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CARGO UAV

BUFFALO-200

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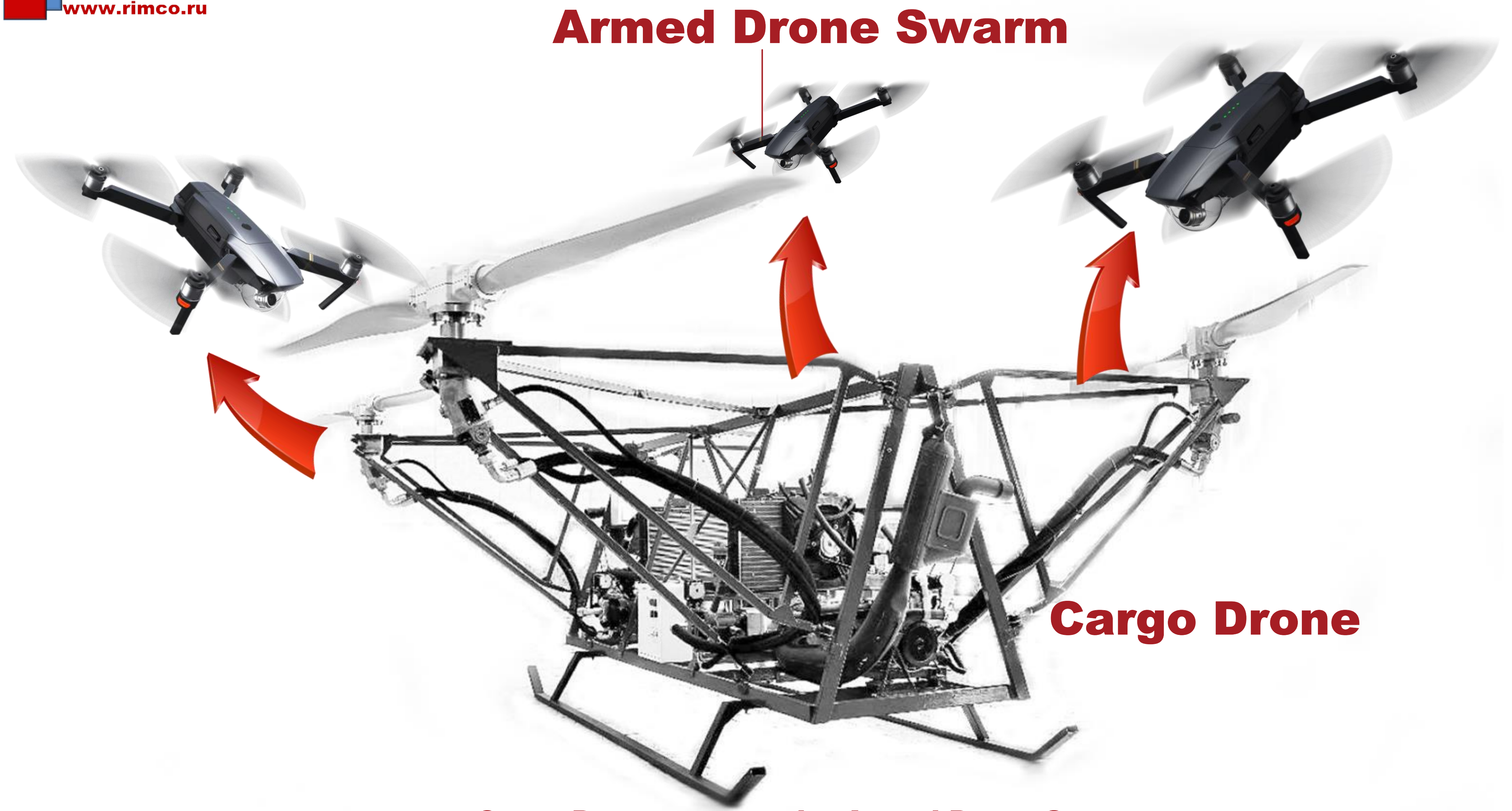
Autonomous Surveillance and Armed Drone Swarm (ASAD-S)



Cargo Drone as a carrier Armed Drone Swarm

Military cargo drones support logistics and supply chain operations within the defense sector, offering long-range and heavy-lift capabilities for the efficient and secure transportation of critical equipment, supplies, and personnel. These autonomous or remotely piloted cargo UAV can enhance operational capabilities by reducing dependency on traditional methods, enabling rapid deployment in even the most challenging terrains.

