Northwest UAV

Where Precision and Reliability Soar!

2019

A GLOBAL COMPANY

PROPSILION & PAYLOAD INTEGRATION SPECIALISTS

Integrate, Train and Flight Test at Northwest UAV!
UAV ENGINES

Northwest UAV has delivered thousands of propulsion modules to defense contractors since 2005. We provide our clients cost effective solutions for their specific land, sea or air unmanned applications – COTS solutions, custom or build-to-print engine systems.

HIGH VOLUME PRODUCTION MANAGEMENT

NWUAV utilizes Intuitive ERP for high volume production management which provides the ability to implement LEAN manufacturing techniques and still retain the capacity to produce more than 500 engine modules and associated subsystems a month.

CUSTOM & MOBILE ENGINE TESTING

With our one-of-kind mobile test stands, you can operate, test, develop and record engine performance data locally and remotely. Customizable to meet your specific requirements.

Custom Engine Test Cell (CETC) is a self-contained 20 or 40 ft. unit, with a single test stand and optional hatches for larger aircraft.

Mobile Test Stand (MTS) is a smaller test unit and can be towed with a standard passenger truck.

Units are available for purchase or lease. We offer delivery and setup worldwide and will train your personnel.

The CETC and MTS are approved for export.
INTEGRATION SPECIALISTS

CAPABILITIES

Facility Test Cells

- Remote monitoring and control
- Environmental temperature controlled altitude chamber
- Durability/endurance evaluation (FAR 33)
- Accessories testing: Pumps/fuel tanks/injectors/camera’s
- Exhaust analyzers – 5 gas
- Fuel flow transmitters – minimum 1 cc/min
- Engine tuning/fuel economy mapping
- In-cylinder pressure mapping @ 100 KHz
- Engine/propeller power and torque mapping
- Propeller noise characterization per MIL-STD-1474D
- FAR 35 based propeller testing
- Mass airflow flow bench
- Engine break-in stations with DAQ’s
- Propeller dyno
- Small engine dyno
- Large engine dyno (180 hp)

PARTNERSHIPS & DISTRIBUTION

- Brican E100 UAV Aircraft
- Pegasus Servo Actuators
- uAvionix ADS-B Solutions
- Veronte Autopilots
- RCV Engines Limited
- Rotron Rotary Engines
- Distributor: NASAM, Japan

ENGINE DEVELOPMENT

Development & Manufacturing

- NW-44 EFI Multi-Fuel Engine
- NW-65 Multi-Fuel Engine
- NW-88 Multi-Fuel Engine
- NW-500 Gasoline Engine
- Electric Propulsion Units
- Rotron Rotary Engines
- RCV Engines

AS9100/ISO9001 and DCAA Compliant

As an AS9100/ISO9001 Certified facility, you can be confident that Northwest UAV has the data reporting and continuous improvement processes - from training to internal auditing to supply chain management - and the certified suppliers to design, develop and manufacture reliable, consistent, cost effective propulsion systems and other UAV components. In an industry with quite a bit of uncertainty and inconsistency, Northwest UAV is proud to continuously work on holding ourselves to aviation-grade standards.
NWUAV purpose-built NW-44 multi-fuel (heavy-fuel/gas) engine is designed and built for unmanned aircraft systems, low altitude, long endurance aircraft and portable power generation.

Overview

Designed from the ground up for unmanned applications, the NW-44 is scalable for use in various classes of aircraft with multiple fuel types and incorporates features not available with hobby based engine designs.

The NW-44 engine is designed to meet STANAG 4671 and FAA Certification requirements. Typical civilian uses include monitoring for climate change, forest fires, and mapping glaciers as well as supporting police, fire, and law enforcement bureaus.

The specialized Fuel Injection System allows the NW-44 to dramatically enhance engine system reliability, maintainability, and performance while reducing weight.

Advanced materials incorporate characteristics needed for lighter weight and better performing engines when utilizing heavy-fuels (Jet-A, JP-5, JP-8, TS-1).

Incorporating NWUAV’s Fuel Injection System and Variable Pitch Propeller (VPP), with the NW-44 engine will dramatically enhance system performance.

The NW-44 has been tested to launch loads greater than 30G’s and deceleration loads in excess of 15G’s. In March 2016, FAR 33 Endurance Test of the NW-44 was successfully completed following stringent 14CFR part 33.49 guidelines.

Features & Capabilities

- Custom 280-Watt direct drive generator with a 6/12/21 or 28 volt Generator Control Unit (GCU); ~280-Watts available, 30-Watts for engine, 250-Watts for payload and aircraft.
- Includes: Fuel injection, barometric pressure, cylinder head with twin spark plugs fired by dual 25kv ignition coils and features a secured cap provision with appropriate shielding and military-grade connectors.
- 43.6 cc, 3.5 hp power rating at 7250 rpm
- ECU Data Acquisition System (DAQ) with 1,000 hours at 1Hz recording rate
- CAN or Serial Bus communication
- Conformal aerodynamic tuned muffler; lightweight and quiet
- Conformal design mitigates unwanted parasitic drag, which increases net fuel-efficiency
- Interfaces with popular autopilots
- Multiple generator output configurations available to fit customer horsepower, electrical output and overall weight requirements
- The NW-44 engine is manufactured in the USA to ensure future engine/system availability

Call for specifications

With All The Extra Features Built Into The NW-44 Multi-Fuel Engine, You Will Be Flying Faster & Quieter At Any Altitude.
NWUAV NW-88 Twin-Cylinder Multi-Fuel Engine

**NW-88 Overview**

The NW-88 is a purpose-built, twin-cylinder multi-fuel engine. The NW-88 closely resembles the NW-44 in all design criteria except larger with more horsepower. Designed to meet STANAG 4671 and FAA Certification requirements. This engine is for use with 34 to 68 kg weight class aircraft.

**Features & Capabilities**

- 88 cc, 7.2 hp power rating at 7250 rpm
- Heavy-Fuel/gasoline
- Boxer configuration
- Fuel injection
- Less drag means increased endurance
- Designed for high-altitude long endurance aircraft
- Standard: 280-Watt direct drive with a 6/12/28 volt GCU
- Optional: 600-Watt direct drive with a 12/28-48 volt GCU
- Tractor & pusher
- Commercial off-the-shelf
- Made in the USA
- No ITAR restrictions

NWUAV NW-500 Gasoline Engine

**NW-500 Overview**

The NW-500 is a turn-key propulsion system that comes as a modular bolt on engine with a simple interface and fully self-contained. It has a vibration isolation system to minimize interference with sensitive autopilot and payload electronics. It is electronically fuel injected to maximize system flexibility, endurance, and reliability.

*The NW-500 is currently deployed, and has been successfully integrated and flown on multiple missions.*

**Features & Capabilities**

- 521 cc (31.79 cu in), gasoline engine
- 2700-6350 rpm range (engine speed limited by ECU), 45-50 hp (32 kW) maximum power at 6150 rpm
- Maximum continuous speed 6350 rpm
- Two-cylinders with dual 25kv ignition coils and spark plugs
- Air cooled with Active Cylinder Head Temperature (ACHT) control
- 700-Watt, 28 VDC generator control unit, full output at 3000 rpm (generator is scalable up to 2000+ Watts)

*Engine application is highly dependent on airframe factors including aerodynamics, propeller selection, and operational concept – please contact NWUAV for guidance.*
**Brican E100 UAV Partners with the NW-44 Gasoline Engine**

*Brican Flight Systems & Northwest UAV have teamed to produce one of the most technologically advanced long endurance UAVs available!*

**A POWERFUL PARTNERSHIP** This system integrates our proven NW-44 gasoline engine with the superbly designed Brican Flight System E100 – creating a long-endurance UAV capable of safely and reliably carrying out your mission.

**Brican E100 UAV Overview**

One look is all it takes to realize the E100 Unmanned Aircraft System is different. Every aspect of this meticulous machine looks and feels like a real aircraft. And that’s because it is one.

In an industry where off-the-shelf systems are being promoted as breakthroughs, where hobbyist parts from Hong Kong are being cobbled together and labelled “UAS” – the E100 comes with an unparalleled pedigree.

The Brican team has produced an aircraft whose avionics, build quality, reliability and payload capacity are second to none. It is the most sophisticated, Made-in-Canada, fixed-wing UAS.

**Features**

- 20-lb payload with 10-hour fuel duration
- Portable all-terrain launcher/landing system
- Ultra-fast 20-minute deployment
- Standard with Transponder “C”
- Autopilot complete with DGPS precision GPS landing system
- Aircraft meets flight loads compliant to “Best Practice Criteria” (FAR Part 23)
- Multiple payload/sensor options

**Rotron Rotary Engines**

The Rotron RT600 LCR-EXE rotary engine is shaping a new generation of tier 2 class UAV engines. This compact, twin rotor engine delivers maximum mission-ready availability and bottom-line value, allowing operators to fly longer with superior performance.

**Specifications**

<table>
<thead>
<tr>
<th>Engine Type</th>
<th>Twin Rotor, Spark Ignition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel Type</td>
<td>Gasoline / AVGAS</td>
</tr>
<tr>
<td>Max Power</td>
<td>53 hp @ 5000 rpm</td>
</tr>
<tr>
<td>Max Continuous</td>
<td>53 hp @ 5000 rpm</td>
</tr>
<tr>
<td>Max Torque</td>
<td>76 lbs/ft @ 5000 rpm</td>
</tr>
<tr>
<td>Power-To-Weight Ratio</td>
<td>2.50 hp/kg</td>
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<tr>
<td>Displacement</td>
<td>600 cc</td>
</tr>
<tr>
<td>Block Weight</td>
<td>46.7 lbs/21.2 kg</td>
</tr>
<tr>
<td>Starting Device</td>
<td>Onboard / External</td>
</tr>
<tr>
<td>Compression Ratio</td>
<td>9.6:1</td>
</tr>
<tr>
<td>Cooling</td>
<td>Air Injection / Liquid Cooling</td>
</tr>
<tr>
<td>Fuel Consumption @ 3700 rpm cruise</td>
<td>0.58 lbs/per hp/per hr</td>
</tr>
<tr>
<td>Min/Max Ambient</td>
<td>-20°C to 50°C / -4°F To 122°F</td>
</tr>
<tr>
<td>Generator</td>
<td>300W/Starter Generator from 1KW to 5KW</td>
</tr>
<tr>
<td>Additional Features</td>
<td>ECU Controlled Altitude Compensation</td>
</tr>
</tbody>
</table>

*Suitable for UAVs requiring 1000 Hrs TBO*
Rotron Rotary Engines

The Rotron Rotary UAV Engine Line features a revolutionary single-motor design. The Wankel cycle engine is a 4-stroke rotary engine, making it smaller, more fuel efficient, more powerful and more reliable than other equivalent piston engines.

