5.1 APIDOne_Tech spec

APID One

TECHNICAL SPECIFICATION

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1 Introduction

1.1 General

The purpose of this document is to describe the specifications and options of Evolved Systems APID System and its helicopter platform the APID One.

All measurements in this document are given in metric units (some are complemented with U.S. units).

1.2 Technical changes

The supplier reserves the right to change the design or included components of the equipment, while maintaining or improving function and performance.

1.3 Contact

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2 Definitions and abbreviations

Within this document the following definitions apply.

2.1 APID System/ APID One

The APID system is an unmanned system that Evolved Systems is offering to the market. The APID system includes a helicopter platform called the APID One, a ground control station, payloads and data links.

2.2 VTOL

VTOL stands for Vertical Take-off and Landing.

2.3 RPAS

RPAS stands for Remotely Piloted Aerial System, also known as UAS, UAV or drone.

2.4 MSL

Mean Sea Level

2.5 ISA/ Density altitude

ISA is an international standard and stands for The International Standard Atmosphere. It is an atmospheric model of how the pressure, temperature, density, and viscosity of the Earth's atmosphere change over a wide range of altitudes or elevations. Density altitude is the altitude relative to the standard atmosphere conditions (ISA) at which the air density would be equal to the indicated air density at the place of observation. Both an increase in temperature, decrease in atmospheric pressure, and, to a much lesser degree, increase in humidity will cause an increase in density altitude. In hot and humid conditions, the density altitude at a particular location may be significantly higher than the true altitude. In aviation, the density altitude is used to assess the aircraft's aerodynamic performance under certain weather conditions. Normal conditions according to the model is 15°C and 1013hPa at sea level.

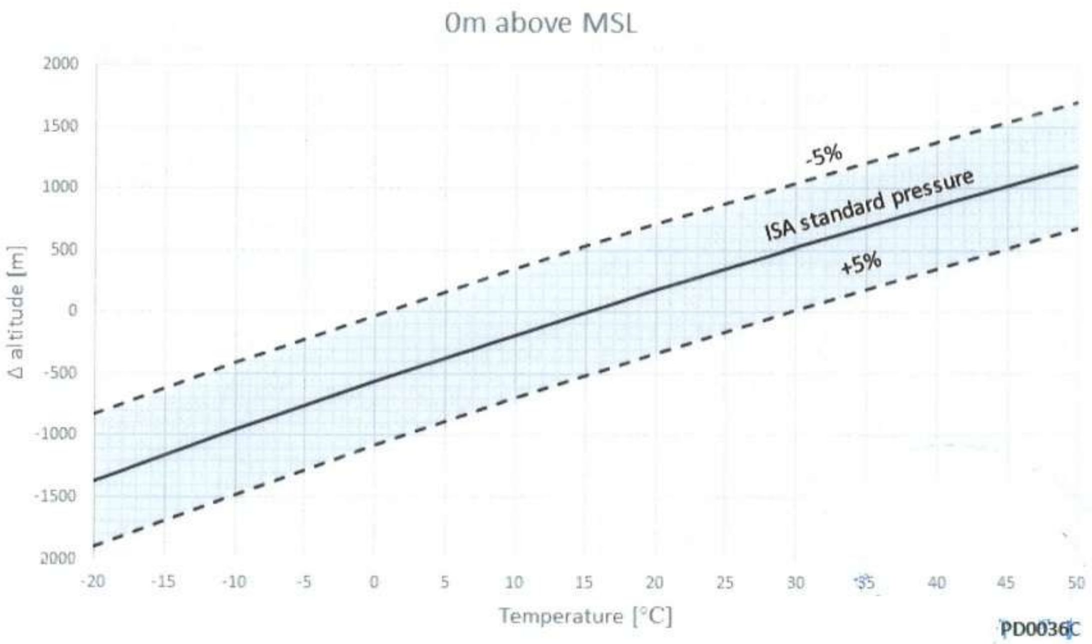

Figure 1. Temperature and pressure influence on density altitude.

2.6 HOGE

HOGE stands for Hover Out of Ground Effect. When hovering close to the ground the APID One creates an aircushion between itself and the ground, this helps to generate lift the APID One. HOGE means hovering without support from this aircushion.

2.7 MTOW

The maximum take-off weight (MTOW) is defined as the maximum allowed gross weight of the helicopter at take-off. MTOW is specified at ISA sea level and needs to be recalculated for the density altitude of the take-off site.

Since the MTOW (at local density altitude) is fixed, the fuel amount may need to be adjusted due to a given payload weight (or vice versa) in order not to exceed the current MTOW.

2.8 Maximum payload and fuel weight

The maximum payload and fuel weight includes the weight of the payload with all mounts and cables.
Maximum payload and fuel weight includes the following

- Fuel and oil
- Gimbal or other sensor equipment
- Any adapter/conversion electronics to sensor
- Payload Breakout Box
- Add-on video/data links
- Necessary mounting hardware and cabling for equipment mentioned above
- Other mission or customer specific equipment not required for the helicopter to be functional

2.9 Service ceiling

Service ceiling is the maximum usable altitude of an aircraft. The service ceiling is heavily dependent on the weight of the equipped APID One. The APID Systems service ceiling is defined by the density altitude where a climb rate of 0,5m/s is achievable.

2.10 Speed

The airspeed is being referred to in this document in terms of performance speed. Airspeed is the helicopter's speed relative to the air mass, in contrast to speed relative to ground.

2.10.1 Max speed

Meaning maximal speed at level flight.

2.10.2 Speed for optimal endurance

Speed for optimal endurance is the speed at which the least amount of fuel is required per hour of operation. The speed for optimal endurance is heavily dependent on the weight of the APID One and will therefore alter during flight.

2.10.3 Speed for optimal range

Speed for optimal range is the speed where the least amount of fuel is required per distance during the operation (heavily dependent on wind directions).

2.11 Range

Range is defined as the distance the vehicle can fly in distance, between take-off and landing -not to be confused with operational radius.

2.12 Endurance

Endurance is the maximum time the vehicle can fly without fuel reserves.

2.13 Flight team

A flight team needs to fill the roles of a vehicle operator, a technician and a payload operator. Two or more roles can be completed by one person.

3 APID System concept

3.1 System overview

Evolved Systems APID System consists of the helicopter platform APID One, a ground control station, data links and a payload.

Evolved Systems APID System consists of the following system components and services:

- APID - Helicopter platform
- Ground Control Station (GCS)
- Data link
- Payload
- Support Equipment
- Education
- Documentation

Figure 2 APID System

The APID System can carry out automatic missions by waypoints and/or be diverted by joystick. In case of communications link failure, the APID can be programmed to return to base and/or land automatically.

The APID One and its payloads are controlled from the GCS through the data links. One data link is included in the helicopter platform. This one is primarily made for controlling the helicopters' flight patterns. Additional data links can be included in the system. These links will allow data, video etc. to be streamed between the GCS and the vehicle.

Evolved Systems offer the following payloads as options; three different camera gimbals, a photogrammetry option, radar, and a lidar option (see chapter 8). Other payloads can be integrated upon request. The APID features a unique frame structure providing full payload integration flexibility for a true multi-mission capability.

The APID System is designed and manufactured in Sweden. The system falls under European export control regulations and is classified as a "dual use" product. The system contains no ITAR regulated components.

3.2 Maritime operations

1.2.1, 1.2.20

Evolved Systems offers a maritime operations option, meaning operations in a marine environment with options for a heavy fuel engine, capable of operations including ship-to-ship, land-to-ship, ship-to-land, and land-to-land transitions at wind speeds of at least 40 km/hr. both automatically and manually. And capability of emergency homing when lost connection with ability of way-point and height pre-set. 5.12

5.13.1.4

The system supports hand-over between ship and another ship, as well as ground operation to ship operation, or ground to ground, assuming the communication equipment and GCS are on both locations.

1.2.21

3.3 APID System configuration

The components of the APID system are selected by the customer to fit their needs. Depending on the payload and the type of operation different system components can be selected to make up the system.

When selecting the components it is important to keep track of the weight and electrical power requirements of the airborne segments. The weight of the airborne segments will determine the range and endurance of the helicopter platform.