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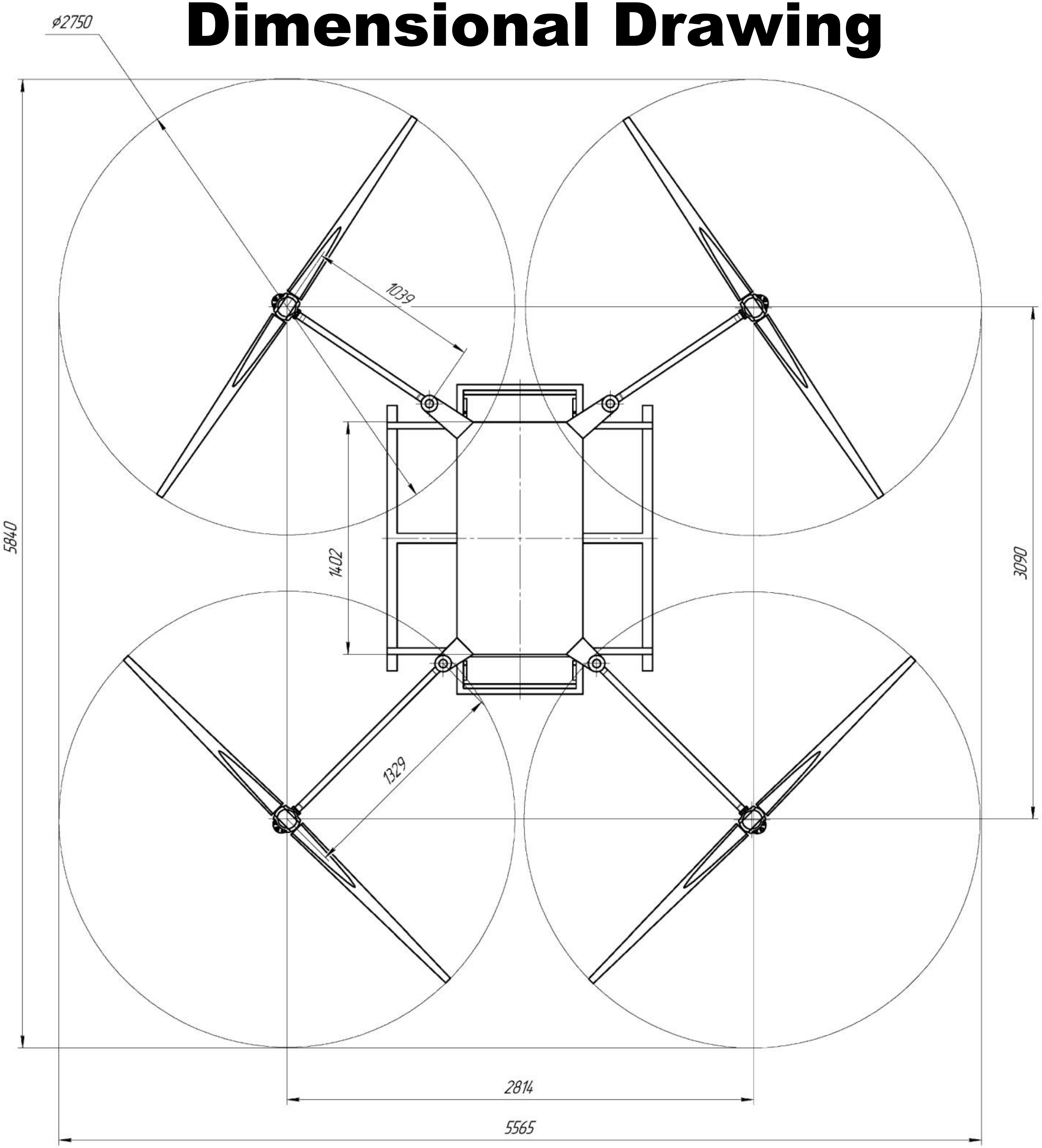