Overview
The revolutionary Rotron Rotary UAV engine is considerably smaller, lighter, and contains fewer moving parts than piston engines of equivalent power output. Every engine is fine-tuned to its optimum operating efficiency and safety levels before shipment. If your application requires a different power configuration but needs to keep the same package size, custom options are available.

RT300 XE 50 hp and RT600 XE 100 hp, Gasoline fuel engines. Call for details.

Features
- High power-to-weight ratio with increased efficiency
- Compact package size allows for greater fuel and payload flexibility for multi-mission capability
- Fuel injection and ECU controlled altitude compensation fitted as standard
- Higher endurance lifecycle
- Available in pusher or tractor (puller) configurations, with either direct or reduction drive

SPECIFICATIONS

<table>
<thead>
<tr>
<th>Engine Type</th>
<th>Single Rotor, Spark Ignition</th>
<th>Twin Rotor, Spark Ignition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel Type</td>
<td>Gasoline / AVGAS</td>
<td>Jet-A1</td>
</tr>
<tr>
<td>Max Power</td>
<td>32 hp @ 7500 rpm</td>
<td>31 hp @ 7500 rpm</td>
</tr>
<tr>
<td>Max Continuous²</td>
<td>30 hp @ 6500 rpm</td>
<td>28 hp @ 6500 rpm</td>
</tr>
<tr>
<td>Max Torque³</td>
<td>24.32 lbs/ft @ 6500 rpm</td>
<td>22.6 lbs/ft @ 6500 rpm</td>
</tr>
<tr>
<td>Power-To-Weight Ratio</td>
<td>2.68 hp/kg</td>
<td>2.5 hp/kg</td>
</tr>
<tr>
<td>Displacement</td>
<td>300 cc</td>
<td>300 cc</td>
</tr>
<tr>
<td>Block Weight¹</td>
<td>26.2 lbs/11.9 kg</td>
<td>27.1 lbs/12.3 kg</td>
</tr>
<tr>
<td>Starting Device²</td>
<td>Onboard / External</td>
<td></td>
</tr>
<tr>
<td>Compression Ratio</td>
<td>9.6:1</td>
<td>8.5:1</td>
</tr>
<tr>
<td>Cooling</td>
<td>Liquid Cooling</td>
<td></td>
</tr>
<tr>
<td>Fuel Consumption @ 6000 rpm cruise</td>
<td>0.527 lbs/per hp/per hr</td>
<td>0.58 lbs/per hp/per hr</td>
</tr>
<tr>
<td>Min/Max Ambient</td>
<td>-20°C to 50°C / -4°F to 122°F</td>
<td></td>
</tr>
<tr>
<td>Generator</td>
<td>300W/ Starter Generator from 1KW to 5KW</td>
<td></td>
</tr>
<tr>
<td>Additional Features</td>
<td>ECU Controlled Altitude Compensation</td>
<td></td>
</tr>
</tbody>
</table>

¹Core block weight only. ²Onboard starter optional. ³DIN70020
RCV Single & Twin Cylinder Heavy-Fuel UAV Engines

NWUAV’s line of RCV Engines can be configured for multiple applications. Utilizing a patented rotary valve 2- and 4-stroke technology these engines are available for unmanned aerial vehicles, micro power generation, and other defense and civilian uses.

RCV Engine Overview

NWUAV can configure the RCV engine architecture to achieve 400 hours durability, 1 hp/lb power to weight and 0.5 lb/hp.hr fuel efficiency. The robust combustion system is tolerant of a wide range of fuels and octane ratings. The engine is easy to calibrate and will provide consistent performance over a wide range of ambient conditions. With controlled operating conditions there is minimal carbonization operating on heavy-fuels. The newest engine is the RCV20 Inline. A micro 4-stroke heavy-fuel engine, designed to replace battery powered UAV systems and significantly extend range beyond 8 hours.

Features

- Single or twin cylinder
- Capacity range from 20 cc (single) to 70 cc (twin)
- Dual ignition
- Clockwise or anticlockwise rotation
- Cooling fan and shrouds for helicopter use
- Generator
- Multi-fuel operation
- Diesel under controlled conditions
- Side starting
- Twins can run on one cylinder in limp home mode
- Muffler and airbox designs available for low acoustic signature

SPECIFICATIONS

<table>
<thead>
<tr>
<th>Type</th>
<th>RCV20 Inline</th>
<th>RCV DF35 Single Cylinder</th>
<th>RCV DF70 Twin Cylinder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Rotary Valve, Spark Ignition, 4-Stroke</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed Range</td>
<td>–</td>
<td>2000 to 10000 rpm</td>
<td></td>
</tr>
<tr>
<td>Capacity</td>
<td>20 cc</td>
<td>35 cc</td>
<td>70 cc</td>
</tr>
<tr>
<td>Capacity Range</td>
<td>10 cc to 20 cc</td>
<td>25 cc to 35 cc</td>
<td>50 cc to 70 cc</td>
</tr>
<tr>
<td>Power (JP-8)</td>
<td>1.0 kW (1.3 hp) @ 9000 rpm</td>
<td>2.0 kW (2.7 hp) @ 8500 rpm</td>
<td>4.0 kW (5.4 hp) @ 8500 rpm</td>
</tr>
<tr>
<td>Weight Complete*</td>
<td>0.9 Kg (2 lb)*</td>
<td>1.9 Kg (4.2 lb)*</td>
<td>2.7 Kg (5.9 lb)*</td>
</tr>
<tr>
<td>Combustion System</td>
<td>Revolving Valve, 4-Stroke</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooling/Lubrication</td>
<td>Air Cooling / Oil in Fuel 1:50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heavy-Fuel Starting</td>
<td>Cold Start Assisted with Installed Cartridge Heaters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel Consumption (JP-8)</td>
<td>–</td>
<td>350 g/kW.hr (0.58 lb/hp.hr)</td>
<td>330 g/kW.hr (0.54 lb/hp.hr)</td>
</tr>
<tr>
<td>TBO</td>
<td>150 hours (VTOL) / 300 hours (Fixed Wing)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

OPTIONS

Rotation
- Clockwise or Anti-Clockwise Viewing the Prop Drive

Starting
- Starter Generator

Cooling
- Mechanical Fan / Cowling / Electric Fan / Water Jacket

* Weight includes engine assembly ready to run with fuel system, ECU, and exhaust. Weight does not include prop, generator or any cowling.
When combined with the NWUAV SW1.0 ECU the pump can be dynamically driven to maintain fuel pressure or at a fixed rate with the relief valve managing rail pressure. When the proper injector and sensors are added along with the EFI Fuel System and SW1.0 ECU a full EFI solution is obtained.

When combined with the NWUAV SW1.0 ECU the pump can be dynamically driven to maintain fuel pressure or at a fixed rate with the relief valve managing rail pressure. When the proper injector and sensors are added along with the EFI Fuel System and SW1.0 ECU a full EFI solution is obtained.

Features
- 6-Amp hour module weight is 1.7 kg
- 6 Ah module footprint (W x L x H): 5.16 in x 7.97 in x 3.81 in (131mm x 202.5mm x 96.7mm)
- EMI shielded
- EMC compatible
- Designed for IPC 67
- Shock and vibration resistant
- Scaleable for other battery sizes

Electrical Specifications
- Input voltage range ship/shore power 25-30V
- Normal output voltage 25-30V
- Output Power
  - Ship/shore continuous 300-Watts
  - Battery transition up to 5 minutes 200-Watts
  - Battery continuous 125-Watts
- Switching
  - Continuous power provided with 21V minimum and 32V maximum
  - Normal output voltage resumed in no more than 100 µs

FUEL DELIVERY SYSTEM (FDS)

The NWUAV EFI Fuel Delivery System reliably delivers clean high pressure fuel for UAV electronic fuel injection solutions. The system provides a conformal header tank with acrobatic pickup, fuel filtration with serviceable filter, fuel pump, pressure regulation, Bingo level and pressure sensing functions all in a small footprint. Components are compatible with either gasoline or heavy-fuels.

Features
- Empty weight 410.5 g (dry/no tubing)
- Full weight with fuel 726.5 g (total fuel weight 316 g)
- Footprint (L x W x H): 6.70 in x 4.04 in x 2.65 in (170.21mm x 102.64mm x 67.39mm)
- Self-priming with acrobatic fuel pickup
- The EFI Fuel Delivery System is easily customized for your application; flow rate, pressure, footprint/layout, and more

Specifications
- Pressurized fuel up to 60 psi
- Rail pressure signal
- Bingo level status signal
- Custom fuel delivery systems available. The header (manifold) can be easily integrated into other tank designs
**PRODUCTS**

**ENGINE CONTROL UNIT (ECU)—SW1.0**

The NWUAV SW1.0 Engine Control Unit is a purpose-built ECU for Unmanned Aircraft of all types. The SW1.0 is a ruggedized system intended to operate in extreme environments encountered during UAS operations. NWUAV has incorporated features missing in other ECUs.

**Features**

- ECU Data inputs include: IAT, BARO, MAP, O2 sensor, TPS, CHT, EGT, coolant temp, fuel temperature, fuel pressure
- Compatible with systems from 10 to 30V
- CAN bus protocol communication system
- EMI shielded and fully programmable ignition curve/Alpha-N
- Multiple configurable digital/analog outputs
- Multiple spare configurable analog/digital inputs
- Fuel pump output driver for active fuel pump control
- Throttle transition compensation
- Extensive self-diagnostic capabilities
- Capable of controlling single and multiple cylinder piston and rotary engines
- Adjustable rev limits including primary, secondary and boost limits
- Adaptable to most existing engine systems
- Configurable daughter board can be added for specific customer needs
- Up to 500 hours of data recording
- Sequential, batch or semi-sequential injector firing
- MIL-SPEC 51 Pin Micro-D connector
- Real time tuning available with configurable fuel map grid
- Primary/secondary main fuel and ignition tables
- Closed loop control with adaptive learning
- Starting, air temp, coolant temp and barometric pressure compensations
- Adjustable dwell as a function of battery voltage
- Software compatible with common autopilots
- Dimensions (L x W x H): 4.6 in x 3.3 in x 0.975 in (117mm x 110mm x 248mm)
- Weight: 175 grams

**GENERATOR CONTROL UNIT for PERMANENT MAGNET ALTERNATORS (GCU)**

The Generator Control Units allow you to mix and match the voltage and power requirements for your system! These designs are modular and scalable to meet your requirements.