The standard APID System configuration includes:

- ***APID One helicopter platform***
- ***APID Ground Control Station***
  - *Ground Control Station 204* with characteristics:
    - Lightweight and mobile control station
- ***APID Helicopter Control Software***
  - *Helicopter Control Software 206*
- ***APID Payload Control Station***
  - *Payload Control Station 205* with characteristics
- ***APID Data links***
  - *Data link 304* with characteristics:

    - Data link with maximum range 50 km,
  - options for 100 and 200 km exist

- ***APID Payload (optional)***
  - *Gimbal 405, SWESYSTEM 200 LE*
  - *Gimbal 406, SWESYSTEM 300 SL*
  - *Gimbal 403, DST-OTUS 250*
  - *Lidar 407, Riegl VUX-1LR*
  - *Photogrammetry camera 408*
  - *Gimbal 409 Overwatch PT-8DN*
  - *Radar 410 Imsar NSP-3*
  - *Radar 411 Imsar NSP-5*
  - *Radar 412 Imsar NSP-7*

- ***Support Equipment (optional)***
  - *Optional Equipment*
    - *ADS-B transponder (Mode S) 503*
    - *Transponder Mode-5 504*
  - *APID One Ground Equipment*
    - *Ground Power and Charging Station 602*
    - *Standard Tools 603*
    - *Transportation wheels 604*
    - *Helicopter platform Cover 605*
    - *Rotor Blade Case 607*
    - *Crew Communication Kit 609*
  - *APID One Maintenance Equipment*
    - *Spare parts for 300 flight hours 709*
    - *Maintenance Tools 702*
    - *Maintenance Equipment 703*

- ***APID Payload (optional)***
    - *Gimbal 405, SWESYSTEM 200 LE*
    - *Gimbal 406, SWESYSTEM 300 SL*
    - *Gimbal 403, DST-OTUS 250*
    - *Lidar 407, Riegl VUX-1LR*
    - *Photogrammetry camera 408*
    - *Gimbal 409 Overwatch PT-8DN*
    - *Radar 410 Imsar NSP-3*
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        - *Transportation wheels 604*
        - *Helicopter platform Cover 605*
        - *Rotor Blade Case 607*
        - *Crew Communication Kit 609*
    - *APID One Maintenance Equipment*
        - *Spare parts for 300 flight hours 709*
        - *Maintenance Tools 702*
        - *Maintenance Equipment 703*

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4 APID One Helicopter Platform 1.1

The APID One is a compact helicopter platform with a demonstrated ability to accommodate a wide variety of payloads, to meet specific customer requirements. As a VTOL-system, the need for launch and recovery equipment or prepared sites is eliminated, offering significant flexibility for use at remote locations. The helicopter is a conventional but unmanned helicopter with both a main and a tail rotor. The helicopter comes with a gasoline engine. The navigation and stabilization of the APID One is performed by the auto pilot. The APID One has an onboard electrical power supply system capable of delivering electrical power on two separate channels. 2.1.2

2.1.2

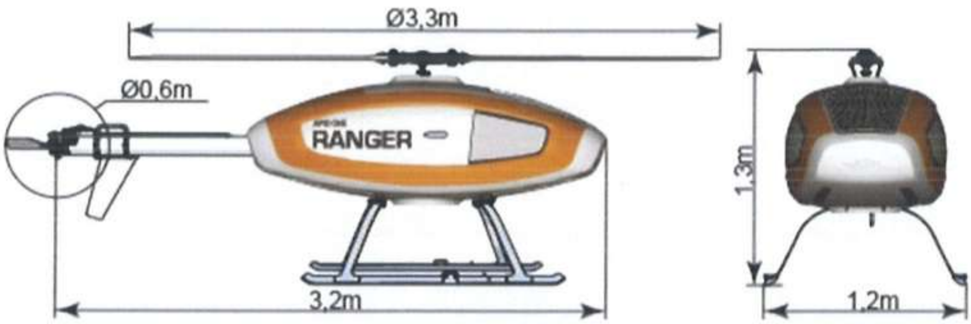
ICN-APID-A-000000-A-SWC42-00582-A-001-01

4.1 Operational setup

The necessary operational preparations for the APID One can be performed by two people and can be done in less than 15 minutes on site.

Before each flight a mission must be planned or loaded from a previous flight. This can be done at another location than the take-off site. A pre-flight inspection must be done prior to each flight and a more thorough inspection must be done every 24 hours. The mission planning and the 24-hour inspection are not included in the setup time. The pre-flight inspection is included in the setup time.

4.2 Technical data and performance



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APID One specifications	Gasoline engine (at ISA MSL conditions)
Engine power	55 kW
Fuel capacity standard	55 kg
Fuel capacity long range	75 kg
Oil capacity	1,7 kg
Maximum payload and fuel weight	95 kg 1.2.2
MTOW	Approximately 200 kg
Operating temperature range	-20°C to +55°C 1.2.7
Maximum endurance	~ 11 h 1.2.2
Maximum take-off and landing wind	15 m/s 1.2.6 54 km/hr
Icing conditions 1.2.17	No flight in icing conditions
Maximum cruise speed	33m/s (120 km/h, 65kt) 1.2.4
Maximum speed	40m/s (144 km/h, 80kts) 1.2.3
Optimal speed for endurance	See speed graphs below
Service ceiling	See service ceiling graph below 1.2.5
Hover out of ground effect (HOGE)	See graph below
Fuel consumption max/min average	See fuel consumption graph below
Range	See range graph below
Humidity	95 %
Navigation	GNSS, GPS, GLONASS 1.2.9

4.3 Endurance

1.2.2

At normal operation the recommendation is to have 30 minutes as reserve, this will reduce the actual endurance.