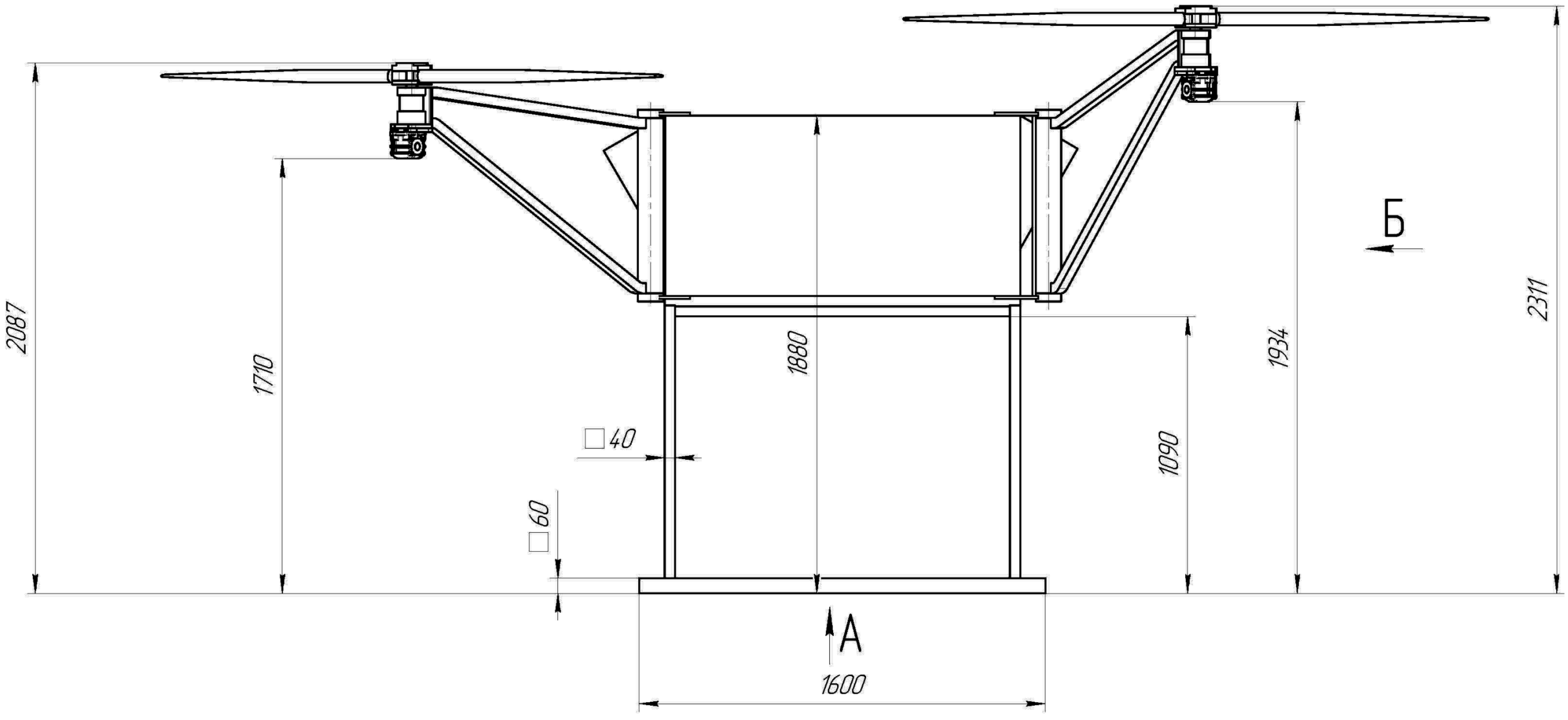
Technical Specifications