**280-WATT GCU**

**System Features**

- Light weight 240 grams
- Small footprint (W x L x H) 2.92 in x 4.23 in x 1.50 in (74mm x 107mm x 38mm)
- EMI shielded
- EMC compatible
- Designed to meet IPC 67
- Shock and vibration resistant
- Requires minimal cooling air
- Operating temperatures -40°C to 90°C
- MIL grade connectors
- NO forced air cooling fans

**Electrical Specifications**

- Combined power 280-Watts
- 21V or 28V at 10 amp max
- 12V at 10 amp max
- Voltage droop is 1V no-load to full-load
- CAN bus reporting of output voltages and currents, total power, and board temp
- CAN bus compliance to ISO 11898-1
- 3-Phase input voltage of 150V to 400V

**600-WATT GCU**

**System Features**

- Light weight 830 grams (board only 276 grams)
- Small footprint (W x L x H) 5.31 in x 4.97 in x 2.00 in (135mm x 125mm x 51mm)
- EMI shielded
- EMC compatible
- Designed to meet IPC 67
- Shock and vibration resistant
- Customizable output voltages
- Operating temperatures -40°C to 55°C
- Firmware is field upgradable
- Real time clock

**Electrical Specifications**

- Combined power 600-Watts*
- 49V at 10 amp standard
- Dedicated and protected 12V line to the motor
- Voltage droop is 5% no-load to full-load
- CAN bus reporting of output voltages and currents
- CAN bus input-capable to record engine data
- CAN bus compliance to ISO 11898-1
- Onboard SD card with 10kHz record rate
- 3-Phase input voltage of 120V to 400V

*Cooling air required for power draw over 300-Watts.
GENERATOR – FRAMELESS/BRUSHLESS

NWUAV’s frameless brushless generator is designed to fit directly into your application using the systems mechanics to hold the generator. The generator is designed to be highly efficient, with high-grade magnets and materials in a compact design.

Features
- Stator dimensions: 1.4 in thick, 3.05 in OD, 2.46 in ID (35mm thick, 77mm OD, 62mm ID)
- Stator weight: 314 grams
- Rotor dimensions: 0.78 in thick, 2.44 in OD, 1.90 in ID (20mm thick, 62mm OD, 48mm ID)
- Rotor weight: 144 grams
- Max operational temperature: 250°F
- 90% efficient
- High-grade permanent magnets:
  - 150V at 3000 rpm
  - 400V at 8000 rpm
- Power output 310-Watts

NWUAV QUIET UAV MUFFLERS

The NWUAV muffler was designed to solve two technical problems inherent in current muffler designs: Excessive noise and air flow blockages within the structure of the muffler.

NWUAV technicians have developed a patented muffler that suppresses noise by using a novel design and innovative packing material. The muffler, due to its unique internal design can help to significantly reduce noise while maintaining or even increasing engine power compared to other designs.

NWUAV has beat out several competitors with an in-house muffler design that is currently being staged for deployment on UAV’s. The unique design results in lower fuel consumption, higher power, and lower noise signature.

Sizes Available
Conformal designs are available for single and multiple cylinder engines. The design can be developed to fit inside client’s air vehicle. NWUAV takes into account the aircraft envelope size, and airflow available for the optimal design. This produces a lower acoustic signature and optimal engine performance.

Example of muffler testing for demonstrative purposes only.
**ping200X** is a complete system designed to meet the Transponder and Automatic Dependent Surveillance – Broadcast (ADS-B) requirements for operating Unmanned Aviation Systems (UAS) in controlled airspace. The system is fully configurable as any combination of Mode A, Mode C, Mode S transponder and Extended Squitter ADS-B transmitter and includes a barometric sensor with accuracy beyond 80,000ft.

**ping200Sr** and **ping20Si** are complete systems designed to meet the conspicuity requirements for operating Unmanned Aircraft Systems (UAS) in controlled airspace. These systems include an integrated, high integrity Satellite Based Augmentation System (SBAS) Global Positioning Sensor (GPS) derived from uAvionix’s Technical Standard Order (TSO) C-199 Class B FYX technology, and a precision, temperature controlled, barometric sensor with accuracy beyond 80,000ft.

**FIAA TSO Certification Pending (TSOA June 2019)**

### MODE S ES ADS-B TRANSPONTERS

<table>
<thead>
<tr>
<th>MODE S ES ADS-B TRANSPONTERS</th>
<th>ping200X</th>
<th>ping200Sr</th>
<th>ping20Si</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input Power</strong></td>
<td>11-34V (3S-8S LiPo)</td>
<td>11-33V</td>
<td>11-16V</td>
</tr>
<tr>
<td></td>
<td>1.5W Continuous On/Alt.</td>
<td>2.0W Ave On/Alt.</td>
<td>1.0W Ave On/Alt.</td>
</tr>
<tr>
<td></td>
<td>4W Peak (8ms Maximum)</td>
<td>1W Standby</td>
<td>0.5W Standby</td>
</tr>
<tr>
<td><strong>Size</strong></td>
<td>47x54x9mm</td>
<td>91x57x17mm</td>
<td>50x25x17mm</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>50 grams</td>
<td>76 grams</td>
<td>20 grams</td>
</tr>
<tr>
<td><strong>SIL/SDA</strong></td>
<td>3/2</td>
<td>1/1</td>
<td>1/1</td>
</tr>
<tr>
<td><strong>Operating Temperature</strong></td>
<td>-45 to 70°C</td>
<td>-45 to 80°C</td>
<td>-45 to 80°C</td>
</tr>
</tbody>
</table>

**TRANSPONDER**

| MTL 1030MHz                  | -74dBm ±3dBm | -74dBm ±3dBm | -81dBm |
| Dynamic Range                | -74dBm ±3dBm | -74dBm ±3dBm | -81dBm |
| **1090MHz Transmit Power**   | 250W Nominal | 250W Nominal | 250W Nominal |

**WAAS GPS**

| Augmentation                  | SBAS | SBAS |
| Sensitivity                   | -167dBm | -167dBm |

**ALTIMETER**

| Range                        | -1000 to 60,000ft | -1000 to 80,000ft | -1000 to 80,000ft |
| Connector                    | 3mm FESTO | 3mm FESTO | 3mm FESTO |

**INTERFACES**

| Control                      | Baudrate 1200-2Mbps | 57600bps GDL 90 | 57600bps GDL 90 |
| Control-Ownership            | – | 57600bps GDL 90 | 57600bps GDL 90 |
| Programming                  | – | 115200bps GDL 90 | 115200bps GDL 90 |
| Control-Protocol             | GDL90+ | – | – |
| Position                     | Baudrate 115200bps | – | – |
| Position-Protocol            | MAVLink | – | – |

**OPTIONS**

| Transponder Antenna          | 1030/1090MHz | 1030/1090MHz | 1030/1090MHz |
| Wi-Fi Programming Adapter    | – | – | – |

**ping200Sr**

- Meets the ADS-B OUT equipment performance requirements of 14 CFR 91.227
- Meets the minimum performance requirements of the following RTCA specifications:
  - DO-181E Level 2els, Class 1
  - DO-260B Class B1S.
- Remote GPS antenna included.

**ping20Si**

- Meets the minimum performance requirements of the following RTCA specifications:
  - DO-181E Level 2e, Class 20W
  - DO-260B Class B1S.
- Integrated GPS antenna.
Designed for unmanned aircraft, uAvionix has dramatically reduced the size and cost of critical safety components required to fly safely and legally in the National Airspace System.

**TRANSCEIVERS**

**ping2020i USA** and **ping1090i UK** are the world’s smallest, lightest and most affordable full range, dual link Automatic Dependent Surveillance – Broadcast (ADS-B) transceivers with integrated Satellite Based Augmentation System (SBAS) Global Positioning System (GPS) and precision barometric sensor. At just 26 grams, they assist with Detect and Avoid (DAA) functionality for Unmanned Aircraft Systems (UAS) operations in the National Airspace System (NAS).

**ping2020i USA**
- ADS-B IN on 1090MHz and 978MHz
- Transmits ADS-B DF-18 on 978MHz
- SMA 978/1090MHz antenna connector, antenna included
- Integrated GPS antenna

**ping1090i UK**
- ADS-B IN on 1090MHz and 978MHz
- Transmits ADS-B DF-18 on 1090MHz extended squitter
- Approved for use in the UK as a CAP1391 Basic Electronic Conspicuity Device (ECD).

<table>
<thead>
<tr>
<th>ADS-B TRANSCEIVERS</th>
<th>ping2020i</th>
<th>ping1090i</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input Power</strong></td>
<td>6-14V</td>
<td>6-14V</td>
</tr>
<tr>
<td></td>
<td>500mW Ave.</td>
<td>500mW Ave.</td>
</tr>
<tr>
<td></td>
<td>30W Peak (400us)</td>
<td>30W Peak (400us)</td>
</tr>
<tr>
<td><strong>Size</strong></td>
<td>25x40x16mm</td>
<td>25x40x16mm</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>26 grams</td>
<td>26 grams</td>
</tr>
<tr>
<td><strong>SIL/SDA</strong></td>
<td>1/1</td>
<td>1/1 (or 1/0 for CAP1391 devices in UK only)</td>
</tr>
<tr>
<td><strong>Operating Temperature</strong></td>
<td>-45 to 70°C</td>
<td>-45 to 70°C</td>
</tr>
</tbody>
</table>

**TRANSCEIVER TRANSMIT**

| 1090MHz             | S/W Disabled | 20W Nominal (43dBm) |
| 978MHz              | 20W Nominal (43dBm) | – |

**TRANSCEIVER RECEIVE**

| MTL 1090MHz         | -88dBm     | -88dBm     |
| Dynamic Range       | -79 to 0dBm| -79 to 0dBm|
| MTL 978MHz          | -93dBm     | -93dBm     |
| Dynamic Range       | -90 to -3dBm| -90 to -3dBm|

**WAAS GPS**

| Augmentation        | SBAS       | SBAS       |
| Sensitivity         | -166dBm    | -166dBm    |

**ALTIMETER**

| Range               | -1000 to 80,000ft | -1000 to 80,000ft |

**INTERFACES**

| COM1 4-PIN Control  | 57600bps GDL 90/MAVLink | 57600bps GDL 90/MAVLink |
| COM1 4-PIN Ownership| 57600bps GDL 90/MAVLink | 57600bps GDL 90/MAVLink |
| COM2 5-PIN Programming | 115200bps GDL 90 | 115200bps GDL 90 |

**OPTIONS**

| 978MHz Transceiver Antenna Included |

NWUAV A Global Company | +1 503.434.6845 | contact@nwuav.com | www.nwuav.com
**SkyLink** meets or exceeds the Command and Control (C2) Data Link Minimum Operational Performance Standards (Terrestrial) for Control and Non-Payload Communication (CNPC) in support of an Unmanned Aircraft Systems (UAS). Infrastructure ready, SkyLink is an L-Band (960-1164MHz) bi-directional Multiple-Input/Single-Output (MISO) dual radio system.

