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2020/21

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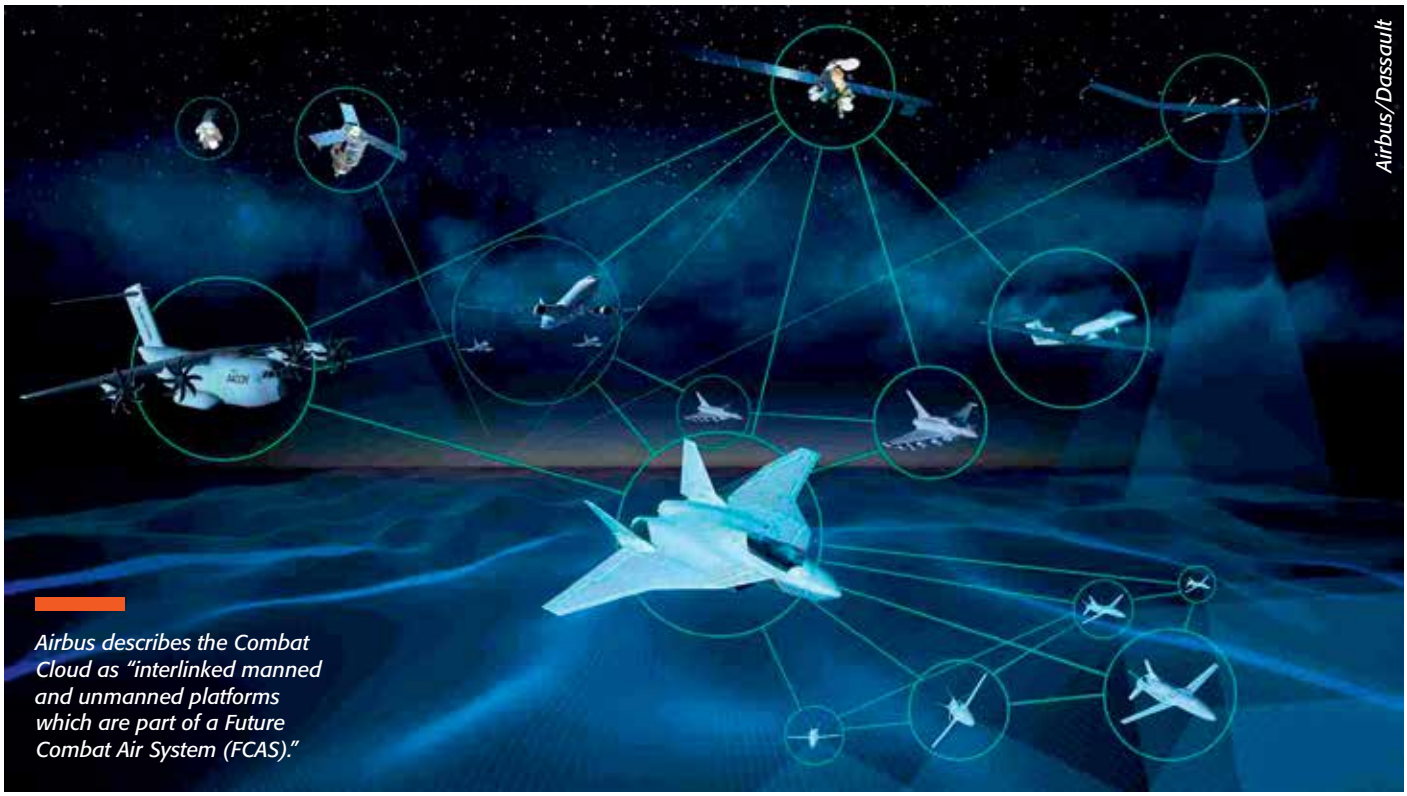


Airbus describes the Combat Cloud as "interlinked manned and unmanned platforms which are part of a Future Combat Air System (FCAS)."

LOYAL, UNAFRAID AND UNMANNED

The role of networked unmanned wingmen closely supporting manned jet aircraft is a vision that is now being realised.

Peter Donaldson

Manned-unmanned teaming (MUM-T) is major theme of big ticket development programmes on both sides of the Atlantic among the Five Eyes (FVEY) group of countries, with the European Future Combat Air System (FCAS) and US/Australian Airpower Teaming System (ATS) taking significant steps forward in recent months.

Phase 1A of the overarching FCAS demonstration programme launched earlier this year on 12 February has Dassault as prime contractor for the manned New Generation Fighter (NGF) with Airbus as its main partner, and Airbus acting as prime for the unmanned Remote Carrier (RC) element with missile specialist MBDA as main partner.

Naturally, robust and secure networked communications are considered crucial to the concept of operations in which the manned platform will manage a diverse package of UAVs that will do the dull, dirty and dangerous work inside the engagement zone of modern Integrated Air Defence Systems (IADS).

Airbus is also serving as prime on the Air Combat Cloud (ACC) that is to provide the airborne infrastructure with reachback to home networks that will serve up tactically relevant and timely information to reconnaissance and strike packages. Thales is taking on the role of main parter on ACC.

All the companies involved in FCAS are committed to cooperation on a common simulation environment to ensure consistency between demonstrators.

REMOTE CARRIERS

As prime on the RC element, Airbus is addressing the entire scope and additionally focusing on artificial intelligence (AI) as it applies to teaming, and will also develop the medium-to-large platforms. The company has extensive experience with platforms from small to large and with teaming, having operated the Barracuda demonstrator since 2006. This vehicle has acted as a testbed for technologies and procedures to be used by the next generation of UAVs in fast reconnaissance, surveillance, targeting and Battle Damage Assessment (BDA) missions. Missile specialist MBDA is to develop the small and medium RC platforms.

As force multipliers, RCs will take on specific roles in high-risk environments and provide new capabilities in conjunction with, and coordinated by, manned air assets including but not limited to the NGF.

One particularly crucial aspect of teaming will be cross-platform mission management, allocating and reallocating tasks to different vehicles, both individually and in groups, as mission phases unfold. The idea is for the RCs

Boeing Australia first fuselage was completed at the beginning of the year. The Loyal Wingman concept feeds into Boeing's manned-unmanned Airpower Teaming System (ATS).

Boeing

to complement and augment the manned fighters, cooperating closely but with enough autonomy to improve performance in high-intensity conflicts and increase combat mass to compensate for the small numbers of sophisticated manned fighters that defence spending plans are expected to fund.

It is likely to be the RC vehicles that benefit from more radical designs, as it is easier to adopt and develop new technologies quickly with unmanned platforms than with manned ones, and types being studied include some that can be employed in expendable swarms, as well as more sophisticated groups that can take on more demanding missions with a high degree of autonomy and task sharing, prioritisation and reallocation. The scope here is broad, but one of the high level goals is to enable safer penetration of hostile airspace by manned aircraft. That is a tall order today, as Russian and Chinese IADS technology is generally believed to have the upper hand.

AIR COMBAT CLOUD

On 20 February it was announced that Airbus and Thales had joined forces to develop the ACC, and the companies are set to work together on the structural design of the communications system needed to support collaborative national and multi-national air operations and that will link the manned and unmanned assets. ACC's purpose is to connect and synchronise all the platforms and enable the processing and distribution of information to enhance situational awareness and collaborative operation, the companies explain.

The agreement represents the ACC pillar within Phase 1A of the FCAS demonstration effort, is to lead up to the early technology demonstrations intended to showcase ACC capabilities in a real world environment. Covering a period extending 18 months from signature date, it is also regarded as the starting point for further demonstrations and technology development.

Airbus has extensive experience in the development of sophisticated military aircraft for both combat and supporting roles, along with the development and integration of mission systems and weapon. The company will also bring its expertise in space systems and collaborative digital C5ISR (Command, Control, Communication, Computers, Cybersecurity, Intelligence, Surveillance & Reconnaissance) technologies to bear.

Design and implementation of ACC's first instantiation will be within the framework of Franco-German FCAS cooperation. Subsequently, the intention is to enlarge its scope to include national air forces at European level, should member nations decide to join the programme. Further, incremental inclusion of existing platforms and related collaborative combat capabilities is expected to combine with the NGF and RC unmanned vehicles as they come on stream to that full FCAS capability is anticipated by 2040.

LOYAL WINGMAN

February also saw Boeing Australia announce that it had completed the first fuselage for a Loyal Wingman unmanned aircraft, a concept demonstration vehicle that is to form a key element of Boeing's manned-unmanned Airpower Teaming System (ATS) effort.

Loyal Wingman is an advanced development programme being pursued jointly by Boeing and the Royal Australian Air Force (RAAF) along with an Australian industrial team. The aircraft measures 38 foot (11.7m) in its largest dimension, and digital engineering and advanced composite materials have been used by the Australian team to achieve their goals for low cost and high agility.

Team member BAE Systems Australia provided hardware kits including flight control computers and navigation equipment, while RUAG Australia provided the landing gear, AME Systems wiring looms, and Ferra Engineering various precision-machined components and sub-assemblies.

Following on from construction of this first major structural assembly, the next major milestone that must be achieve is to install the undercarriage so that the fuselage can come out of its assembly jig to continue systems installation and functional testing. Before COVID-19, the aircraft had been expected to fly for the first time this year.

This first prototype is intended to provide lessons that will feed into the development of ATS, which is what Boeing Australia is currently calling the operational aircraft it will offer to the global defence market. Boeing says that this aircraft represents its biggest investment in a new UAV outside the US and that it will provide fighter-like performance and a range of more than 2,000 nautical miles. It is also to carry integrated sensor packages to support ISR and EW missions and also to exploit artificial intelligence to operate independently or in support of manned aircraft while maintaining safe separation.

DARPA WANTS SWARMS

Other advanced capabilities under investigation include swarms of dissimilar unmanned systems, both airborne and ground based, capable of conducting military operations in urban environments. This is the subject of the US Defence Advanced Research Agency's OFFensive Swarm-Enabled Tactics (OFFSET) initiative. Under OFFSET, nine contractors are to start work on what DARPA describes as the 'fifth swarm sprint' for the programme, which envisions up to 250 collaborative autonomous systems providing insights to ground troops operating in dense, crowded towns and cities.

Key areas to be investigated under OFFSET include swarm tactics, swarm autonomy, human-swarm teaming, virtual environments and physical testbeds. As the "sprint" label implies, the intention is to foster rapid innovation and continuous incorporation of new technologies.

The fifth swarm sprint is focused on the physical testbed and swarm tactics. Organisations selected for the first include

The US Defense Advanced Research Projects Agency (DARPA) is experimenting with using a swarm of autonomous drones and ground robots to support military missions.

Michigan Technological University/Michigan Tech Research Institute, the Johns Hopkins University Applied Physics Laboratory, HDT Expeditionary Systems, Sentien Robotics and Texas A&M University. They are to focus on speeding up integration of hardware and enhancements to reduce swarm deployment time, introducing new navigation and perception sensors, employing fixed-wing aircraft into swarm operations, and enhancing the mobility of wheeled vehicles.

In addition to Michigan Tech, Charles River Analytics, Soar Technology, and Northwestern University are working on the swarm tactics area and are to focus on the design and implementation of new tactics using a swarm of air and ground robots, and addressing mission objectives such as to seize key urban terrain within eight square city blocks over a mission duration of four-to-six hours. According to DARPA, proposed tactics include disrupting enemy decision making, obfuscating the swarms intent, updating maps of a dynamic environment, and maintaining the swarm's communications inside buildings.

In other developments, Elbit announced $20 million worth of contracts in April to upgrade Hermes 900 MALE UAVs for Latin American customers, integrating satcom and automatic take-off and landing systems into aircraft already in service.

In April, the US Ambassador to South Korea revealed the delivery of a Global Hawk HALE UAV system to an undisclosed location, with more expected. South Korea bought four Block 30 RQ-4s in 2011.

CHINA RISING

Illustrating China's growing prowess in the UAV arena, a Chinese military website published a brief analysis of the popularity of the Predator-like Wing Loong system, which it called China's best selling armament. The 30ft (9m) long, one tonne aircraft has a 46ft (14m) wingspan and can carry two missiles under the fuselage at once. Wing Loong has been exported to more than a dozen countries in recent years, *China Military Online* said. It also expressed the opinion that the Wing Loong's competitive price of around $1 million for a single air vehicle, rising to about $3 million with the GCS, was a major reason for its success. Other Chinese UAVs, big and small, have a growing presence in the world military market. A

AERONAUTICS

ORBITER 4

Span: 5.4m
Maximum take-off weight: 50kg
Range: Line of sight up to 150km comms range
Speed: 70kts
Endurance: up to 24hr
Altitude: 18,000ft
Payload capacity: Two payloads, up to 12kg. Stabilised pod with day, night (cooled IR) sensors, laser designator, COMINT, ELINT, VISINT, photogrammetric mapping (HDLite), synthetic aperture radar, maritime patrol radar, LiDAR, Automatic Identification System
Powerplant: Spark ignition multi-fuel engine
Launch/Recovery: Catapult and compact, foldable net
Remarks: Designed for shipboard and land-based applications including ISTAR, fire control electronic warfare, comms relay & ship self-defence.