Vehicle mass: 400.00 kg approx. (depends on configuration)
Recommended payload mass: 120.00 kg
Maximum payload mass: 150.00 kg
Maximum take-off weight: 550.00 kg
Cruising speed: 15.0 m/s or 54 km/h
Flight time: up to 4 h (depends on payload and wind)
Take-off altitude: up to 4,000 m about sea level
Flight radius: minimum 100 km using radiocontrol, with waypoints up to 40 km
Dimensions: 5840 x 5565 x 2311 mm
Operational conditions:
Temperature: −40°C to 50°C
Humidity: Maximum 90%
Wind tolerance: Steady pictures up to 6 m/s

Dimensional Drawing



Dimensional Drawing



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Key Features of Military Cargo Drones

Typical cargo drones military forces utilize are engineered to deliver mission-critical payloads while overcoming obstacles posed by terrain, weather, and hostile environments.

Heavy-Lift Capabilities - **Military transport drones are capable of carrying payloads ranging from small supplies to multi-hundred-kilogram loads, including highly specialized cargo drone 100 kg platforms.**

Long-Range Cargo Drone - **Long-distance cargo drone designs allow extended missions, critical for resupplying remote outposts or bypassing contested regions.**

Robust Communications Systems - **Rugged and robust communications technology ensures secure data transfer even during long-distance missions, as seen with long range military drones.**

AI-Driven Navigation Systems - **AI-enabled navigation systems can support autonomous route planning and obstacle avoidance in cargo UAS missions.**

Cargo Drone Applications in Military Operations

The adaptability of military cargo drones and unmanned aerial vehicles (UAV) can enable their use in diverse applications:

- **Weapon Truck: anti-submarine weapon, strike FPV-drones for the destruction of tanks, protected vehicles on the battlefield and naval vessels in the waters of the seas.**
- **Troop Resupply: Reliable and rapid delivery of food, water, ammunition, and medical supplies to frontline units.**
- **Strategic Transport: Platforms such as military transport drone systems support the movement of critical materials across vast distances.**
- **Casualty Evacuation: Cargo UAV systems can be modified for the extraction of injured personnel in hostile or inaccessible areas.**
- **Humanitarian Aid: In disaster relief, cargo drones can be vital for delivering supplies where traditional transportation is impractical.**
- **Infrastructure Support: Equipment such as large cargo drones can be used to deliver tools and components for the repair of critical infrastructure.**

Innovations in Cargo UAV Technology

The ongoing evolution of cargo UAV platforms reflects the integration of cutting-edge advancements in propulsion systems, materials, and autonomy.
Hybrid propulsion systems are set to extend the operational reach of long distance cargo drone platforms, while lightweight composites can enable drones to achieve high payload capacities without sacrificing durability.

The modularity of these systems also allows for quick adaptation to different mission requirements. For instance, cargo UAV can transition between troop resupply and humanitarian aid roles with minimal reconfiguration. Encrypted communication technologies can ensure secure operation even in contested airspace.

Air-to-air missile

An air-to-air missile is a missile launched from an Cargo UAV to target and destroy other aircraft or aerial targets.

The Future of Military Cargo Drones

The next generation of long range cargo drone systems is set to focus on increasing autonomy, payload capacity, and interoperability with existing military technologies.
Emerging innovations, such as swarm technology, could allow multiple drones to operate collaboratively, optimizing supply chain efficiency.

As defense forces continue to adopt military cargo drone technologies, these systems are set to play an increasingly central role in both combat and support operations.
Whether deploying a large cargo drone to resupply a forward base or using a long distance cargo drone to deliver humanitarian aid, these advanced platforms can ensure that military logistics remain resilient, reliable, and ready for the challenges of modern warfare.