- Command and Non-Payload Control (CNPC) radio
- Dual radio system: User plane and control plane
- RTCA DO-362 Class 1LYAM and 1LYGM
- 10W transmit power

**MicroLink** is an aviation grade, miniature, 2X2 Multiple-Input/Multiple-Output (MIMO) data link radio specifically designed for long range, robust, Unmanned Aircraft Systems (UAS) telemetry data links. Ideal for size, weight, power and performance sensitive applications, MicroLink operates in the 902-928MHz license free ISM band.

- 2X2 MIMO radio architecture for true diversity: Path (spatial) Diversity, Frequency Diversity, and Polarization gain
- Dynamic Medium and Multiple access, time and position synchronized, to support 100’s of simultaneous links, adaptive time and frequency spreading
- Global Positioning System (GPS) Coordinated Universal Time (UTC) link synchronization

### COMMUNICATION

<table>
<thead>
<tr>
<th><strong>skyLink</strong></th>
<th><strong>microLink</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input Power</strong></td>
<td>11-34V (3S-8S LiPo)</td>
</tr>
<tr>
<td></td>
<td>16W Peak</td>
</tr>
<tr>
<td><strong>Size</strong></td>
<td>47x54x13mm</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>70 grams</td>
</tr>
<tr>
<td><strong>Operating Temp</strong></td>
<td>-45 to 70°C</td>
</tr>
<tr>
<td><strong>Band</strong></td>
<td>960-1164MHz</td>
</tr>
<tr>
<td><strong>Architecture</strong></td>
<td>2X2 MIMO</td>
</tr>
<tr>
<td><strong>Transmit Power</strong></td>
<td>10W Nominal</td>
</tr>
<tr>
<td><strong>Spreading</strong></td>
<td>Code and Frequency</td>
</tr>
<tr>
<td><strong>Bandwidth</strong></td>
<td>200kHz</td>
</tr>
</tbody>
</table>

### RECEIVER SENSITIVITY

<table>
<thead>
<tr>
<th><strong>skyLink</strong></th>
<th><strong>microLink</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>User Receiver</strong></td>
<td>-118dBm</td>
</tr>
<tr>
<td><strong>Control Receiver</strong></td>
<td>-121dBm</td>
</tr>
<tr>
<td><strong>Doppler Capture Range</strong></td>
<td>+16kHz</td>
</tr>
</tbody>
</table>

### INTERFACES

<table>
<thead>
<tr>
<th><strong>skyLink</strong></th>
<th><strong>microLink</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>User Plane</strong></td>
<td><strong>User Plane</strong></td>
</tr>
<tr>
<td><strong>Data Rate</strong></td>
<td>57600bps</td>
</tr>
<tr>
<td><strong>Protocol</strong></td>
<td>Transparant Binary</td>
</tr>
<tr>
<td><strong>Data Rate</strong></td>
<td>115200bps</td>
</tr>
<tr>
<td><strong>Protocol</strong></td>
<td>GDL90+</td>
</tr>
<tr>
<td><strong>Control Plane</strong></td>
<td><strong>Control Plane</strong></td>
</tr>
<tr>
<td><strong>Data Rate</strong></td>
<td>-</td>
</tr>
<tr>
<td><strong>Protocol</strong></td>
<td>-</td>
</tr>
<tr>
<td><strong>Data Rate</strong></td>
<td>115200bps</td>
</tr>
<tr>
<td><strong>Protocol</strong></td>
<td>GDL90+</td>
</tr>
</tbody>
</table>

### TIMING/POSITION

<table>
<thead>
<tr>
<th><strong>skyLink</strong></th>
<th><strong>microLink</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UTC</strong></td>
<td>1PPS Time Pulse</td>
</tr>
<tr>
<td><strong>Position</strong></td>
<td>NMEA 0183 115200bps</td>
</tr>
</tbody>
</table>

### ENVIRONMENTAL

<table>
<thead>
<tr>
<th><strong>skyLink</strong></th>
<th><strong>microLink</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DO-160G</strong></td>
<td>Temperature Cat B2</td>
</tr>
</tbody>
</table>
**NAVIGATION**

truFYX is the world’s first Technical Standard Order (TSO) certified SBAS Global Positioning System (GPS) position source designed specifically for Unmanned Aircraft Systems (UAS) autopilots and Automatic Dependent Surveillance – Broadcast (ADS-B) OUT solutions. The truFYX incorporates the GPS receiver and antenna into a single 24mm radius / 20g waterproof enclosure.

Reduce your onboard GPS count by leveraging truFYX as the primary position source to your autopilot and ADS-B solution.

---

**RECEIVERS**

pingRX is the smallest, lightest, and most affordable Automatic Dependent Surveillance – Broadcast (ADS-B) receiver. It assists with Detect And Avoid (DAA) for unmanned aircraft systems (UAS) operations in the National Airspace System (NAS). Compatible with Pixhawk / ARDUPILOT and connects directly to TELEM2 PX4 interface.

pingStation is a dual band, all-weather networkable ADS-B receiver with a POE interface enclosed in an IP67 rated weatherproof enclosure. The pingStation has an integrated GPS for use in fleet tracking and low-altitude surveillance.

pingUSB provides ADS-B high-quality tracking data for use with software such as Virtual Radar Server and services including ADS-B Exchange. Easy to use just connect the pingUSB to a smartphone or tablet and enter your aircraft information.

pingUSB also functions as a programmer to configure the ping ADS-B transponders and transceivers with your UAS information.

Note: Does not receive FIS-B (weather) Services.
Northwest UAV is the exclusive US distributor for the Pegasus Servo Actuator product line.

VERONTE AUTOPILOT

- Fully Autonomous Control
- Hybrid, Multicopter, Fixed-wing, Heli, Missile, Ground Vehicle, Boat and more
- BLOS Communications (4G, Satcom)
- Cloud Connectivity
- DO-178C/ED-12, DO-254, DO-160 and IP 67 Compliance
- Sense and Avoid

The Veronte Autopilot is designed to control any unmanned vehicle: UAVs, multicopters, helicopters, airplanes, VTOL, blimps … as well as ground and surface vehicles, and many others.

Custom flight phases and control channels provide support for any aircraft layout and performance. Compatible with any payload (gimbal, camera, cargo release, transponder, etc.).

FEAT URES
- Cloud connectivity
- Automations
- Sense and avoid / UTM
- Custom flight phases
- RTK precise positioning
- Certification support

VERONTE REDUNDANT AUTOPILOT 4X

- Adaptive Control
- RTK & RTCM Positioning
- 4x Redundant Configurations
- One-click Missions
- Curve Based Navigation
- Fly-by-Camera and Gimbal Auto Tracking

Veronte Redundant Autopilot 4x is the optimal choice for critical applications, where the risk of casualties in civilian applications or the failure of military operations, is not an option.

It incorporates three complete Veronte Autopilot modules and connectivity for a fourth external module. The dissimilar arbiter includes advanced voting algorithms for selecting the control module, eliminating single points of failure.

FEATURES
- Highly reliable
- Automations
- Sense and avoid / UTM
- Custom flight phases
- RTK precise positioning
- Certification support

SPECIFICATIONS & HIGHLIGHTS

<table>
<thead>
<tr>
<th>VERONTE AUTOPILOT</th>
<th>VERONTE REDUNDANT AUTOPILOT 4X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensors</td>
<td>1x Magnetometer, 1x Pilot, 2x IMU, 2x Barometer, 2x GNSS</td>
</tr>
<tr>
<td>GNSS</td>
<td>Dual GNSS: 72 Channels, RTK &amp; RTCM, GPS, GLONASS, BelDou</td>
</tr>
<tr>
<td>Attitude Aiding</td>
<td>Differential GNSS</td>
</tr>
<tr>
<td>Speed</td>
<td>IAS up to 382 Km/h (Optional up to 2900 km/h)</td>
</tr>
<tr>
<td>Pitch / Roll / Yaw</td>
<td>0.5 / 0.5 / 1.5 deg (0.2 / 0.2 / 0.3 deg upgrade)</td>
</tr>
<tr>
<td>Weight / Size</td>
<td>190 g / 63 x 39.6 x 67.9 mm (90 g 52.6 x 34.7 x 55 mm no enclosure)</td>
</tr>
<tr>
<td>Processor</td>
<td>DSP + Dissimilar Supervisor</td>
</tr>
<tr>
<td>Supervised FCUs</td>
<td>N/A</td>
</tr>
<tr>
<td>Casing</td>
<td>Sealed Anodized Aluminium, IP67 Waterproof, EMI Shielding</td>
</tr>
<tr>
<td>Temperature (operation)</td>
<td>-40°C to 65°C</td>
</tr>
<tr>
<td>LOS Datalink Radio</td>
<td>Encrypted 400 MHz, 900 MHz or 2.4 GH + External</td>
</tr>
<tr>
<td>BLOS Communication</td>
<td>Satcom Compatibility, Embedded M2M LTE Module</td>
</tr>
<tr>
<td>Certifications</td>
<td>DO-178C, DO-254, DAL-B</td>
</tr>
<tr>
<td>Power Input</td>
<td>Dual Independent (6.5 – 36 VDC)</td>
</tr>
<tr>
<td>Device Compatibility</td>
<td>Transponder, Gimbal, Altimeter, Obstacle Detection, Companion …</td>
</tr>
<tr>
<td>Advanced Control</td>
<td>Fly-by-Camera, Curve Based Navigation, Follow Me, One Click Missions, Adaptive Control …</td>
</tr>
</tbody>
</table>

NOTE: Standard Veronte autopilot system requires both an onboard an control station unit; both units must have the same radio installed.
VERONTE AUTOPILOT KIT

This is the ideal autopilot kit choice for UAS/RPAS professionals seeking an advanced integration environment to configure and fine-tune the Veronte Autopilot into their UAS/RPAS.

