

Small wind turbines
with carbon fiber blades -
Lakota & Long-Bow



Lakota 900W Long-Bow 1Kw Lightweight and Powerful!



SMALL WIND TURBINE MANUFACTURER

with Aerospace Grade Materials and Technology



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The **Lakota & Long-Bow** wind turbines are built with advanced aerospace-grade materials and technology, which makes our units the highest in quality and performance in the industry.

Zytech Aerodyne is one of the world's leading manufacturer providing state-of-the-art small wind power systems with advanced aerospace-grade materials and technology since 1992 in U.S.

Our robust small wind turbines, **Lakota and Long-Bow** are designed to work safely, reliably and efficiently anywhere in the world.

Zytech Aerodyne small wind power systems are advanced technology American aerospace engineered, lightweight, multi-stage upward furling wind turbines designed for home, village, station, marine and military power applications.

Zytech Aerodyne has experienced and built up a global reputation for robust small wind power systems. With over 2000 small wind turbines installed worldwide, we produce the present-day **Lakota, Lakota Marine, Lakota M1 and Long-Bow**.

Lakota 900W & Long-Bow 1Kw SMALL WIND TURBINES

Wind Turbine Generator Features:

- Aircraft aluminum anodized body with all stainless Steel hardware.
- UV stabilized titanium dioxide, linear polyurethane aircraft coating that protect the unit from rain, snow, ice, sand, dust and corrosion.
- Rare Earth Neodymium-Iron-Boron Permanent Magnets.
- Lowest cost per watt guaranteed.
- High power density generator technology.
- Peak output power at 1300 to 1800 watts.
- Start-up wind speed at 6.5 mph.
- 12, 24, 48 volt models available.
- Lightweight 18kg.



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Turbine type	LAKOTA 900 W	LONG-BOW 1KW	Target Markets
Rated Power (watts)	900	1000	• Urban and remote residential
Start-up Wind Speed	6 mph (2.7m/s)	6 mph (2.7m/s)	• Small business/manufacturing
Rated Wind Speed	28mph	18 mph	• Rural electrification
Peak Power	1600	1800	• Water pumping
Rotor Diameter	2.1 m	2.3 m	• Military
Swep Area	3.46 m ²	4.15 m ²	• Marine/sailboats
Weight	18kg (39 pounds)	21.3kg (47 pounds)	• Monitoring sites
Voltage	12, 24 & 48V	12, 24 & 48V	• Telecommunications
Alternator	3 Phase AC Brushless Permanent Magnet	3 Phase AC Brushless Permanent Magnet	
Application	Battery or Grid	Battery or Grid	
Warranty	5 years	5 years	

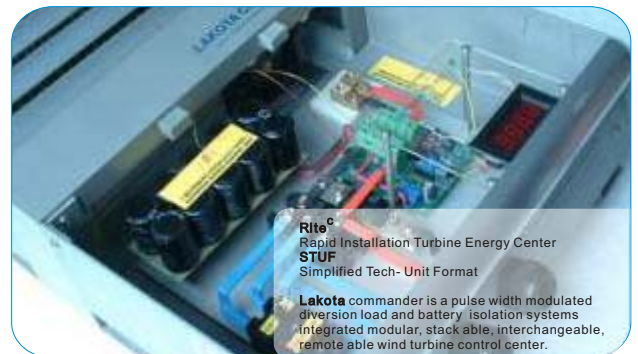
Lowest inertia Uni-directional carbon fiber blades

- Aerospace grade high precision, computer designed low Inertia Blades.
- Our blade technology is very quiet and invisible to radar, no TV or Radio interference.
- 7 times stiffer than common steel, no flutter, "Stealth Quiet" the "World Wide" industry leader in the elimination of acoustic emission! **Guaranteed!**
- Can be optimized for low or high wind environments, pitch Adjustable mag 5d hub optional.
- Advanced 3 stage active geometry "Upward Furling" array enables robust severe wind survival advantages that deliver highest performance while enabling the operating system to maintain full power flight envelope.
- Survival wind speed rating 160 mph.
- **Warranty, 5 years parts and labor carry-in. 20 years Blade "Rotor Array".**

Carbon fiber blades delivers more power in lower wind speed!

LAKOTA COMMANDER

- PWM-Pulse width modulated diversion load regulator.
- Super capacitor absorbs ion/transients isolation module.
- Battery Isolation control circuit.
- Battery state of charge indicators.
- Turbine amperage meter.
- System voltage meter.
- Integrated high voltage protection diode.
- Modular super heat sink.
- Insulated high power buss bar interconnections-No internal high power wiring! More efficient, no connectors no wiring confusion!
- Stack able diversion load resistor module can also be remote from control center.
- Stacking module with integrated cooling fan. Note: A second stacking kit can be added to enhance performance of remote diversion load resistor module.
- Diversion load indicator L.E.D.
- Lock able removable transparent poly carbonate cover.
- High quality industrial grade ceramic braking resistors. Note: Resistors are reconfigurable for system voltage.
- Integrated stand off brackets provide added cooling and safety while enabling greater ease of Installation.