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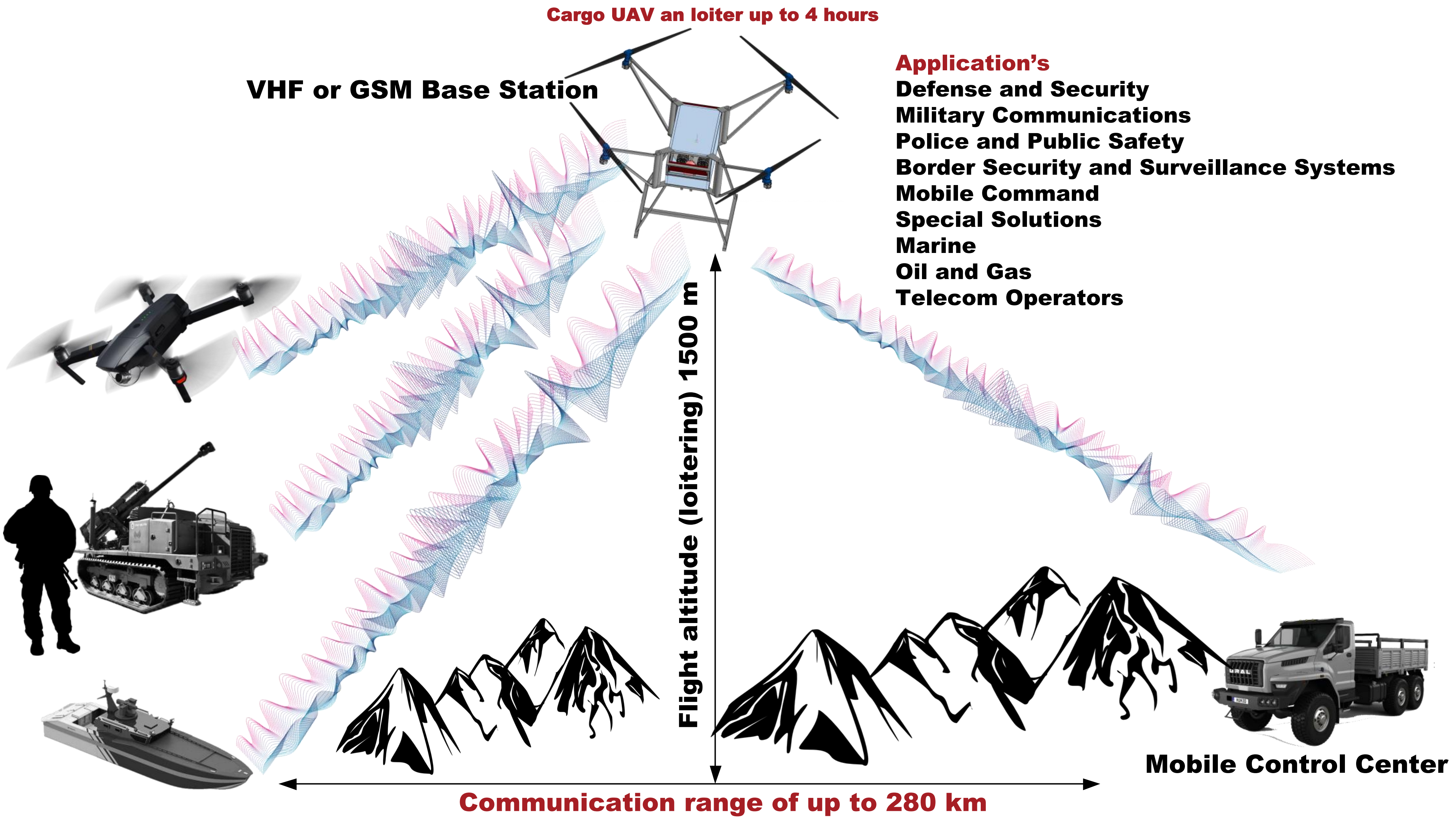
Tactical Telecommunication Services witch Cargo UAV

Loiter is the phase of flight consisting of flying over some small region.



