeiss Opttronics ATTICA Thermal Imager. Supplied in either a Mid Wave or Long Wave configuration. With its 4 Fields of View and advanced image enhancement features, including edge enhancement, local adaptive dynamic compression and electronic zoom, it offers exceptional Detection, Recognition and Identification (DRI) capabilities. Daylight TV is also impressive with a 1/2" 3CCD sensor coupled to a 20 x zoom lens. This lens is fitted with an Optical Extender giving an effective 40 x zoom ratio. **Specification:** Stabilised Turret: Turret Type 4 gimbal, 2 axis. Stabilisation <20.rad rms. Azimuth look angles 360°continuous. Elevation look angles +20° to -120°. Dimensions 495(h) x Ø410. Mass 43kg (three sensor configuration). Slew Rate 60°/sec.

» GOSHAWK 350

Used on low to medium height UAV platforms, light aircraft and helicopters to improve mission effectiveness and enhance public safety. **Multi Sensor Payloads:** Payload configurations are available with up to three high performance sensors simultaneously, covering a span of requirements to provide the operator with high resolution picture performance during all operational conditions. **Sensor options available:** Day / night payloads house a choice of Thermal Imagers (TI) from the medium to long wave IR spectrum with 2 FOV optics as well as a medium wave TI with continuous zoom optics. They are complemented with a colour zoom TV camera and Eye Safe Laser Range Finder. Day payloads house a choice of colour zoom TV cameras from a 1/2 inch format 3-CCD Broadcast quality colour camera with a 40 x zoom lens to a 1/6 inch format 1-CCD colour camera with a 25 x zoom lens for daytime observation, providing clear crisp images. These sensors are complemented with a B&W TV camera and Eye Safe Laser Range Finder. **Turret:** Stabilisation Accuracy < 30 .radian. Temperature range (Operational/Non operational): -30 °C to +50 °C / -40 °C to +. Altitude (Operational/Non operational): 4000 m (13000 ft) / 6000 m (20000 ft). Air speed (Operational/Non operational): 155 / 240 knots. Anti-icing Heaters: Yes. EMI/EMC (MIL-STD-461C) CE03, RE02, CS01, CS02, CS06, RS02. Mass: < 14 kg. Dimensions: 500 mm H x 350 mm (dia). Design: Aluminium Gimbal with Composite Shells.

» FLIR SYSTEMS

BRITE STAR

Multiple sensor, laser designation and long-range (thermal/visible) reconnaissance system with onboard, integrated, laser cooling and fully-automatic integrated boresight module.

Performance: Sensor 1 - 3-5 μm InSb, thermal imager with 640x480 resolution; Payload 2 - Nd: YAG, 1.06 μm, laser designator; Sensor 3 - 1.57 μm, Class 1 (eye-safe) rangefinder; Sensor 4 - Long range, Monochrome CCD with 3 Fields of View matched to thermal imager. **Dimensions/weight:** Turret (DxH) 22.8 X 30.4 cm; 51.2 kg. **Power:** 18-31 VDC; MIL-STD 704E

Options: Invertible turret; autotracker; ARINC, MIL-STD-1553B and RS-232/422 interfaces; moving map based Mission Management System; ergonomic universal hand controller, real time video downlink.

MICROSTAR II

Three sensor, (thermal/visible/LRF) surveillance and reconnaissance system. **Performance:** Sensor 1 - 3-5 μm InSb thermal imager with autofocus; Sensor 2 - Long range, daylight CCD camera with 18:1 zoom lens; Sensor 3 - 1.54 μm, Class 1 (eye-safe) laser rangefinder. **Dimensions:** Turret (DxH) 22.9 X 34.3 cm; 9.5 kg. **Power:** 18-32 VDC. **Additional:** Compact electronics control unit; ARINC, GPS, RS.

Turning Vision into Reality

Innovative Solutions for Surveillance and Reconnaissance

The advertisement highlights several products under the heading "Turning Vision into Reality" and "Innovative Solutions for Surveillance and Reconnaissance". It includes a diagram showing various platforms (aircraft, helicopter, UAV, boat) with dashed lines pointing to specific products. The products are categorized as follows:

- Air / Ground / Maritime:**
 - HRN-1 Directional Antenna Pedestal:** A small, rectangular device mounted on a circular base.
 - FOX Thermal Imaging Camera with Continuous Zoom Lens:** A compact camera unit with a lens and a zoom ring.
 - DSP-1 Dual Sensor: Day/Night(3-5 μm) FLIR with 22.5x continuous zoom 22 kg:** A larger, more complex sensor unit.
 - ESP-600C Triple Sensor: Daylight Color Lightwave, Long Focal Length 12 kg:** A large, cylindrical sensor unit.
 - STAMP Gyro Stabilized Miniature Payload Flexible mounting Weight from 650 grams**: A handheld device labeled "NEW".
 - D-STAMP Daylight Color CCD** and **U-STAMP Uncooled FLIR**: Smaller versions of the STAMP system.
- Best solution for SUAVs, Aerostats & UAVs:** An illustration of a small UAV.
- CONTROP Precision Technologies Ltd**
- E-mail:** marcom@controp.co.il **Website:** www.controp.com

PATHFINDIR - INFRARED CAMERA

The PathFindIR is a compact thermal imager perfect for unmanned ground vehicle applications. Hermetically sealed against harsh environmental conditions, PathFindIR is a stand-alone camera system for use on virtually any vehicle platform. **Performance:** PathFindIR's 320 x 240 uncooled VOx microbolometer arrays operate without a TEC over a temperature range of -40° to +80°C. **Dimensions:** 71.4 mm x 57.4 mm x 56.1 mm (2.8 in x 2.3 in x 2.2 in). **Weight:** 360 gr (0.8 lb) **Power:** <2W nominal. Input power requirement is 12VDC. **Options:** Cameras can be factory-configured to operate at less than 9 frames/second.

PHOTON 320 - INFRARED CAMERA CORE/PAYOUT

Photon 320 is a commercially-developed, military-qualified thermal imaging camera. Photon is the best-selling IR payload camera for small unmanned vehicle use, including the Raven-B. Over 18,000 Photon cameras have been delivered for use by integrators in a wide variety of applications. **Performance:** Superior LWIR image quality is achieved using FLIR's 320x256 uncooled VOx microbolometer arrays that operate without a TEC over a temperature range of -40° to +80°C. Photon is shock-rated to 70 g's and field-proven to withstand much greater impacts. Both analog (NTSC or PAL) and 14-bit digital video output formats are enabled, as well as RS-232 control of camera functions, including 2x digital zoom, image polarity, gain/offset, etc. **Dimensions:** 51.4 mm W by 49.7 mm H by 33.0 mm D, not including lens. ~57 mm D w/ 36-degree HFOV lens. **Weight:** 97 g without lens; 136 g with 36-degree HFOV lens. **Power:** 1.5 W nominal. Input power range is 5 to 24 VDC. **Options:** Several lens versions are available. Reduced resolution versions of the Photon are available at lower prices. Cameras can be factory-configured to operate at less than 9 frames/second for export without a license.

PHOTON 640 - INFRARED CAMERA CORE/PAYOUT

Photon 640 is the next-generation of FLIR's highly successful Photon 320 camera, the best-selling IR payload camera for firefighting thermal imaging systems and small, unmanned vehicles. **Performance:** FLIRs 640 x 512 uncooled VOx microbolometer arrays operate without a TEC over a temperature range of -40° to +80°C. The specified NE D^{t} is 50mK when normalized to f/1. Both analog (NTSC or PAL) and 14-bit digital video formats are enabled, as well as RS-232 control of camera functions, including 2x and 4x digital zoom, image polarity, gain/offset, etc. **Dimensions:** 63.5 mm W by 60.9 mm H by 45.7 mm D, not including lens. **Weight:** <160 g without lens; 242 g with 26-degree HFOV lens. **Power:** 3.0 W nominal. Input power range is 7 to 14 VDC. **Options:** Several lens versions are available.