SAFETY ENGINEERED TOWER KITS

Zytech Aerodyne also offers certified, safety-engineered Tilt-Up tower kits for mounting **Lakota & Long-Bow** wind turbines. Our aerospace-engineered Tilt-Up tower kits with patented rapid assembly stainless steel and brass compression couplings have a perfect safety record.

47 Foot Tower Kits

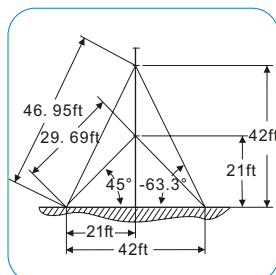
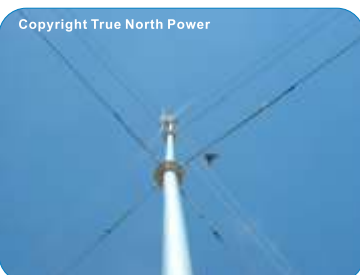
- Tower Height - 14.6 m (42 feet, not including riser)

25 Foot Tower Kits

- Tower Height - 7.3m (21 feet, not including riser)

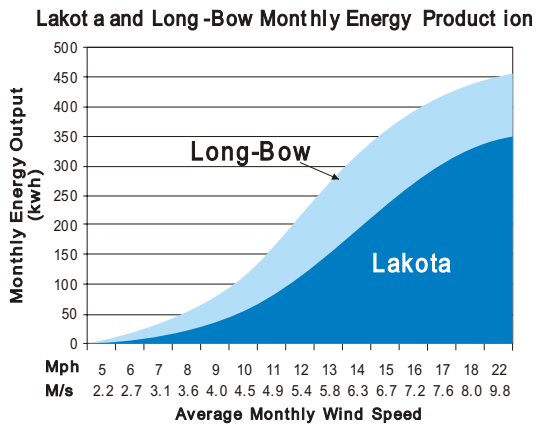
Specifications and Features:

- Capable of mounting riser on top of tower.
- Will withstand gusts exceeding 100 MPH.
- 3 compression couplers for mast assembly.
- Pivot base with electric conduit adapters.
- Gin pole receptacle.
- Slip-T assembly for ease in lowering and raising tower.
- 1/4 inch aircraft grade tension cable.



MONTHLY POWER PRODUCTION

Cautionary Note: Comparison of test curves and power data is highly dependent on location, tower height, turbulence, obstacles, humidity and other factors. Please consult an expert before drawing conclusions or accepting manufacturer claims.



These charts show the superior performance of the **Lakota** blade technology (see also blades technology below). With a smaller diameter, lightweight and very stiff blade technology and much lighter system **Lakota** out performs higher rated competitors in medium to high wind conditions.

That's because **Lakota** does not hide from the wind but maintains its optimum performance throughout its entire flight envelope.

Even above 40-50mph it continues to produce peak power in excess of 1500W and some users report up to 1800W at almost 100 amps without damage to either electrical or mechanical components. Rain, snow, sleet or storms the **Lakota** SC turbines are made to take it all and continue to put out the power.

In addition, since the blades are very light they can take advantage of wind gusts that heavier blades can't because their inertia is too high to react before the gust is over. Over time this amounts to considerable extra energy extracted from the same column of air.

WIND TURBINE PERFORMANCE IN DIFFERENT REGIONS

This model uses a mathematical idealization of the wind speed probability. The validity of this assumption is reduced as the time period under consideration (i.e., the wind speed averaging period) is reduced.

This model is best used with annual or monthly average wind speeds. Use of this model with daily or hourly average wind speed data is not recommended because the wind will not follow a weibull distribution over short periods.

Your performance may vary. (Assumptions: Weibull Factor = 2.00, Wind Shear Exponent = 0.18, Turbulence Factor = 10%, Site Altitude = 1000 m / 3300 ft, Anemometer Height = 10 m / 33 ft, Tower Height = 14 m / 47 ft)

The easiest way to determine whether your residence, and specially your property, is suitable for the installation of a wind turbine is to use wind atlases, which provide information about the respective wind conditions. alternatively you can obtain information in your nearest weather station.

Wind class	1	2	3	4	5	6	7
Average wind speed at anemometer hub height	10.1	13.4	15.0	16.2	17.3	18.8	22.3
Average wind speed at anemometer hub height	4.50	6.00	6.70	7.25	7.75	8.40	9.95
Monthly anticipated energy output in	99	197	250	290	324	364	432
Yearly anticipated energy out put in	1147	2367	2995	3478	3890	4370	5180
Percent operating time	65.4%	78.8%	82.5%	84.6%	86.0%	87.1%	86.7%

Prior to considering both the acquisition and installation of one of the wind powers systems at least the average wind speed at the concerning location should be known, as well as the electricity.