Hybrid propulsion system for Cargo UAV

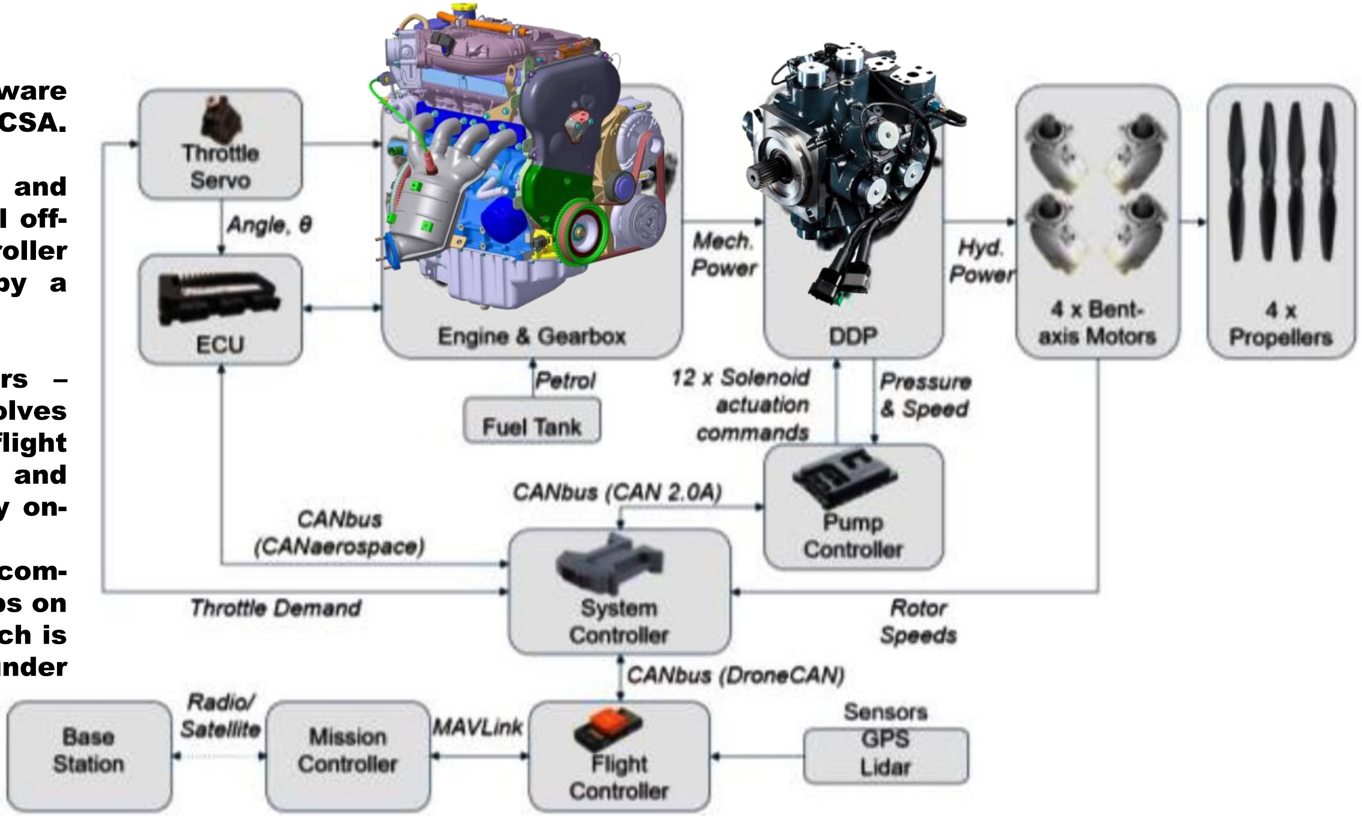
In recent years, there has been rapid growth in the development of electrical vertical take-off and landing (eVTOL) aircraft concepts, notably the Vertical Flight Society's eVTOL concept tracker reached 1000 unique designs in 2024. The proliferation of design concepts is due in part to the growing use of distributed electric propulsion systems to provide lift. Distributed propulsion systems may enable new aircraft architectures offering improved fuel efficiency and safety.
Digital Displacement® (DD) hydraulic technology has emerged as an alternative to electric drive systems for distributed propulsion, offering a higher power density than an equivalent electric transmission. This enables increased flight range and useful payload capacity for multirotor Unmanned Aerial Vehicles (UAVs). Compared to conventional hydraulics, DD technology boasts a higher efficiency, faster control response, and elimination of hysteresis.

RIMCO JSC, based in Russia (RU), has developed a heavy-lift utility UAV which utilises a DD hydrostatic transmission. Since 2025, RIMCO JSC has focused development on its "BUFFALO-200" pre-production UAV demonstrator, a 500 kg platform at maximum take-off weight.
The prime mover of the "BUFFALO-200" is a russian car fuel combustion engine, providing up to 99 kW of continuous power.
This is coupled to a Digital Displacement Pump (DDP), a radial piston pump which has four independently controllable hydraulic outputs. Each of the pump's independent outlets provides flow of hydraulic oil to a bent-axis fixed displacement hydraulic motor. These motors are used to drive the rotors which produce lift.

The operation of the control system and the hardware used is detailed in Russia Patent # 232 136 or figure CSA.