STAR SAFIRE HD

First all digital, high-definition stabilized airborne thermal imaging system. Fully configurable with up to 7 payload options. Applications include national security, intelligence, surveillance, reconnaissance, search and rescue, border patrol, coastal patrol, unmanned aerial vehicles, and navigation. Accurate distance measurements from platform to targets 25 km out. Adapt to mission conditions effectively by having both wide area and narrow-beam cover laser payloads. Dual laser pointers allow for both scene illumination and target pointing. Precision geo-point allows for exact co-ordinates to be identified. Users can operate the system without CEU and HCU over a single fiber-optic connection.

ULTRA8500

Designed to meet the multi-role mission requirements of airborne law enforcement by offering increased stand-off capabilities, state-of-the-art infrared imaging performance and best-in-class auto-tracking for improved surveillance capabilities. **Features:** Continuous zoom 320 x 240 Indium Antimonide (InSb) infrared imager and 18x/72x,.2 lux low-light TV camera that can be combined with an optional Class IIIb CW diode laser. **Specifications:** (Thermal Imager): Pixel Arrangement (HxV) 768 x 494 (NTSC), 752 x 582 (PAL). Resolution +470 television lines (NTSC), +460 television lines (PAL). Daylight Imager: Size: 10.6" x 9.9" x 5.9" (27 x 25 x 15 cm). Weight: 15.8 lbs (7 kg). Power: 18 VDC to 32 VDC input, max current requirements 15 amps. Communications Interface RS-232/422. Video Output RS-170, NTSC, PAL.

» IMAGING SENSORS & SYSTEMS INC

ISS AEROSCOUT

Airborne multi-sensor providing midwave IR, TV/laser ranging/ Near IR pointer **Performance specifications:** 3 FOV optical telescope, 4x microscanner, enhanced image processing, RS-232/422 control; RS-170 video output **System dimensions/weights:** 37 x 38 x 53 cm/33 kg **Power (volts/consumption):** 28VDC/200W.

» L-3 COMMUNICATIONS CINCINNATI ELECTRONICS

NIGHTCONQUEROR II

Forward Looking Infrared (FLIR) Thermal Imaging System. **System Parameters:** Type MWIR InSb Reticulated sensor. System Control: RS-422 or 232 Serial Interface. Video Format: RS-170/CCIR Interlaced. Uniformity Calibration: Internal Multi-Point Source. Digital Data: 14 bit Data via Hotlink. **Power:** +28 VDC. **Weight:** 4.5 lbs. **Dimensions:** (Inches) 7.9 L x 6.9 H x 3.5 W. **Environment:** Operating Temp: -32°C to +55°C; Storage Temp: -40°C to +71°C.

» L-3 COMMUNICATIONS SONOMA EO

SONOMA 333

Mid-sized range performance in a small turret. A choice of 5 sensors. High accuracy GEO-location and rock-solid stabilization using IMU-Inside technology. Meets MIL-STD-810, MIL-STD-704 and MIL-STD-461 standards. Incorporates mounting and cable adapters to facilitate replacement of legacy mid-sized turrets. **Specifications:** Turret <55 lbs (all sensors), 12.4"(D) x 15.0"(H) 150W (Typical), Master Control Unit (%ATR MCU) - 20 lbs 4.9"(W) x 9"(H) x 14"(D) 90W (Avg.), 280W (Max.). Hand Controller Unit (HCU) - 2.2 lbs, 4.25"(W) x 8.97"(L) x 3"(D) 3.5W (Avg.); 5W (Max.). Cables - Consult factory for available variants. Environmental - MIL-STD-461, MIL-STD-810, RTCA/DO-160.

Turret Specifications: Line-of-sight Stabilization - Typically <15 .radians. Consult factory for performance under specific vibration condition. Stabilization and Steering - (2) Axis Inner (pitch/yaw) (2) Axis Outer (azimuth/elevation).Vibration Isolation - (6) Axis Passive (x/y/z/pitch/roll/yaw), AZ/EL Slew Rate: 0 to 60°/sec. LOS Pan Range: Continuous 360°. LOS Tilt Range: +90° to -120°.

SONOMA M11

Step-Stare Turret is a completely digital tri-sensor gimbaled developed with high speed Step-Stare capability. Introduced into the market for Tactical Unmanned Aerial Vehicles (TUAV) this high performance system is intended for small aircraft requiring very long-range reconnaissance, surveillance and targeting (RSTA).Offering a 3 field-of-view long-range optic, the system captures more than 8 overlapping, digital still images per second, which are then tiled together to create a high-resolution digital image. Offering unprecedented coverage and resolution with 4000m standoff, the M11 covers up to 300sq km per hour, assuring complete and accurate coverage of the target area while increasing the survivability of the UAV. **Physical Dimensions:** Turret - 17.7 kg (39 lbs) 27.9cm (11.0 in) diameter x 36.8cm (14.5 in) height. Mission Interface Unit (MIU) - 2.3 kg (5 lbs) 10.2cm (4 in) W x 10.2cm (4 in) H x 15.2cm (6 in) L. Hand Controller - 1 kg (2.2 lbs) **Power:** 85W nominal, 170W maximum.

» L-3 COMMUNICATIONS WESCAM

12DS/TS-200

Designed to meet the needs of law enforcement, paramilitary and surveillance applications on both rotary and fixed wing aircraft. **Dual Sensor Includes:** Sensor 1: 3-5.m 3 field-of-view Thermal Imager, with Indium Antimonide staring array. Sensor 2: Color Daylight CCD camera with 20x zoom lens. Sensor 3: (optional) IR Illuminator. **Specifications:** (12DS200) Physical Dimensions Gimbal: 20.9 kg (46 lbs.) 30.5 cm (12") dia. x 37.1 cm (14.6") ht. SmartLink Interface Unit (SIU) - Optional: 4.1 kg (9 lbs.) 33 cm (13") D x 25 cm (10") W x 10 cm (4") H. Hand Controller: 0.7 kg (1.6 lbs.) 20 cm (8") x 10 cm (4") x 8 cm (3").

Cables: Standard cable kit: Control cable 7.6m (25ft), hand controller 1.8m (6ft) and Power cable 4.6m (15ft). **Power (nominal):** 28 Vdc, 10 amps (with no ancillary equipment operating).

MX-15I & MX-15

Today's MX-15 incorporates a new generation of imaging capabilities. Installed system weight - 25% lighter, Obtain 24/7 EO imaging, 20% Improvement in IR range, Fully Digital True HD output, Expanded ease-of-use control suite. **Performance:** Choice of Integrated MCU or external MCU, CMCCD Night Spotter Camera, Digital or Analog EO/IR, 2 Megapixel 1080p true EO,20μm IR, MX-GEO Gen.3 **System dimensions/weights:** MX-15I - Turret with Integrated MCU - 15.5" diameter/18.75" height, <100 lbs (all sensors) **Power (volts/consumption):** 280W (Avg) - 900 (Max) MX-15 - Turret with External MCU - 15.5" diameter/18.75" height, < 97 lbs (all sensors) **Power (volts/consumption):** 220W (Avg) - 840 (Max) External 1/2 ATR MCU - 14" diameter, 4.9" wide x 9" high - 20 lbs **Power (volts/consumption):** 90W (Avg) - 280 (Max).

» NORTHPROP GRUMMAN DEFENSIVE SYSTEMS DIVISION

NIGHT HUNTER II

Night Hunter II is a high-performance electro-optic (E/O) and infrared (IR) system for intelligence, surveillance, reconnaissance (ISR), and targeting **Performance** 11 inch aperture; gimbal supports six sensors **Dimensions / weight:** Turret: L x W x H 20.8 x 20.8 x 25.6 in; Processor: L x W x H 13 x 8 x 11 in / 155 lb (turret); 35 lb (processor). **Power:** 400 W (turret); 100 W (processor).