The kit includes the Hardware-in-the-Loop (HIL) Simulator, whereby your UAS/RPAS will fly in a simulated virtual environment provided by X-Plane, allowing for adjustments, e.g. control PID gains on the fly.

VERONTE MCS STATION

- Antiglare screen
- WiFi connection
- High brightness
- Dual screen
- Rugged
- Multi-touch

VERONTE PCS STATION

- Geo positioning
- IP66 protection
- Embedded data link
- >3m altitude
- WiFi and ethernet
- Expansion bay

VERONTE BCS AUTOPILOT FOR CONTROL STATION

- Veronte to PC connection
- Can be used with any PC or tablet
- Embedded data-link, GPS and sensors
- Telemetry and telecommand
- Servo and device control
- Joystick, tracker, servo, tunnels ...

VERONTE HIL SIMULATOR

- Safe environment operation and testing
- Training and development
- Real actuator movement
- Full Hardware-In-The-Loop (HIL) simulation
- Real autopilot hardware and software

VERONTE PIPE SOFTWARE

- Cross-platform (Windows, Linux, macOS)
- Intuitive, easy-to-use and dependable
- Customizable to your needs
- Configure the Veronte system
- Create and edit missions
- Monitor flight information
- Automatically configure actions
- Compatible with all Veronte systems

The flight controller’s choice for advanced and professional UAV and unmanned vehicle control. Call for more information or visit www.nwuav.com

NWUAV A Global Company | +1 503.434.6845 | contact@nwuav.com | www.nwuav.com
NORTHWEST UAV: Turnkey Solutions for the UAS Industry

Northwest UAV is America’s industry leader in UAS Propulsion System Manufacturing, providing quality, made in the USA products to clients around the globe. At NWUAV we understand UAS requirements inside and out, incorporating a total lifecycle approach that provides top quality, high-performance solutions to enhance any system platform. Our onsite Engineering Group is dedicated to our company mission of delivering reliable, cost effective UAS systems, and their experience is proven. When you need to get in the air and stay there, you need Northwest UAV.

NW-44 MULTI-FUEL

BATTERY BACKUP MODULE (BBM)
- Full power system management
- Switches between generator shore power and battery
- Uninterrupted backup battery power

GENERATOR CONTROL UNIT (GCU)
- 280-Watts
- Outputs: 6/12/21 or 28V
- Trimmmable to your application

FUEL DELIVERY SYSTEM (FDS)
- Pressurized fuel for EFI, filtered with acrobatic pickup
- Regulated fuel pressure
- Pressure and Bingo level sensors

ENGINE CONTROL UNIT (ECU)
- Purpose built for UAVs
- Highly versatile baseline, customizable

ECU WIRE HARNESS
- MIL SPEC connectors
- EMI/EMC protected
NW-44 MULTI-FUEL [HEAVY-FUEL/GAS] UAV ENGINE

**ROTOR & STATOR**
- 310-Watts
- 90+% Efficient

**MUFFLER (PATENTED)**
- Lightweight conformal design
- Extreme acoustic suppression

**ENGINE CORE**
- 44 cc

**PROPELLER**
- Exclusive aerodynamic design
- Low noise

**IGNITION**
- 12V power
- 25kV ignition coil
- Capacitor discharge ignition (CDI)

The NW-44 EFI is one of the most configurable small UAV engines on the market today. Purpose-built to handle aircraft from approximately 18 to 34 kg* (40-75 lbs.) depending on mission requirements. The NW-44 EFI core and subsystem components mitigate ITAR and end of life concerns and are primed to meet pending FAA Certification requirements.

**APPROVED FOR EXPORT**
Northwest UAV is the exclusive United States Distributor for the Pegasus UAV Servo Actuator product line.

<table>
<thead>
<tr>
<th>Model Number</th>
<th>PA-R-135-4</th>
<th>PA-R-135-6</th>
<th>PA-R-205-4</th>
<th>PA-R-205-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>This micro low-profile servo provides ultimate reliability, precision and power output in a tiny but rugged package. Currently the world’s smallest professional servo in its class.</td>
<td>Based on our proven PA-R-135-4 this servo provides a higher continuous and maximum torque in just a slightly larger packaging.</td>
<td>Despite its comparatively small size, it is suitable for all kinds of industrial motion/remote control applications demanding extraordinary reliability and lifetime service.</td>
<td>The PA-R-205-6, is the power version of our PA-R-205-4 type with modified software and a much more powerful motor.</td>
<td></td>
</tr>
</tbody>
</table>

### PEGASUS INDUSTRIAL SERVO CHARACTERISTICS

<table>
<thead>
<tr>
<th>Continuous Torque</th>
<th>30 Ncm (42 oz-in)*</th>
<th>60 Ncm (82 oz-in)*</th>
<th>80 Ncm (113 oz-in)*</th>
<th>180 Ncm (255 oz-in)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Torque</td>
<td>&gt; 60 Ncm (&gt; 84 oz-in)</td>
<td>&gt; 80 Ncm (&gt; 113 oz-in)</td>
<td>&gt; 200 Ncm (&gt; 283 oz-in)</td>
<td>&gt; 350 Ncm (&gt; 495 oz-in)</td>
</tr>
<tr>
<td>Operating Voltage</td>
<td>6, 12 or 24 VDC</td>
<td>Nominal 6, 12 and 24 VDC</td>
<td>6, 12 or 24 VDC</td>
<td>6, 12 or 24 VDC</td>
</tr>
<tr>
<td>Travel Angle</td>
<td>±90° (Standard PA-ME/Contact-less Angle Sensor), Alternative Angles On Request</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Load Speed</td>
<td>425°/sec</td>
<td>135°/sec</td>
<td>335°/sec</td>
<td>210°/sec</td>
</tr>
<tr>
<td>Motor</td>
<td>DC Motor</td>
<td>DC Motor</td>
<td>DC Motor</td>
<td>DC Motor</td>
</tr>
<tr>
<td>Gear Train</td>
<td>2 Ball Races with PA-SC Gear Train Protection Output Shaft</td>
<td>2 Ball Races with PA-SC Overload Protection Output Shaft</td>
<td>6 Ball Races with Rigid Output Shaft (Optional with Slip Clutch Output Shaft PA-SC)</td>
<td>6 Ball Races with Rigid Output Shaft (Optional with Slip Clutch Output Shaft PA-SC)</td>
</tr>
<tr>
<td>Case</td>
<td>Horiz. 3-Point/Vert. 4-Point Fixation</td>
<td>Horizontal 3-Point Fixation</td>
<td>Horiz./Vert. 4-Point Fixation</td>
<td>Horiz./Vert. 4-Point Fixation</td>
</tr>
<tr>
<td>Weight</td>
<td>65 g (2.3 oz)</td>
<td>&lt; 80 g (2.8 oz)</td>
<td>130 g (4.6 oz)</td>
<td>150 g (5.3 oz)</td>
</tr>
</tbody>
</table>

*Standard Signal for the R-135-6 is the
*B" Signal and "A" and "C" are optional.
PA-R-250-8
For applications with high demands on powerful torque and high speed positioning. With its BLDC technology (brushless DC motor) and PA-ME contactless sensor it combines extraordinary reliability and precision.

PA-R-250-9
The high-output version of the PA-R-205-8. We implemented the high-output brushless DC motor technology, refined the gear train and servo case design. Its power-to-weight relation speaks for itself.

PA-R-340-7
By modifying our PA-R-340-7 servo’s hardware and software, we significantly increased the power output of this well proven servo actuator.

PA-R-340-9
The high-power version of our well proven PA-R-340-7, providing equal characteristics with a 50% higher continuous torque rate. A real workhorse!

PA-R-440-7
The PA-R-440-7 Servo Actuator with 35 Nm maximum torque. This is the powerhouse of our product range.

- Dependable oil bath lubrication improves gear train service lifetime
- Actuators are shielded to minimize EMI/RFI susceptibility and magnetic interference
- Enhanced vibration tolerance
- Incorporated aerospace specified connectors
- IPC-A-600 Class 3 compliant internal PC-board design and manufacturing

---

<table>
<thead>
<tr>
<th>Model</th>
<th>Torque Range (Nm)</th>
<th>Voltage Compatibility</th>
<th>Feedback Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA-R-250-8</td>
<td>300 Ncm (425 oz-in)*</td>
<td>12 or 24 VDC</td>
<td>Digital – Programmable – with Differential and Analog Sensor Feedback</td>
</tr>
<tr>
<td>PA-R-250-9</td>
<td>400 Ncm (560 oz-in)*</td>
<td>24 VDC</td>
<td>12 VDC or 18-32 VDC</td>
</tr>
<tr>
<td>PA-R-340-7</td>
<td>850 Ncm (1200 oz-in)*</td>
<td>12 VDC or 18-32 VDC</td>
<td>200%sec @ 24 VDC</td>
</tr>
<tr>
<td>PA-R-340-9</td>
<td>1200 Ncm (1700 oz-in)*</td>
<td>18-32 VDC</td>
<td>240%sec @ 24 VDC</td>
</tr>
<tr>
<td>PA-R-440-7</td>
<td>20 Nm (14.8 lb-ft)*</td>
<td>&gt; 500 Ncm (&gt; 710 oz-in)</td>
<td>200%sec @ 28 VDC</td>
</tr>
<tr>
<td></td>
<td>20 Nm (14.8 lb-ft)*</td>
<td>&gt; 700 Ncm (&gt; 992 oz-in)</td>
<td>230%sec @ 28 VDC</td>
</tr>
<tr>
<td></td>
<td>20 Nm (14.8 lb-ft)*</td>
<td>&gt; 1800 Ncm (&gt; 2500 oz-in)</td>
<td>105%sec @ 28 VDC</td>
</tr>
<tr>
<td></td>
<td>20 Nm (14.8 lb-ft)*</td>
<td>&gt; 2100 Ncm (&gt; 2970 oz-in)</td>
<td>±90° (Standard PA-ME/Contactless Angle Sensor), Alternative Angles On Request</td>
</tr>
</tbody>
</table>

---

PWM Signal, TTL Level (Standard Configuration); PWM Signal, Differential (RS485 Transceiver) (optional) or RS485 Data Protocol (optional)