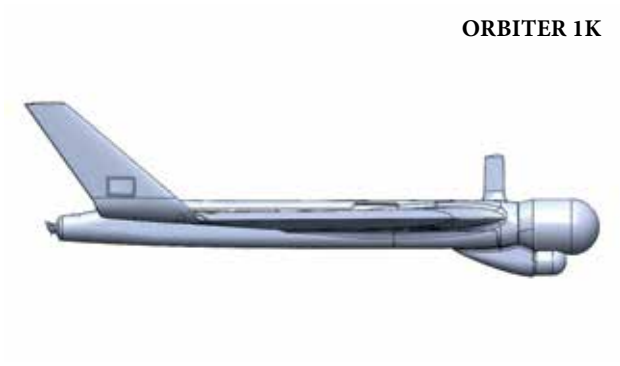
ORBITER 3

Span: 4.4m
Maximum take-off weight: 30kg
Range: line of sight up to 150km
Speed: 70kts
Endurance: 7hr (up to 100km from base)
Altitude: 18,000ft
Payload capacity: 5.5kg. Controp T-STAMP tri-sensor EO (Day/Night), cooled, laser pointer. D-STAMP: day (CCD) EO. UZ-STAMP: Night (uncooled IR). M-STAMP: Dual Day (CCD) and Night (Uncooled IR) EO. Rafael HD-Lite: Photogrammetric mapping, 3D modelling.
Powerplant: Propeller driven by an electric motor
Launch/Recovery: Cat/net
Remarks: In service with domestic & export customers. Can complete missions without GPS or datalink.

ORBITER 2

Length: 1m (estimated)
Span: 3m
Maximum take-off weight: 10.3kg
Range: 40-50km
Speed: 50kts
Endurance: up to 4hrs
Altitude: 18,000ft
Payload capacity: 1.5kg. Controp stabilised payloads including EO/IR/laser, laser designator, EO HD, Rafael HD-Lite photogrammetric mapping & 3D modelling sensor, Netline Woodpecker comms jammer, Aeronautics K-munition warhead, L3Harris comms relay.
Powerplant: Electric motor driving pusher propeller
Launch/Recovery: cat/para
Remarks: In service with domestic and export customers inc Finland.

ORBITER 1K



Length: 1m approx
Span: 2.9m
Maximum take-off weight: 13kg
Range: 100km
Speed: 30 to 70kts
Endurance: 2.5hrs
Altitude: 8,000ft AGL
Payload capacity: 3kg.
Stabilised mini dual EO\IR camera.
Powerplant: Electric motor driving pusher propeller
Launch/Recovery: cat/precision net or expendable
Remarks: Loitering munition based on Orbiter 2 MUAS.

AEROSTAR

Length: 4.5m
Span: 8.7m
Maximum take-off weight: 230kg
Range: 250km
Speed: 110kts max
Endurance: >12hrs
Altitude: 18,000ft
Payload capacity: 50kg. Options include stabilised EO/IR sensors, laser designation, synthetic aperture radars with ground moving target indication, ELINT and COMINT systems. Customers include: Israel, General Dynamics, CIS, the Netherlands & Poland.
Powerplant: Zanzottera 498i fuel injected 2-str twin, 38 hp
Launch/Recovery: conv/conv
Remarks: Tactical UAS with over 250,000 operational flight hours logged.

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DOMINATOR

Length: 8.6m Span: 13.5m
Maximum take-off weight: 1,910kg
Range: LOS 300km, BLOS satcom unlimited
Speed: 150kts max Endurance: > 20hrs
Altitude:>27,000ft
Payload capacity: 373kg. Options include EO/IR and hyper-spectral sensors with laser pointer and designator, maritime radar, SAR\GMTI radars, communications relays, COMINT, ELINT, MAD etc.
Powerplant: 2 x 170hp Austro AE300 jet fuel piston engines
Launch/Recovery: conv/conv
Remarks: Operators include Mexico & Turkey. Operational in GPS-denied environments.

AEROVIRONMENT

PUMA 3AE

Length: 1.4m Span: 2.8m
Maximum take-off weight: 6.8kg
Range: 20km or 60km with long range comms antenna
Speed: 25-45kts
Endurance: 2.5hrs with an LE battery Altitude: 300-500ft AGL
Payload capacity: > 0.85kg. Mantis i45 Gimbaled payload with dual 15mp EO cameras, 50xf zoom, IR camera and low light camera for night operations, and high-power illuminator
Poweplant: battery electric
Launch/recovery: hand or rail/autonomous or manual deep stall landing
Remarks: All-environment 3rd generation Puma mini-UAS with new propulsion system making hand launch easier, enhanced sensor suite.

RAVEN

Length: 0.91m Span: 1.37m
Maximum take-off weight: 1.9kg Range: 10km comms range
Speed: 17-44kts Endurance: Up to 1.5hrs.
Altitude: 500ft AGL, 14,000ft MSL launch
Poweplant: battery electric
Payload capacity: 0.17kg. Dual forward and side-looking EO or IR camera nose with electronic pan-tilt-zoom & stabilisation.
Launch/recovery: hand/deep stall landing
Remarks: Most are operated by the US, but foreign customers have included Australia, Estonia, Italy, Denmark, Spain and the Czech Republic.

SWITCHBLADE LOITERING MUNITION

Length: <0.6m estimate Span: <0.9m estimate
Maximum take-off weight: < 2.5 kg Range: 10 km
Endurance: 15min Speed: 55 to 85kts
Altitude: < 500ft AGL, > 15,000ft MSL
Payloads: Dual front and side look EO cameras and IR nose camera. Stabilised electronic pan-tilt-zoom, Orbital ATK advanced munition warhead.
Powerplant: battery electric
Launch/recovery: tube/NA
Remarks: US Army and USMC are the primary users.

BLACKWING

Length: 45.5cm Span: 69cm
Maximum take-off weight: 1.8kg Range: 10-45km
Speed: 87kts Endurance: 1hr estimate
Altitude: < 500ft AGL
Payloads: Modular. Includes Front and side look day/night cameras, tactical data relay.
Powerplant: battery electric
Launch/recovery: Underwater-to-air delivery canister, multi-pack
Remarks: Submarine-launched ISR UAV in service with the US Navy.

WASP AE

Length: 0.76m Span: 1.02m
Maximum take-off weight: 1.3kg
Range: 5km LOS, more with DDL relay
Speed: 20-45kts Endurance: 50min
Altitude: 500ft AGL
Payloads: Gimbaled payload with pan and tilt stabilised high resolution EO & IR camera in a compact aerodynamic modular payload.
Powerplant: battery electric
Launch/recovery: hand, remote/deep stall landing in confined area
Remarks: Serves with US Army and export customers including Australia.

VAPOR 55

Length: 1.9m Span: 2.3m rotor diameter
Maximum take-off weight: 24.9kg Range: 56km
Speed: 15m/sec (speed-over-ground limit)
Endurance: 60 mins cruise, 45 minute hover
Altitude: 0-12,000ft MSL
Payload capacity: 4.5kg. Options include EO/IR sensor, lidar, hyperspectral imager, PPK mapping, drop deployment mechanism
Powerplant: electric motor powered by high-energy-density lithium polymer batteries
Launch/recovery: automated VTOL
Remarks: All-electric helicopter UAS build with military grade components.

VAPOR 35

Length: 1.941m
Span: 1.7m rotor diameter
Maximum take-off weight: 14.5kg
Range: 56km
Speed: 15m/sec (speed-over-ground limit)
Endurance: 1hr cruise, 45 minute hover
Altitude: 0-12,000ft MSL
Payload capacity: 2.27kg. Options include EO/IR sensor, lidar, hyperspectral imager, PPK mapping
Powerplant: electric motor powered by high-energy-density lithium polymer batteries
Launch/recovery: automated VTOL
Remarks: All-electric helicopter UAS build with military grade components.

AIRBUS HARFANG

Length: 9.3m
Span: 16.6m
Maximum take-off weight: 1,250kg
Range: 1,000km
Speed: 110kts
Endurance: 12hr at 550nm from base
Altitude: 25,000ft
Payload capacity: 250kg. Synthetic aperture radar with 1 m resolution, Wide-Area Surveillance (WAS) & spot modes, EO/IR turret also with WAS & spot modes, NATO-STANAG-3875-compliant laser designator, panoramic pilot assistance camera.
Powerplant: 115 hp turbocharged Rotax 914 piston engine
Launch/recovery: conv/conv
Remarks: Retired French systems acquired by Royal Moroccan Air Force.

ATLANTE

Length: 5.47m
Span: 8.0m
Maximum take-off weight: 570kg
Range: 200km on datalink
Speed: 108kts max, 73kts cruise
Endurance: > 10hrs
Altitude: 20,000ft
Payload capacity: 100kg. Retractable HD EO/IR turret as standard, SAR/GMTI, maritime radar, environmental sensors including releasable types are options.
Powerplant: 1 x internal combustion engine
Launch/recovery: conv/conv or cat/para
Remarks: Tactical UAS certifiable to operate in segregated air space.

KZO

Length: 2.25m
Span: 3.42m
Maximum take-off weight: 161kg
Range: > 140km (on data link)
Speed: 118.8kts
Endurance: 5.5hrs
Altitude: 11,500ft
Payload capacity: 35kg. Thermal imager system (8–12 µm or 3–5 µm), 3 x fixed-focus TV cameras (6 FoV), all 3-axis stabilised. Principal operator is the German Army.
Powerplant: 24kW 2-str engine
Launch/recovery: rato, cat/para
Remarks: Tactical UAS optimised for high speed reconnaissance missions.

VSR-700

Length: 6.2m
Span: 7.2m rotor diameter
Maximum take-off weight: 700kg
Speed: 100kts
Endurance: 8hrs with full tactical payload 80nm from ship
Altitude: 19,600ft
Payload capacity: 100kg. Naval-grade EO system, naval tactical radar, AIS, deck finder autoland system.
Powerplant: 155hp diesel and jet fuel engine
Launch/recovery: Automated VTOL
Remarks: Shipborne unmanned helicopter designed to operate alongside other shipborne naval assets.

ZEPHYR S

Length: 7.5m estimate
Span: 25m
Maximum take-off weight: <75kg
Range: >18,500km
Speed: approx 30kts
Endurance: > 30 days
Altitude: > 65,000ft
Payload capacity: 5kg. HD Optical / IR Video, AIS, Narrowband mobile comms (e.g. Tetra), 100Mpbs broadcast
Powerplant: Solar powered electric motors
Launch/recovery: conv/conv
Remarks: Solar-electric long-endurance UAV intended as a high-altitude pseudo satellite with the persistence of a satellite and the flexibility of a UAV

ZEPHYR T

Length: 6m estimate
Span: > 32m
Maximum take-off weight: 140kg
Range: > 18,500km estimate
Speed: approx 30kts
Endurance: > 45 days
Altitude: > 65,000ft
Payload capacity: 20kg. RADAR, LIDAR, ESM/ELINT, Broadband Comms
Powerplant: solar powered electric motors
Launch/recovery: conv/conv
Remarks: Larger variant of Zephyr with greater payload & endurance.

ARCTURUS

T-20

Length: 2.87m
Span: 5.33m
Maximum take-off weight: 84kg
Range: NA
Speed: 75kts
Endurance: 20hr
Altitude: 15,000ft rated, 25,000ft proven
Payload capacity: 34kg inc fuel. Cloud Cap Technologies 200 and 400 Series EO/IR are standard options. 3-D mapping, SAR, LIDAR, communications relay, COMINT, and SIGINT systems are available. Operators include the US & Mexican navies & reportedly the Turkish government.
Powerplant: 1 x 190cc fuel-injected Honda 4-str petrol
Launch/recovery: cat/belly
Remarks: UAV with CFRP monocoque fuselage that accepts oversized payloads, wing hard points.

JUMP 20

Length: 5.64m
Span: 2.87m
Maximum take-off weight: 95.25kg
Range: 125km
Speed: 72kts
Endurance: nine to 16hrs
Altitude: 15,000ft
Payload capacity: 27.2kg inc fuel. Cloud Cap Technologies 200 and 400 Series EO/IR are standard options. 3-D mapping, SAR, LIDAR, comms relay, COMINT, SIGINT systems available.
Poweplant: 1 x 190cc 4-str engine & 4 x electric motors, props for VTOL
Launch/recovery: VTOL, cat launch option
Remarks: Arcturus aircraft family are operated by US SOCOM under the Mid-Endurance Unmanned Aircraft Systems III contract. Jump 15 is smaller variant.

ARMENIAN ARMED FORCES

KRUNK

Length: 3.8m
Span: 5m
Maximum take-off weight: 214kg estimated based on approx payload fraction of 0.28
Speed: 82kts
Endurance: 5hrs
Altitude: 15,770ft
Payload: 60kg. Operators include the Armenian armed forces, the Republic of Artsakh
Powerplant: Internal combustion engine driving pusher propeller
Launch/recovery: conv/conv
Remarks: Intended for close reconnaissance, real-time visual or IR video transmission and capturing higher resolution stills.

BAYKAR

BAYRAKTAR AKINCI

Length: 12.2m
Wingspan: 20m
Maximum Take-Off Weight: 5,500kg
Range: LOS – BLOS (Global)
Endurance: +24hrs
Cruise - Max Speed: 130- 195knots
Altitude: 20,000ft - 40,000ft
Payload Capacity: 1,350kg
Payload - ISR: EO/IR/LD, Multi-Mode AESA Radar & SIGINT
Payload - Weapons: Laser Guided Smart Munitions, Missiles & Stand Off Weapons
Powerplant: 2x450 or 2x750 hp – Twin Turboprop Engine
Launch/Recovery: Autonomous
Remarks: The Bayraktar Akinci is a strategic class platform whose unique aerodynamic design provides less drag, more stability and lower fuel consumption.