RAVEN EYE II

RAVEN EYE II is a family of advanced, off-the-shelf EO payloads designed for day and night operation including surveillance and targeting functions. **Features:** Rugged, low weight, highly-stabilized four gimbal construction. Wide angular field of regard (including the nadir point). Selectable fields of view for increased range. FLIR and TV cameras for day/night observation. Automatic target tracking night and day. User friendly symbology features. **Operating Modes:** Manual or remote payload control. Slaved to other designating sources, such as navigation and radar. Body fixed and stow. **Basic Configuration:** Day channel: TV camera (monochrome or color CCD). Night channel: FLIR (3rd gen 3 to 5.μm FPA). Laser Designator and Rangefinder. Automatic Video Tracker. **Operation:** Temperature ranger: -30° to +55°C. Stabilization: Better than 15 .rad. Speed: Up to 400 knots. Altitude: Up to 40,000 ft.

» OPTICAL ALCHEMY INC

KJ 600 SERIES

This small, ultralight gimbal sensor system offers the payload flexibility, inertial stabilization and high pointing accuracy needed for sense and respond missions. Nominally a six inch sphere, this system provides configurable payloads including high resolution IR and visible sensors, laser marker, laser designator or a user-defined custom sensor suite. Onboard IMU, GPS and digital compass capability provide accurate latitude/longitude pointing. **Specifications:** Exterior Envelope: (173mm x 165mm x 173mm). Weight: 4 lbs (1.8 kg), 2 lb gimbal, 1 lb std payload, 1 lb electronics. Azimuth: ± 217°. Elevation: ± 45°. **Standard Payload:** IR Sensor: 8-12 μm. Resolution: 1.5 mr. HFOV x FVOF: 570 x 430. Video Format: NTSC, PAL. Payload Max Weight: 5 lbs (2.3 kg). Payload Capacity: 80 in³ (1300 cm³).

» POLYTECH (A CEDIP INFRARED SYSTEMS COMPANY)

KELVIN 275

A 10-inch gimbal, equipped with a radiometric IR camera providing fully calibrated temperature mapping for airborne remote sensing applications. Kelvin 275 is ideal for power line inspection and other radiometric research work, such as oil spill detection, pipeline inspection, environmental and wild life studies. This standard system contains everything needed for on-demand inspection missions. **Specifications:** Gimbal diameter: 275 mm. Stabilization performance: 35 prad. Thermal IR camera: 8-12μm LWIR radiometric camera. Field of view (IR): Dual FOV (20° - 49°). Colour TV camera: Continuous zoom from 42° to 1.6° FOV. Image Recording System: PC software suite, including GPS registration. Geo Mapping: Optional geo mapping and geo referencing.

» SENSORS UNLIMITED INC

SU320US-1.7RT INGAAS NIR SNAPSHOT MICROCAMERA

Designed for imaging in the short wave infrared (900 nm to 1700 nm) on unmanned aerial vehicles and robots, the SU320US-1.7RT Indium Gallium Arsenide (InGaAs) camera delivers high resolution image quality to any standard monitor or frame grabber. **Dimensions / weight:** Length x Width x Height = 5.9 cm x 2.8 cm x 1.7 cm / < 70 g (with lens). **Environmental:** Operating Temp: 5°C to 35°C **Power Requirements:** 100-240 VAC, 47-63 Hz.



» Survey Copter's T130-VI turret.

» SURVEY COPTER

T130-XX

A stabilised high performance turret, which can be integrated to manned platforms (aeroplanes, helicopters, balloons etc) or to mini UAV (helicopter, etc) to provide aerial images in the civilian, paramilitary and military fields. **Dimensions (D x H):** 130x190 mm **Waterproof:** IP61 **Power supply:** 10 to 14V DC **Pan:** 360° with no stop **Maximum speed for pan and elevation:** 30°/s **Stabilisation:** Gyro stabilisation 2 axes

T130-VI

T130-VI incorporates a daylight sensor. **Sensor:** CCD 1/6'', 800,000 pixels, 25x optical zoom, 12x digital zoom, NIR filter **Weight:** 1.57 Kg **Elevation:** +5°/-90°

T130-IR-GA

T130-IR-GF incorporates an infrared sensor. **Sensor:** Non-cooled micro bolometer, spectral range 8-12 m, resolution 384 x 288 pixels, focal length 25 mm, F/1.1, field 32° x 24° **Window:** Gazir **Weight:** 1.72 Kg **Elevation:** -5°/-85°

T130-IR-SF

T130-IR-SF incorporates an infrared sensor. **Sensor:** Non-cooled micro bolometer, spectral range 8-12 m, resolution 384 x 288 pixels, focal length 25 mm, F/1.1, field 32° x 24° **Window:** no, CBlister, available for vehicle speed under 25 m/s **Weight:** 1.52 Kg **Elevation:** -5°/-85°

T150 -VISIR

A stabilised high performance turret, with daylight and infrared sensors, which can be integrated to manned platforms (aeroplanes, helicopters, balloons etc.) or to mini UAV (helicopter, etc.) to provide aerial images in the civilian, paramilitary and military fields. **Dimensions (D x H):** 150x220 mm **Weight:** 2 Kg **Waterproof:** IP61 **Power supply:** 10 to 14V DC **Pan:** 360° with no stop **Elevation:** +5°/-90° **Maximum speed for pan and elevation:** 30°/s **Stabilisation:** Gyro stabilisation 2 axes **Visible Sensor:** CCD 1/6'', 800,000 pixels, 36x optical zoom, 12x digital zoom, IR filter **IR Sensor:** Non-cooled micro bolometer, spectral range 8-12 m, resolution 384 x 288 pixels, focal length 25mm, F/1.1, field 32° x 24°

» THALES OPTRONICS

AGILE

Description The Airborne Gyrostabilized IR Light Equipment (AGILE). **Characteristics** Gyrostabilised platform: 3 axis active gyrostabilisation; Azimuth: 360° continuous; Elevation: + 30° to -100° and Ø 305 mm. **Weight** 20 kg

» TOP I VISION

LEV 2 & LEV 5

Lev 2: Light weight stabilized payload, 0.8 kg, Day - x25 zoom high resolution CCD sensor. Lev 5: Light weight stabilized payload, 3 kg, Day - x40 zoom high resolution CCD sensor.

INTEGRATED SYSTEMS

» 2D3 LTD (PART OF OXFORD METRICS GROUP PLC)

AUTOMATED IMAGERY

2d3 has a suite of embeddable or ground-based software solutions for unmanned aerial vehicle EO payloads, allowing for mapping 3D terrain and tracking targets, to 3D positioning, zooming in on video and picking out detail from super resolution, as well as mosaicing overlapping images to create 3D models.

» ACRA CONTROL

KAM-500

This product line provides extremely flexible, high-performance digital data acquisition systems supporting advanced signal conditioning, integrated data logging, and multiple output types within a single unit or master/slave distributed network environment. The system uses industry-leading digital filter signal conditioning (FIR & IIR) designs, which are accurate up to 0.1% of full scale over the entire temperature range (-40°C to + 85°C). All analogue signal conditioning modules in the system provide an analogue to digital converter (up to 16 bit A/D) per channel, programmable gains, offsets and sampling rates up to 100ksp. The backbone of the KAM-500 architectures is a digital-backplane which supports 16MB of data transfers per second. The system operates in an isochronous sampling mode with a data throughput of 2 Msample/second (32Mbps). Capable of outputting data in PCM, Ethernet, ARINC, MIL-STD 1553 formats, and logging data to solid state flash memory - all at the same time. The parameters and their sample rates can even be different between each of the different output/memory formats.

» AERONAUTICS DEFENSE SYSTEMS

UMAS

Unmanned Multi-Application Systems. Solution for integrating your UAV platform & ground workstation. Off the shelf, turn-key solution, both for your airborne avionics & for its ground interface. **Main Electronic Board and Processor - ground:** 32 bit processor. 9 Input / 5 Output serial ports. 8 digital outputs, 4 digital inputs collecting switch matrix. **On board power supply:** DC/DC solid state interfaces & I/Os **Dimensions:** 18x11x8 cm (7x4.5x3 inch) **Weight:** 1.3 kg (3lb) including IMU. **Environmental Conditions:** Temperature range: -40 to +71 deg C. Non Operating Shock: 1000G (1ms half sine wave). Max. Acceleration: 50G.

» AKAMAI PHYSICS INC.