BLDC Motor | Hi-Output BLDC Motor | BLDC Motor | BLDC Motor | BLDC Motor
---|---|---|---|---

Neodym Magnet

Hardened Steel, Spur Gear Type with 6 Ball Races with Rigid Output Shaft (Optional with Slip Clutch Output Shaft PA-SC)

6 Ball Races with PA-SC Overload Protection Output Shaft

8 Ball Races or Roller Bearings with PA-SC Overload Protection Output Shaft

10 Roller Bearings with PA-SC Overload Protection Output Shaft

Aluminum, Water & Dust Protected (IP67) with Solid Horizontal & Vertical Multiple Mounting Options

<table>
<thead>
<tr>
<th>Model</th>
<th>Shaft</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA-R-250-8</td>
<td>PA-SC</td>
<td>285 (10.05 oz)</td>
</tr>
<tr>
<td>PA-R-250-9</td>
<td>PA-SC</td>
<td>335 (11.82 oz)</td>
</tr>
<tr>
<td>PA-R-340-7</td>
<td>PA-SC</td>
<td>780 (27.5 oz)</td>
</tr>
<tr>
<td>PA-R-340-9</td>
<td>PA-SC</td>
<td>930 (33 oz)</td>
</tr>
<tr>
<td>PA-R-440-7</td>
<td>PA-SC</td>
<td>1500 (3.3 lb)</td>
</tr>
</tbody>
</table>

*According to Pegasus Actuators GmbH Specification Test (results available by request).
PEGASUS REDUNDANT SERVO ACTUATORS

Pegasus Redundant Servo Actuators are a stand-alone solution. All redundancy related process cycles are performed internally by the actuator. The advantages are that no additional engineering for modified autopilot systems, and no redundancy related decisions to be proceeded by the A.P.

Model  Number

PA-RR-260-8  The world’s first redundant UAV Servo Actuator for small and medium sized UAV systems, enhancing servo actuator reliability to an unparalleled level.

PA-RR-260-9  For applications where the PA-RR-260-8 type actuator seems to be just not powerful enough, the Pegasus PA-RR-260-9 type will generate the missing force to support your demand.

PA-RR-340-7  Based on the well proven PA-R-340-7 and is a stand-alone solution. This means that all redundancy related process cycles are performed internally by the actuator.

PA-RR-340-9  The PA-R-440-7 Servo Actuator with 35 Nm maximum torque. This is the powerhouse of our product range.

REDUNDANT SERVO CHARACTERISTICS

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Continuous Torque</th>
<th>Maximum Torque</th>
<th>Operating Voltage</th>
<th>Travel Angle</th>
<th>No Load Speed</th>
<th>PC-Board</th>
<th>Signal</th>
<th>Motor</th>
<th>Gear Train</th>
<th>Case</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA-RR-260-8</td>
<td>300 Ncm (425 oz-in)*</td>
<td>&gt; 500 Ncm (&gt; 710 oz-in)</td>
<td>18-32 VDC/Typical 24-28 VDC</td>
<td>315° (PA-ME)/Redundant Contact-less Angle Sensor</td>
<td>195°/sec @ 24 VDC</td>
<td>Dual BLDC Motor</td>
<td>Redundant RS485 Data Protocol</td>
<td>8 Ball Races with PA-SC Overload Protection Output Shaft</td>
<td>8 Ball Races with PA-SC Overload Protection Output Shaft</td>
<td>Aluminum, Water and Dust Protected (IP67) with Solid</td>
<td>490 g (17.3 oz)</td>
</tr>
<tr>
<td>PA-RR-260-9</td>
<td>400 Ncm (560 oz-in)*</td>
<td>&gt; 700 Ncm (&gt; 992 oz-in)</td>
<td>18-32 VDC/Typical 24-28 VDC</td>
<td>230°/sec @ 28 VDC</td>
<td>170°/sec @ 24 VDC</td>
<td>Dual Hi-Output BLDC Motor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>575 g (20.6 oz)</td>
</tr>
<tr>
<td>PA-RR-340-7</td>
<td>850 Ncm (1200 oz-in)*</td>
<td>&gt; 1800 Ncm (&gt; 2500 oz-in)</td>
<td>18-32 VDC/Typical 24-28 VDC</td>
<td></td>
<td>210°/sec @ 28 VDC</td>
<td>Dual BLDC Motor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1230 g (43 oz)</td>
</tr>
<tr>
<td>PA-RR-340-9</td>
<td>1200 Ncm (1700 oz-in)*</td>
<td>&gt; 2100 Ncm (&gt; 2970 oz-in)</td>
<td>18-32 VDC/Typical 24-28 VDC</td>
<td></td>
<td>240°/sec @ 28 VDC</td>
<td>Dual DC Motor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1450 g (51 oz)</td>
</tr>
</tbody>
</table>
• Control surfaces requiring servo actuation
• Hi-Value target drones - surface control, and speed brakes
• Swash plate or flap control
• Utility actuation - throttle control, doors, and spoilers
• Helicopters - manned or unmanned
• PA-ME3 magnetic deflection angle sensor

High-Altitude Long Endurance (HALE) Redundant Servo Actuators

High-Altitude Long Endurance (HALE) - Aircraft which functions optimally at high-altitude and is capable of long distance flights for extended lengths of time without having to land.

• Internal heating system/heated circuit board
• Low temperature grease
• Enhanced feedback signal resolution
• Outer protective cold environment insulation “Winter Jacket” case

The IH feature allows operation of the PA-RR-Series Actuators at temperature ranges down to -84°C (-119°F): at natural convection. Two independent heating units with independent power supplies are installed, and the heating control loop is independent of the Servo PCB. In the event of a single point failure of a heating system elements, the remaining components will provide sufficient heat down to -84°C (-119°F).

Available Units:
PA-RR-260-8-C-24-C-315-IH
PA-RR-340-7-C-24-C-315-IH

Optionally Piloted Aircraft (OPA) Servo Actuator System

The redundant duplex actuators are used on optionally piloted (air) vehicles (OPV). This system allows the pilot to engage or disengage the clutch to operate the aircraft conventionally piloted or as a UAV.

Included in the System:
• Unique PC-board arrangement
• Two magnetic clutches

Available for all Redundant and Industrial Servo models from R-250 to R-440.

% According to Pegasus Actuators GmbH Specification Test (results by request).
**VARIABLE PITCH/CONSTANT SPEED PROPELLERS (VPP)**

The VPP has been designed for ease of use in field operations with universally interchangeable and easy to replace blades. The reverse thrust capabilities translates to steeper descent and shorter runway landings. Custom blade and blade retention design means reduced weight for your UAS application.

### SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric Motor</td>
<td>17.4 hp @ 4800 rpm</td>
</tr>
<tr>
<td>Max RPM</td>
<td>5500</td>
</tr>
<tr>
<td>Weight lbs/kg</td>
<td>5.9 lbs / 2.67619 kg</td>
</tr>
<tr>
<td>Blades</td>
<td>3 Blades</td>
</tr>
<tr>
<td>Blade Style</td>
<td>31.5” Ellipse</td>
</tr>
<tr>
<td>Pitch Range</td>
<td>+ or -9° from Nominal</td>
</tr>
<tr>
<td>Reverse Thrust</td>
<td>Down to -9° Pitch</td>
</tr>
<tr>
<td>Feather</td>
<td>Full Commanded Feather</td>
</tr>
<tr>
<td>Time to Feather from</td>
<td>&lt;15 s</td>
</tr>
<tr>
<td>Nominal Communications</td>
<td></td>
</tr>
<tr>
<td>Across Inductive Gap</td>
<td>Wireless</td>
</tr>
<tr>
<td>Max Power Transfer</td>
<td>6-Watts</td>
</tr>
<tr>
<td>Testing</td>
<td>FAR 35 Based Propeller Testing</td>
</tr>
<tr>
<td>Rotational Inertia</td>
<td>~39 lb<em>in</em>^2</td>
</tr>
</tbody>
</table>

### Manufacturing

NWUAV’s in-house CMM is used during the development and manufacturing process to ensure every VPP is delivered to exact configuration requirements. This ensures your VPP is delivered ready to fly; enabling longer missions and lower acoustic signature.

### Testing

NWUAV utilizes in-house test cells for acoustic and performance testing, and computational fluid dynamics (CFD) for numerical performance validation over the entire operation range.

**LOW NOISE PROPELLER DESIGN AND CONSTRUCTION**

NWUAV utilizes propriety code developed for racing airplanes to improve maximum speed and efficiency. Performance efficiency and acoustical signature are the driving metrics for this low-noise propeller design. They are traditionally optimized separately but somewhat concurrently through proprietary software.

The NWUAV propeller design is a unique solution to an elliptical lift distribution along the blade span, making efficient use of the entire span. The thrust generated tapers off to virtually none at the tip, greatly decreasing energy losses and increasing the conversion of input energy to thrust overall.

The unique shape that achieves this performance gain also serves to lower the acoustic signature. It is hypothesized that the swept segments of the trailing edge distribute the phases of the thickness and loading contributions of the spanwise elements, reducing the amplitudes of the tones.

With the specific design criteria and operating conditions defined, during the first design iteration the propeller geometry is tailored and optimized for the best aerodynamic and structural characteristics. The second design iteration considers the manufacturability of the aerodynamic design using the appropriate production techniques. The final propeller is the best solution for the combination of aerodynamic performance and efficient manufacturability.

The performance of a UAV Propeller is determined by its geometry, which consists primarily of the:

- Number of blades
- The diameter
- Hub diameter
- The airfoil shape/distribution
- Chord
- Pitch distribution
- Coning angle
- Aerodynamic design
The Custom Engine Test Cell (CETC) is completely self-contained and customizable to meet your specific requirements. The CETC is available in 20 or 40 foot container lengths and includes everything needed to test a UAV engine.

**Testing Capabilities**
- Acceptance testing
- Engine tuning/fuel economy mapping
- Engine/propeller power and torque mapping
- Over-speed testing
- New/overhauled engine break-in
- Durability/endurance evaluation (FAR 33)
- Throttle response evaluation

**Custom Built for your Application**
NWUAV’s CETC can be custom built for your specific application and to your requirements. We offer delivery and setup worldwide and will train your personnel how to perform engine testing with the CETC. Purchase or Lease the CETC. On-site turn-key engine test solutions, with NWUAV operators available. The CETC is approved for export.