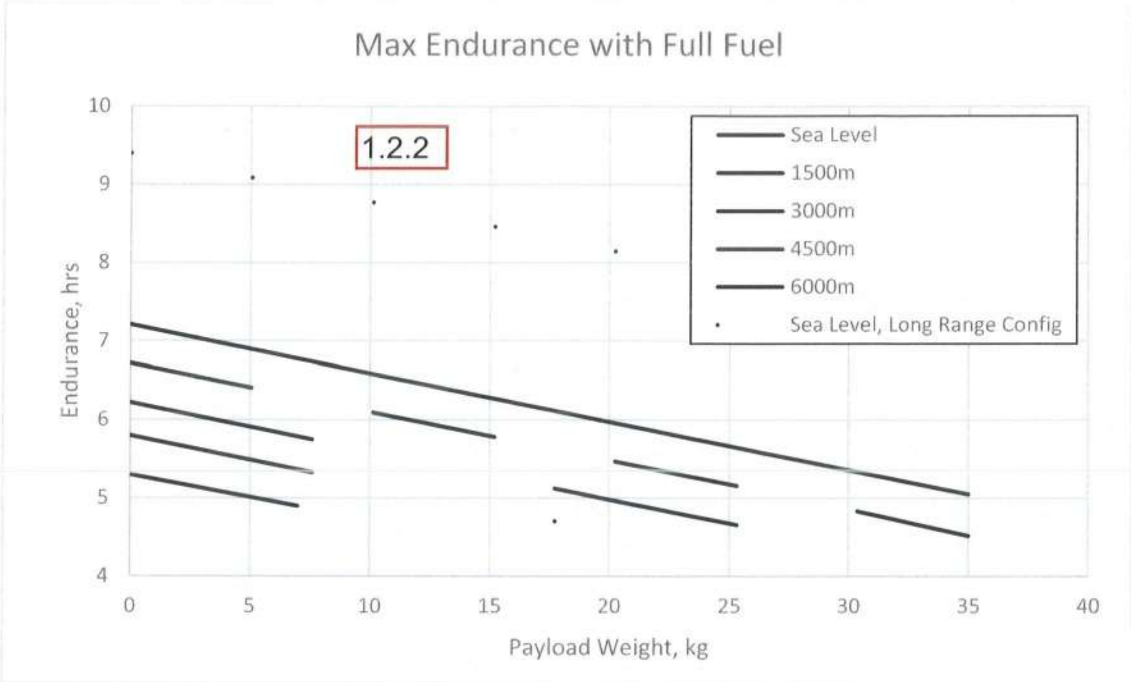

Figure 3. Payload- endurance at different density altitude

4.4 Optimal Speed for endurance

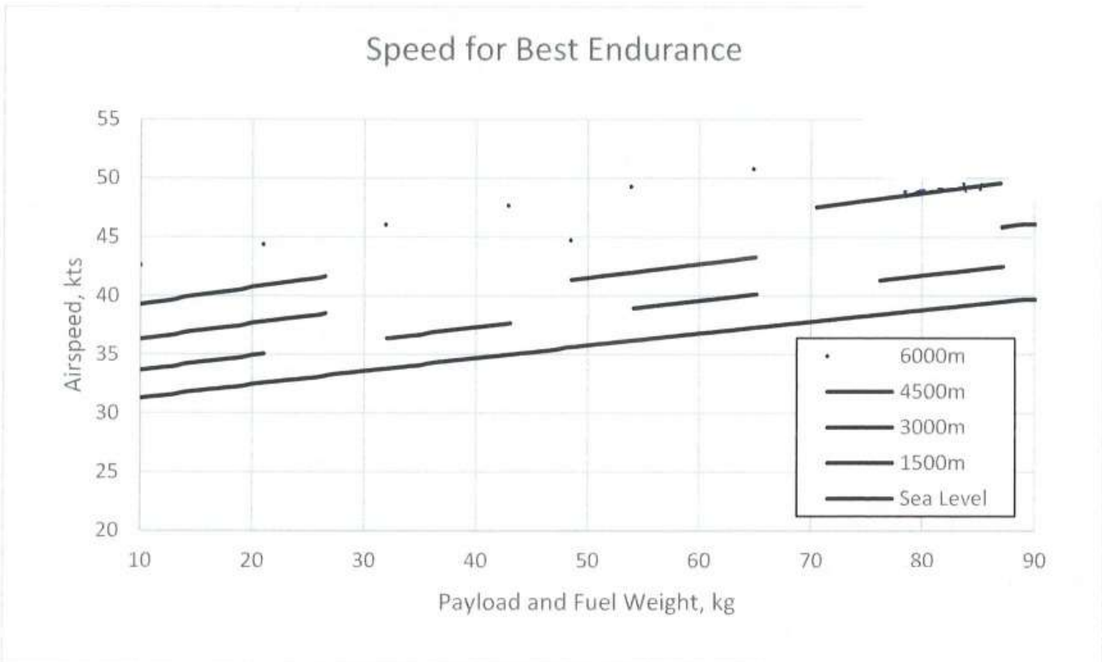

Figure 4. Speed for best endurance, *at different density altitude*

4.5 Service ceiling 1.2.5

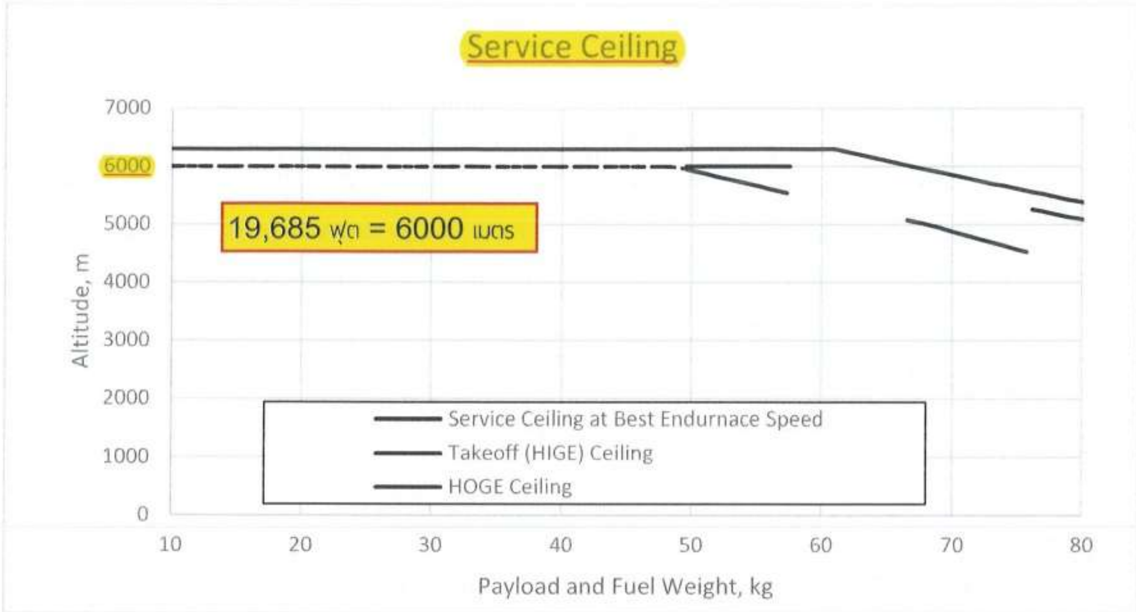

Figure 5. Service ceiling versus combined payload and fuel weight

4.6 Fuel consumption

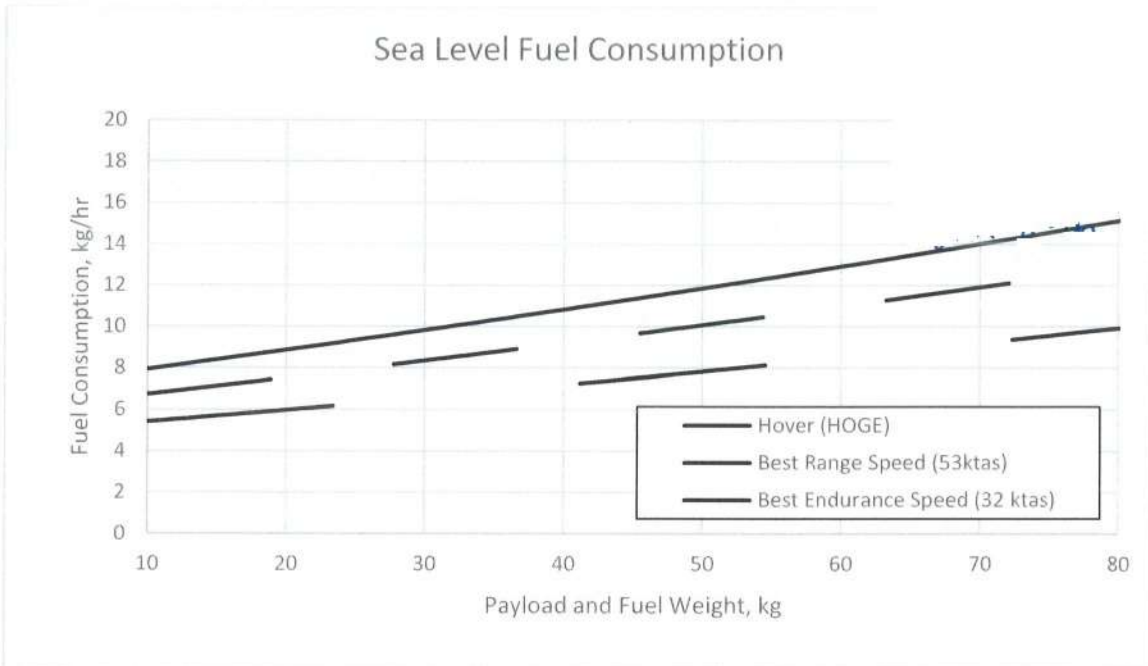

Figure 6. Fuel consumption at different weight

4.7 Range

The following graph describes the range dependent on the attached payload.

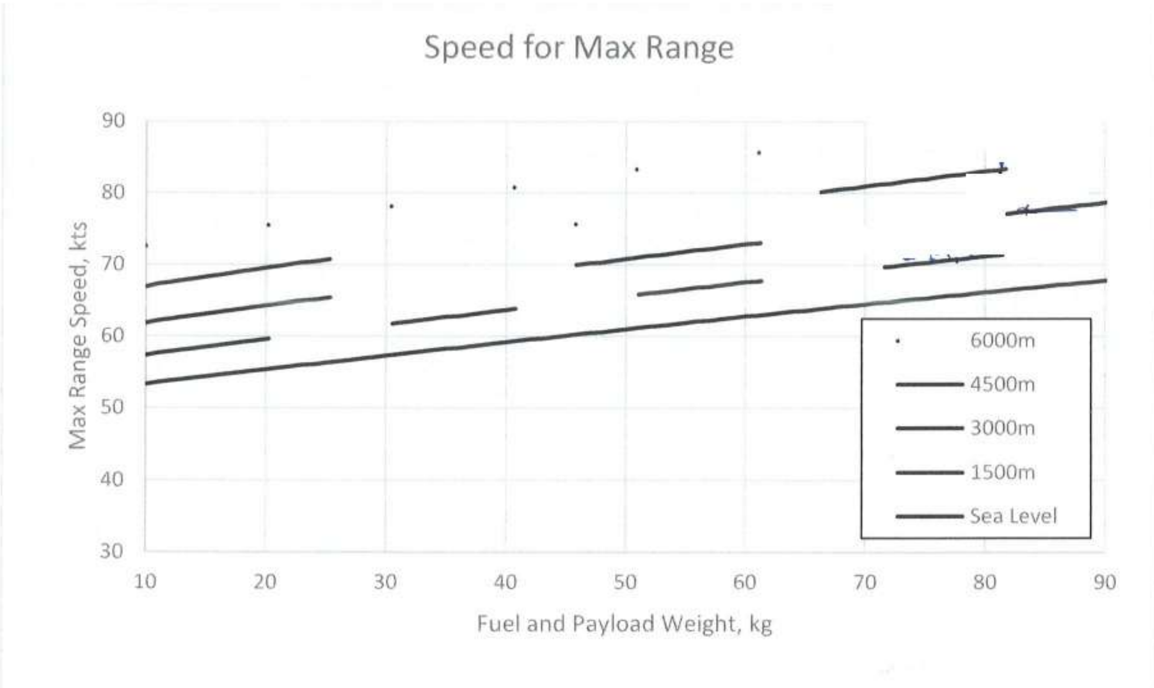

Figure 7. Range- payload at different density altitude

4.8 Helicopter components

2.1.1, 2.1.2

The APID One consists of several components, following is the basic description of some of the major components.