BAYRAKTAR TB2

Length: 6.5m
Wingspan: 12m
Maximum Take-Off Weight: 650kg
Range: LOS - BLOS
Endurance: Up to 27hrs
Cruise - Max Speed: 70 - 120knots
Altitude: 18,000ft - 27,000ft
Payload Capacity: 150kg
Payload - ISR: Interchangeable EO/IR/LD or Multi Mode AESA Radar
Payload - Weapons: 4 Laser Guided Smart Munitions
Powerplant: 100 hp – Internal Combustion Engine
Launch/Recovery: Autonomous
Remarks: More than 120 in service with Presidency of Defence Industries, Turkish Land Forces, Turkish Gendarmerie, Turkish Navy, Turkish Police, National Intelligence Agency and numerous foreign customers.

BAYRAKTAR VTOL UAV

Length: 1.5m
Wingspan: 5m
Maximum Take-Off Weight: 30kg
Range: 150km
Endurance: 12hours
Cruise - Max Speed: 50 - 80knots
Altitude: 15,000ft
Payload - ISR: Multi Sensor Day, Night Cameras and Lasers
Powerplant: 4x electric engine & 6 hp internal combustion engine
Launch/Recovery: Autonomous
Remarks: Bayraktar Vertical Landing Unmanned Aerial Vehicle (VTOL) is a Mini Tactical UAV class aircraft capable of land or shipborne reconnaissance and intelligence missions.

BAYRAKTAR MINI

Length: 1.2m
Wingspan: 2m
Range: 15km
Endurance: 60min
Cruise - Max Speed: 30 - 40knots
Altitude: 2000ft
Payload – ISR: Interchangeable Day & Night Cameras
Powerplant: Electric
Weight: 5kg
Launch/Recovery: Hand Launched / Parachute or Belly
Remarks: More than 300 in operational with Turkish Land Forces, Turkish Gendarmerie, Turkish Police and a foreign customer.

BLUEBIRD AERO SYSTEMS

MICROB

Length: 1.02m
Span: 1.7m
Maximum take-off weight: 2.2kg
Communication range: 10km
Speed: 40.5kts cruise, 75kts max
Endurance: up to 2hrs
Best Operational Altitude: up to 3,281ft AGL
Ceiling: over 16,000ft ASL
Payload capacity: up to 0.3kg. Dual sensor (CCD / Uncooled IR) Gimbaled and stabilised surveillance payload
Powerplant: brushless electric motor, rechargeable battery
Launch/recovery: shoulder-fired launcher/para
Remarks: Micro UAS designed to provide similar capabilities to a mini UAV in a smaller, more affordable package.

SPYLITE

Length: 1.35m Span: 2.75m
Maximum take-off weight: 9.5kg
Communication range: 50km (standard), 80km (extended)
Speed: 32-65kts Endurance: 4hrs
Best Operational Altitude: up to 3,281ft AGL
Ceiling: over 30,000ft ASL Max Launch altitude: Over 16,400ft ASL
Payload capacity: up to 1.5kg. Single HD, dual or triple CCD IR and optional laser pointer gimbaled and stabilised payloads and/or optional high resolution, proprietary RGB/ multi-spectral/radiometric photogrammetric payloads for mapping.
Powerplant: brushless electric motor, rechargeable battery
Launch/recovery: auto cat/para, airbag
Remarks: Operational in Israel and by numerous international Defence, HLS and civilian customers.

WANDERB VTOL

Length: 1.79m Span: 3.1m
Maximum take-off weight: 13kg Communication range: 50-80km
Speed: 65kts Endurance: 2.5hours
Best Operational Altitude: up to 3,281ft AGL
Ceiling: 22,000ft ASL
Payload: 1.35kg. Day and IR stabilised cameras, photogrammetric, multi-spectral or radiometric mapping cameras for airborne ISR or Mapping on Demand.
Poweplant: Four battery driven VTOL electric motors and one electric pusher motor for level flight
Launch/recovery: VTOL
Remarks: Mini UAS optimised to facilitate covert, over-the-hill operations or extensive, day-and-night ISR.

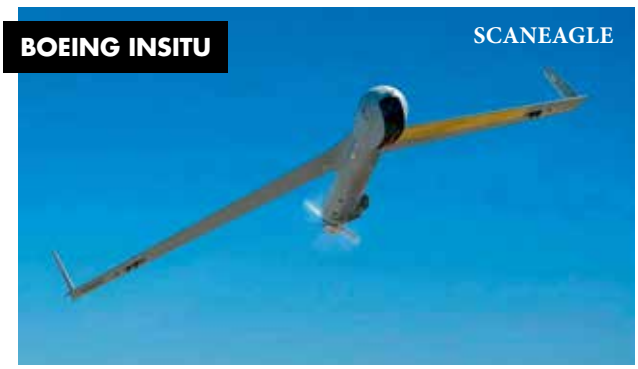
THUNDERB

Length: 1.9m Span: 4m
Maximum take-off weight: 32kg Communication range: 150km
Speed: 32-72kts
Endurance: Up to 24hrs in standard configuration, up to 12hrs in cargo release configuration, up to 15hrs on station 150km from its ground control position carrying T-STAMP
Best Operational Altitude: 6,000ft Ceiling: 16,000ft
Payload: up to 4kg nose mounted with full fuel and additional payload under the wings, examples include Controp T-STAMP triple sensor (CCD/cooled IR/laser)
Powerplant: Advanced two stroke engine with electronic fuel injection
Launch/recovery: auto cat/para airbag, VTOL version available
Remarks: Operational in Israel and by international Defence and HLS customers. Continues mission in GPS denied environment

BOEING

UNMANNED LITTLE BIRD H-6U

Length: 9.94m Span: 8.38m (rotor diameter)
Maximum take-off weight: 1,497kg Range: 430km
Speed: 145kts Endurance: about 6hrs
Altitude: 20,000 ft
Payload capacity: 635kg unmanned, 544kg manned
Powerplant: Rolls-Royce model 250 turboshaft
Launch/recovery: VTOL
Remarks: Provides over-the-horizon search, re-supply and retrograde, communications relay and surveillance capabilities



BOEING INSITU

SCANEAGLE

Length: 1.6m Span: 3.1m
Empty operating weight: 16kg Range: > 100km LOS
Speed: 50 to 60kts cruse, 80kts max Endurance: > 24hrs
Altitude: 19,500ft
Payload capacity: 3.4kg. EO, EO900 (EO camera and EO telescope), MWIR, Dual Imager (EO and MWIR)
Powerplant: Obital 2-str heavy fuel (JP-5 or JP 8) 2-str engine or C-10 gasoline engine
Launch/recovery: cat/SkyHook
Remarks: Operated by USAF, USMC, USN and numerous export customers.

SCANEAGLE 2

Length: 1.71m Span: 3.11m
Maximum take-off weight: 26.5kg
Range: 900nm (estimated based on endurance & cruise speed)
Speed: 50 to 60kts cruise Endurance: 18hrs
Altitude: 19,500ft
Payload capacity: 5kg. Options include high resolution, day/night camera and thermal imager & many others. Up to 150W onboard power
Powerplant: Orbital Argon heavy fuel (JP-5 or JP-8) 2-str piston engine
Launch/recovery: cat/SkyHook vertical wire
Remarks: ScanEagle 2 offers more payload options, rapid integration, a purpose-built engine, architecture that maximises commonality with Insitu systems.

SCANEAGLE 3

Length: 2.3-2.5m Span: 4m
Maximum take-off weight: 36.3kg
Range: 720nm (estimate based on cruise speed & endurance)
Speed: 40-50kts cruise, 80kts max Endurance: 18hrs
Altitude: 20,000ft
Payload capacity: 9.1kg. Turret houses EO, EO900 (EO camera and EO telescope), MWIR, Dual Image EO and MWIR), 170W onboard power
Powerplant: 1 x 2-str heavy fuel piston engine burning JP-5/JP-8
Launch/recovery: cat/SkyHook vertical wire
Remarks: ScanEagle3's design doubles the aircraft's payload capacity and is compatible with existing ScanEagle payloads.

BLACKJACK

Length: 2.5m Span: 4.9m
Maximum take-off weight: 61kg
Range: 960 nm (estimate based on endurance & cruise speed)
Speed: > 90kts max, 60kts cruise Endurance: > 16hrs
Altitude: > 20,000ft
Payload capacity: 17.7kg. EO imager with 1.1°–25° optical field of view & 4x digital zoom, mid-wave infrared imager with 2°–25° field of view, laser rangefinder, IR marker. Communications relay and AIS also integrated.
Powerplant: 8 HP reciprocating engine with EFI, burning JP-5, JP-8 heavy fuels
Launch/recovery: cat/SkyHook vertical wire
Remarks: Developed for a US Navy requirement for a small tactical unmanned aircraft system capable of operating from land and sea.

INTEGRATOR

Length: 2.5m Span: 4.8m
Maximum take-off weight: 61.2kg
Range: 1,320nm (estimate based on endurance & cruise speed)
Speed:> 90kts max, 55kts cruise Endurance: > 24hr
Altitude: 19,500ft
Payload capacity: 18kg. Baseline package includes EO imager, mid-wave infrared imager, IR marker, laser rangefinder
Powerplant: 2-str heavy fuel piston engine burning JP-5/JP-8
Launch/recovery: cat/SkyHook vertical wire
Remarks: Designed as a modular & flexible multi-mission UAV for land and maritime operations.

CATIC

ASN209

Length: 4.2m Span: 7.5m
Maximum take-off weight: 320kg Range: 200km
Endurance: 10hrs Speed: 97kts
Altitude: 16,000ft
Payload capacity: 50kg
Powerplant: Internal combustion engine driving pusher propeller
Launch/recovery: rocket booster/para
Remarks: Medium altitude/medium endurance multi-role UAV designed for ISTAR, BDA, artillery fire adjustment by day and night in real time.

WING LOONG I

Length: 9.05m
Span: 14m
Maximum take-off weight: 1,100kg
Range: 4,000km
Endurance: 20hrs
Speed: 150kts
Altitude: 16,000ft
Payload capacity: 200kg on pylons, 100kg for sensors. Reportedly capable of launching guided bombs including the FT-10, FT-9, FT-7, GB-7 and GB-4, and the BRM1 and AKD-10 guided missiles. In service with China and export customers inc Saudi Arabia and Egypt.
Powerplant: 1 x 100 hp Rotax 914 turbocharged piston engine, pusher propeller
Launch/recovery: conventional
Remarks: Export variant developed from Wing Loong is Known as Sky Saker

WING LOONG II

Length: 11m
Span: 20.5m
Maximum take-off weight: 4,200kg
Range: 4,500nm (estimate based on 140kts cruise & endurance)
Endurance: 32hrs
Speed: 200kts max, 81kts min
Altitude: 32,500ft
Payload capacity: 480kg on external stores. Reportedly capable of launching guided bombs including the FT-10, FT-9, FT-7, GB-7 and GB-4, and the BRM1, AKD-10 and BA-7 guided missiles.
Powerplant: turbocharged piston engine
Launch/recovery: conventional
Remarks: Operational in China, Pakistan, UAE & Egypt.

DENEL DYNAMICS

SEEKER 400

Length: 5.77m
Span: 10m
Maximum take-off weight: 450kg
Range: 250km
Speed: 81kts
Endurance: 16hrs
Altitude: 18,000ft
Payload: 100kg. S400 can carry dual imaging EO/IR payloads with gimbal diameters of up to 530mn with day TV, thermal imaging, colour/monochrome spotter camera, night spotter camera. Laser illuminator and LRF, electronic intelligence payload.
Powerplant: 1 x 85hp two-cylinder, air-cooled 4-str engine
Launch/recovery: conv/conv
Remarks: Seeker 400 is an evolution of the battle-proven Seeker II UAS. Seeker 200 is a smaller variant with a 40kg payload.

HUNGWE

Length: 2m
Span: 4m
Maximum take-off weight: 35kg
Range: 100km line of sight for comms
Endurance: 6hrs
Altitude: 12,000ft service ceiling
Payload capacity: 5kg
Powerplant: Internal combustion engine driving pusher propeller
Launch/recovery: catapult/skid or conventional runway
Remarks: Small UAV with an all-composite, low-drag blended wing design.

ELBIT

HERMES 45

Length: 1.25m (estimate)
Span: 5m
Maximum take-off weight: 70kg
Range: 100 to 200km (comms limited)
Endurance: 22hrs
Altitude: 18,000ft
Payload capacity: 20kg. Payloads include EO/IR cameras, radar, ELINT, COMINT, VHF/UHF communications relay etc in a multi-payload configuration
Powerplant: Internal combustion engine driving a pusher propeller
Launch/recovery: cat/net for point landing
Remarks: Multi-Mission small tactical USA for land and maritime operations. Supports higher tactical echelon with long endurance ISTAR missions.

HERMES 450

Length: 5.7m
Span: 10.5m
Maximum take-off weight: 550kg
Range: 250km
Speed: 95kts
Endurance: 17hrs
Altitude: 18,000ft
Payload capacity: 180kg. Options include EO/IR, SAR/GMTI & maritime patrol radars plus AIS, ELINT, EW, COMINT, COMJAM. Forms the basis of the UK/Thales WK450 Watchkeeper system.
Powerplant: 1 x 52 hp UAV Engines R802/902 rotary
Launch/recovery: conv/conv
Remarks: Multi-role, high-performance tactical UAS operational worldwide.