To control the attitude (pitch, roll and yaw angles) and altitude of the UAV, a Cubepilot Orange commercial off-the-shelf flight controller is used. The flight controller sends thrust commands which are interpreted by a system controller which has two main functions:

- **Control of the rotational speed of the rotors – achieved by a feedback control loop which involves converting the thrust commands from the flight controller into flow commands for the DDP and measuring the rotational speeds of the rotors by on-board tachometers.**
- **Control of the engine speed – achieved by a combination of feedback and feedforward control loops on the angle of the throttle valve on the engine, which is adjusted to maintain constant engine speed under varying load.**



Control System Architecture (CSA)

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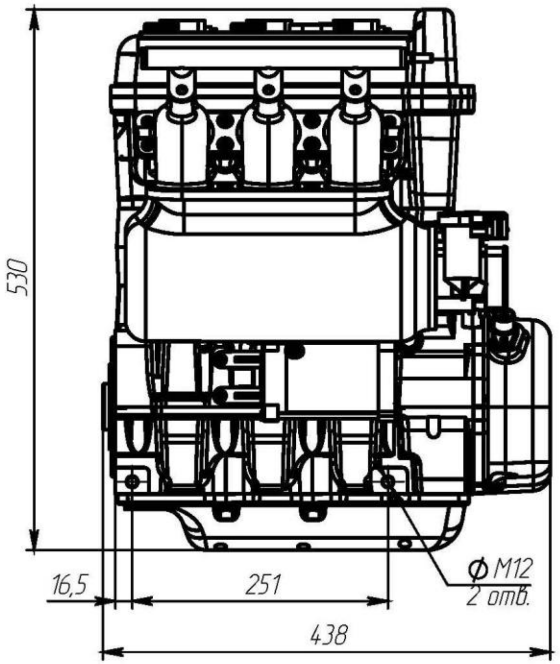
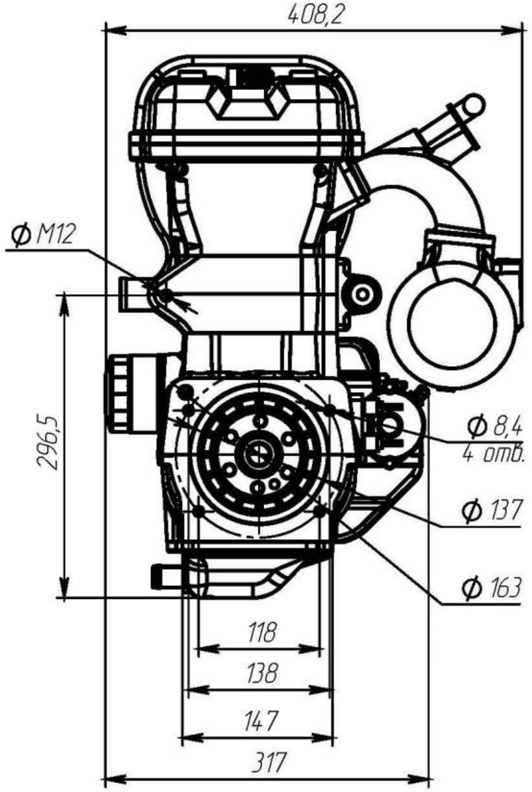
Russian Fuel Combustion Engine





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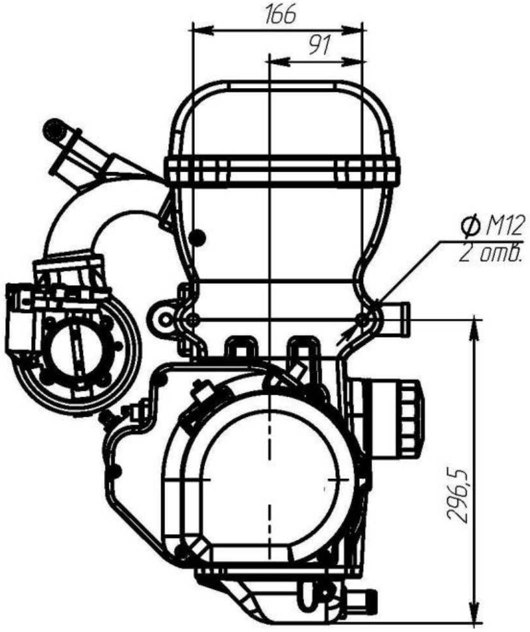

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