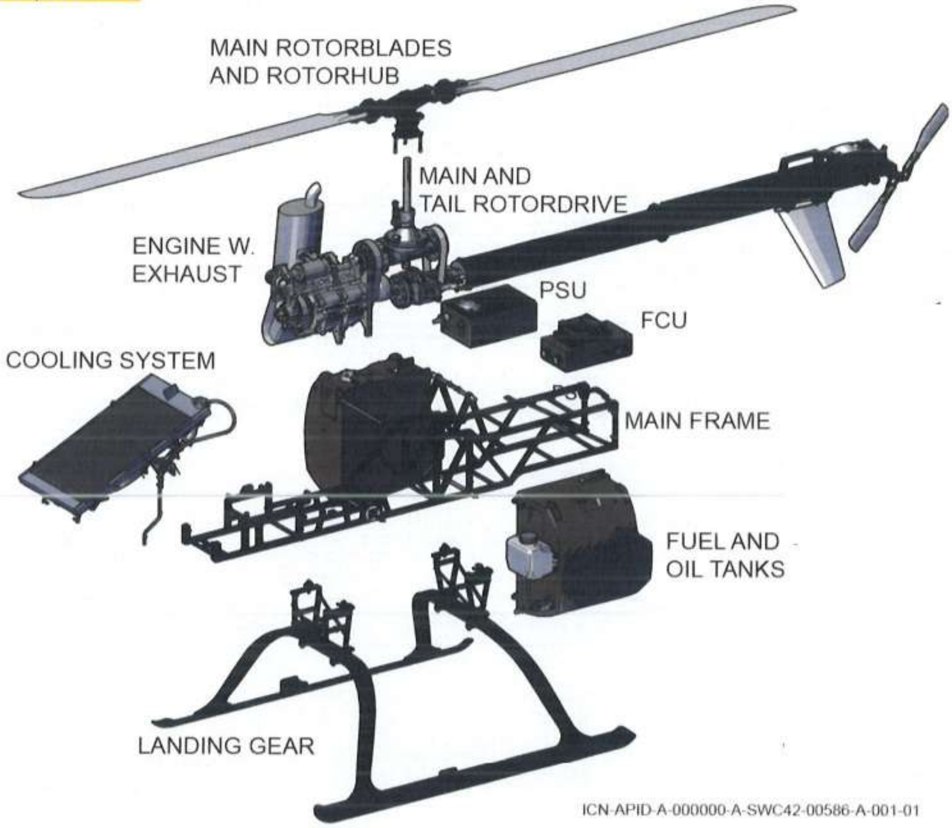

Figure 8 Helicopter components

4.8.1 PSU - Electrical power

There are two separate systems for electrical power generation on the helicopter. There is a 12V system that uses the engine alternator and a 28 V system that uses an alternator that is attached to the drive train. The 12V system is used to power all engine electronics including the electric starter for the engine. The 28V system is used to power the flight control system and payloads. The 28V system has two redundant channels. The flight control system can draw power from both channels. Both the 12 V and 28V systems have backup batteries. The batteries are charged during flight when the helicopter has reached nominal rpm, before then it is powered by internal batteries. It is possible to use ground power for the 28V system. It is possible to charge the batteries from an external charger when on the ground.

Figure 9 PSU - Electrical power

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4.8.2 FCU - Navigation

1.2.16

The flight control system holds the flight control software and controls the helicopter using sensors to measure what the helicopter is doing and actuators to control the rotors and engine. The navigation sensors consist of high-speed redundant GPS receivers for position, speed, altitude and heading input. A digital compass and a barometric altimeter are used as backup sensors in case of GPS failure.

Figure 10 FCU - Navigation

4.8.3 Fuel and oil tanks

The composite fuel tanks are easily removable, and all fuel and oil connections have quick spill free connections. The fuel system is of mechanically regulated pressure type and uses redundant electric fuel pumps.

Figure 11 Fuel and oil tanks

4.8.4 Landing gear

The landing gear is of composite design and is designed to have flexibility to be able to handle hard landings. The landing gear skids have attachment points for the transportation wheels.

Figure 12 Landing gear

4.8.5 Fuselage

2.1.1

For ease of maintenance and payload installation flexibility the APID One is built on a chassis. All equipment is attached to the chassis and the APID One is covered using aerodynamic cowlings. The cowlings are easily removed to give access to all the systems on the inside of the APID One during inspections.

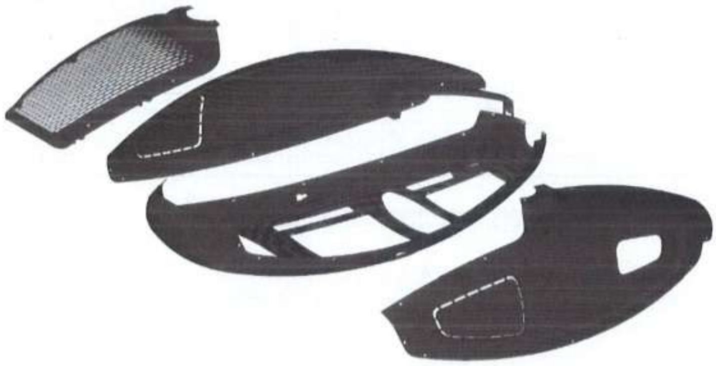

Figure 13 Fuselage

4.8.6 Main and tail rotor

Both main and tail rotors are of the same type, soft in plane semi ridged. They are used with composite rotor blades.

The rpm from the engine is reduced to the main and tail rotor. The reduction for the main rotor is done using first a belt drive and then a spiral bevel gearbox. The reduction for the tail rotor uses a belt drive on the pinion shaft of the main gear box, a composite drive shaft and a spiral bevel gearbox to change the direction at the tail rotor shaft. There is a centrifugal clutch on the engine to be able to start the engine without the inertia of the rotors and a torsional vibration damper to protect the rotor systems from the torsional vibrations from the engine. A sprag clutch is incorporated in the main rotor belt drive.

Figure 14 Main and tail rotor drive

4.8.7 Engine

2.2.1, 2.2.2

The engine is a twin rotor rotary engine. Rotary engines have low radial and torque vibrations. Furthermore, the engine is specifically designed for helicopter and maritime operation.

2.2.2

	Gasoline engine
Displacement	600 cc
Fuel type	MOGAS 2.2.1
Oil	Separate Oil injection
Cooling	Water
Nominal RPM	6500
Starter type	Electric starter
Fuel Injection	Electronic fuel injection

4.9 Payload Area

2.1.3

The area under the body of the APID One helicopter platform is intended for payload. The structure provides highly flexible mounting of the payload. The payload will be distributed to balance the APID One. There are premade mounts for the payloads described in chapter 8. There is space for two EOIR gimbals under the fuselage, as well as side-mounted radar. Any other payload integration needs to be approved by Evolved Systems prior to installation.

4.10 Data links

4.4, 4.5

The data link electronics are housed inside the flight control unit. The antennas are placed on the airframe. The data link is protected by AES-256 encryption.

Communication Systems: Preferred

C2 Primary System: Radio NOR

- Frequency 4.9-5.9GHz spread spectrum, phased array
- Not less than 100 kk up to 200 km range
- Data rate 15 Mbps
- Encryption AES-256 4.3
- Phased Array Adaptive beamforming (advanced anti-jam technology) 1.2.18

C2 Secondary System: DLX
1. Frequency 902-907MHz
2. Range up to 150km
3. Encryption AES-256

4.11 Anti-jam GPS receivers 1.2.9, 1.2.18

The system is equipped with dual GNSS (GPS, GLONASS) receivers and an INS (Inertial Navigation) subsystem. The GNSS receiver is of Anti-Jam type with adaptive antenna technology making it hardened against jamming and spoofing

4.12 Transponder 1.2.15

The system has an ADS-B / Mode-S / Mode-05 IFF transponder at distances exceeding 50 nautical miles.

5 Ground Control Station 1.2.12

The Ground Control Station includes Helicopter Control Station (HCS), Payload Control Station (PCS) (see chapter 8.6) and some optional special equipment. Below are the solutions for a portable Helicopter Control Station.

5.1 Helicopter Control Station 204 5.8

The Helicopter Control Station for the APID system is a lightweight portable rugged laptop. The HCS is designed to be operated by one person.

5.1

1.2.12 The Helicopter Control Station software organizes the workload of the HCS, implements commands to the airborne helicopter and receives and analyzes Helicopter Control Station data downlinked from the helicopter. The software is installed in the rugged computer system. Graphical information is presented on the display and commands are given via keyboard, mouse and steering-pad or directly on a "touchscreen" display. The Helicopter Control Stations are interchangeable for redundancy reasons. 5.4, 5.5

5.2 Ground Control Station Software

1.2.11 The map centric (GCS) S-57 compliant Software allows command and control of the (RPAS) in a manner that lets the operator focus on the mission. The software can be customized to fit the command and monitoring needs of the customer, depending on payload and datalink selection. The status and health are constantly monitored, and alarms are displayed on any flight critical discrepancy. A flight can be recorded and replayed in the software indefinitely, provided that there is enough storage space available. 5.11

5.8 *Figure 15 GCS Software user interface example*

5.2.1 Flight modes

1.2.11, 5.13.1.1, 5.13.1.2, 5.13.1.3, 5.13.1.4

The helicopter is operated in different flight modes, to support the different phases of a flight. The engine start, warmup and take off is all automatic and commanded from the ground control station. In flight, different flight modes are used to perform the task, as listed below. Normally a mission is programmed before the flight and flown in waypoint mode. If a diversion from the mission is required, or semi-automatic operation preferred, the operator can at any time switch to joystick mode. Landing and shut down is also commanded from the software and performed automatically.

5.2.1.1 Waypoint Mode

5.13.5

In waypoint mode the helicopter will automatically fly a programed mission consisting of multiple waypoints in order. The mission can be updated during flight and saved to file for later reuse. The operator can switch waypoint at any time. There are different waypoint types to perform different tasks such as cruise, hover, circling and landing. The mission is programmed by choosing waypoint positions on a map and the height of the waypoints are constantly validated for ground clearance against the build in Digital Terrain Elevation Database. Search patterns can also be automatically generated.