HERMES 900

Length: 8.3m
Span: 15m
Maximum take-off weight: 1,180kg
Range: 2,500km estimate
Speed: 119kts max, 60kts cruise
Endurance: 30-36hrs
Altitude: 30,000ft
Payload capacity: 350kg. Options include Leonardo Gabianno T-200 maritime & SAR/GMTI radar, AIS, Elbit D-CoMPASS EO/IR/Laser turret, AES 210 V – ESM/ELINT, Skyfix / Skyjam – COMINT/DF & optional COMJAM system and a communications relay. Users include the Israeli Air Force, with exports to Brazil and other Latin American countries.
Powerplant: 1 × 115hp Rotax 914 4-str engine
Launch/recovery: conv/conv
Remarks: Next-generation MALE UAS equipped with a variety of high-performance sensors to detect ground or maritime targets over a wide spectral range.

HERMES 900 STARLINER

Length: 8.8m
Span: 17m
Maximum take-off weight: 1,600kg
Range: 2,500km estimate
Speed: 119kts max, 60kts cruise
Endurance: 36hrs
Altitude: 30,000ft
Payload: 450kg
Options include Leonardo Gabianno T-200 maritime & SAR/GMTI radar, AIS, Elbit D-CoMPASS EO/IR/Laser turret, AES 210 V – ESM/ELINT, Skyfix / Skyjam – COMINT/DF & optional COMJAM system and a communications relay. Users include Switzerland reported. Designed to comply with civilian airspace regulations.
Powerplant: 1 × 115hp Rotax 914 4-str engine
Launch/recovery: conv/conv
Remarks: Next-generation MALE UAS qualified for flight in and transit through civilian air space.

SKYLARK I-LEX

Length: 1.5m
Span: 3m
Maximum take-off weight: 7.5kg
Range: 40km LOS
Speed: 27-50kts
Endurance: 3hrs
Altitude: 15,000ft
Payload: 1.2kg. Stabilised EO/IR turret, delivering high-quality day and night real-time video. Advanced image processing capabilities include tracker, moving target indicator, geo-registration, and mosaicking.
Powerplant: battery electric
Launch/recovery: hand/stall-airbag
Remarks: Stealthy portable mini UAS for backpack or vehicle-based operation. Serves with IDF, NATO and other international users.

SKYLARK 3

Length: 2.5m (estimate)
Span: 4.7m
Maximum take-off weight: 40kg
Range: 100km
Endurance: 5hrs
Speed: 45-70kts
Altitude: 15,000ft
Payload: Dual payload features high resolution EO/IR gimbal is standard, options include ELINT and COMINT
Powerplant: battery electric, two-blade pusher propeller
Launch/recovery: cat/stall, airbag
Remarks: Tactical mini UAS for dismounted or vehicle operation to support division, brigade and battalion command levels.

THOR

Maximum take-off weight: 12.5kg
Range: 10km radius
Endurance: 70min
Speed: 11.6kts
Altitude: 2,000ft
Payload: 3kg. Lightweight dual EO/IR stabilised camera turret. Folding, backpack portable multi-rotor UAS with camera-guided advanced convoy mode
Powerplant: battery & 4 x electric motors driving vertical props
Launch/recovery: VTOL
Remarks: Multi-rotor mini-UAS developed for military, para-military and special operations, particularly in urban environments.

MAGNI

Maximum take-off weight: 2.5kg
Range: 3km
Endurance: 30 minutes
Speed: 21.5kts
Altitude: 4,000ft ASL
Payload: 350g. Incorporates dual S-Band and LTE communications and coordinate tracking capabilities, MAGNI provides day/night, 3D intelligence to manoeuvring forces.
Powerplant: battery & 4 x electric motors driving vertical props
Launch/recovery: VTOL
Remarks: Multi-rotor mini UAS designed for surveillance and reconnaissance missions and deployable in a wide range of terrains and weathers.

NOX

Maximum take-off weight: 5kg
Range: 4km radius
Endurance: 55min
Speed: 27kts max, 21.6kts operational
Altitude: 1,500ft
Payload: 0.7kg. A a range of EO and high resolution cameras is available
Powerplant: battery & 3 x electric motors driving vertical props
Launch/recovery: VTOL 10 to 1,500ft
Remarks: Ultra-light drone designed to carry a range of EO and high resolution payloads that can be deployed rapidly by a single operator.

EMT PENZBERG

LUNA

Length: 2.36m
Span: 4.17m
Maximum take-off weight: < 40 kg
Range: > 80km comms range
Endurance: 6 to 8hr
Speed: 38kt cruise
Altitude: 5,000m
Payload: 1 x colour video CCD pilot view camera; wing ice monitoring camera, 3-axis stabilized modular sensor platform, downward looking colour video CCD zoom camera and MWIR imager as standard. Transponder. Serves with the German Army.
Powerplant: 2 cylinder 2-str internal combustion engine, pusher propeller
Launch/recovery: cat/para or net
Remarks: Powered glider UAS with the ability to glide without engine power with no acoustic signature and to restart the engine at any time.

LUNA NG

Length: 3.0m
Span: 5.3m
Maximum take-off weight: 110kg
Range: > 100km digital data link
Endurance: > 12hr
Speed: 60kt cruise
Altitude: 5,000m
Payload: Sensor turret with colour and IR zoom video, LRF, pilot colour video. Transponder. Optional sensors: SAR/GMTI, SIGINT-sensors, ESM, CBRN, Data link relay for BLOS operations, encryption, GCS hand-off function.
Powerplant: 1 x 11 kW, fuel-injected multi-fuel engine
Launch/recovery: cat/para or net
Remarks: Purchased by the German Army.

Length: 1.57m
Span: 1.46m
Maximum take-off weight: < 4kg
Range: > 15km
Endurance: > 1hr
Speed: 30kt cruise
Altitude: 30m AGL minimum, 150m typical, 3,000m density alt max
Payload: Daylight configuration: 4 x colour CCD video cameras: 1 pilot view, 2 x downward looking, 1 downward looking on left side used in circling mode, plus high-res forward looking zoom camera, 2 x daylight video cameras. Night configuration: 1 x IR video, 1 x colour video CCD camera
Powerplant: battery & electric motor driving tractor propeller
Launch/recovery: hand or cat/auto
Remarks: High performance mini UAV in operational service with several NATO countries.

ENICS

Length: 0.6m
Span: 1.47m
Maximum take-off weight: 5.5kg
Range: 25km with comms link, 50km off line
Endurance: 1hr 40min
Speed: 30-70kts
Altitude: 16,400ft
Payload: Option 1: 3-axis stabilised turret with a 10x optical magnification-enabled video camera and digital photo camera with minimum 10.2mpix resolution. Option 2: Stabilised turret with 10x thermal imaging and video camera. Digital camera with minimum 10.2Mp resolution.
Powerplant: battery & 1 x electric motor driving pusher propeller
Launch/recovery: cat/para
Remarks: Designed for round-the-clock aerial electro-optical surveillance. Can be supplied with Russian "Acceptance 5" quality standard certification.

Length: 0.9m
Span: 2.2m
Maximum take-off weight: 15.5kg
Range: Up to 60km
Endurance: 2hrs 30min
Speed: 30-70kts
Altitude: 13,100ft
Payload: Option 1: 3-axis stabilised turret with a 36x optical magnification video camera, plus a 10mpix digital camera. Option 2: 3-axis stabilised turret with an uncooled thermal imager and a video camera, plus a 10mpix digital camera, drop containers optional
Powerplant: battery & electric motor driving pusher propeller
Launch/recovery: cat/para
Remarks: Larger member of Eleron range. Designed for round-the-clock aerial electro-optical surveillance.

FLIR SYSTEMS (PROX DYNAMICS)

Length: 0.168m
Span: 0.123m
Maximum take-off weight: < 33g
Range: 2km
Endurance: 25min
Speed: 12kts (6 m/sec ground speed)
Altitude: > rooftop
Payload: Day: 2 x EO cameras, 1 video, 1 high-res snapshot. Night: fused thermal and EO.
Powerplant: battery & electric motor driving two-blade main and tail rotors
Launch/recovery: VTOL
Remarks: Personal/vehicle reconnaissance system. Vehicle launch unit mounts externally and fully integrates within vehicle.

Length: 80cm between motor mounts
Maximum take-off weight: 6.5kg
Range: 8km comms range with standard base station
Endurance: 50minutes with high-endurance propulsion system
Speed: 50kph max ground speed
Payload: 2kg. HDZoom 30, EO/IR MK-II, StormCaster-T, StormCaster-L, Osprey
Powerplant: battery powering 4 electrically driven rotors
Launch/recovery: VTOL
Remarks: Man-packable UAS designed to deliver a range of Group 2-3 payload capabilities with the agility and single-operator deployment footprint of a Group 1 UAS

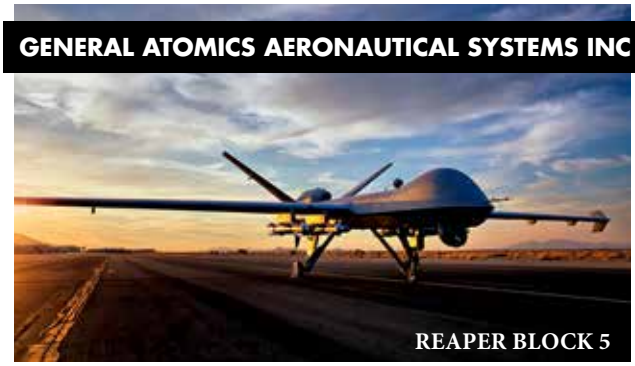
R60 SKYRANGER

Length: 60cm between motor mounts
Maximum take-off weight: 3.07kg
Range: 10km comms range with directional antenna
Endurance: Up to 50minutes
Speed: 27kts ground speed
Payload: 670g. Day HDZoom 30, night EO/IR Mk-II
Powerplant: battery powering four electrically driven rotors
Launch/recovery: VTOL
Remarks: Stable in sustained 35kts winds and gusts up to 48.5kts. Deployed with over 20 militaries, in use with public safety and industrial operators

R80D SKYRAIDER

Length: 80cm between motor mounts
Maximum take-off weight: 6.5kg
Range: 8km comms range with standard base station
Endurance: 50 minutes with high-endurance propulsion system
Speed: 27kts max ground speed
Payload: 2kg. HDZoom 30, EO/IR MK-II, Forward EO/IR
Powerplant: battery powering 4 electrically driven rotors
Launch/recovery: VTOL
Remarks: Man-packable UAS designed to deliver a range of Group 2-3 payload capabilities with the agility and single-operator deployment footprint of a Group 1 UAS

GENERAL ATOMICS AERONAUTICAL SYSTEMS INC



REAPER BLOCK 5

Length: 11m
Span: 20m
Maximum take-off weight: 4,763kg
Range: LOS/global
Endurance: 27hrs
Speed: 240kts max
Altitude: 50,000ft MSL
Payload Capacity: 1,701kg (386kg internal, 1,361kg external, not simultaneous)
Payloads: MTS-B EO/IR, Lynx multi-mode radar, maritime radar, SIGINT/ESM system, Automatic Identification System (AIS), comms relay, dual ARC-210 UHF/VHF radios, other customer specific payloads.
Weapons: Hellfire missiles, GBU-12, GBU-38, GBU-49 smart bombs
Powerplant: Honeywell TPE331-10 turboprop 3-blade propeller
Launch/recovery: conv/conv
Remarks: Operated by: USAF, US Homeland Security, Australia, France, Italy, Netherlands, Spain, UK (to be replaced by Protector RG Mk1).

PREDATOR XP

Length: 8m
Span: 17m
Maximum take-off weight: 1,157kg
Range: LOS/global
Endurance: 35hrs @ 10,000ft
Speed: 120kts max
Altitude: 25,000ft
Payload Capacity: 147kg. EO/IR, Lynx multi-mode radar, comms relay
Features: auto takeoff and landing, optimised fuel mapping
Powerplant: Heavily Modified Rotax 914 Turbo piston engine
Launch/recovery: conv/conv
Remarks: Updated version of Predator licensed by US Government for sale to customers in the Middle East, North African, and South American regions.

GRAY EAGLE

Length: 9m
Span: 17m
Maximum take-off weight: 1,633kg
Range: LOS/global
Endurance: 25hrs
Speed: 167kts max
Altitude: 29,000ft
Payload Capacity: 261kg internal, 227kg external. EO/IR, SAR/GMTI radar, communications relay, 4 x Hellfire missiles.
Powerplant: 165hp Thielert HP heavy-fuel engine
Launch/recovery: conv/conv
Remarks: Persistent UAS dedicated to direct operational control by US Army field commanders. Features fault-tolerant control system, triple-redundant avionics.

GRAY EAGLE EXTENDED RANGE

Length: 9m
Span: 17m
Maximum take-off weight: 1,905kg
Range: LOS/global (comms)
Endurance: 42hrs
Speed: 167kts
Altitude: 29,000ft
Payload Capacity: 261kg internal, 227kg external. EO/IR, SAR/GMTI radar, communications relay.
Powerplant: HFE-180 HP heavy-fuel engine
Launch/recovery: conv/conv
Remarks: Open, modular architecture supports integration of three payloads simultaneously, with capacity for growth.