UPWARD FURLING WIND TURBINE



The upward furling mechanism ensures the **Lakota** will not "hide" from high winds but continue to produce up to two times rated power without damage to its electrical or mechanical components.

- Cost-effectiveness
- Almost maintenance free
- Flexibility
- Long service life



Highest Performance-Lowest Noise and Cost per watt, Guaranteed!

TURBINE TECHNOLOGY

Power Generation

The **Lakota** turbine uses an 8 pole, 36 slot, 3 phase alternator with 10 winding leads. This allows 4 separate field adjustable settings to be made that will optimize it's output and match it's performance to low, medium, high or severe wind regimes.

The **Lakota** generator has a high power to weight ratio. It uses a single stator, rare-earth neodymium iron boron permanent magnet in a cast aluminum casing with stainless steel fittings. The upward furling mechanism ensures the **Lakota** will not "Hide" from high winds but continue to put out up to two times it's rated power without damage to its electrical or mechanical components.

It's precision components are designed for long life. We recommend at least a 60-100 amp DC circuit breaker be used with all installations. **Lakota** turbines are sealed units and require only annual inspection. No lubrication or overhaul maintenance schedule is required during the life of the generator (approx. 15-20 years).

Marine or desert installations may need more attention to surface corrosion and leading-edge tape on the blades. Helicopter grade leading-edge tape is replaceable if abraded by fine debris or sand. **Lakota** field units have survived 120mph storms while other units nearby have self-destructed. Vehicle mounted test units continue to output maximum power at over 70mph with no damaging

Blades

Zytech Aerodyne **Lakota's** aerospace grade unidirectional carbon fiber blades are not to be confused with carbon matrix or carbon reinforced plastic blades. Unlike plastic with powdered carbon blades that bend and flutter, the carbon fibers in the **Lakota** blades are 7 times stiffer than common steel, and carry the loads from tip to root.

This allows the **Lakota** to harness far more energy annually than comparable similar wind turbine generators. In addition, the increased output substantially lowers the overall cost of energy despite a slightly higher initial purchase price.

Warranty

Standard factory five (5) years parts and labor carry-in warranty plus seven (7) years blade parts warranty. All warranty claims will be serviced at an authorized service center. Tower components excluding cable, clamps and fasteners shall carry a limited life time parts only, carry-in warranty.

Destructive modal frequency

With conventional turbine blades made from constructed of wood, fiberglass, and plastics there is what is known as destructive modal frequency.

This occurs when the resonant frequency of the blade is matched through torsional, thrust, or gear vibrations, causing a vibration in the blade itself. When this wave is created it is just a matter of time before the unit shakes itself apart.

This vibration interacts with the generator, casing, and through the tower it sits upon. Wind turbine companies fix this problem by thickening the casing, using heavier internal components, then increase the tower thickness, and add a heavier base. In the end the product is heavy and "fat" with reinforcements that are not necessary with a next generation wind turbine like the **Lakota**.

Coatings

The **Lakota** SC has a special UV stabilized titanium dioxide, linear polyurethane aircraft coating that protect the unit from rain, snow, ice, sun, sand and dust, wind and corrosion.

Regulation and Control

The electronics perform several functions to ensure maximum output and safety for the user. The regulation control maintains a load on the alternator at all times preventing turbine over speed, regardless of the charge condition of the battery.

You may select among a variety of regulation and control device from cost effective rectifier module to advanced manual or automated load divergence center to professional wind turbine flight and battery charge controller. If your application requires a quiet and powerful wind turbine and is in a place with low as well as potentially high winds, then consider **Zytech Aerodyne small wind power systems**.



Our **Lakota & Long-Bow** wind turbines can be integrated into a mixed plant, equipped with Zytech Solar photovoltaic modules.

Combining small wind power systems with a solar system, as the sun and the wind complement one another, your power supply becomes even more cost-effective!.



REVOLUTION IN THE WIND

www.revolutioninthewind.com

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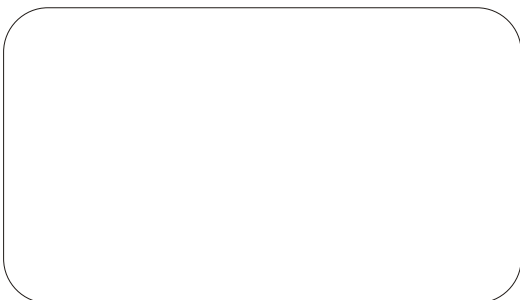
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