5.2.1.2 Joystick Mode

In joystick mode the helicopter is controlled in real-time with either a hardware joystick or on-screen. The operator commands the desired speed, and the flight controller executes it independently of wind and other external disturbances. The autopilot keeps the motions within a safe flight envelope.

5.2.2 Communication Failure

1.2.22

In case of loss of communication, the APID is programmed to automatically carry out a return to a pre-defined position and land there. (Automatic Homing Function)

5.13.1.4

5.2.3 Simulation

The system supports hardware-in-the-loop simulation, meaning the full system is used just as in flight. This is very useful for training and mission plan validation.

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6 Data links

1.2.10, 4, 5.1

4.1

The APID system can be used with redundant data links for helicopter control. Normally one combined video and control link is selected as primary data link and a link that only handles control data is chosen for secondary data link.

6.1 Data link 304

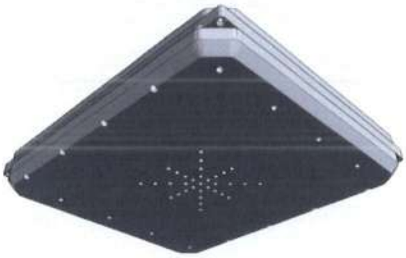
4, 4.1, 4.2

The data link 304 option features a C-band tracking phased array antenna. Can be used for both payload video/data stream and controlling the APID One.

Data link 304	
Data link maximum range	100 km (50, 200 km options) 4.1, 4.2
Weight Airborne segment	2,8 kg (w. cables)
Weight Ground segment	12,5 kg
Operative frequency range	4.900-5.900 GHz
Maximum data throughput	15.0 Mbps 4.2
Safety distance to antenna	1 m
Electrical power consumption Airborne segment	Peak 310 W

6.1.1 Airborne segment

The airborne segment of the data link 304 has the electronics and antennas housed in one unit.



6.1.2 Ground segment

The ground segment of the data link 304 consists of one antenna that can be mounted to fit the customers' needs.

7 Payload

2.1.3, 3.1, 3.2

Evolved Systems offers the following payloads as a standard

- *Gimbal 405, Trakka SWE-200 LE*
- *Gimbal 403, DST-OTUS 250*
- *Lidar 407, Riegl VUX-1LR* 3.7
- *Photogrammetry camera 408*
- *Gimbal 409 Overwatch PT-8DN*
- *Radar 410 Imsar NSP-3*
- *Radar 411 Imsar NSP-5*
- *Radar 412 Imsar NSP-7*
- *Cargo Pod 450 Dual life jacket*

7.1 Gimbal 405, Trakka SWE-200 LE

Gyro Stabilized camera gimbal with daylight and thermal imager for stable imaging a fully digital 4-axis active gyro stabilization system compensate for the aircraft movements and vibrations. The set includes mounts, electronics and cabling necessary to send the video and control signals to the data link.

Figure 16. Gimbal 405, Trakka SWE-200 LE

Gimbal 405, Trakka SWE-200 LE	
Gimbal size	200 mm
Weight	8 kg
Power consumption steady state	150 W
Daylight imaging	Full HD 1080p
• Sensor	• 1/2.8" CMOS or Super HAD CCD (1/4")
• Resolution	• 1920 x 1080 or (PAL / NTSC)
• Fields of view	• 30x (60° to 2°) or 40x (60° to 1.6°)
• Digital Zoom	• Yes
Thermal imaging	640 x 512 resolution, 8-14 µm spectral range
• Lens options	• 18, 25, 50, 60, 75 mm
Gyro-Stabilization	4 axes
Power requirement	20-30 VDC 150W

3.4.1, 3.4.1.1

3.2 **7.2 Gimbal 402, DST-OTUS U250** 1.2.13.1 3.3.2.1 5.13.2.4

Electro optical gyro stabilized camera gimbal with daylight and thermal imager. The set includes mounts, electronics and cabling necessary to send the video and control signals to the data link.

3.3.2.1(1)

3.3.1

Figure 17. Gimbal 403, DST-OTUS 250

Gimbal 403, DST-OTUS 250	
Gimbal size	250 mm
Weight	9 kg
Power consumption	70 W
Daylight imaging 3.3.2.1.(3)	1920 x 1080 HD resolution, 20x optical zoom
• Sensor	• High-Definition CMOS (or Standard Definition CCD)
• Resolution	• 1920 x 1080 (PAL / NTSC)
• Fields of view 3.3.2.1.(2)	• Continuous optical zoom 20x (12x)
• Digital Zoom	• Up to 4x continuous
Thermal imaging 3.3.2.1.(4)-3	640 x 512 resolution, 3-5 µm spectral range
• FOVs 3.3.2.1.(2)	• Continuous zoom $4.3^0 - 25^0$ HFOV or Prime lenses with 10.4^0 or 18^0
Gyro-Stabilization	4 axes
Power requirement	18-36 VDC 70W (Typical)

7.3 Lidar 407, Riegl VUX-1

The RIEGL VUX-1 is a very lightweight and compact laser scanner, meeting the challenges of emerging survey solutions by RPAS, both in measurement performance as in system integration.

Lidar 407, Riegl VUX-1	
Survey-grade accuracy	15 mm
Scan speed	up to 200 scans / second
Measurement rate	up to 500,000 meas./sec (@ 550 kHz PRR & 330° FOV)
Operating flight altitude	up to more than 1,000 ft
Field of view	up to 330° for practically unrestricted data acquisition
Signal processing features	• Echo signal digitization • Online waveform processing • Multiple target capability
Power requirement	11-32 VDC 72W (Typical)
Weight	10 kg

7.4 Photogrammetry camera 408

Photogrammetry camera 408 takes pictures during flight and these are processed on ground to create a 3-D model of the photographed area.

3.4.1, 3.4.1.1

3.2 7.5 Gimbal 409 Overwatch PT-8DN 1.2.13.2,

PT-8DN SMART SENSOR payload is a versatile day-night payload optimized for automated, wide-area search, ISR, and sensor-to-sensor collaboration. Dual RGB sensors of different focal lengths provide "Interrogate Mode" detection and verification capabilities.

Figure 18: Gimbal Overwatch PT-8DN

Gimbal 409, Overwatch PT-8DN	
Gimbal size	200 x 310 mm
Weight	7.5 kg 3.4.1.2.3(6)
Power consumption	70 W 3.4.1.2.3(7)
Daylight imaging	1920 x 1080HD 3.4.1.2.1 (1)
• LWIR and RGB (forward video)	• 1920 x 1080
• LWIR Gimbal Camera	• 1920 x 1200
• 100mm Mono Spotter	• 12.3 MP 3.4.1.2.2(1) -2
• 35mm RGB	• 24.5 MP
Power requirement	18-36 VDC 70W (Typical) 3.4.1.2.3(7)

7.6 Radar 410 ImSAR NSP-3

The NSP-3 is a multimode, low-Size, Weight, and Power (SWaP) radar system in a weatherized pod. The NSP-3 pod requires only power and ethernet to operate. It can be attached to an aircraft with the IMSAR quick connect rail with blind mate connections or by using the MIL-Spec 14" lug mounts. IMSAR also has the in-house expertise to design custom integrations for specific platforms when needed. 5.13.4.3

The NSP-3 can be connected to the Lisa GCS Ground Processing Server via a datalink or paired with the Lisa Air or Lisa Air Lite Airborne Processing Server to enable real-time, onboard data processing. Radar data can also be stored onboard the NSP-3 for post-mission processing.

Specification			
Size	DIAMETER:95 mm LENGTH: 776 mm		
Weight	3.35 kg		
Power	81W 3.4.2.2		
Frequency	Ku 3.4.2.3		
Operating Altitude	Mode dependent up to 6,000 feet AGL 3.4.2.6		
Sensor queuing	Cursor on target		
Communication	Ethernet		
Command & Control	LISA 3D™, LISA DASHBOARD™, AND RADAR CONTROL API		
Image exploitation	LISA 3D™ OR EXISTING PED EQUIPMENT		
Standard data products	KML, COMPLEX NITF, JPG, PNG, BMP, STANAG 4607 DETECTS, STANAG 4676 TRACKS 5.13.4.1		
Performance Data			
SAR Imaging	Resolution (m)	Max Range (km)	Max Range Pixels
	3.4.2.5 -1 0.3	10.0	4,000
	1.0	14.3	4,000
Moving Target Indicator	Max Range (km)	Max Continuous Coverage (km²)	
3.4.2.5 -3 Vehicle	6	16	
Maritime Surveillance	Range (km)	Swath Width (km)	Coverage km²/h
Raft 5.13.4.2	7	6.5	500
Fishing Boat	9	8.8	700
Yacht	15	14.2	1,300
Container Ship	32	28.5	2,600
Super Tanker	66	62.0	5,700
Minimum Service Interval			
1,250 hours 3.4.2.4			

7.7 Radar 411 ImSAR NSP-5

The NSP-5 is a multimode, low-Size, Weight, and Power (SWaP) radar system in a weatherized pod. The NSP-5 pod requires only power and ethernet to operate. It can be attached to an aircraft with the IMSAR quick connect rail with blind mate connections or by using the MIL-Spec 14" lug mounts. IMSAR also has the in-house expertise to design custom integrations for specific platforms when needed.