SEAGUARDIAN

Length: 11.7m
Span: 24m
Maximum take-off weight: 5,670kg
Range: > 5,500nm
Endurance: 35hrs
Speed: > 200kts
Altitude: > 40,000ft
Payload Capacity: 2,155kg across 9 hard points (8 wing & 1 centreline), 363kg internal. High definition EO/IR, multimode 360° maritime radar, Automatic Identification System, Lynx multimode radar, dual VHF/UHF certified radios
Features:
Powerplant: Honeywell TPE331-10 turboprop driving pusher propeller
Launch/recovery: conv/conv
Remarks: Variant of MQ-9B with maritime mission kit.

SKYGUARDIAN

Length: 11.7m
Span: 24m
Maximum take-off weight: 5,670kg
Range: LOS/global
Endurance: 40hrs
Speed: 210kts
Altitude: 40,000+ft
Payload Capacity: 363kg internal, 1814kg external. Raytheon MTS-B EO/IR, GA-ASI Lynx multi-mode radar, VHF/UHF certified radios
Powerplant: Honeywell TPE331-10 turboprop driving pusher propeller
Launch/recovery: conv/conv
Remarks: Selected by UK (Protector RG Mk1) and Belgium.

GUIZHOU AIRCRAFT INDUSTRY ASSOCIATION

WZ-7 SOAR DRAGON/SOAR EAGLE

(image attribution - By Baiweiflight - Picture drawn by Baiweiflight, CC BY-SA 3.0)

Length: 14.3m
Span: 25m
Maximum take-off weight: 10,000-12,000kg (estimate)
Range: 7,000km (estimate)
Endurance: 10hrs (estimate)
Speed: 405kts cruise
Altitude: 59,000ft
Payload Capacity: unknown
Payloads: Multi-sensor electro-optical system and maritime radar most likely
Powerplant: Single 43.1kN thrust Guizhou WP-13 turbojet
Launch/recovery: conventional from runway
Remarks: HALE UAV system broadly comparable with US Global Hawk in service in small numbers with Chinese People's Liberation Army Air Force

HARBIN

BZK-005 GIANT EAGLE/SEA EAGLE

Maximum take-off weight: 1,250kg
Range: 6,000km (estimate from cruise speed & endurance)
Endurance: 40hrs estimate
Speed: 150 to 180kph cruise
Altitude: 26,200ft estimate service ceiling
Payload Capacity: 150kg estimate
Payloads: Electro-optical sensor system under fuselage
Powerplant: Internal combustion engine driving single pusher propeller
Launch/recovery: conventional
Remarks: HALE UAV system in service with Chinese People's Liberation Army Air Force and Navy. Manufactured by Harbin Aircraft Industry Group.

IAI

HERON

Length: 8.5m
Span: 16.6m
Maximum take-off weight: 1,270kg
Range: 350km LOS, > 1000km BLOS
Endurance: 45hrs
Speed: 140kts
Altitude: > 30,000ft
Payload capacity: 470kg
Payloads: Multi Sensor Mission: EO/IR with LRF & designator, SAR, COMINT, ESM, comms relay etc
Remote operation: landing, takeoff and additional capabilities by Satellite Communication (SATCOM)
Powerplant: Certified electronic-controlled fuel injection engine
Launch/recovery: conv/conv, automatic takeoff and landing system (ATOL)
Remarks: MALE UAV with multi-sensor capabilities for strategic and tactical missions.

HERON MK2

Length: 8.5m
Span: 16.6m
Maximum take-off weight: 1,350kg
Range: > 1000km
Endurance: 45hrs
Speed: 140kts max, 60-80kts loiter
Altitude: > 35,000ft
Payload capacity: 470kg
Payloads: New configuration include long-range EO systems and radars plus a wide range of additional payloads: ELINT/COMINT/ESM, communication relay, special etc
Powerplant: Certified electronic-controlled fuel injection engine
Launch/recovery: conventional runway automatic take-off and landing system
Remarks: Updated version of Heron enabling new configurations with long-range observation sensors and radars.

MARITIME HERON

Length: 8.5m
Span: 16.6m
Maximum take-off weight: 1,350kg
Range: 350 km LOS, > 1,500km BLOS
Endurance: > 45hrs
Speed: 140kts
Altitude: 35,000ft
Payload: 470kg. Multi Sensor Mission: EO/IR with LRF & designator, MPR (Maritime Patrol Radar) / SAR, Sonobuoy (acoustic detector), MAD (Magnetic Anomaly Detector), COMINT, ESM, comms relay etc.
Remote operation: landing, takeoff and additional capabilities by Satellite communication (SATCOM)
Powerplant: Certified electronic-controlled fuel injection engine
Launch/recovery: conv/conv, automatic takeoff and landing system (ATOL)
Remarks: Multi-role MALE RPAS equipped for maritime operations.

HERON TP

Length: 14m
Span: 26m
Maximum take-off weight: 5,670kg
Range: BLOS
Endurance: > 30hrs
Speed: 220kts
Altitude: 45,000ft
Payload: 2,700kg. EO/IR/LRF/LD, synthetic aperture and maritime patrol radar, ELINT/COMINT, ESM and additional capabilities of payloads.
Powerplant: 1,200hp Pratt & Whitney Canada PT6 Turboprop driving pusher propeller
Launch/recovery: conv/conv, automatic takeoff and landing system (ATOL)
Remarks: Turbine-powered MALE UAV with large internal volume for a variety of payloads, certified to STANAG 4671 and compatible with NATO standards.

TACTICAL HERON

Length: 7.3m
Span: 10.6m
Maximum take-off weight: 600kg
Range: 300 km LOS, > 1500km BLOS
Endurance: 24hrs
Speed: 120kts max, 60-80kts loiter
Altitude: 23,000ft
Payload: 180kg. Multi Sensor Mission: EO/IR with LRF & designator, maritime patrol radar (MPR)/ SAR, COMINT, ESM, comms relay etc. Up to 4 payloads simultaneously
Powerplant: Certified electronic-controlled fuel injection engine
Launch/recovery: conv/conv, automatic takeoff and landing system (ATOL)
Remarks: landing, takeoff and additional capabilities through SATCOM

SEARCHER MK III

Length: 5.85m
Span: 8.55m
Maximum take-off weight: 450kg
Range: 350km
Endurance: 20hrs
Speed: 110kts max, 60-80 kts loiter
Altitude: 21,000ft service ceiling
Payload: 120kg. EO/IR or SAR/GMTI or SIGINT, aerial data relay
Powerplant: Jabiru 4-str "silent" piston engine
Launch/recovery: conv/conv
Remarks: Offers multiple operational configurations, operates in extreme weather, fully redundant avionics.

BIRDEYE 650

Length: 1m
Span: 3m
Maximum take-off weight: 11kg
Range: 40km
Endurance: > 4hrs
Speed: 70kts max, 40kts loiter
Altitude: 1,500ft AGL
Payload capacity: 1.2kg. Wide coverage, stabilised day/night payload and moving target tracker
Powerplant: battery & electric motor, pusher propeller
Launch/recovery: cat/flip-over & parachute
Remarks: System capable of 12 hours of operation can be carried in three backpacks, run by two people.

BIRDEYE 650D

Length: 1.1m
Span: 4m
Maximum take-off weight: 30kg
Range: > 150km
Endurance: > 15hrs
Speed: 80kts max, 40kts loiter
Altitude: 15,000ft
Payload: 5.5kg. Wide coverage, stabilised day/night payload and moving target tracker
Powerplant: Gasoline fuelled reciprocating engine
Launch/recovery: cat/parachute, flip over & airbag
Remarks: Advanced, long-endurance small tactical UAV for urban operations and over-the-hill intelligence

IDS

IA-17

Length: 1.27m
Span: 2.8m
Maximum take-off weight: > 25kg
Range: 80km LOS
Endurance: > 5hrs
Speed: 86kts
Altitude: 14,764ft
Payload capacity: 2.5kg
Payloads: Gyro-Stabilised turret with 15x zoom CMOS day camera and 4x thermal imager for night operations
Powerplant: 2-str gasoline engine
Launch/recovery: cat/para
Remarks: Small UAV configured for surveillance, aerial observation and reconnaissance missions

INDRA

PELICANO

Length: 3.4m
Span: 3.3m rotor dia
Maximum take-off weight: 200kg
Range: 100km
Endurance: 4-6hrs
Speed: 100kts
Altitude: 11,811ft
Payload: 30kg
Gyro-Stabilised MMP EO/thermal camera, Automatic Identification System (AIS)
Powerplant: Heavy fuel engine burning JP5
Launch/recovery: VTOL
Remarks: Maritime unmanned helicopter designed to support surveillance and law enforcement tasks from a ship or a ground base.

KOREA AEROSPACE INDUSTRIES

RQ-101

Length: 4.7m
Span: 6.4m
Maximum take-off weight: 300kg
Range: 80km radius
Endurance: 6hrs
Speed: 100kts
Altitude: 14,764ft
Payload capacity: 85kg (inc fuel)
Payloads: Dual sensor day TV & thermal imaging turret
Powerplant: Rotary internal combustion engine driving pusher propeller
Launch/recovery: cat/para or conv
Remarks: Corps level UAV system in service with Republic of Korea Armed Forces

LEONARDO

AW HERO

Length: 3.7m
Span: 4m rotor diameter
Maximum take-off weight: 200 g class
Endurance: 6hrs with 35kg payload
Speed: 90kts max cruise
Altitude: 14,000ft service ceiling
Useful load: 85kg (payload + fuel)
Payloads: Options include EO/IR turret, maritime radar, synthetic aperture radar, ESM, ADS-B, IFF, LiDAR, AIS
Powerplant: Heavy fuel engine burning JP5, JP8, Jet A1
Launch/recovery: Automated TOL
Remarks: Maritime rotorcraft UAS that took part in a successful maritime surveillance capability demonstration in the European OCEAN 2020 initiative in the Mediterranean in late 2019

FALCO

Length: 5.25m
Span: 7.2m
Maximum take-off weight: 490kg
Range: > 200km
Endurance: 8-14hrs
Speed: 117kts
Altitude: > 16,404ft
Payload: 70kg. EO/IR turret with laser designator, SAR/GMTI radar, multi-mode surveillance radar, AIS, ESM/COMINT, comms relay, hyperspectral imager.
Delivered to Pakistan Air Force. 5 customers total, including deployment on behalf of the United Nations (UN) MONUSCO peacekeeping operations in the Democratic Republic of Congo (DRC).
Powerplant: 65hp gasoline engine
Launch/recovery: conv/conv
Remarks: Medium altitude, medium endurance tactical UAV intended for surveillance missions.

FALCO EVO

Length: 6.2m
Span: 12.5m
Maximum take-off weight: 650kg
Range: > 200km link range
Endurance: > 20hrs
Altitude: 19,685ft
Payload: > 100kg. EO/IR with laser designator, laser marker, SAR/GMTI radar, multi-mode surveillance radar, AIS, ESM, COMINT, comms relay, hyperspectral sensor.
Delivery to the first of two Middle-East/Gulf customers, thought to be Jordan and Saudi Arabia, in January 2018. Deployed as part of the European Frontex surveillance research programme.
Powerplant: 80hp gasoline engine
Launch/recovery: conv/conv
Remarks: Falco variant that adds multi-payload capability, mission endurance and range.

FALCO XPLORER

Length: 9m
Span: 18.5m
Maximum take-off weight: 1,300kg
Range: comms range unlimited (satcom)
Endurance: > 24hrs
Altitude: > 30,000ft service ceiling
Payload capacity: 350kg
Payloads: Gabbiano T80UL multimode synthetic aperture radar mapping, ground moving target indication. EO turret up to 20-in diameter, visual/IR/laser rangefinder, laser marker and optional laser designator, ELINT or COMINT suite, AIS
Launch/recovery: conv/conv
Remarks: Large UAV launched in June 2019, will be offered as both an integrated platform and as a fully-managed information-superiority service to military and civil customers, designed for civil certification

CREX-B

Length: 0.45m Span: 1.7m
Maximum take-off weight: < 2.1kg (±5%)
Range: 10m Line of Sight (LOS)
Endurance: 75min at max take-off weight
Speed: 60kts (max), 20kts (cruise)
Altitude: 10,100ft ASL (99-1600ft (AGL) operational)
Payload: 3 stabilised payload modules for real-time monitoring: Two day colour TV modules, one IR module, digital links, built-in video enhancement features (stabilisation, visual tracking, mosaicing, target locking)
Powerplant: Battery driving tractor propeller
Launch/recovery: Hand release, automatic short landing
Remarks: In service with the Italian armed forces

SW4 SOLO

Length: 9.068m Span: 9m (main rotor diameter)
Maximum take-off weight: 1,800kg Range: 940km
Endurance: 6hrs Speed: 111kts (max cruise)
Altitude: 17.000ft service ceiling Payload: 470kg
Powerplant: 1 x 336kW Rolls-Royce 250-C20R/2 turboshaft engine
Launch/recovery: automated VTOL
Remarks: ISTAR, manned-unmanned teaming and data dissemination demonstrated in real operational environment in several sets of trials, including Ocean 2020

LOCKHEED MARTIN

CONDOR XEP

Length Span: 3.6mft
Maximum take-off weight: 18.3lbs
Range:
Endurance: > 4hrs under ideal conditions, > 3hrs in tactical operations
Speed: 45kts max Altitude: 17,000ft
Payload capacity: Up to 2.2kg. Standard 720p HD streaming video with 30x zoom, FLIR Boson 640x512 uncooled LWIR camera with 7.5um to 13.5um detector array
Powerplant: Battery & electric motor driving a tractor propeller
Launch/recovery: Hand launch, marinised for landings in water to sea state 3.
Remarks: Improvements to propulsion system and battery doubled endurance while keeping payload capacity for special ops missions

DESERT HAWK III

Span; 1.5m Maximum take-off weight: 3.72kg
Range:
Endurance: 1.5hrs Speed: 50kts
Altitude: 11,000ft
Payload: 0.9kg. Includes 360-degree colour EO and IR video camera systems, plus other interchangeable, snap-on "Plug and Playloads"
Powerplant: battery & electric motor driving tractor propeller
Launch/recovery: hand/conv skid
Remarks: Small UAS that provides day and night support to small unit ISTAR and related operations.