BRIGHT ONYX CHEMICAL SENSOR

Active multi-spectral chemical sensor operating in the 5-μm region for remote chemical detection of chemicals associated with weapons of mass destruction that may be transported on ships inbound to United States ports. The Bright Onyx sensor must operate at UAV airspeeds and ranges with detection sensitivities of 10ppmm and meet UAV power, weight, and size requirements.

» ATHENA TECHNOLOGIES INC.

GUIDESTAR (GS-111)

Integrated digital flight control system. Inertial navigation. **Weight:** 1.4 lb **Power:** 5 W max, 3 W typical **Voltage:** 18-50 VDC **Serial I/O:** Two RS-232 (up to 115 kbaud), Two RS-232 (up to 250 kbaud), One RS-422 (up to 920 kbaud). **Analogue input:** eight channels - 14 bit A/D. **Data storage:** 48 MB (solid-state, non-volatile).

GUIDESTAR (GS-311)

Offers processors for more complex mission and payload management and extensive analog and digital I/O, including Ethernet and the option of a second GPS (SAASM) installation. **Dimensions / Weight:** 4 x 5 x 6 inches; < 4.8 lbs. **Power:** 28 V/12 W. **Environmental capability:** -40 to 70 C (operating), EMI: Mil-Std-461E. **Features:** Inertial sensors; Integrated GPS receiver (DGPS capable); Flight processor (sensor management and flight controls); Mission processor; Payload processor.

GUS

An advanced integrated sensor suite that is equivalent to the size of a small cell phone and offers a complete INS/GPS navigation solution, with the option of hosting flight control software. Uses reliable solid state sensors, including accelerometers, rate gyros, magnetometer, air data pressure sensors, along with a differential ready, WAAS-enabled GPS receiver. Also included is built-in automatic magnetometer calibration to simplify installation. The unit includes all the analog and digital I/O interface hardware required to accommodate a variety of vehicle configurations and payloads. **Specifications:** Size: 4.5 x 2 x 1 in3, Volume: 8.0 in3 , Weight: 0.25 lbs (113 g; 4 oz). **Power:** 3.5 W max at 9 - 18 V.

Environmental: Temperature (Operating): - 40° to + 70° C, Temperature (Non-Operating): - 54° to + 85° C, Humidity: 95% RH, non-condensing, Vibration/Shock: MIL-STD-810. **IMU**

Performance: Update Rate: 50 or 100 Hz, Maximum Angular Rates: +200 deg/sec, Maximum g Range: +10g (Higher rates available +18g), Sampling Resolution: 24 bits A/D.

» AUTONOMOUS UNMANNED AIR VEHICLES (AUAV)

EZI-NAV AUTOPILOT SYSTEM

This autopilot controls the vehicle's flight path using GPS technology. The on-board sensors include an IR horizon sensing attitude control for roll and pitch, GPS navigation with GPS Cross track error correction and GPS altitude hold with remote gain control from the RC transmitter. **Specifications:** Dimensions: 5.9 X 3 X 2 inches (72 MHz version) and 4.75 X 3 X 2 inches (2.4 GHz DSS version); Weight: 15.5 oz; Altitude: 17,999 ft MSL; Power: Autopilot: 5.5 VDC 200 mA, Data transmitter: 5.5 VDC 170 mA TX (20 mA RX).

» BEI SYSTRON DONNER INERTIAL DIVISION

MMQ50 MINIATURE MEMS QUARTZ

This Inertial Measurement Unit (IMU) incorporates solid-state quartz micromachined inertial rate sensors and silicon MEMS accelerometers. The MMQ is especially suited for embedded applications where extremely small size, low cost, and low power consumption are required. It features a full six Degrees-of-Freedom sensing capability in an compact size of less than 5 cubic inches. It uses three of SDID's patented GyroChip rate sensors which consist of a dual-ended quartz tuning fork. The MMQ50 uses high performance, low cost silicon MEMS accelerometers.

» BLUE BEAR SYSTEMS RESEARCH

SURVEILLANCE & NAVIGATION AUTOPILOT (SNAP)

Is a high specification miniture autopilot with extensive processing power and versatile open architecture applicable to air, sea and land platforms. **Board Specifications:** 100x 20 x 15mm, 58g (incl. GPS), and 200Ma @ 5.5V - 12V. **Features:** Internal GPS - 4Hz update rate - SBAS ready. 8 servo outputs and 8 & Rx inputs. Data Logging, Telemetry, 12C bus expansion. 2x Processor Modules: 400MHz Intel Xscale (ARM), Micro-controller for h/w interfacing. Connectors: Filtered D-Type Power and interfacing, USB, SMA (Active GPS Antenna).

» BRITANNIA 2000 LTD

2604 MINI DV AIRBORNE VCR

Small lightweight, front loading digital VCR designed for aircraft use. High resolution with perfect stills and slow motion. Fits standard half ARINC rack, 146 mm wide. Backlit display. Built in heaters. **Options:** Full function remote control panel, LITE remote control for RECORD/STOP with end of tape indicator, Multi-deck Controller to allow 2 decks to operate automatically in sequence, or individually so that one deck can be used for 'instant replay' whilst the second deck continues to record the event.

» CDL SYSTEMS

VCS - 4586

This ground control station has been developed according to STANAG 4586 protocol for NATO UAV interoperability. It incorporates full resolution digital video with real time metadata & MPEG processing (STANAG 4609). Seamless forward & reverse viewing of digital video at multiple speeds. Still imagery is captured using STANAG 4545 (NITF 2.1) format. Sensor control & vehicle control panels are configured dynamically based on configuration messages from the Vehicle Module (VSM).

» CLOUD CAP TECHNOLOGY INC

PICCOLO FAMILY OF COMPLETE INTEGRATED AUTOPILOTS

The Piccolo autopilots provide an advanced integrated avionics system including the core autopilot, flight sensors, navigation, wireless communication and payload interface, all in a small and inexpensive package. All versions are packaged in a shielded carbon fiber enclosure. Integrated radio link options include 900 MHz ISM, 2.4 GHz ISM, and licensed band UHF. A complete communications specification and SDK support custom interfaces and payload management. Royalty free source code licensing is also available. Over 1500 Piccolo avionics have been delivered to the UAV market as both fixed wing and rotary craft autopilot solutions. Options provide advanced features to meet customer needs:

PICCOLOPLUS

A full-featured autopilot, ideal for fixed wing UAV applications. 12 surface / GPIO lines and 2 payload serial ports. **Weight / Dimensions:** 212 g, 5.6 x 3.0 x 2.4 inches **Power:** 8 V to 20 VDC, 5 W max

PICCOLO II

The Piccolo II adds additional flexibility by adding a higher rate GPS, and additional serial, analogue and general I/O for payload support. 16 surface / GPIO lines, 4 analog inputs, and 5 payload serial ports. **Weight / Dimensions:** 233 g, 5.6 x 3.0 x 2.4 inches **Power:** 8 V to 20 VDC, 5 W max

PICCOLO LT

The smallest of the Piccolo Family, ideal for the small electric UAVs. 7 surface / GPIO lines and 2 payload serial ports. **Weight / Dimensions:** 109 g, 5.1 x 2.34 x 0.76 inches **Power:** 4.8 V to 24 VDC, 5 W max

» EDO MBM TECHNOLOGY LTD.

LIGHTWEIGHT STORES RELEASE UNIT (SRU)

SRU is an entirely new design specifically developed for the carriage and release of small stores and 'smart' MIL-STD-1760 weapons from a wide variety of platforms. Its low reaction load is particularly suitable for the lightweight construction of Unmanned Air Systems. **Weights:** It weighs less than 2.8 kg (6.2 lbs). Stores carriage capability is excess of 100 kg (220 lbs), with a dual eject piston variant capable of carriage up to 660 kg (1450 lbs). The design incorporates proven, non-pyrotechnic technology from in-service practice bomb carriers. The self-locking electro-mechanical release mechanism simplifies loading and eliminates the need for cartridges and the associated time-consuming servicing cycle. Store carriage is on conventional 14 inch lug centres with either gravity or soft eject release. Safety mechanisms include an in-flight operable lock and two built-in zero retention force arming units. First line operation and maintenance is achievable without specialist skills, tools or test equipment, and second line servicing is required only annually. As no consumables or replenishables are used in operation, a low logistic footprint is ensured. **Status:** In low rate production.