The NSP-5 can be connected to the Lisa GCS Ground Processing Server via a datalink or paired with the Lisa Air or Lisa Air Lite Airborne Processing Server to enable real-time, onboard data processing. Radar data can also be stored onboard the NSP-5 for post-mission processing.

Specification			
Size	DIAMETER: 137 mm LENGTH: 118 mm HEIGHT: 175 mm		
Weight	16.5 LBS (7.5 KG)		
Power	130W		
Frequency	Ku		
Operating Altitude	Mode dependent up to 10,000 feet AGL		
Sensor queuing	Cursor on target		
Communication	Ethernet		
Command & Control	LISA 3D™, LISA DASHBOARD™, AND RADAR CONTROL API		
Image exploitation	LISA 3D™ OR EXISTING PED EQUIPMENT		
Standard data products	KML, COMPLEX NITF, JPG, PNG, BMP, STANAG 4607 DETECTS, STANAG 4676 TRACKS		
Performance Data			
SAR Imaging	Resolution (m)	Max Range (km)	Max Range Pixels
	0.3	16.5	4,000
	1.0	24.0	4,000
Moving Target Indicator	Max Range (km)	Max Continuous Coverage (km^2)	
Vehicle	12	60	
Maritime Surveillance	Range (km)	Swath Width (km)	Coverage km^2/h
Raft	12	12.3	2.900
Fishing Boat	16	14.6	3,700
Yacht	27	59.0	6.200
Container Ship	55	50.0	12,600
Super Tanker	102	95.2	24,000

7.8 Radar 412 ImSAR NSP-7

The NSP-7 is a multimode, low-Size, Weight, and Power (SWaP) radar system in a weatherized pod. The NSP-7 pod requires only power and ethernet to operate. It can be attached to an aircraft with the IMSAR quick connect rail with blind mate connections or by using the MIL-Spec 14" lug mounts. IMSAR also has the in-house expertise to design custom integrations for specific platforms when needed.

The NSP-7 can be connected to the Lisa GCS Ground Processing Server via a datalink or paired with the Lisa Air or Lisa Air Lite Airborne Processing Server to enable real-time, onboard data processing. Radar data can also be stored onboard the NSP-5 for post-mission processing.

Specification	
Size	DIAMETER: 137 mm LENGTH: 148 mm HEIGHT: 173 mm
Weight	10.9 kg
Power	275 W
Frequency	Ku
Operating Altitude	Mode dependent up to 23,000 feet AGL
Sensor queuing	Cursor on target
Communication	Ethernet
Command & Control	LISA 3D™, LISA DASHBOARD™, AND RADAR CONTROL API
Image exploitation	LISA 3D™ OR EXISTING PED EQUIPMENT
Standard data products	KML, COMPLEX NITF, JPG, PNG, BMP, STANAG 4607 DETECTS, STANAG 4676 TRACKS

Performance Data			
SAR Imaging	Resolution (m)	Max Range (km)	Max Range Pixels
	0.3	22.5	4,000
	1.0	32.0	4,000
Moving Target Indicator	Max Range (km)	Max Continuous Coverage (km²)	
Vehicle	17	85	
Maritime Surveillance	Range (km)	Swath Width (km)	Coverage km²/h
Raft	17	14.5	4,000
Fishing Boat	23	20.4	5,600
Yacht	39	36.0	10.000
Container Ship	77	71.4	19.900
Super Tanker	135	128.0	35.500

7.9 Payload Control Station

3, 5.13.2.1, 5.13.2.2, 5.13.2.3, 5.13.2.4

The Payload Control Station is a handheld control device for controlling the camera gimbal, and a monitor for viewing the camera image as well as a video recorder. The Payload control station varies depending on what payload the customer chooses.

Figure 19 Example of set up

7.10 Cargo Pod 450 Dual Life Jacket

3.5

The APID One has the capacity to be outfitted with the Cargo Pod 450 Dual Life Jacket module. This lets operators deploy a pair of life jackets during **flights** in maritime conditions. It is also a general cargo pod drop and carry box for other items.

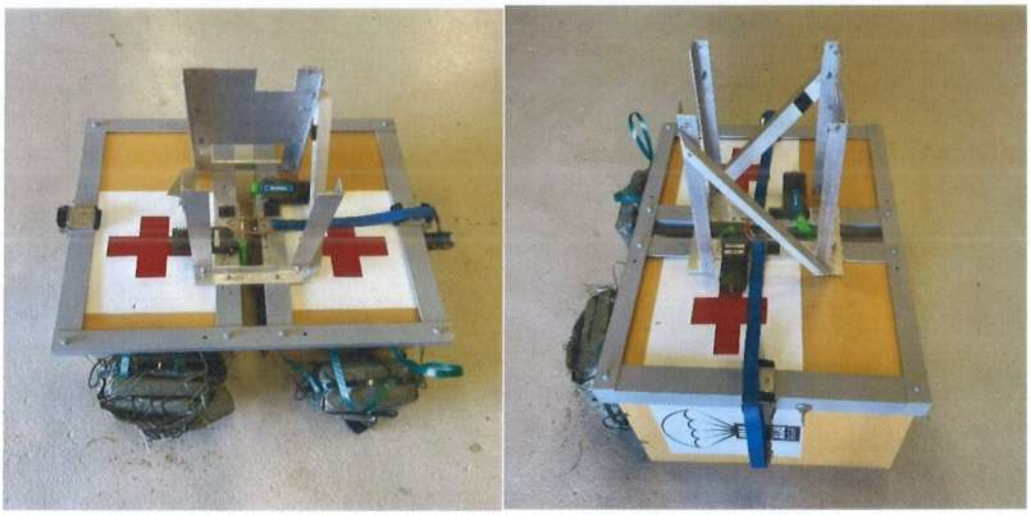


Figure 20: Life Jacket and cargo pod drop mechanism.

7.11 AIS Receiver

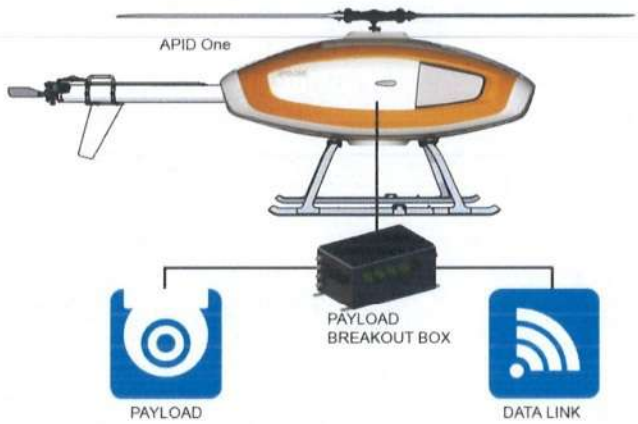
The APID has an optional AIS Receiver subsystem. The AIS receiver can be integrated with the Payload controller to provide distance and ID to maritime vessels.

8 Support Equipment

8.1 Payload Breakout Box

The Payload Breakout Box is needed to integrate various data links and payloads.

The Payload Breakout Box is an electronic box that can connect payloads, gimbals, data links etc. to the APID One and the GCS to get the data collected in the air down to the ground.



8.2 ADS-B transponder 503 or IFF (Mode-5) transpoder

Sagetech XP Mode S Transponder is an Automatic dependent surveillance-broadcast transponder, XPS-TR, is a system that can be integrated with the APID One. It is a system designed to reduce the incidence of mid-air collisions between aircraft. It monitors the airspace around an aircraft for other aircraft equipped with a corresponding active transponder, independent of air traffic control, and warns pilots of the presence of other transponder-equipped aircraft which may present a threat of mid-air collision.

It is based on secondary surveillance radar transponder signals and operates independently of ground-based equipment to provide advice to the pilot on potential conflicting aircraft.

ADS-B-503	
Weight	0,2 kg
Power consumption nominal	15 W

8.3 Ground power and charging station 602

The ground power and charger station 602 can supply the APID One with electrical power or charge the onboard batteries.

8.4 Standard tools 603

The standard tool set has all tools needed in normal operation and inspections.

8.5 Transportation wheels 604

Attaches to the landing gear to be able to easily move the vehicle by lifting it in the tail boom handle.

8.6 Helicopter cover 605

There is a helicopter specific cover that can be used to protect the helicopter if it is stored outside to protect it from sand, rain and sun.

8.7 Rotor blade case 607

The rotor blade case holds two rotor blades and protects them from damage when not mounted on the helicopter.

8.8 Crew communication kit 609

A duplex hands-free radio system for crew communication.

8.9 Spare parts for 300 FHS 709

The spare parts set for 300 flight hours are stored in three cabinets with lockable wheels.

8.10 Maintenance tools 702

The maintenance tool set holds all tools needed for maintaining the APIP One at line replaceable unit level. The tools are stored in a cabinet with lockable wheels. The front door of the cabinet can be rearranged to become a maintenance table.

8.11 Maintenance equipment 703

The maintenance equipment set holds bulky maintenance equipment like cranes and scales.