INDAGO 3

Length: 0.81m Span: 0.81m
Maximum take-off weight: 2.05kg
Range: 10km line of sight comms Endurance: 50-75min
Altitude: 500ft AGL
Payload capacity: 0.2kg. Multiple hot-swappable payload options for ISR, search & rescue etc
Powerplant: battery & 4 x electric motors driving vertical propellers
Launch/recovery: VTOL
Remarks: Developed by Lockheed Martin Procerus Technologies, Indago 3 is rucksack portable and deployed in support of military operations and covert missions globally.

STALKER XE

Span: 3.66m
Maximum take-off weight: 10.9kg
Range: 370km (aircraft), 93km comms
Endurance: > 8hrs
Speed: 30.4kts cruise, 39kts dash
Altitude: 12,000ft max launch alt
Payload capacity: 2.5kg. EO/IR with cursor-on-target, integrated tracker with scene lock moving target tracking, auto-track and follow navigation
Powerplant: solid oxide propane fuel cell & electric motor driving tractor propeller
Launch/recovery: cat/conv glide, VTOL option
Remarks: VTOL capability provided by four electric motors driving vertical propellers mounted in pairs mid-span

LUCH

SOKOL 2

Length: 1.39m (tube)
Tube diameter: 160mm
Maximum take-off weight: 5kg
Range: 20km
Endurance: 2hrs
Speed: 54-65kts cruise
Payload capacity: 1kg
Payloads: Video camera and radio link to send target imagery back to armoured vehicle
Powerplant: battery & electric motor driving pusher propeller
Launch/recovery: tube/NA
Remarks: Reconnaissance and targeting asset integrated into infantry combat vehicle or armoured personnel carrier

NORTHROP GRUMMAN

BAT

Length: 2m
Span: 3.65m or 4.3m depending on variant
Maximum take-off weight: 95kg or 159kg depending on variant
Endurance: 8hrs or 18hrs depending on variant
Speed: 166kph (max)
Altitude: 5,500m
Payload capacity: 34kg to 57kg depending on variant
Payloads: Still image and real time video cameras, EO/IR and SAR sensors, laser range finders & designators, IR cameras, comms relay equipment, chemical, biological, electronic warfare, and IED detection systems
Powerplant: Hirth electronic fuel-injection engine and heavy fuel-variant, which runs on a variant of JP-8
Launch/recovery: catapult/net
Remarks: Bat is a family of affordable, medium altitude, multi-mission unmanned aircraft systems. Can be configured with differently-sized fuel tanks and different sensor payloads.

FIREBIRD

Length: 10.5m
Span: 24.1m
Maximum take-off weight: 3,220kg
Endurance: > 30hrs
Speed: 135kts cruise at 6,000m altitude
Altitude: 7,600m
Payload capacity: 771kg
Payloads: Multi-sensor, mission ready with 5 payloads operating at once
Powerplant: 400 HP Lycoming Engine
Launch/recovery: conventional/austere runway
Remarks: Optionally-piloted multi-INT aircraft. On-board/off-board processing, with network attached storage. Rapid payload integration and change in configuration from UAV to manned.

NATO AGS - RQ-4D

Length: 14.4m
Height: 4.7m
Span: 39.8m
Weight: 14,950lbs / 6,781kg
Maximum take-off weight: 14,628kg
Endurance: 32hours
Speed: 310knots
Altitude: 60,000ft
Thrust: 7,600lbs
Payloads: 1,360 kg
Powerplant: Rolls Royce-North American AE 3007H turbofan
Fuel capacity: 7,847kg
Range: 8,700 nautical miles
Remarks: Primary function: High-altitude, long-endurance intelligence, surveillance and reconnaissance. The AGS system consists of air, ground and support segments, performing all-weather, persistent wide-area terrestrial and maritime surveillance in near real-time. The AGS will provide in-theatre situational awareness to commanders and contribute to a range of missions such as protection of ground troops and civilian populations, border control and maritime safety, anti-terrorism, crisis management and humanitarian efforts in natural disasters.

GLOBAL HAWK

Length: 14.5m
Maximum take-off weight: 14,628kg
Endurance: 24hr at 2,222km
Altitude: 60,000ft
Span: 39.9m
Range: 22,780km (ferry)
Speed: 310kt loiter
Payload: 1,360kg
Remarks: All-weather synthetic aperture, radar/moving target indicator, high-resolution electro-optical (EO) digital camera, and a third-generation infrared (IR) sensor working through common signal processor. Wideband communications and signals collection and processing.
Powerplant: Rolls-Royce AE3007 turbofan generating 8,500lb thrust

MQ-8C FIRE SCOUT

Length: 12.6m
Span: 10.7m dia
Maximum take-off weight: 2,722kg
Range: 150nm radius from ship, 1,380nm estimate based on endurance & cruise speed
Endurance: 12hr
Speed: 135kts max, 115kts cruise
Altitude: 16,000ft
Payload capacity: 318kg
Payloads: EO/IR/LRF, comm relay, AIS, AN/ZPY-8 maritime radar, AMCM (future). Multiple payloads and configuration available
Powerplant: Rolls-Royce 250-C47E turboshaft engine driving main and tail rotors
Launch/recovery: automatic VTOL
Remarks: US Navy declared the MQ-8C initial operationally capable and it is scheduled to deploy in late 2021.

TRITON

Length: 14.5m
Span: 39.9m
Maximum take-off weight: 14,630kg
Range: 15,186km (ferry)
Endurance: 30hrs
Speed: 320kts
Altitude: 56,500ft
Payload capacity: 1,452kg max internal, 1,089 external
Payloads: Multi-Function Active Sensor Active Electronically Steered Array (MFAS AESA) radar, MTS-B multi-spectral targeting system
Powerplant: Rolls-Royce AE3007 turbofan generating up to 8,500 lbs thrust
Launch/recovery: conventional runway
Remarks: Developed under the US Navy's Broad Area Maritime Surveillance programme, Triton's role is to provide ISR over vast ocean and coastal regions, conduct search and rescue missions, and to complement the P-8 Poseidon MPA.

NOSTROMO DEFENSA

CARBURE III

Length: 1.2m
Span: 2.2m
Maximum take-off weight: 5kg
Range: 15km LOS comms range
Endurance: 90mins
Speed: 57kts max
Altitude: 13,100ft ceiling
Payloads: 10 x zoom CCD daylight camera, colour/low-light CCD camera, uncooled IR camera options
Powerplant: lithium polymer battery driving 450W brushless motor & two-blade propeller
Launch/recovery: catapult/belly landing
Remarks: Operated by the Argentine Marine Corps

YARARA

Length: 2.465m
Span: 3.98m
Maximum take-off weight: 35kg
Range: > 50km LOS link range
Endurance; 6hrs
Speed: 90kts max
Altitude: 9,843ft
Payload capacity: 5.5kg
Payloads: IAI MicroPOP EO/IR turret
Powerplant: 1 x 8hp Cubewano Sonic 35 multi-fuel rotary engine driving 3-blade pusher propeller mounted above the wing.
Launch/recovery: conventional, unprepared runway
Remarks: Operated by the Argentinian Air Force, system comprises three UAVs, GCS and support equipment in three boxes weighting less than 250 kg

ZONDA

Length: 1.7m Span: 2.8m, 3.2m and 3.6m versions available
Maximum take-off weight: 15kg
Range: 30km LOS Endurance: > 2hrs
Payload capacity: 3kg
Payloads: Interchangeable video and stills cameras, the latter including a CCD colour camera, long-wave IR camera, multispectral camera. All feed image processor and downlink
Powerplant: battery and electric motor driving a tractor propeller
Launch/recovery: catapult or trolley/parachute or belly
Remarks: Developed for image intelligence applications with real time and on board recording of still images in visible, NIR and IR bands

PIAGGIO AEROSPACE

HAMMERHEAD

Length: 14.4m Span: 15.6m
Maximum take-off weight: 6,600kg Range: 7,038km
Endurance: 15hrs max with 227kg payload, 9.5hrs 1,500km from base
Speed: 395kts max, 320kts cruise, 135kts loiter
Altitude: 45,000ft service ceiling Payload capacity: 227kg standard
Payloads: SkyISTAR mission system with sensors including FLIR Systems StarSafire 380HD EO/IR turret, Leonardo Seaspray 7300 E Radar. The Italian defence ministry has reportedly requested purchase of 20 aircraft.
Powerplant: 2 × 850shp Pratt & Whitney Canada PT6A-66B pusher turboprops
Launch/recovery: conventional runway
Remarks: Based on P180 Avanti manned business aircraft. UAE launch order cancelled. Italian government has pledged continued support for certification

SAFRAN

SPERWER MK II

Length: 3.5m Span: 4.2m
Maximum take-off weight: Range: 200km
Endurance: > 6hr Speed: 90kts
Altitude: 15,000ft Payload capacity: 50kg
Payloads: Safran Euroflir 350 day/night gyrostabilised optronic sensor (EO/IR). Principal operator is the French Army.
Powerplant: 1 x 70 hp Rotax 582 2-str engine
Launch/recovery: cat/para
Remarks:

PATROLLER

Length: 8.5m Span: 18m
Maximum take-off weight Range: 200m LOS
Endurance: 20hr Speed: 110kts max
Altitude: 20,000ft Payload capacity: 250kg
Payloads: Safran Euroflir 410 EO/IR turret plus COMINT, SIGINT, radar and other sensors.
Powerplant: 1 x 115hp Rotax 914F 4-cyl turbocharged liquid cooled engine
Launch/recovery: conv/conv
Remarks: The French Army has 14 on order, was due to receive the first 5 at the end of 2019, 14 in 2020 and two more in 2024. No deliveries yet reported.

SCHIEBEL

CAMCOPTER® S-100

Length: 3.11m Span: 3.4m rotor diameter
Maximum take-off weight: 200kg Range: up to 200km data link range
Endurance: > 6 with 34kg payload, > 10hr with external fuel tank
Speed: 120kt dash, 55kt best endurance
Altitude: 18,000ft Payload capacity: 50kg
Payloads: EO/IR, wide area opticas, Ground- and Maritime Moving Target Indication (GMTI + MMTIs, Signal Intelligence (SIGINT) & Communication Intelligence (COMINT), High-Frequency Direction Finder (HFDF), drop box and underslung load cargo carrying.
Powerplant: 50hp rotary engine
Launch/recovery: VTOL
Remarks: Initial substantial ordes came from the UAs, currentlnd Schiebeerhas more than 33 customers worldwid

SKY WATCH

HEIDRUN EO/IR

Length: 1.07m Span: 1.65m
Maximum take-off weight: 2.3kg
Range: approx 46nm based on cruise speed & endurance
Endurance: 90min Speed: 31kts cruise
Altitude: 11,500ft service ceiling
Payloads: 2-axis stabilised turret with EO/IR sensors
Powerplant: battery & electric motor driving a tractor propeller
Launch/recovery: Hand launch/deep stall landing
Remarks: battle proven, fixed wing, mini drone for low-altitude video surveillance and reconnaissance missions

SURVEY COPTER

ALIACA

Length: 1.85m Span: 3m
Maximum take-off weight: 12kg Range: 50km
Speed: 52kts Endurance: 3hrs
Altitude: 9,843ft Payload capacity: 1.1kg
Payload: T120 gyrostabilised EO/IR turret
Powerplant: battery & 1 electric motor driving a single tractor propeller
Launch/recovery: cat/belly
Remarks: Developed for ISR, protection & monitoring missions in military and civil applications. Currently deployed by the French army, foreign land & naval forces, SOF, police & gendarmerie.