SABRE - LIGHTWEIGHT MULTIPLE STORE CARRIER

SABRE is a modular family of ultra lightweight, miniature store carriers specifically developed for releasing a variety of small stores and smart MIL-STD-1760 weapons from a wide variety of platforms. **Weight:** Minimum weight (18 kg) combined with a very low mobility/ logistic foot print were two critical factors in the design of this entirely new carriage and release system which can carry up to a total of 590 kg (1,300 lbs) SABRE utilises a common hardback structure which can be configured as a twin or triple station variant and has a modular growth capability for multiple combinations thereof. Each station has a new generation, lightweight, non-pyrotechnic stores release unit with a gravity or soft eject capability. The hardback void contains flight proven electronics which support store/ aircraft electrical interfaces ranging from a low level through to full MIL-STD-1760 class 2 and miniature munitions capability.

» GENEVA AEROSPACE

FLIGHTEK

flightTEK, a Flight Control System, can autonomously fly and control a variety of unmanned systems varying in size and capability ranging from standard fixed-wing vehicles to mini air vehicles, loitering munitions, airships, seaplanes and more. It includes Variable Autonomy Control System (VACS) architecture, which is more than just an autopilot, but also serves as a true mission management system. **Dimensions:** 3.5" x 4.75".

» GLOBAL AERIAL SURVEILLANCE INC.

UAV AUTOPILOT

The Autopilot is a six degree-of-freedom IMU & GPS navigation module specifically designed for autonomous vehicles. The Autopilot has tri-axial MEMS based angular rate and accelerometer sensors with a full featured GPS receiver on a single board. The Autopilot also features on-board static/dynamic pressure sensors for aircraft applications and temperature sensor for compensation. It has six gain stages for accelerometers and rate gyros. Standard systems are factory set for unity gain. High performance 5th order elliptic filters on all IMU channels configurable from 1-100Hz. Advanced IIR filtering and Kalman filtering available. And includes data pump software which digitises and reports sensor data via a logic level serial channel. Intended for user programmed applications such as UAV stability, control and navigation. **Weight:** 45.3g (Incl. GPS). **Dimensions:** 1.58" X 3.47" X 0.75".

UAV COLLISION AVOIDANCE LADAR

A compact, low power, 3D imaging LADAR for UAV navigation and collision avoidance. **Wavelengths:** 1550, or 1064 and 1550 dual bandwidth operation **Range:** Dependant on wavelength and power **Accuracy:** 1/4 inch range accuracy **FOV:** ~ 45 deg (256 or 512 pixels) by 90 deg (480 pixels).

» GUIDED SYSTEMS TECHNOLOGIES INC.

INTEGRATED VISION SYSTEM TESTBED - ADVANCED ENDURANCE

Development of a full-function research-grade integrated avionics suite for autonomous adaptive flight operations of a variety of fixed and rotary-wing UAV systems that require high-precision GPS-aided inertial navigation and one or more auxiliary high-performance processing resources for flight evaluation/demonstration of computationally intense algorithms (e.g. real-time trajectory optimization and mission management in complex scenarios, sensor fusion, and vision processing for guidance and control). The system is currently being integrated on the UAVRL fixed-wing UAV prototype (pictured) and was developed by GST with USAF funding for university research at Georgia Tech.

» KEARFOTT GUIDANCE AND NAVIGATION CORPORATION

K-2000

The K-2000 Series Servo Actuator provides UAV manufacturers with a high performance, low weight, compact servo actuators optimised for UAV's in the 150 to 2000 pound class. Designed to accommodate the system requirements for UAVs in the area of EMI (MIL-STD-461D) and reliability. Based on the modular concept utilising a common 28 volt DC brushless motor as the prime mover with the electronic control, power stage, gear train and position feedback system essentially common to all actuators. Currently, seven different versions are produced including standard and high torque models as well as digital (RS485) or analog (Pulse Width Modulated) communication interfaces.

KN-4073

This system offers a low-weight navigation solution. The KN-4073, which features Kearfott's Monolithic Ring Laser Gyro (MRLG), is designed to operate in conjunction with an embedded Differential and WAGE ready PC(Y)/C/A code GPS receiver for enhanced navigation performance and faster satellite acquisition. **Dimensions:** 9.1" (L) x 5.4" (W) x 6.0" (H). **Weight:** <3.7 kg (8 lbs). **Power:** 28 V dc (35 W) per MIL-STD-704A. **Environmental:** Altitude: to +50,000 ft; Temperature: -45°C to +71°C.

» L-3 COMMUNICATIONS SYSTEMS - WEST

ATX-2740(V)

Light weight exportable data link system. Ruggedised COTS, satisfying NATO STANAG 7085 for digital, point-to-point data links. Provides real-time, full duplex sensor data and voice communications. Consists of three units: AMA, one or more fixed or steerable antennas and RFE. **Carrier Frequency:** X-Band or Ku-Band. Solid state or TWTA transmitter. Integral multiplexing and demultiplexing. LOS microwave range to 50,000 ft altitude. Optional ATM sensor interface (NIU).

Kearfott Guidance & Navigation Corporation**UAV Servo Actuator Family**

K2000 Servo Family



K3000 Servo



Product evolution with proven technology

- 15 applications and counting!
- COTS or custom
- Brushless DC with RS485 or PWM communication protocol
- BIT capability
- Compact size (<11cu/in) Low weight (<14oz)
- Proven reliability
- New K3000 Servo

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DESIGNED FOR PERFORMANCE, PROVEN ON THE BATTLEFIELD!

» L-3 COMMUNICATIONS WESCAM

MX-15D

The MX-15D Laser Designator achieves unparalleled designating ranges using a compact and reliable diode-pumped laser, IMU inside technology and an exceptional EO/IR sensor package.

Performance: Supports 1 to 6 payload sensors: IR with high magnification 4-step zoom, Color Daylight Camera with Zoom lens, Mono Daylight camera with Spotter Lens, Laser Designator with LFR, Laser Illuminator, Eyesafe Laser Rangefinder. **System dimensions/weights:** Turret - 16.5" diameter/18.75" height, <103 lbs (all sensors) **Power (volts/consumption):** 220W (Avg) - 840 (Max) External ½ ATR MCU - 20lbs, 14" diameter, 4.9" wide x 9" high **Power (volts/consumption):** 90W (Avg) - 280 (Max).

MX-20

Today's MX-20 incorporates a new generation of imaging capabilities: 24/7 EO Imaging, 20% improvement in IR range, expanded ease-of-use control suite. **Performance:** Supports 1 to 7 payload sensors: IR with high magnification 4-step zoom, Color Daylight Camera with Zoom lens, Color Daylight Camera with Spotter Lens, Night (mono) Camera with Spotter lens, Laser Illuminators, Laser Rangefinder. **System dimensions/weights:** Turret with Integrated MCU - 21.00" diameter, 26.25" height, <190 lbs (all sensors) **Power (volts/consumption):** 500W (Avg) - 1000 (Max) Master Control Unit (¾ ATR MCU) - 16.7 diameter, 7.5 wide x 10 high, 33lbs. **Power (volts/consumption):** 90W (Avg) - 280 (Max) External ½ ATR MCU - 14" diameter, 4.9" wide x 9" high, 20lbs. **Power (volts/consumption):** 90W (Avg) - 280 (Max).

» LOCKHEED MARTIN

MOBILE COMMANDER'S ASSOCIATE (MCA)

The system integrates key functionality required for manned / unmanned teaming: connectivity to multiple digital radio links to provide simultaneous command and control of UAVs and communicate with ground and manned aerial forces; decision-aiding technology to monitor the UAV team's flight activity with minimal human input; and fusion of ground and airborne sensor data so as to build a situational picture of the evolving battlefield.