**MEASUREMENT CAPABILITIES**
- Torque
- Fuel Flow
- Ambient Pressure
- Ambient Temperature
- Relative Humidity
- Exhaust Gas Temperature
- Cylinder Head Temperature
- Engine Speed (RPM)
- Brake Specific Fuel Consumption (BSFC)
- Horsepower

**Optional Measurement Capabilities**
- Thrust
- In-cylinder Pressure Mapping
- Exhaust Gas Carbon Monoxide

**OTHER CAPABILITIES**
- Generator Electronic Loading

**Optional Build**
- Side Hatches*

* Hatches in the side of the CETC allow the customer to place their entire airframe into the CETC for testing.
**PORTABLE TEST CELLS**

**Mobile Engine Test Stand (MTS)**

The NWUAV Mobile Test Stand can be used to operate, test, develop and record engine performance data for various engine configurations. The MTS is Customizable to meet the application and testing required.

**Mobile Test Stand Software**

The LabVIEW NWUAV DAQ software included with the laptop is used to control and monitor the running engine, and can be configured for specific engine and/or targeted diagnostic tests.

**Mobile Test Stand Hardware**

Inside the Mobile Test Stand there is access to the battery, fuel system, data acquisition units, power supply blower system and laptop, with space for engine storage. A power/data acquisition box contains all the power supply components and data acquisition units, which provide the interface between the engine sensors, stand sensors, starter and the laptop software. The main power panel provides power to the run stand using external 240V power, and includes a main on/off switch and two 110V outlets. The propeller guard is removable and installs on the back of the stand.

**Mobile Test Stand Capabilities**

The following is a list of some of the highlights of the analysis and testing that can be performed with the Mobile Test Stand:

- Engine durability testing
- Engine endurance testing
- Engine performance testing
- Exhaust analyzers – 5 gas
- Fuel flow transmitters – minimum 1cc/min
- Engine fuel mapping
- In-cylinder pressure mapping @ 100 KHz when properly equipped (custom option)
- FAR 33 endurance testing

**Mobile Test Stand Custom Built for your Application**

NWUAV’s Mobile Test Station can be custom built for your special application and to your desired specifications. We will build, deliver and train your personnel worldwide (the MTS is approved for export).

**Purchase or Lease the MTS**

For more information on the purchase or lease call 503-434-6845.

---

**SPECIFICATIONS & EQUIPMENT**

Dimensions w/Propeller Guard Vertical (W x L x H) 57.5 x 130.5 x 76 in (146.05 x 331.47 x 193.04 cm)

Class III 2 in (5.08 cm) Hitch

1 Spare Wheel and Tire (P185/70R14)

4 Stabilizer Jacks

1 Stabilizing Tongue Jack

LED Caution Light

Forward Access Panel 57 x 34 in (144.78 x 86.36 cm)

AFT Access Panel 57 x 19 in (144.78 x 48.26 cm)

Propeller Guard 37 in (93.98 cm) dia.

Power: (1) 4-Wire 240V

(2) 110V Outlets

12V Battery

Maximum Tow Speed 55 mph

Panasonic Toughbook Laptop

NWUAV Data Acquisition (DAQ)

Data Interface: Ethernet

On-board Engine Cooling

12-gallon On Board Fuel System

**ENGINE INDICATORS (running)**

- Torque
- Thermocouples
- Cylinder Head Temperature
- Analog Input Channels
- Fuel Flow
- Fuel Pressure
- Tachometer
- Digital I/O Channels
- Throttle Position

**RUN ROOM ATMOSPHERE CONDITION INDICATORS**

- Ambient Pressure
- Ambient Air Temperature
- Humidity

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**Purchase or Lease the MTS**

For more information on the purchase or lease call 503-434-6845.
NWUAV’s CFD and Acoustical analysis tools coupled with an experienced team will work with you to hone the performance of your design and realize the efficiencies you need in your component or complete system.

Computational Fluid Dynamics
NWUAV utilizes a suite of software to set up a flow problem, solve it, and extract the information needed to optimize your design. The software offers an extensive list of user defined flow parameters to more accurately model and simulate the flow field and can be utilized in:

- **INVESTIGATIVE ANALYSIS** – A valuable tool to answer questions early in the design process.
- **VALIDATING DESIGNS** – CFD data will help validate the design before cutting molds or making prototypes.
- **OPTIMIZATION** – Helps to fine-tune the design to increase efficiency.
- **DETAILED INFORMATION** – “Numerical sensors” provide flow properties anywhere in the flow stream.

Acoustical Testing
NWUAV utilizes a 1/24th Octave Real Time Analyzer to visualize and record sound energy in a sound controlled room. Data provided by this system helps determine how “loud” a system is, and where in the frequency spectrum the highest levels of noise exist. The data can also be extrapolated to determine acoustical detectability per MIL-STD-1474D.

Effective uses of CFD:
- Propeller performance
- Cooling system design; external air cooling or internal water cooling
- Test cell airflow analysis
- Engine intake design

![Graph showing non-detectability distance vs. RPM](image)

**NONDETECTABILITY**

<table>
<thead>
<tr>
<th>RPM</th>
<th>Muffler 2/28i</th>
<th>28i NWUAV Muffler</th>
<th>APC 16x14 2 Blade Nylon</th>
<th>NWUAV LIPPSE 17x13 3 Carbon</th>
</tr>
</thead>
<tbody>
<tr>
<td>3600</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>4000</td>
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<tr>
<td>8000</td>
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</tbody>
</table>
**State Of The Art Testing Facility**

NWUAV testing capabilities include engine performance and propeller testing. NWUAV has dedicated space for engine development, endurance testing, and production quantity engine break-in and tuning. National Instruments data acquisition modules and LabVIEW are the primary data systems supporting testing at NWUAV. Real time acoustical analysis software and measurement quality condenser microphones are employed for acoustic testing and data collection down to 1/24 octave from 20Hz to 20kHz.

**Test Cell Capabilities**

NWUAV also offers its customers advanced testing and analysis for UAV propellers and engines.

The following is a list of some of the highlights of analysis and testing that are performed for our customers:

- Engine durability and endurance testing
- Acoustical and computational fluid dynamics testing
- Environmental temperature controlled altitude chamber
- Accessories testing: Pumps, fuel tanks, injectors, camera’s and more
- Exhaust analyzers – 5 gas
- Fuel flow transmitters – minimum 1 cc/min
- Engine fuel mapping
- In-cylinder pressure mapping at 100 KHz
- Propeller dyno
- Propeller noise characterization per MIL Standard 1474D
- FAR 33 endurance testing
- FAR 35 based propeller testing
- Mass airflow flow bench
- Engine break-in stations with digital acquisition systems
- Small engine dyno
- Large engine dyno (180 hp)

**Test**

NWUAV validates the finished product utilizing engine run-in stations and various dyno’s to qualify the design elements to the clients specifications – so you get the best propulsion system for your application.

At NWUAV our software system allows you to access and test your running engine remotely, from anywhere that you have computer access.

**Prop & Engine Dynos**

NWUAV’s capability to control the environment during the testing and design phases reduce test flight risk significantly, saving a substantial amount of time, money and resources.

NWUAV works with several electric motor manufacturers to produce propulsion systems for electric aircraft. NWUAV is currently working with the Army on an electric aircraft design.

**Testing Facility**

NWUAV is poised to grow alongside the UAV industry in its ten acre facility. The location houses a production facility, a diverse team of R&D engineers, a state of the art engine testing, and administrative offices.
UAV Propulsion System Build-To-Print, Production & Manufacturing

We are more than aeronautics. We are a multidimensional engineering and manufacturing firm ready and able to react quickly to your prototyping and manufacturing requirements.

UAV Engines

UAV systems include solutions for unmanned vehicles of all types – in the air, on land, and in the sea. We excel in high volume production management and focus on several areas of expertise including:

- Engine design
- Engine vibration isolation and characterization
- Engine durability and endurance testing
- Environmental testing with altitude, temperature, and humidity control up to 25,000 feet
- Electrical assembly
- Carbon fiber propeller design and manufacturing
- Propeller thrust
- Noise and torque characterization utilizing our propeller dyno

NWUAV Engines

NWUAV regularly produces 150-200 turn-key engine systems per week. A large investment in management software allows for high volume output with strict quality control oversight.

Build

We work with our clients to provide cost effective solutions for their specific land, sea, and air unmanned applications – COTS or custom and build-to-print engine systems.

Production

Utilize NWUAV for full scale production (or refinement) of a proven design.

NWUAV’s research and development capabilities make changes in designs an easy transition from the production floor, right into your unmanned system. NWUAV has delivered thousands of propulsion systems since 2005.

Engine Accessories

We also build accessories for small engines, such as:

- Generators
- Electrical wiring bundles
- Inlet duct systems
- Shrouds
- Cowls
- Fuel tanks
- Variable Pitch Propeller systems

NWUAV’s AS9100 facility utilizes Intuitive ERP for high volume production management which provides the ability to implement LEAN manufacturing techniques and still retain the capacity to produce more than 500 engine modules and associated subsystems a month.

With our technologically advanced facility, we build small engines for the UAV industry. These engines can be built to your specifications, or you can use a NWUAV purpose-built solution. Engine modules are delivered ready to fly.
NWUAV’s engineering capabilities eliminate weeks in the design and validation phases. Utilizing the latest in available software highly trained and skilled engineers will help to refine and shape any idea or design, making it production ready.

**Beyond the SWAP (Size, Weight and Power)**

Specializing in unmanned system propulsion design our engineers are familiar with the normal trade-offs required when designing for unmanned air vehicles. Many considerations need to be made specifically for the UAV industry including detectability, vibration transmission, lifecycle costs and deployed footprint minimization.

Our total lifecycle approach includes modular concept for design and development, with attention to manufacturability, and an emphasis on low impact maintainability.

With our state of the art testing facilities our world class test engineers and specialists design qualification and acceptance tests, and perform noise reduction and detectability analysis. This ensures that your flight program will be a profitable and predictable success.

---

**Mechanical Engineering**

**Specialists in each aspect of unmanned design**

Software developed by SolidWorks® allows NWUAV’s engineers to take a concept and develop a prototype, evaluate and refine it as needed to produce final production ready designs.

**Electrical Engineering**

**Precision Circuit and Electrical Systems**

Electrical Systems Altium Designer® provides our engineers a single unified solution for the entire design process. NWUAV uses all the latest technologies to design and develop circuit and electrical systems with precision.