9 Maintenance

9.1 Maintenance

The Evolved Systems maintenance concept is based upon a set service schedule, more information regarding the maintenance can be found in the Aircraft Maintenance Manual (AMM) upon delivery.

Thanks to unique innovative solutions in the latest version such as No mechanical drive components and low vibration design, the need for maintenance could be greatly reduced.

The scheduled inspections are as follows:

- every 100 flight hours
- every 500 flight hours
- every 1,000 flight hours
- every 4,000 flight hours

In general, maintenance is accomplished by the replacement of assemblies. There are a limited number of field/line or repairable/overhaul components.

10 Education and Training

Depending on the complexity of the selected system Evolved Systems offers a tailored training and education suite. The number of students will affect how the education is organized to best reach maximum efficiency and quality. The training is primarily intended to form an operating organization, a flight team therefore it is important that the same students fulfill the entire class together.

The training consists of three modules

- Mechanics training: The students gain theoretical and practical training required to safely prepare and service the APID One to operate missions.
- Operator training: The students learn enough about the APID System to be able to operate it.
- Administrator training: Administration work related to planning and servicing the System.

11 Documentation

One set of documentation will be supplied with each system, both hard (paper) and soft copies. The documentation set consists of the following parts:

- System Documentation Manual
- Operators Manual template
- Flight Manual
- Aircraft Maintenance Manual
- Illustrated Parts Catalogue
- Logbook template
- Template for maintenance planning

12. General Requirements (Additional Detail)

1.1

12.1 The unmanned aerial vehicle (UAV) required by Thai-MECC is a Vertical Take-off and Landing (VTOL) unmanned aerial vehicle specifically designed for coastal operations, long-distance reconnaissance, identification, and various operational support tasks. It is also intended to aid Maritime Law Enforcement and Search and Rescue (SAR) missions. This UAV system has a well-proven track record of successful use and is not a prototype. The system comprises at least two Vertical Take-off and Landing (VTOL) unmanned aerial vehicles (UAV), a Ground Control Station (GCS), operational support equipment/tools, maintenance tools, equipment, spare parts, and a detailed maintenance guide along with a list of necessary spare parts.

12.2 The UAV must have a flight time of 6 hours (hrs.) while carrying additional equipment or a payload weight of at 20 kilograms (kg.). This performance must be achievable while operating the entire payload using fuel from standard operating tanks, batteries, or a hybrid mixture of both. The seller is required to provide verification from the assembly manufacturer confirming these capabilities, presented in the form of a table, graph, or calculation. (This information should demonstrate the relationship between payload, altitude, and wind speed to show flight time.) 1.2.2

12.3 Capable of withstanding wind speeds of at 36 km/h while in operation (Enabling it to operate in strong wind gusts and moderate wave conditions, according to the Beaufort Scale, Section 5) 1.2.6

12.4 Capable of controlling the aerial vehicle and transmitting and receiving data in all 360-degree directions, covering a distance of at 100 km by supporting the frequencies authorized for Thai-MECC by the National Broadcasting and Telecommunications Commission 1.2.8

12.5 Must include at least two navigation systems, GPS (Global Positioning System) and GLONASS (Global Navigation Satellite System), which operate together automatically. 1.2.9

12.6 Must feature a powerful processing system that can link ground control systems with unmanned aerial vehicles in real time 1.2.10

12.7 Must have a flight mission control monitor that displays real-time video from the flight control camera and shows flight trajectory information, capable of displaying at least 2D information or better. 1.2.11

12.8 The unmanned Aerial Vehicle with more than 2 units must be of the same type as Units 1 and 2, possessing the same characteristics, and capabilities and also being able to install payloads as specified in Article 1.2.13. 1.2.14

12.9 Each aerial vehicle must be equipped with an IFF Transponder Mode-S identification system capable of identifying targets at distances exceeding 50 nautical miles. 1.2.15

12.10 Each unmanned aerial vehicle must be equipped with a receiver system displaying the AIS (Automatic Identification System) Line of Position 1.2.16

12.11 Capable of operations including ship-to-ship, land-to-ship, ship-to-land, and land-to-land transitions at wind speeds of at 36 km/hr. 1.2.17

12.12 There are at least two External Pilot/RC Pilot control systems (Primary & Secondary) per Ground Control Station (GCS) for controlling each unmanned aerial vehicle 1.2.19

12.13 Capable of operating unmanned aerial vehicles from ship-to-ship and land-to-land using a manual control system that ensures stability equivalent to that of the Navy's Offshore Patrol Vessel in Sea State 2 and higher. (The Offshore Patrol Vessel is part of Thai-GECC's reserve ship list.) 1.2.20

12.14 Capable of connecting and transmitting data via the internet to other operation centers from the Ground Control Station 1.2.23

13. OTUS U250 – C230 (Additional Detail)

13.1 Detecting thermal radiation with a wavelength range of MWIR (Complementary Metal Oxide Semiconductor: C-MOS) 3.3.2.1(4) -1

13.2 Capable of continuous operation for a minimum of 12 hours 3.3.2.1(4) -4

13.3 Having a cooling system

13.4 The cool down for availability should not exceed 10 minutes 3.3.2.1(6)

13.5 Capable of recognizing and distinguishing types of targets, NATO STANAG 4347 standard targets or equivalent, sized 2.3 x 2.3 square meters, from a distance of not less than 5 km when utilizing maximum optical zoom, with the camera positioned at a height of 1,000 feet above sea level 3.3.2.1(7)

13.6 Capable of identifying targets, NATO STANAG 4347 standard targets or equivalent, sized 2.3 x 2.3 square meters, from a distance of not less than 2.5 km when utilizing maximum optical zoom, with the camera positioned at a height of 1,000 feet above sea level 3.3.2.1(8)

13.7 Capable of tracking targets, NATO STANAG 4347 standard targets or equivalent, sized 2.3 square meters, with the camera positioned at a height of 1,000 feet above sea level. 3.3.2.1(9)

13.8 Photo Detector

- Capable of continuous operation for a minimum of 12 hours 3.3.2.2(4)-3

3.3.2.2(5) 13.9 Capable of recognizing and distinguishing types of targets, NATO STANAG 4347 standard targets or equivalent, sized 2.3 x 2.3 square meters, from a distance of not less than 6 km when utilizing maximum optical zoom, with the camera positioned at a height of 1,000 feet above sea level

3.3.2.2(6) 13.10 Capable of identifying targets, NATO STANAG 4347 standard targets or equivalent, sized 2.3 x 2.3 square meters, from a distance of not less than 3.5 km when utilizing maximum optical zoom, with the camera positioned at a height of 1,000 feet above sea level

3.3.2.2(7) 13.11 Capable of tracking targets, NATO STANAG 4347 standard targets or equivalent, sized 2.3 x 2.3 square meters, with the camera positioned at a height of 1,000 feet above sea

3.3.2.3(1) 13.12 Having the system that ensures stable video images despite movement or shaking of the camera or its mounting base. The bidder must furnish technical documentation from the manufacturer detailing the system's specifications to the government

3.3.2.3(2) 13.13 Capable of interfacing with external devices via an RS422/RS232 communication interface module or higher, as well as with cables suitable for connecting to computers, network devices, or LAN (Local Area Network) cables

3.3.2.3(3) 13.14 Capable of continuous 360-degree rotation without the necessity of reverse, with the ability to tilt from +10 to -80 degrees, displaying both rotation and tilt angles on the ground control station's display screen

3.3.2.3(4) 13.15 Having the camera's rotation speed at least 45 degrees per second, and the tilt adjustment speed ranges at least 30 degrees per second

3.3.2.3(6) 13.16 Capable of controlling the display of image, animation, and recording images via both remote control and direct control by the pilot or operating personnel at the ground control station while in flight. If data compression is applied before transmitting video streaming, the compression standard must be H.264 or better, and images/animation must be recorded in the camera system during flight

3.3.2.3(7) 13.17 Capable of operating in environments with temperatures ranging from 0 to 50 degrees Celsius

3.3.2.3(10) 13.18 Capable of displaying the hour meter for both camera systems (Color Daylight Camera and Thermal Imager Camera)

3.3.3 13.19 Having a laser range finder of no less than 10 km.

3.3.6 13.20 Having sufficient spare desiccators for EO/IR cameras to conduct maintenance throughout the warranty period

14.PT8 – DN Smart Sensor (Additional Detail)

3.4.1 14.1 A high-quality camera system incorporating a color camera and thermal imager for continuous scanning (EO/IR Wide Area Automated Maritime Search Sensor) for unmanned aerial vehicles, features the following specifications.