» MDL LASER SYSTEMS

MDL LASER SYSTEMS

Airborne Laser altimeter: compact class 1 eye safe, rugged, multipurpose laser distance meters for integration into OEM applications. The laser distance measuring modules have been specifically designed for additional integration each giving a reflectorless range of up to 700m (2,300ft), 300m (1,000ft), 150m (500ft) and 35m (110ft) for the IM700, IM300, IM150 and IM35 respectively. The sensors can be integrated into a number of suitable system applications requiring, primarily distance measurement. **Specifications:** Version: R 3000: Wavelength (nm) - 905, Max range (m) - 1000, Accuracy (cm) - 10, Resolution (cm) - 1, Rep rate (Hz) - 9, Operating Temp (°C) -10 to + 60, Dimensions (mm) - 154 x 78 x 49, Weight (g) - 950.

» MICROPILOT

MP2028G

An autopilot system. **Characteristics:** Weight (including GPS receiver, gyros, and sensors): 28 grams (not including GPS antenna); Power (including GPS receiver, gyros, all sensors and GPS antenna): 140 mA @ 6.5V; Telemetry update rate: 5hz; Size of onboard datalog: 1.5 MB; Waypoints: 1,000. **Dimensions:** (LxWxH) 10 x 4 x 1.5 cm.

MP2128G

The MP2128G is MicroPilot's premium autopilot. It offers the world-renowned small size and weight of the MP2028G with 50 times the processing power. **Specifications:** Weight: 26 grams (including GPS receiver, gyros, and sensors. Not GPS antenna). Length: 10 cm. Width: 4 cm. Height: 1.5 cm. **Power:** (including GPS receiver, gyros, all sensors and GPS antenna) 140 mA @ 6.5V. **Voltage:** 4.2 - 26V. **Features:** 150 mips RISC processor gives scalability. Upward compatible with MP2028G. GPS waypoint navigation with altitude and airspeed hold. Completely independent takeoff, bungee launch, hand launch and landing. Fully integrated with 3-axis gyros/ accelerometers, GPS, pressure altimeter, pressure airspeed sensors, all on a single circuit board. Extensive data logging and telemetry. Includes HORIZONmp ground control software.

» MICROSTRAIN

3DM-GX1

Gyro enhanced orientation sensor combining three angular rate gyros with three orthogonal DC accelerometers, three orthogonal magnetometers, multiplexer, 16 bit A/D converter, and embedded microcontroller, to output its orientation in dynamic and static environments. Operating over the full 360 degrees of angular motion on all three axes, it provides orientation in matrix, quaternion and Euler formats. The digital serial output can also provide temperature compensated, calibrated data from all nine orthogonal sensors at update rates of 350 Hz.

» RAFAEL

GOLDEN BAY

Golden Bay provides real-time, high throughput and high accuracy processing of reconnaissance imagery, yielding a dramatic increase in accurate target generation rate. Coupled with an optical payload, the Golden Bay ground station minimizes the sensor-to-shooter cycle time enabling Time Critical Targeting. The system can interface with any scanning pod or observation device, operating in day or night. Imagery is transmitted via data-link to the ground element for automatic processing, and further distributed online through command, control and communications networks.

» RAYTHEON INTELLIGENCE AND INFORMATION SYSTEMS (IIS)

TACTICAL CONTROL SYSTEM (TCS)

Controlling Multi-Service UAVs. The system can be configured in racks for ship-based operations, shelterized as a land-based system, or integrated into a shelter on a HMMWV. There are five levels of TCS functionality. Levels I and II enable receipt of imagery. Levels III and IV provide command and control of the air vehicle and payload and imagery receipt. Level V provides complete C2, payload control, imagery receipt, and the ability to takeoff and land. These capabilities allow the battlefield commander to receive and in some cases direct the collection of imagery from any tactical UAV asset in the area of operations.

» RAYTHEON SPACE AND AIRBORNE SYSTEMS (SAS)

AN/AAS-52 MTS

The AN/AAS-52 Multi-Spectral Targeting System (MTS) combines electro-optical (EO), infrared (IR), laser designation, and laser illumination capabilities in a single sensor package. The multi-use system offers long-range surveillance, target acquisition, tracking, rangefinding, and laser designation.

System components: Multiple wavelength sensors; TV cameras (near-IR and colour); illuminators; eyesafe rangefinders; image fusion; spot trackers and other avionics.

MTS-B MULTI-SPECTRAL TARGETING SYSTEM

An electro-optical, infrared, laser designation, and laser illumination capabilities integrated in a single sensor package.

Features: FOW (degrees) - Width: 34 x 45; medium-wide: 17 x22; narrow: 0.47 x 0.63 (IR and TV); ultra narrow: 0.08 x 0.11 (TV). Electronic zoom (IR & TV): 2:1 and 4:1 in smallest FOVs.

Maximum airspeed: >200kts IAS. Automatic video tracker: multimode (centroid, area, and feature). Interface: 1553 data bus and/or discrete controls. Video outputs: RS-170 (525-lines), digital, and other formats available. Cooling: self contained.

Power: 28 VDC aircraft power. **Weights and dimensions (approx.):** WRA-1: 230 lbs; 22 in. diameter. WRA-2: 25 lbs; ½ ATR, (LxWxH) 14.4 in. x 4.9 in. x 7.6 in.

» ROKE MANOR RESEARCH LIMITED

MINIATURE RADAR ALTIMETERS MK VI

The Mk VI has been developed using a combination of Mk IVa and Mk V technologies and combines the best of both worlds - a high operating altitude and high accuracy. The microwave (MW) operating mode offers a 1.5 m to 700 m operational altitude range for high speed operation while the millimetre wave (MMW) operating mode provides for high accuracy vertical takeoff and landing operation from 0.2 m to 100 m.

Specifications: Power: 12V 0.5A (MMW), 28V @ 0.3A (MW). Temperature: -40 to +70C. Size: 100 x 75 x 70 mm (MMW), 150 x 80 x 54 mm (MW). Weight: 400 g. Interface: RS 232.

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» ROTOMOTION LLC

UAV HELICOPTER CONTROLLER

The UAV system (Patent Pending) is an integrated package designed to control and guide an R/C-class helicopter. A 1.25lb box is mounted to the helicopter and uniquely tuned for the customer's airframe. An additional 7.2lb battery is required to run the guidance system. The servo driver, safety over-ride and RX are powered by a separate, but conventional, 4.8V R/C RX battery. The operator is required to take-off and land the helicopter manually. Once the helicopter has taken-off and is placed into a hover, a switch is flipped on the transmitter and the helicopter goes into autonomous mode. At this point, the helicopter no longer requires direct manual control. The autonomous flight control system utilizes an advanced stable-hover (Patent Pending) control system.

» SIERRA NEVADA CORPORATION

UCARS-V2

This automatic landing system is a second generation version of the AN/UPN-5(V) UAV Common Automatic Recovery System (UCARS) providing automatic landing guidance on board ships at sea. **Features:** Performs takeoff and recovery in bright sunlight, fog, rain, at night and in most sea conditions. Flexible architecture for integration with any shipboard or land-based UAV system. 35 GHz airborne subsystem-to-track subsystem communication is difficult to jam and detect. Meets shipboard and airborne E3 requirements (Mil-Stds-461 & 464). Interfaces with NATO STANAG 4586. **Airborne Sub-system:** Weighs approx. 3.5 pounds (1.6 kg). Transponder dimensions: 6.35 x 9.34 x 19.83 cms. Requires 28 VDC aircraft power at 25 watts.

» TADIRAN ELECTRONIC SYSTEMS LTD

MRS-2000

All digital man-pack receiving system. Fully integrated control and communications system is based on the company's Man-Pack Receiving System (MRS) and Man-Pack Control System (MCS), which now adds powerful new control capabilities to the widely deployed MRS. It provides a non-LoS (Line of Sight) view of the enemy, enabling commanders to make mission-critical decisions based on a complete IMINT (Image Intelligence) and tactical situation awareness picture of "over-the-hill" scenarios.