**Aerospace Engineering**

**Experts in flight and propulsion dynamics**

With our suite of analysis tools we can understand the dynamics of your system to help ensure success with your total design. Our engineers use our proprietary propeller design to get the highest possible efficiency at the lowest possible acoustic detectability for your specific application.

**Physics**

**Experts in heavy-fuel combustion dynamics**

With access to the latest combustion dynamics software suites, NWUAV understands how to optimize your system for operation on heavy-fuels.
Maintenance Repair Organization (NWUAV MRO)

NWUAV MRO provides UAV operators with a cost effective engine maintenance alternative. NWUAV MRO provides all levels of engine repairs, overhauls, or customized modifications; all with short turn times and exceptional value.

At NWUAV MRO, we have the experience of thousands of engine builds working for our customers. We have the engineering, prototyping and test/evaluation capabilities of NWUAV at our disposal, which enables us to perform custom modifications to meet our customer specifications.

CONUS AND OCONUS Field Service Maintainers available.

Engine Repair & Overhaul
At NWUAV MRO we overhaul and repair engines to restore original levels of performance and efficiency at a fraction of the cost of new equipment.

We allow our customers to determine the level of service provided, giving you more control of your valuable resources.

In addition, NWUAV MRO can implement a Save All Serviceable Hardware (SASH) program for possible reuse as desired by our customers. Our SASH program will evaluate most lower level and/or accessory components for serviceability, giving you the option to replace parts with new or serviceable, further enhancing your cost control.

Customized Modifications
NWUAV MRO will work closely with our customers to customize modifications including:

- Engine overhaul
- Engine repair
- Engine testing/monitoring
- Component overhaul
- Component repair
- Wiring repair
- Custom modification

Component Level Repairs
NWUAV MRO repairs custom engine assemblies, lower level and accessory components. We work with our customers to determine the most cost effective component service options, in order to better support your operational needs.

NWUAV MRO understands that, second only to quality, engine repair turn-time is the most important factor in the overall cost of ownership of UAVs. We work with our customers to establish inventory of all major subassemblies in order to minimize lead time and reduce spare engine requirements for our customers.

Benefits/Services

- Propeller
- Engine core
- Fuel delivery
- Ignition
- Muffler
- Engine overhaul
- Engine repair
- Engine testing/monitoring
- Component overhaul
- Component repair
- Wiring repair
- Custom modification

CONUS AND OCONUS Field Service Maintainers available.
SERVICES

Metrology Solution Services & CMM Capabilities

With our experienced operators and fast turnaround time, your CAD file or CMM report can be available on time, when you need it. Our precision and reliability is unsurpassed in our CMM inspection and measurement services.

Our certified operators will ensure that your CMM (coordinate measuring machine) inspection and measurement is performed to your specifications. NWUAV’s CMM is housed in an environment isolated, 68°F temperature controlled room for scanning precision.

CMM Equipment
Zeiss Contura® G2 RDS has high-speed scanning capability and with the articulating head, needs only a single stylus to measure a wide range of angles. The stylus holder can reach 20,376 positions in 2.5° increments. This leading-edge CMM performer can scan large quantities of data in a short time with reliability and precision, with accuracy down to 1.8 microns.

CMM Software
We use Zeiss’ CALYPSO CAD based software for scanning and the CURVE module for the measurement of free form objects. With the RDS Articulating Probe and CALYPSO software, precision and accuracy is achieved for any CMM project. The advantages of scanning with CALYPSO include the ease with which the software can create measurement plans for CAD programming, and the flexibility of the software and sensor to switch between automatic and manual measuring modes. With CALYPSO, we are able to easily provide a customized measurement report to suit your project requirements. The software supports most file formats that are compatible with SolidWorks: ACIS, STEP, IGES, and Parasolid.

NWUAV CMM Capabilities
- First article inspection
- Reverse engineering
- Laser scanning
- AS9100/ISO9011 standards
- Environment isolated 68°F temperature controlled lab
- Certified operations
- Fast turnaround times

We work with our clients to provide cost effective solutions for their specific applications. Contact us for more specific information, and quotes for your CMM project.
CNC Machining & Manufacturing

At Northwest UAV we believe precision and reliability should be the foundation of every component of your unmanned system. That’s why we rely on CNC Machining for a variety of our own propulsion system components, as well as for our clients.

The Mori NHX 4000 is the heart of our machine shop, and with our experienced team, we’re able to cut and produce a variety of unmanned components with reliability you can count on, in the quick turnaround time you need. Stop settling for good enough. Demand the precision and reliability your unmanned system needs to do the job right.

Our machine shop is equipped with a variety of CNC machines, milling machines, software, and experienced artisans to ensure that all propulsion systems and unmanned components we produce are accurate and durable. With the Mori NHX 4000, we offer a torque spindle that is 2.3 times more powerful than conventional CNC machines and a table size with the most substantial y-axis travel in its class! In other words, we’ll get your large projects done fast! At Northwest UAV we have worked hard to develop a reputation for precision and reliability – using CNC machining allows us to maintain our dependability and to ensure that we meet your turnaround time. If accuracy, reliability and time are essential to you, then talk to us about NWUAV CNC Machining.

GREATER PRECISION & RELIABILITY
Quick Turnaround

Machine Centers & Features

- **2016 DMG Mori VMX 1100 Vertical 3-Axis**
  - 30 Tool Magazine, Twin KME 5-Axis Trunnion Table, Renshaw Probe, Broke Tool Detection and Chip-Conveyor

- **2015 DMG Mori NHX 4000 Horizontal 4-Axis**
  - 180 Tool Magazine, 5-Position Pallet Pool, Renshaw Probe and Broke Tool Detection

- **2013 DMG Mori NHX 4000 Horizontal 4-Axis**
  - 60 Tool Magazine, 4-Position KME 5-Axis Tomstone and Broke Tool Detection

- **2012 DMG Mori 1035 Vertical 3-Axis**
  - Chip-conveyor

- **2009 DMG Mori 5100 Vertical 3-Axis**
  - 30 Tool Magazine and a Single KME 5-Axis Trunnion Table

Future Expansion Machine Centers

- **Makino a51nx Twin Horizontal full 4-Axis Cell System**

Other Equipment

- **MasterCam® CNC Software**
- **Manual Mill**
- **Manual Lathe**
**Electrical & Wire Harness Shop**

From building to testing to repair, the NWUAV electrical and wire harness shop has the skill and experience to handle almost anything electrical in your unmanned system. Our diverse team can efficiently and effectively build temperature sensors, simple to multi-leg harnesses, and timing sensors, just to name a few. If you need testing instead, our shop is set up to test ignition coil endurance, harness continuity and shorts, timing sensors and lighting assemblies. As a FOD and ESD sensitive operation with AS9100 certification, you can rely on our team for clean, thorough electrical work, to get you flying, fast. Our electrical services include:

- **Design, manufacture and testing of:**
  - Temperature sensors
  - Harnesses – from simple to multi-leg complex
  - Timing sensors
  - Ignition coils
  - Fueling systems
  - Air inlet assemblies
  - Lighting assemblies
  - Fuel pumps

**FAA Approved COA FAST Test Range**

With a Certificate of Authorization (COA) by the FAA, Northwest UAV offers our own Flight, Analysis, and System Testing (FAST) UAV Test Range just 12 miles south of our main campus. Fly up to 4,000 feet within a 5 nautical mile radius of airspace. With our own licensed private and unmanned vehicle pilot managing air traffic and field operations, you can rest assured that your flights will remain within FAA regulations and safe, for you, those around you, and your equipment. The best part? When your UAV has an issue or needs a quick rethink in design, you can send it down the road to NWUAV where the rest of our team is ready to help. Notable features of the FAST UAV Test Range include:

- Just 12 miles south of the Northwest UAV full-service facility
- Fly up to 4,000 feet in the air
- Fly within a 5 nautical mile radius
- UAS Pilots available from the NWUAV team
- Wi-Fi, power, and water available
Northwest UAV (NWUAV) was established in 2005 by President and Owner Chris Harris in an effort to meet the growing demand for the high volume production needs of companies that utilize propulsion systems and components required in Unmanned Aerial Vehicles (UAVs/Drones). NWUAV is the largest UAV Propulsion System Manufacturer in the U.S. Our success is the result of our original mission to build and deliver the most reliable, dependable and cost effective UAV systems in the industry. To that end, we have assembled an on-site team of highly trained and skilled engineers that understand UAV requirements and work with a total life cycle approach for product optimization.

Northwest UAV expects to continue to see rapid growth in the coming years due to the integration of UAVs into the national airspace. NWUAV is well positioned to take advantage of this growth, sustaining an AS9100/ISO9001 (AS9104-1) certified, DCAA compliant plant. NWUAV is also in the process of establishing a Part 145 Repair Station to meet the future need for UAV MRO services.

Northwest UAV (NWUAV) is a privately owned corporation, managed by an executive team surpassing 80 years of combined manned aviation proficiency, giving us the background in safety and compliance that will be mandatory for unmanned flight in the public domain. We staff more than 100 employees, which include a qualified team of engineers and highly skilled production technicians, with the ability to produce quality products in high volume.

We are situated outside of McMinnville, Oregon in a facility over 60,000 square feet in size. This location houses our engineering department, 23 state of the art UAV propulsion test cells, production, machine shop, wiring harness shop, electrical test lab, CMM, sales and marketing, administration, and leased office space.

Customers

Northwest UAV currently holds key production contracts with Insitu/Boeing, who is the world’s largest manufacturer of STUAS Class UAS. Clients purchasing NWUAV proprietary products and engineering services include associates in Latin America, Canada, Africa and Asia made up of Tier 1 OEM’s and Direct Government contracts.

Products

NWUAV has created a purpose-built NW-44 EFI multi-fuel engine designed and built for unmanned a craft systems, low altitude, long endurance aircraft and portable power generation. This engine is designed to meet STANAG 4671 and FAA Certification requirements, and is approved for export under EAR 99. The NW-44 growth potential is significant, as it fits into the 40-75 lb. weight class aircraft classification that the FAA plans to integrate into the commercial airspace. NWUAV is working with the FAA to develop certification criteria for small UAS propulsion systems.

NWUAV’s alliance with Rotron Engines in the United Kingdom brings additional depth to our product line. NWUAV is also a distributor of Pegasus Servo Actuators, uAvionix, and Veronte Autopilot products. Additional new product introductions are expected throughout 2019.

Northwest UAV’s formal business plan and other information will be made available by request.
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