TRACKER 120

Length: 1.54m Span: 3.3m
Maximum take-off weight: 8.7kg Range: 25km
Speed: 17 to 25m/sec Endurance: 90mins
Altitude: 985ft cruise, 8,200ft max Payload capacity: 1.1kg
Payloads: T120 gyrostabilised EO/IR turret
Powerplant: battery & 2 x electric motors driving twin tractor propellers
Launch/recovery: hand/belly landing
Remarks: Designed for ISR, coastal surveillance, convoy protection, monitoring of sensitive areas

DFV 2000 ER

Length: 2.27m Span: 3.3m
Maximum take-off weight: 22.5kg Range: > 50km
Speed: 65kts Endurance: 7hrs
Altitude: 32,300ft Payload capacity: 2kg
Payload: Survey-Copter's own T120 gyrostabilised EO/IR turret
Powerplant: 1 x fuel-injected 2-str engine
Launch/recovery: cat/conv
Remarks: Designed for military and civilian intelligence, surveillance and inspection missions

TAI

ANKA

Length: 8.6m Span: 17.5m
Maximum take-off weight: 1,600kg Range: 200km comms link range
Endurance: 24hrs Speed: 117kts
Altitude: 30,000ft
Payload capacity: 200kg for 24hrs endurance
Payloads: EO/IR laser designator and rangefinder, plus SAR/ISAR/GMTI sensors
Powerplant: 1 x 155hp Tusaş Engine Industries PD-170 heavy fuel engine
Launch/recovery: conv/conv
Remarks: In service with Turkish Air Force, National Intelligence Organisation and Navy. Ordered by Tunisia in march 2020

ANKA AKSUNGUR

Length: 11.6m Span: 24m
Maximum take-off weight: 3,300kg Range: 6,500km estimate
Endurance: Ground attack/maritime mission 12hrs at 25,000ft with 750kg, SIGINT mission 24 hours at 35,000ft with 150kg payload
Speed: 135kts cruise Altitude: 40,000ft service ceiling
Payload capacity: 750kg
Payloads: IMINT, SIGINT, maritime patrol and comms relay packages.
Weapons options: three hard points on each wing with 500, 300 and 150kg capacities for a range of precision guided weapons
Powerplant: 2 x PD-170 dual turbo diesels rated at 170hp (SL, ISA)
Launch/recovery: conventional runway
Remarks: MALE UAV system with ISTAR and strike capabilities

TEXTRON UNMANNED SYSTEMS

AEROSONDE SMALL UNMANNED AIRCRAFT SYSTEM

Length: 2.1m Span: 3.6m
Maximum take-off weight: 36.3kg Range: 140km comms range
Endurance: > 14hrs Speed: 40–65kts
Altitude: 15,000ft service ceiling, 7,000ft max take-off elevation
Payload capacity: 9.1kg
Payloads: Carries day/night full-motion video, communications relay, signals intelligence and/or a customer-selected payload simultaneously
Powerplant: Lycoming EL-005 two-stroke Heavy Fuel Engine
Launch/recovery: cat/net
Remarks: Field-proven small UAS over more than 300,000 flight hours, offers up to 200watts of payload power

AEROSONDE HYBRID QUADROTOR (HQ)

Length: 2.1m Span: 3.6m
Maximum take-off weight: 47kg Range: 140km comms range
Endurance: 10hrs with multi-INT payload
Speed: 65kts
Altitude: 10,500ft density altitude with multi-INT payload
Payload capacity: 6.8kg
Payloads: Can carry Cloudcap TASE 400 two-axis stabilised turret with EO/MWIR with continuous zoom optics with multiple 3rd bay and laser options, integrated GPS/INS, onboard video processing
Powerplant: Lycoming EL-005 two-stroke Heavy Fuel Engine plus 4 electric vertical rotors
Launch/recovery: VTOL
Remarks: Runway independent development of Aerosonde

NIGHTWARDEN

Length: 3.9m Span: 7m
Maximum take-off weight: 340kg
Range: (comms limited) 125km LOS, > 1,000km) satcom
Endurance: 15hrs Speed: 85kts max, 60-72kts cruise
Altitude: up to 18,000ft Payload capacity: > 59kg
Payloads: EO/IR turret with laser designator, synthetic aperture radar, weapons, special purpose equipment
Powerplant: water-cooled rotary engine driving pusher propeller
Launch/recovery: conventional
Remarks: Group 3 UAS developed from Shadow family to provide cost-effective MALE capabilities usually associated with larger vehicles

SHADOW V2

Length: 3.66m Span: 26.2m
Maximum take-off weight: 212kg Range: 125km LOS
Endurance: 9hrs
Speed: 62-65kts / Max 98kts dependent on mission profile
Altitude: 18,000ft ceiling, 10,000ft max take-off elevation
Payload capacity: 43kg
Payloads: EO/IR, communications relay, optional laser designation, etc.
Powerplant: UAV Engines model 741 rotary engine
Launch/recovery: cat/conv, arrested
Remarks: Operators of this and earlier versions include the US Army, US Marine Corps, the Australian Army, the Italian Army, the and the Swedish Army

THALES

TACTICAL (WATCHKEEPER)

Length: approx 5.7m
Span: 10.5m
Maximum take-off weight: 550kg
Range: 200km
Endurance: 16hrs
Speed: 95kts
Altitude: 16,000ft
Payload capacity: 150kg
Payloads: Elbit Compass turret with visual, Infra-Red (IR) laser rangefinder and designator, Thales I-Master SAR/GMTI radar, radio relay, COMINT. Principal operator is the British Army.
Powerplant: Powerplant: 1 x 52hp UAV Engines R802/902 rotary
Launch/recovery: conv/conv
Remarks: Based on Elbit Hermes 450, Watchkeeper is British Army tactical UAV system, latest version offered for export by Thales is Watchkeeper X

SPY'RANGER

Length: 1.76m (estimate)
Span: 3.9m
Maximum take-off weight: 14kg
Range: 30km (comms limited)
Endurance: 3hrs
Speed: 49kts
Altitude: 14,764ft (t/o)
Payload: 1.2kg
Powerplant: battery & DC brushless electric motor
Launch/recovery: cat/belly
Remarks: French Army acquired a fleet of 210 Spy'Rangers for reconnaissance and observation missions

FULMAR X

Length: 1.2m
Span: 3m
Maximum take-off weight: 20kg
Range: 800km
Endurance: 6-12hrs
Speed: 54kts cruise, 81kts max
Altitude: 9,843ft
Payload capacity: 8kg
Payloads: EO/IR camera turret with fusion capability
Powerplant: 1 x gasoline & heavy fuel engine
Launch/recovery: cat/net
Remarks: Intended for border surveillance, ISR, emergency management, monitoring illegal traffic, infrastructure security etc

UMS SKELDAR

V-150

Length: 3.2m
Span: 3.5m rotor diameter
Maximum take-off weight: 150kg (330.7lb)
Endurance: > 4hrs
Speed: 65kts
Altitude: 10,000ft service ceiling
Payload capacity: 42kg (12kg in the nose, 30+kg in the main bay)
Payloads: Land ops, main bay: SIGINT/GMTI, WAMI, LiDAR, hyperspectral & multispectral cameras, custom mission pods; maritime ops: SAR pods, tactical multi-INT/MTI radar; nose bay: Wescam MX8, i2Tech i2AX
Powerplant: heavy fuel engine running on Jet A1, JP8
Launch/recovery: VTOL
Remarks: Automated rotorcraft designed to support tactical operations for surveillance, emergency response, homeland security and defence

V-200

Length: 4.031m
Span: 4.6m (diameter)
Maximum take-off weight: 235kg
Endurance: > 5hr with 20kg payload at ISA
Speed: 150km/h (81kts)
Altitude: 12,000ft
Payloads: Optional payloads: advanced EO/IR turrets, Sentient Vision ViDAR, SAR/GMTI radar, hyper-spectral and multi-spectral cameras, comms relay systems
Powerplant: 1 x 54hp Hirth heavy fuel engine running on Jet A1, JP5 & JP8
Launch/recovery: VTOL
Remarks: Maritime unmanned helicopter with open interface to battlefield management and C4ISR systems, STANAG 4586 compliance for ease of integration into ships

Boeing Phantom Works

Stingray air vehicle T1 positioned with the forward launch and aft holdback bars lowered over the imitation catapult's shuttle track.

STINGRAY: NO BARB OR VENOM FOR NOW

US Naval Air Systems Command is developing the world's first non-experimental air vehicle designed for carrier-based operations and autonomous aerial refuelling.

Mark Ayton

A team of aerospace specialists led by Naval Air Systems Command (NAVAIR) and Boeing's Phantom Works is currently developing a new weapon system, one that's set to change many of the established cultures of military aviation. Designated the MQ-25A and named Stingray, this 15.5 metre (51 foot) long non-experimental unmanned air vehicle (UAV) is the world's first designed for carrier-based operations. In addition to catapult launch and arrested landing capabilities, the Stingray will perform autonomous aerial refuelling (AAR) in support of all fixed wing aircraft assigned to the Carrier Air Wing (CVW).

Secondary to that, the MQ-25A has an intelligence, surveillance and reconnaissance (ISR) role afforded by an electro-optical and infrared (EO/IR) sensor. Data will be transmitted at appropriate classification levels to other aircraft, naval vessels, ground forces, and to exploitation nodes afloat and ashore, specifically the Navy's Distributed Common Ground System.

In official Department of Defense (DoD) parlance, the MQ-25 extends CVW mission effectiveness range, partially reduces the current Carrier Strike Group (CSG) organic ISR shortfall and fills the future CVW-tanker gap, mitigating strike fighter deficit and preserving F/A-18 Super Hornet fatigue life for fleet defence and strike missions.

As the first carrier-based, Group 5 unmanned aircraft system (UAS), the MQ-25 will pioneer the integration of manned and unmanned flight operations, demonstrate mature sea-based UAS command, control, communications, computers, and intelligence (C4I) technologies, and pave the way for future multifaceted multi-mission unmanned air vehicles to keep pace with emerging threats.

The latter is a pointer to follow-on roles for the MQ-25. Certainly the air vehicle's low-observable stealthy configuration points to the air vehicle being used to drag aircraft in CVW strike packages further from the carrier than ever before: most importantly supporting F-35C Lightning IIs into non-permissive environments.

A likelihood not denied by Captain Chad Reed, MQ-25 programme manager, Unmanned Carrier Aviation with PMA-268 who said: "Right now, even though its configuration is stealthy, there is no low-observable requirement for the MQ-25. Our requirement was for Boeing to use mature technologies in accordance with the accelerated programme goals. It is designed to operate in permissive environments when it enters the fleet, while concepts of operation are explored, and it's meshed with manned operations. Manned-unmanned teaming is a notable aspect of the

Boeing Phantom Works

T1 N234MQ (s/n 00001) on its first wheels-up flight from MidAmerica Airport. The shadow cast shows the air vehicle's chine, the longitudinal line of sharp change in the cross-section profile of the fuselage.

programme, one that's on the cutting-edge simply because other aircraft are not designed to operate in such close proximity to and with manned aircraft: Stingray has a configuration and a new capability unmatched in a current air wing."

UCLASS AND NGAD

MQ-25 requirements are aligned with the initial capability documents for the Unmanned Carrier Launched Airborne Surveillance and Strike (UCLASS) programme, and the Next Generation Air Dominance (NGAD) family of systems. Both documents highlighted the need for carrier-based refuelling and persistent ISR capabilities.

The Joint Requirements Oversight Council's (JROC's) guidance set out a requirement for a versatile platform that supports a myriad of organic naval missions such as aerial refuelling and ISR to support the CSG. On 21 July 2017, the JROC validated the capability development document for the MQ-25 Carrier Based Aerial Refueling System (CBARS).

Designed to be sustainable on board an aircraft carrier and from shore bases, the MQ-25 system is comprised of three major architectural segments:

- the air segment includes the MQ-25A air vehicle and associated support and handling equipment including the deck handling system, spares and repair materials.

- the control system and connectivity (CS&C) segment includes the Unmanned carrier aviation Mission Control System (UMCS) and its associated communication equipment; mission support functionality of the Distributed Common Ground Station-Navy (DCGS-N), the Navy's primary intelligence, surveillance, reconnaissance and targeting system; all network based interfaces and routing equipment required to control the Stingray; and all required modifications to existing networks and C4I system infrastructure.

- the CVN (aircraft carrier) segment comprises the ships' spaces allocated to unmanned carrier aviation, installed ship systems and modifications necessary for interface with the air and CS&C segments. CVN systems important to the MQ-25 include aircraft launch and recovery systems, data dissemination systems (including radio terminals and antennas), and deck operations systems. Ship installation requires considerable work to re-model nearly 900ft² (84m²) of space on board the carrier to house the UMCS.

As Lead Systems Integrator (LSI), PMA-268 manages all three.

In terms of its operating envelope, the MQ-25 adequately meets the fleet's current operational needs and achieves the two primary roles. Driving that performance is a relatively low air vehicle empty weight and the fuel-efficiency of the Rolls-Royce AE3007N engine.

Components integrated on the air vehicle to meet mission requirements include a long wingspan for flight stability and endurance; a Héroux-Devtek landing gear system; redundancy systems for safety of flight; Raytheon ALR-69A(V) all-digital radar warning receivers providing 360 degree coverage; a Raytheon AAS-52 MTS-A multi-sensor imaging system equipped with infrared and CCDTV sensors, laser rangefinder, designator and illuminator; and one Rolls-Royce AE3007N turbofan engine rated at 9,000lb (40kN).

Systems specific to carrier flight deck operations include a tail hook for arrested landings; foldable wings to minimise the air vehicle's parking footprint on the flight deck; design features that ease maintenance; and on-deck control systems that integrate with systems currently used on Nimitz and Ford-class carriers.

CBARS COMPETITION

Based on the US government's acquisition strategy approved in April 2017, the MQ-25 programme is an evolution from the previous UCLASS programme.

Concepts for the now defunct UCLASS programme were deemed too difficult and challenging given the number of new technologies involved, all of which required evaluation. Consequently, NAVAIR's PMA-268 implemented a restart to evaluate the art of the possible for introducing something so new as the MQ-25, and to explore concepts of operation.