» TADIRAN SPECTRALINK LTD

TACTICAL DIGITAL DATA LINK (TDDL) SYSTEM

Latest-generation Ku-band wireless communications system implemented in a flexible architecture configuration and featuring software-defined radio (SDR) technology, which enables vast waveforms and frequency allocation as well as the ability to comply with a variety of different military standards, including provision for interoperability with TCDL and STANAG 7085. **Characteristics:** Range: Greater than 200 km without relay. **Frequency bands:** UHF, L, S, C, X, and Ku. **Data rates:** Uplink -9.6 to 200 kbps; Downlink -1.6 to 10.71 mbps, upgrade to 45 mbps. **Control interfaces:** MIL-STD-1553B, RS-422; 10/100 Base-T; remote operation via F/O interface available. **Weight:** <6 kg. **Power consumption:** <200W. **Digital data rate:** 3 up to 45 Mbps. **Modes of operation:** Analogue/digital video, digital data, telemetry. **Immunity:** Clear or Jam-Resistant, LPD/LPI, using DS/SpSp techniques. **Options:** (1) Capability for simultaneous transmission of data from multiple low and high rate sensors and payloads; (2) Provision for encryption.

» UAV FLIGHT SYSTEMS INC.

AP50

AutoPilot (AP) includes complete 3-axis sensing, GPS navigation, and dual channel analog data logging. The AP50 is designed to work with a wide range of RC-based UAV platforms. The AP50 fulfills two primary functions: navigation and flight stability control. The navigation role includes performing mission-related tasks including controlling three (3) mission servos, three (3) TTL-level digital outputs, engine shutdown and data logging. The stability control task is accomplished with a 6-state user-defined control law table for each flight control surface based on a modified PID (Proportional-Integral-Derivative) control algorithm. **Specifications:** Weight: 50 g; Size: 144 x 47 x 41 mm; Power: 750mW (~120 mA @ 5.4 to 8 VDC).

» UAV NAVIGATION

AP04

The Autopilot 4 (AP04) is a fully integrated autopilot with manual override, radiolink, and payload control capabilities, and is capable of fully automatic take-off, flight plan following, and landing. **Specifications:** Power: 7V to 14V unregulated supply; 2.1W (typical) power consumption; Environmental: -40C to +75C temperature range; >20G vibration.

» UNAV LLC

UNAV 3300

A digital flight control and telemetry system using 3-axes MEMS, IMU attitude sensor and 3-axes Kalman filter. It is a full featured, tightly integrated digital autopilot and ground station system. The autopilot updates the attitude control loop 18 times per second while managing the vehicle flight path, GPS waypoint navigation and data-link. The 3300 is capable of providing a full-duplex (up & down) data link with the ground station. **Specifications:** Dimensions: 4.0" L x 2.0" W x 1.6" H, Weight: 3.0 oz; Altitude: 15,000 ft MSL; Power: 5.5v - 14.0v @ 180mA.

» WECONTROL

WEPCS

The weGCS ground control station has been designed to monitor and control the wePilot1000 flight control system. It runs on Windows 2000/XP on a field laptop which communicates via a data-link connection with the aircraft. The weGCS software combines a mission planner and a mission executer.

WEPILOT1000

Flight control system for small remote-controlled helicopters. Plugged in between the RC receiver and the servo actuators. Consists of a flight control processor with a built-in embedded computer system, a GPS receiver, a full six-degree of freedom inertial measurement unit, and an external connectable magnetometer. General purpose I/O interface allows control of custom payload equipment. Optional data-link mat be added to visualise data on a GCS.

RADAR

» EADS DSS

MISAR

Miniature Synthetic Aperture Radar (MISAR) is specially applicable for miniature UAVs. Provides high-resolution images regardless of daylight and weather conditions. Real-time SAR image processors provide motion-compensated multi-look images and moving target indication (MTI) on-board and on-ground. **Features:** All weather capability. High resolution, range independent. Ground image. A high-resolution K-Band SAR with all weather capability. **Weight:** 4 kg. **Power:** <50 W.

» EDO CORPORATION

AN/APS-144 SAR/MTI MODULAR RADAR

This dual function radar is easily installed in helicopters, light aircraft, and UAVs or in an external pod mounting. The SAR function in the AN/APS-144 complements the MTI function with its ability to image fixed targets in a spot or strip mode. The spot SAR mode provides very high-resolution images of fixed targets from an airborne platform, while the strip mode provides wide-area fixed target imagery. In the MTI function the AN/APS-144 provides wide-area surveillance of moving targets, and cueing of optical or IR sensors for a variety of needs such as battlefield surveillance, tactical border patrol, and drug interdiction applications. The AN/APS-144 has a number of features that provide size, weight, and installation advantages. **Weight:** 75 lbs. **Power:** 450 Watts **MTI Coverage:** 3 to 15 km search mode with 75-m resolution. Dual 3 km swaths (3 - 9 to 6-12) or 3 km spotlight zoom mode. **MTI Coverage:** 500M x 500M (Fine Resolution 0.3M), 1500M x 1500M (Coarse Resolution 1M). **Strip Mode:** 1500M meter wide continuous strip.

» EDO DEFENSE PROGRAMS AND TECHNOLOGIES

AN/APS-144 SAR/MTI MODULAR RADAR

Dual function radar: The SAR function complements the MTI function with its ability to image fixed targets in a spot or strip mode. The spot SAR mode provides very high-resolution images of fixed targets from an airborne platform, while the strip mode provides wide-area surveillance of moving targets, and cueing of optical or IR sensors. **Weights:** 75 lbs. **Power:** 450 Watts. **MTI Coverage:** 3 to 15 km search mode with 75-m resolution. Dual 3-km swaths (3 - 9 to 6-12) or 3-km spotlight zoom mode.

» GENERAL ATOMICS AERONAUTICAL SYSTEMS

LYNX I AN/APY-8 HIGH-RESOLUTION RADAR

A high-resolution, wide area surveillance Ku-Band SAR/GMTI radar with unique intelligence analysis and targeting capabilities. The Lynx I radar has multiple image exploitation modes and GMTI capabilities that provide imaging and tracking applications for the most demanding operations. Capabilities include change detection modes, precision targeting, near all-weather target classifications, and tracking. The radar is operational on multiple airframe configurations, including manned and unmanned fixed wing and rotary wing systems. Lynx I is deployed throughout the world with missions against significant real world threats. **Performance:** multiple resolutions from 3m to 0.1m in appropriate spot, strip, and GMTI modes. Maximum ranges for SAR in clear weather are out to 90 km, and out to 30 km for GMTI. **Weight:** 52 kg **Power:** 28 Vdc, <1,250W **Options:** CLAW Sensor Control and Data Mining Software provides multi-sensor, multi-mode controls, data-basing and advanced radar and optical sensor processing. CLAW is a PC/Windows-based system that enhances productivity via near real-time image processing, providing the opportunity to command additional imagery from either SAR and/or GMTI modes, as well as cross-cueing/cross-commanding other sensors and their respective modes.

www.uavnavigation.com
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LYNX AN/DPY-1 LIGHTWEIGHT HIGH-RESOLUTION RADAR

A reduced weight, power, and volume variant of the Lynx I AN/APY-8 radar. The Lynx II radar is a high-resolution, wide area surveillance Ku-Band SAR/GMTI radar with intelligence analysis and targeting capabilities. Lynx I has multiple image exploitation modes and GMTI capabilities that provide imaging and tracking applications. Capabilities include change detection modes, precision targeting, near all-weather target classifications, and tracking. In addition, Lynx II has been ruggedized to meet the most demanding battlefield environments with enhanced reliability and maintainability. It is a candidate system for integration into the US Army's future rotary and fixed-wing UAVs. **Performance:** multiple resolutions from 3m to 0.1m in appropriate spot, strip, and GMTI modes. Maximum ranges for SAR in clear weather are out to 90 km, and out to 30 km for GMTI. **Weight:** < 40 kg **Power:** 28 Vdc, < 1000W **Options:** CLAW Sensor Control and Data Mining Software provides multi-sensor, multi-mode controls, data-basing and advanced radar and optical sensor processing. CLAW is a PC/Windows-based system that enhances productivity via near real-time image processing, providing the opportunity to command additional imagery from either SAR and/or GMTI modes, as well as cross-cueing/cross-commanding other sensors and their respective modes.