3.4.1.1 14.2 The general features are surveillance cameras intended for installation on unmanned aerial vehicles, featuring a cooled thermal imager and a color daylight camera. The cameras are designed to be strong, durable, resistant to vibration and shock, rustproof, waterproof. These cameras feature image analysis and processing systems capable of automatic object detection from images or videos. The systems are installed concurrently on the unmanned aerial vehicles, and are able to transmit image data and target details via the unmanned aerial vehicles' data link system to the ground control station to be displayed on the control system's screen, supporting capabilities for recording and playback

14.3 Frame rate of at least 0.4 frames per second 3.4.1.2.1(2)

3.4.1.2.1(3) 14.4 Capable of detecting targets over water surface, sized 2.0 x 2.0 square meters, at a distance of at least 3 km while the camera is positioned at a height of 1,000 feet above sea level

14.5 Photo Detector 3.4.1.2.2(1)

3.4.1.2.2(1) -1 14.5.1 Being a charge-coupled device (CCD) or a complementary metal-oxide semiconductor (CMOS) image sensor

14.5.2 Featuring a resolution of at least 12.3 million pixels (12.3 MP) 3.4.1.2.2(1) -2

14.6 Frame rate of at least 0.4 frames per second 3.4.1.2.2(2)

-

3.4.1.2.2(3)

14.7 Capable of detecting targets over water surface, sized 0.5 x 0.5 square meters, at a distance of at least 4 km while the camera is positioned at a height of 2,000 feet above sea level

14.8 Capable of detecting targets over water surface, sized 19 x 3 square meters (With a distance of not less than 18 km for small vessels while the camera is positioned at a height of 4,500 feet above sea level) 3.4.1.2.2(4)

14.9 Having the system that ensures stable video images despite movement or shaking of the camera or its mounting base. The bidder must furnish technical documentation from the manufacturer detailing the system's specifications to the government 3.4.1.2.3(1)

14.10 Capable of interfacing with external devices via an RS422/RS232 communication interface module or higher, as well as with cables suitable for connecting to computers, network devices, or LAN (Local Area Network) cables 3.4.1.2.3(2)

14.11 Capable of controlling camera system for displaying images and target data and recording images by both remote control and operating personnel at the ground control station while in flight. If data compression is applied before transmitting video streaming, the compression standard must be H.264 or better, and image/animation must be recorded in the camera system during flight. 3.4.1.2.3(4)

14.12 Capable of operating in environments with temperatures ranging from 0 to 50 degrees Celsius 3.4.1.2.3(5)

14.13 Being waterproof and dustproof according to IP65 standards or better 3.4.1.2.3(8)

14.14 Complying with MIL-STD 810F or equivalent military standards of the manufacturing country for environmental conditions, shock, and vibration resistance, and MIL-STD-461E or equivalent military standards of the manufacturing country for electromagnetic interference (EMI). The bidder must provide documentation from the manufacturer detailing these standards and compare the main parameters with MIL-STD 810F and MIL-STD-461E standards in bidding on government contracts. 3.4.1.2.3(9)

14.15 Capable of displaying the hour meter for both camera systems (Color Daylight Camera and Thermal Imager Camera) 3.4.1.2.3(10)

14.16 The aerial vehicle operator or pay load operator can select a target and send its information to the EO/IR camera (Main Payload), enabling the EO/IR camera to automatically turn, track, and identify the target. 3.4.1.2.3(11)

14.17 Having sufficient spare desiccators for high-quality cameras with color camera systems and thermal imagers for continuous scanning (EO/IR Wide area automated maritime search sensor) to perform maintenance during the warranty period 3.4.1.3

14.18 Providing a maintenance manual, including a purge method to remove moisture inside the EO/IR camera system 3.4.1.4

14.19 The acceptance inspection involves testing moisture and water resistance by placing the remote night vision thermal imager in a splash-proof test cabinet. The conclusion drawn from the test results by the Inspection and Acceptance Committee is considered final 3.4.1.5

15. Data link / Communication Link (Additional Detail)

15.1 Having a primary control/telemetry channel for managing both the unmanned aerial vehicle and its payload, as well as a secondary control/telemetry channel that features full redundancy, which allows control of unmanned aerial vehicles from a fixed ground control station at distances of no less than 100 km

4.1

16. ground control system/station (Additional Detail)

5.1 16.1 At least one set of Mission Control/Pilot display devices, including a set of chairs

5.2 16.2 At least one set of Payload Control display devices, including a set of chairs

5.3 16.3 The display devices mentioned in Article 5.1 and Article 5.2 are fully interchangeable, capable of performing each other's duties, and can be used interchangeably if one display device fails

5.4 16.4 A dual redundancy system is in place for both the display and processing systems.

5.5 16.5 Devices mentioned in Articles 5.1-5.4 must feature a strong, durable, ruggedized design and be easily movable for changing the installation location

5.6 16.6 The system must display a map of Thai-MECC's operating area in the Gulf of Thailand and the Andaman Sea and support the use of electronic maps compliant with the S-57 standard of the International Hydrographic Organization, as provided by the Hydrographic Department of the Royal Thai Navy for government use, allowing Thai-MECC to import these maps into the system independently.

5.7 16.7 The system must operate continuously for at least 12 hours while remaining stable

5.8 16.8 Each system must include at least one computer for external display from the pay load device, capable of displaying real-time video from the payload device and sharing this video across various locations as needed by Thai-MECC through the network system. The bidder must provide the Interface Control Document (ICD) for data connection, covering both flight information of unmanned aerial vehicles (latitude, longitude, course, speed, attitude, flight information) and detected target information (latitude, longitude, course, speed), as well as image and animation information from surveillance cameras

5.9 16.9 There must be two mobile emergency power units, each providing sufficient power to support the equipment and electrical appliances in the GCS, with a capacity of no less than 5.5 kilowatts. These units should be installed on the mobile aerial control vehicle as specified in Article 6.1.

5.10 16.10 An adequate Uninterruptible Power Supply (UPS) system must be in place at the Ground Control Station to maintain control of the unmanned aerial vehicle for a minimum of 30 minutes (excluding the air conditioning system).

5.11 16.11 The system must include capabilities to record and retrieve flight information and operational data in the form of images and animations for a minimum of 48 hours. This data can be stored and accessed from other locations via the IP network. The seller is required to supply essential connectivity equipment such as signal cables, routers, and switches to integrate with Thai-MECC's network system.

5.12 16.12 Each GCS, as per Section 1.2.19, must have at least 2 sets of External Pilot/RC Pilot devices. These devices should be robust, durable, and operable by a single officer at distances of no less than 100 meters from the Ground Control Station.

5.13 16.13 The Ground Control Station must have at least the following capabilities:

16.13.1 The flight mode comprises at least:

5.13.1.1 16.13.1.1 When flying according to the flight plan program, it must be capable of configuring speed, altitude, and activating/deactivating various systems

5.13.1.2 16.13.1.2 Direct to coordinator flying can be allowed for setting a new position for the unmanned aerial vehicle to immediately change its route while flying.

16.13.1.3 Hold position flight or orbit 5.13.1.3

16.13.1.4 Auto homing mode 5.13.1.4

5.13.2.4 16.14 A manual control that allows switching between daytime and nighttime cameras, adjusting optical zoom, and panning and tilting the direction

5.13.3.1 16.15 A pilot camera in the scenario where it is installed at the same location as the pilot camera

5.13.3.2 16.16 A camera for searching objects and detecting on the water surface

5.13.3.3 16.17 Capable of identifying the location of detected objects

5.13.3.4 16.18 Transmitting the location coordinates of the detected object to the EO/IR camera (Main Payload)

5.13.3.5 16.19 Enabling interoperability between a high-quality EO/IR camera (Main Payload) and an EO/IR Wide Area Automated Maritime Search Sensor, both of which can be operated automatically and manually using a computer program

16.20 Payload Mode for RADAR

5.13.4.1 16.20.1 RADAR for searching for objects and detecting on the water surface

5.13.4.2 16.20.2 Capable of identifying the location of detected objects

5.13.4.3 16.20.3 Enabling interoperability between RADAR and a high-quality EO/IR camera, both of which can be operated automatically and manually using a computer program

16.21 Having a fly-by-wire flight control system 5.13.5

5.14 16.22 Equipped with a voice-activated internal communication system with at least 5 sets of speakers and headphones for Ground Control Station staff and ramp agents, capable of operating on 220 volts of electricity

METRIC

MIL-STD-461F
10 December 2007

3.3.2.3(9)

SUPERSEDING
MIL-STD-461E
20 August 1999

DEPARTMENT OF DEFENSE INTERFACE STANDARD

REQUIREMENTS FOR THE CONTROL OF ELECTROMAGNETIC INTERFERENCE CHARACTERISTICS OF SUBSYSTEMS AND EQUIPMENT

AMSC 9034 AREA EMCS

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

3.3.2.3(9)

FOREWORD

1. This standard is approved for use by all Departments and Agencies of the Department of Defense.

2. Comments, suggestions, or questions on this document should be addressed to ASC/ENOI, 2530 Loop Road W, Wright-Patterson AFB OH 45433-7101, or emailed to Engineering.Standards@wpafb.af.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at http://assist.daps.dla.mil/.

3. The stated interface requirements are considered necessary to provide reasonable confidence that a particular subsystem or equipment complying with these requirements will function within their designated design tolerances when operating in their intended electromagnetic environment (EME). The procuring activity should consider tailoring the individual requirements to be more or less severe based on the design features of the intended platform and its mission in concert with personnel knowledgeable about electromagnetic compatibility (EMC) issues affecting platform integration.

4. An appendix is included which provides the rationale and background for each requirement and verification section.

5. A committee consisting of representatives of the Army, Air Force, Navy, other DoD agencies, and industry prepared this document.

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