In 2016 Congress appropriated PMA-268 a congressional plus-up award for four contractors each capable of developing an UAS suitable for the CBARS requirements; Boeing, General Atomics, Lockheed Martin and Northrop Grumman.

Each contractor presented PMA-268 with ideas about how they were to mature their own technologies and concepts prior to receiving their share of the congressional plus-up award; a means of funding their respective concept development programmes through mid-2018. At that point with details, including the giveaway fuel load and ranges of each of the concepts submitted, PMA-268 conducted a tanker trade study which help conclude its requirements for the CBARS programme.

PMA-268 released the draft air system Engineering, Manufacturing, and Development (EMD) Request for Proposal (RFP) in July 2017 and released the final EMD RFP in early October 2017. Shortly after, Northrop Grumman dropped out of the competition citing an inability to meet the Navy's specification and deliver a profit.

Less than eight months after receiving qualified proposals, PMA-268 awarded the EMD contract to Boeing Company in August 2018. This was the fastest Acquisition Category 1 (ACAT-1) EMD award of the past ten years.

Under the EMD contract, the first seven aircraft procured by the Navy are four Engineering Development Model (EDM, not EMD) test air vehicles (AV-1, AV-2, AV-3 and AV-4), and three System Demonstration Test

Articles (SDTA). In addition, Boeing will also build two more airframes – one for fatigue testing and one for static loads testing.

Part of the requirement was to have a considerable amount of the design already complete prior to contract award; each company had either a prototype or a developmental article ready.

PMA-268 staff conducted a thorough review of each proposal over the next eight months. Boeing's bid was determined to offer the best value for the government, first and foremost because of its ability to meet the schedule, and the ability to meet the key performance parameters (KPPs). It's notable that the MQ-25 had just two KPPs. This a consequence of a pilot programme launched by the Chief of Naval Operations, Admiral John Richardson in 2017 that sought to limit the number of KPPs for a new weapon system to no more than three. PMA-268 opted for two; the capability to give away a set amount of fuel to a CVW strike package hundreds of miles away from the carrier, and full integration with Nimitz and Ford-class carriers as they currently operate.

MQ-25 is designated a maritime accelerated acquisition programme because the Chief of Naval Operations, Admiral John Richardson and the Assistant Secretary of the Navy for research, development and acquisition, James Geurts saw the importance of getting the system to the fleet quickly. More specifically to reduce the amount of flight time used up by F/A-18 Super Hornets when conducting the aerial refuelling role. The 6,000-hour Super Hornet service life is being depleted at much faster rates than anticipated. This has forced the Navy to devise and develop a new weapon system to conduct its tanker mission and save Super Hornet service life. This is a primary reason why the Navy switched its plan for a carrier-borne UAS from one programme, UCLASS, to another; CBARS (see below).

The CBARS concept also addresses other tactical aspects of carrier aviation; it helps to counter emerging threats now fielded by potential adversaries. That capability almost certainly points to a need for the MQ-25's stealthy, low-observable configuration.

T1 AND PHASE ONE TESTING

Phantom Works, Boeing's advanced prototyping division, started building air vehicle T1 in 2012.

The design features a blended wing-body-tail air foil with folding, high-aspect-ratio wings and a V-tail. Its configuration reflects the long-endurance mission requirements of the UCLASS programme, particularly the long thin wings. Phantom Works finished the first iteration in 2014 as part of its design proposal for the UCLASS programme.

Touch down at MidAmerica St Louis Airport, Illinois at the end of T1's maiden flight on 19 September, 2019.

Air vehicle T1 has the same outer mould line and the same engine to nascent production standard MQ-25s. Consequently, some aspects of testing already undertaken with T1 will not require repeating with a production standard air vehicle.

The objective of the MQ-25 test programme is to evaluate system maturity and technical performance of the aerial refuelling role; both mission and recovery tanking.

Initial ground testing with T1, including communications integration, towing, combined system and taxi, began almost immediately following contract award at Boeing's facilities in St Louis, Missouri. In April 2019, Boeing trucked T1 to MidAmerica St. Louis Airport in Illinois to conduct the first phases of flight testing. T1's maiden flight took place there on 19 September 2019. The company chose MidAmerica (the commercial side of Scott Air Force Base) because of hangar, runway, taxiway and air space availability.

As of 20 March, T1 had flown 12 flights and amassed nearly 30 hours during which the team worked through test points designed to evaluate the aerodynamic performance of the air vehicle, altitudes and air speeds, and the performance of the engine. T1 is fully instrumented for capturing flight test data used to evaluate flight and aerodynamic performance.

T1 is currently undergoing a planned modification for the installation of an aerial refuelling store underneath the left wing, specifically a Cobham 31-301-7 buddy store. The modification is required because T1 was originally developed without pylons to carry stores; that was not a requirement of UCLASS. The first series of aerial refuelling flight tests will follow later this year.

Testing with T1 will continue over the next few years to include envelope expansion, engine testing, aerial refuelling store operations, and Joint Precision Approach Landing System (JPALS) functionality testing.

The latter will require T1 to undergo a second modification period to enable the air vehicle to land using the JPALS, a differential, GPS-based precision landing system that guides aircraft onto carriers in all weather and surface conditions up to the rough waters of Sea State 5.

An important mod to evaluate functionality and identify any issue with JPALS before the FY2021 delivery to Naval Air Station Patuxent River of the first EDM test configured air vehicle AV-1.

T1's involvement in the test programme will culminate with its hoisting aboard an aircraft carrier to test the deck handling and control station systems.

RISK REDUCER / LATER TEST PHASES

T1 has already proven beneficial as a risk reducer during initial ground and flight testing. According to PMA-268, T1 is performing as the models projected to give the programme confidence as it moves to EDM standard air vehicle production and test.

Having T1 available for testing years

before the first EDM comes off Boeing's St Louis production line supports early learning and the discovery of any issues much earlier than is typical. Lessons learned and any issues identified can be applied and corrected during the development of the EDM air vehicles. For example, an icing susceptibility issue with the air data probe system has already been identified. To correct the issue, a different air data probe has been designed and will be fitted to all four EDM air vehicles AV-1, AV-2, AV-3 and AV-4, during their production.

Without T1, the test team would not have been able to identify the air data probe problem for several years.

Initial testing of each EDM air vehicle will take place at Boeing's MidAmerica St Louis Airport facility by an integrated Navy-Boeing test team before delivery to Naval Air Station Patuxent River, Maryland. The Air Test and Evaluation Squadron 23 (VX-23) 'Salty Dogs' will lead testing of MQ-25.

Part of the air vehicle's catapult launch and arrested landing equipment testing will take place at Naval Air Engineering Station Lakehurst, New Jersey, followed by cold soak trials in the McKinley climatic laboratory at Eglin Air Force Base, Florida.

AV-1 will undergo all aspects of a standard flight test programme followed by catapult launches and arrested landings at both Patuxent River and Lakehurst.

Boeing is conducting T1 flights in partnership with PMA-268, whereas EDM flight testing will be conducted by an integrated Navy-Boeing test team led by VX-23.

PMA-268 is overseeing all preparations for the MQ-25's test programme at Patuxent River. A hangar and laboratory facility are under construction, support equipment is being acquired, and personnel recruited.

AV-1 and AV-2 will be dedicated to flight sciences testing and fitted with similar instrumentation to T1. AV-3 and AV-4 will be dedicated to mission systems and carrier suitability testing, and the air vehicle's effectiveness to the aerial refuelling role, all planned for the second phase.

The air vehicle's all-up weight is an incredibly important design parameter for carrier suitability. The MQ-25 must be capable of fulfilling its tanking role despite the constraints imposed by maximum catapult shot weights and arrested recoveries from Nimitz- and Ford-class carriers. All-up weight was also constrained by the requirement for a fuel giveaway of 16,000lb (7,257kg) at 500 nautical miles (925km) from the carrier. By comparison, a Super Hornet holds a giveaway fuel load of 12,000lb (5,443kg) on a two-hour cycle, 15,000lb (6,803kg) on a normal cycle and 25,000lb (11,339kg) on a short cycle.

The MQ-25 will also be tasked with recovery tanking, which involves having a tanker airborne in orbit close to the carrier while aircraft recover. A critical capability at night or when the weather conditions are bad with a pitching deck in heavy seas, such that pilots need to top up the tanks to afford further attempts to land on the flight deck.

Initial Operational Test and Evaluation (IOT&E) is the final phase.

CONTROL SYSTEM

Designated the MD-5 A/B (ship/shore), the Unmanned Carrier Aviation Mission Control System (UMCS). An MD-5 A/B control station comprises open architecture software, six OJ-845 common display systems, two UYQ-122 common processing systems, one network processing group, one integrated communication system, and network connectivity.

Both the MD-5 and its operating software are being developed by PMA-268, which is also responsible for all modifications required to shore-based and CVN infrastructure. The latter includes integration of NAVAIR-developed software with Boeing's air vehicle OFP, the network, and the command, control and communication systems that will enable both CVN and shore-based control of the air vehicle.

A PMA-268 team demonstrated the first build of the UMCS using representative shipboard equipment and a simulated air vehicle at Patuxent River on April 11, 2017.

During the demo, the UMCS communicated with a Surface Mobile Aviation Interoperability Lab truck, simulating an air vehicle, and verifying command and control. Connectivity between the UMCS and shipboard network systems was tested and voice trunking (internet protocol to serial) between the air vehicle operator (AVO) and the simulated UAV was verified.

Limited control and data dissemination between the UMCS and simulated air vehicle to include automatic identification system detection, electro-optical/infrared camera operation, and full motion video, pre-planned and dynamic mission re-planning, was also performed.

UMCS 1.0 demonstrated that third party software can coexist with the common control system (CCS) framework, thereby proving the architecture is viable.

This demonstration was the first of a series to demonstrate UMCS capabilities as development of the system progresses.

Integration testing is ongoing at Patuxent River as part of the programme's first test phase.

UMCS hardware builds on Naval Sea Systems Command's common display and processing systems from the DDG-1000 Zumwalt-class destroyer and other Aegis-equipped ships.

It also incorporates the Navy's CCS, a software architecture that features a common framework, user interface, and components designed for use with a variety of unmanned systems.

US Navy documentation lists a requirement for 12 UMCS sub-systems for assembly and delivery to installation sites between September 2020 and October 2027.

AIR VEHICLE CONTROL I

Using mouse and keyboard controls, the AVO commands the air vehicle where it needs to go and what it's required to do: the system determines how to get there in the most safe

Combined system and taxi testing at Boeing's St Louis facility. This shot shows the fuselage cross section form, the bulges of the wing joints housing the actuators and hydraulically-actuated pins that lock the wings in place, and the pitch of the tail surfaces of the V-tail.

An artist impression of the Lockheed Martin proposal for the CBARS programme, shown on a catapult ready for launch.

and efficient way.

Typical operation involves the AVO maintaining positive control of the air vehicle, including the ability to change speed, direction and altitude, and continuously monitor the machine while in flight.

Flight control software is designed to handle unexpected events such as bad weather or when a change to altitude or the position of its tanking pattern is required.

The AVO, a warrant officer, will use the MD-5 control station housed within the carrier's Unmanned Carrier Aviation Warfare Center throughout all stages of the mission from the catapult launch to the arrested landing.

Prior to launch and landing, a deck handling operator will use a deck control device to taxi the Stingray around the flight deck. Once the air vehicle is on the catapult, at some point the deck handling operator will hand-off to the AVO. After landing, the deck handling operator will assume control to taxi the air vehicle to its parking spot. This is a similar method to the one used for the Northrop Grumman X-47B demonstrator.

During aerial refuelling ops, the AVO will have the ability to communicate with the receiver aircraft's pilot. PMA-268 is currently developing a concept of operations for aerial refuelling which will follow the same procedures as currently used by Super Hornets.

MILESTONE C AND BEYOND

Since contract award to Boeing, PMA-268 is following a non-standard version of the rigorous Systems Engineering and Technical Review (SETR) process to finalise the design. The DoD tasked PMA-268 to tailor out elements of the standard SETR process as part of the MQ-25's Military Airworthiness Authority distinction in order to achieve a six-year schedule. MQ-25 milestone names and requirements differ from the traditional convention because of the focus on accelerating development and delivery to the fleet. Work will continue through to the MQ-25 system design review (SDR) later this year to set its baseline design. This will allow production of the EDM air vehicles to begin. SDR is similar to a critical design review used by other DoD programmes.

PMA-268 is pursuing a Milestone C decision for low rate initial production in FY2023 to procure up to 12 MQ-25A air vehicles. Following successful IOT&E, PMA-268 will pursue a full rate production decision for an estimated total of 76 air vehicles. Stingray is expected to achieve its initial operational capability with the fleet in 2024. A

MQ-25 STINGRAY CHARACTERISTICS

Wingspan: **22.86m (75ft)**
Wingspan folded: **9.54m (31ft 3in)**
Length: **15.54m (51ft)**
Height : **4.78m (15ft 8in)**
Flight deck footprint - no greater than a Super Hornet

INDEX TO ADVERTISERS			
AERONAUTICS	5	NORTHROP GRUMMAN	COVER 4
BAYKAR	9	SCHIEBEL	COVER 2
IAI	7		

ON THE COVER:
Northrop Grumman's Firebird is designed to provide ISR payload and cockpit flexibility through open architecture and plug-and-play payload integration. The system's hardware- and software enable users to carry out a wide range of ISR missions for 30 plus hours at approximately 25,000 feet. (Northrop Grumman)

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