» IAI/ELTA SYSTEMS LTD.

EL/M-2022U - UAV MARITIME PATROL RADAR SYSTEM

The EL/M-2022U belongs to a family of multi-role, multi-mode airborne maritime surveillance radars incorporating new technologies, operational feedback and experience of more than 30 years in radar development and manufacture. The EL/M-2022U consists of a UAV Radar Payload and a Ground Radar Operator Station that controls the radar's operation and processes the data sent by the Radar Payload via the UAV's data link. **Sea Mode:** Detection of small to large ships with automatic tracking of all detected targets. **Classification Mode:** Range Signature and Inverse SAR (RS & ISAR) imaging with automatic classification to class (ISAR library). **Imaging Mode:** Wide area Strip-SAR imaging and high-resolution Spot-SAR imaging for littoral surveillance. **Air-Mode:** Airborne targets detection and tracking. **Nav/Weather Mode:** Real Beam Mapping (RBM) and 4-colour Weather Avoidance display. **Modular Radar Payload Configurations:** MALE UAV: 114Kg / 2300 Watt V-UAV: 50Kg / 1000 Watt **Ground Radar Operation Station (GROS):** Advanced data processing and friendly Human-Machine-Interface (HMI). - Automatic and/or Computer-aided tools for data interpretation and reporting. - Modular configurations. - Direct interface with the UAV Ground Control Station (GCS).

EL/M-2055 SAR/GMTI RADAR

SAR/GMTI radar sensors provides a state-of-the-art solution for all-weather, air-to-ground ISTAR applications onboard manned and unmanned aircraft. **EL/M-2055D:** (downsized)- a single Line Replaceable Assembly with Medium Power Transmitter and Compact Antenna. Optimal configuration for Tactical UAVs carrying either single or dual payloads. The Radar fits existing EO/IR sensor mountings (e.g. IAI/TAMAM -MOSP) for rapid UAV reconfiguration. **EL/M-2055DX:** downsized-extended range - made of two LRUs, the Radar Processor and the Mid-sized Antenna and Transmitter Assembly. Best configuration for mid-sized tactical or MALE UAVs or Light Reconnaissance Aircraft. **EL/M-2055M:** for high altitude MALE UAVs and long-range reconnaissance aircraft. The Radar contains three major LRUs: the Radar Processor; the High Power Transmitter and Large-aperture Antenna Assembly.

» IMSAR

NANOSAR

Micro miniature Synthetic Aperture Radar (SAR).

Specifications: Operating Mode: Stripmap. Processing: Onboard, Real-Time. Output: Onboard, real-time NTSC video. Control: RS232, RS485. **Weight:** 1 to 2 lbs, option dependant. Size: 82 x 5 x 3 inches to 5 in, option dependant. Range: 3300'. Resolution: ~14 x 14 in. **Power:** 10 to 25 Watts, option dependant. Transmit Frequency: X-Band **Options:** Ground Motion Target Indicators (GMTI). Motion compensation. Geo-location. 802.11g data link. Onboard Flash drive storage. Real-time pan and zoom. Package 1: Insitu A-20 plug and play module Package 2: Manned aircraft pod Package 3: Custom module

» LOCKHEED MARTIN

RAIDER

Real-time Active Imaging in 3-D at Extended Range (RAIDER) multi-sensor system. This is an extended-range version of the Polarimetric Imaging Laser Radar (PILAR) system. RAIDER includes an enhanced Forward Looking Infrared (FLIR) system, TV camera and upgraded Laser Detection and Ranging (LADAR) capability. The system provides unique high-resolution, three-dimensional target imaging for military and civil applications. The improved LADAR in RAIDER allows the system to see over twice as far as the original PILAR, and fly at higher altitudes while mapping terrain. RAIDER offers vastly enhanced image quality and improves the speed at which the imagery is processed and transmitted. Additionally, the sensor is able to cover significantly wider search areas on the ground than previously possible. The system is designed to conduct wide-area searches and identify actual or potential threats, including targets partially obscured by camouflage or foliage. RAIDER is housed in a 20-inch turret.

» NORTHRUP GRUMMAN ELECTRONIC SYSTEMS

TESAR (AN/SPQ-1)

Tactical Endurance Synthetic Aperture Radar (TESAR). Surveillance radar. Operates in both synthetic aperture radar (SAR) and moving target indicator (MTI) modes. SAR mode is continuous, fully focus, high-resolution near real-time strip map imagery formed on either side of the UAV. Co-ordinates of each map centre are provided to within 25 metres CEP (assumes P-coded GPS). Radar provides two SAR strip map modes and a spot map mode. MTI mode, radar provides target reports overlaid on digital map.

» RAYTHEON SPACE AND AIRBORNE SYSTEMS (SAS)

ASARS-2

The ASARS-2 is the Advanced Synthetic Aperture Radar System designed for high altitude aircraft, like the Global Hawk. It is a real-time, high-resolution reconnaissance system with all-weather, day-night, long-range mapping capabilities.

HISAR

This synthetic aperture radar (SAR) is an adaptable airborne surveillance system that incorporates multiple sensors, air and ground workstations, and data links to fit a variety of mission needs. **Performance** Stripmode has a 6 m resolution and a SAR Spot mode with 1.8 m resolution. Both modes are positionable from 20 to 110 km in range. The MTI feature detects moving land and sea contacts. **Frequency** X-Band. **Weight** 250 kg (approx. radar and airborne work station. **Integrated Options** FLIR; LOROPs; SIGINT and a variety of radios, datalinks, and ground stations.

» SANDIA NATIONAL LABORATORIES AND ROCKWELL COLLINS

MINISAR

The system weighs 12kg and is made up of the antenna-gimbal assembly (8kg) and the 4kg radar electronics assembly (REA), and measuring about 18cm on either side. The system's current mode is spotlight SAR, with plans to include strip map mode and a ground moving target indicator (GMTI). It provides 4-inch resolution at 10km, 0.3m resolution at 15km and 1m resolution at 23.km. The unit operates on a 16.8-GHz frequency that is extensible to X and Ka Bands, while the antenna provides 3-GHz frequency range in the Ku-Band. Waveform synthesizer: 3U, cPCI, FPGA-based, quadrature outputs (1.2 GHz clock, agile, programmable).

» SELEX SENSORS AND AIRBORNE SYSTEMS (SELEX S&AS)

PICOSAR

Lightweight, compact Active Electronically Scanned Array (AESAs) radar for small airborne platforms. PicoSAR is a Synthetic Aperture Radar (SAR) which provides high-resolution ground mapping and ground moving target indication (GMTI) in all weather conditions. It consists of a single line replaceable unit (LRU) with a connector for a GPS antenna and combined 28-volt DC power/Ethernet interface. PicoSAR weighs < 22lbs (10kg), operates in the X-Band and provides spotlight mode images at a resolution of < 1 meter at > 6.2 miles (10km). Additional modes include strip map, continuous built-in test and interruptive built-in test. Electronics for the radar are packaged in an air-cooled unit with internal fans.

» THALES AIRBORNE SYSTEMS

I-MASTER

A lightweight high performance combined Synthetic Aperture Radar (SAR) and Ground Moving Target Indicator (GMTI). The GMTI is able to detect both vehicle and infantry movements at ranges up to 20km. **Dimensions / weight** 450 mm (H) x 370 mm (Diameter) / 30 kg **Power** 500 W **SAR Performance** Stripmap: 20 km range; Spotlight: 8.5 km range.

» TNO PHYSICS & ELECTRONICS LABORATORY

MINI-SAR

Scalable synthetic aperture radar (SAR) / moving target indicator (MTI). **Frequency** X-Band. **Dimensions / Weight** Three antenna panels of 15 cm each / <50 kg.

Performance: 0.3 to 1 m resolution in stripmap- and 0.05 m in spotlight mode. Minimum detectable velocity (MDV) of 3 km/h with 0.7 km/h accuracy.

