



Skystream 3.7™
Owner's Manual

INSTALLATION

OPERATION

MAINTENANCE

Southwest Windpower, Inc.
1801 West Route 66
Flagstaff, Arizona 86001
Phone: 928.779.9463
Fax: 928.779.1485

Web: www.skystreamenergy.com

MADE IN THE **USA** © August 2006 Southwest Windpower, Inc. All Rights Reserved

SKYSTREAM

**Southwest Windpower
Congratulations on your purchase and welcome to our family!**

Dear Skystream 3.7™ Owner,

Thank you for your purchase of Skystream. You have just selected the most technologically advanced, cost-effective renewable energy appliance available for a home or small business. We congratulate you on your choice and are confident you will experience years of dependable service.

Before going any further, please complete and return the enclosed Warranty Registration Card. **The conditions of your warranty are dependent upon the proper installation of Skystream.** Furthermore, this will assure you of being kept up-to-date with the latest developments from Southwest Windpower. These include new options, performance tips, updated software to maximize output and user notices. It is important to know that we do not sell or distribute your information to any third party. We understand your privacy is important.

If you have any questions or comments, we would like to hear from you. Please call during working hours (Monday-Friday – 8:00am to 5:00pm Mountain Standard Time). Our number is **928-779-9463**, toll-free **866-807-9463**.

Again, welcome to our family and thank you for investing in the future of wind energy with Skystream.

Best Regards,

Southwest Windpower

Enter the serial and model number below

Serial Number _____

Model Number _____

MADE IN THE USA



Skystream Installation Manual
Document No. 0313
Revision: NC

IMPORTANT SAFETY INSTRUCTIONS

READ THESE INSTRUCTIONS IN THEIR ENTIRETY BEFORE INSTALLING OR OPERATING.



Professional installation
highly recommended

- 1) **SAVE THESE INSTRUCTIONS.** This manual contains important instructions for Skystream that must be followed during installation and maintenance.
- 2) Read, understand and respect all warnings.
- 3) Do not install Skystream around standing water.
- 4) Do not install Skystream on a windy day.
- 5) Install Skystream in accordance with National Electric Code (NEC) and local building codes.
- 6) Always obtain a building permit before construction.
- 7) When moving Skystream or any heavy objects to the site, use a cart to prevent back injury.
- 8) If unusual noise or abnormal operation is observed from Skystream, turn off the machine and contact authorized service personnel.
- 9) This wind generator complies with international safety standards and therefore the design or its installation must never be compromised.
 - a. Do not open the inverter cover; doing so without factory authorization will void the warranty.
 - b. Apply the proper torque to all fasteners.
 - c. Torque field wire connections to Skystream to 20-25 inch-lbs. (2.3-2.5 N-m). Refer to Electrical Connections section of this manual (Section 2-1-2).
 - d. Install only on a Professional Engineer (PE) certified tower.
 - e. Do not paint the blades.
- 10) Use only proper grounding techniques as established by the NEC.
- 11) Properly complete the warranty registration card; failure to complete and return the card may affect your warranty.
- 12) Skystream must be installed in accordance with this manual and local and national building codes. Failure to comply with the manual and local codes will affect and possibly void your warranty.
- 13) Skystream uses high voltage and is potentially dangerous. Be sure to use all safety precautions at all times.

In this manual



TIP: Helpful information to ease the installation



Professional installation
highly recommended



Warning: Risk of injury or death - proceed with extreme caution

Table of Contents

- Important Safety Instructions _____ 2
- Skystream 3.7 Specifications _____ 4
- 1) BEFORE INSTALLATION _____ 5**
 - 1-1 Package Contents _____ 5-6**
 - 1-2 Recommended Tools _____ 6**
 - 1-3 Skystream Options _____ 7**
 - 1-4 Skystream Project Preparation _____ 8**
 - 1-4-1 Finding the Best Location for Your Skystream _____ 8**
 - 1-4-2 Tower Types _____ 9**
 - 1-4-3 Working With Your Utility _____ 9**
 - 1-4-4 Working With Your Local Zoning Authority _____ 9**
- 2) INSTALLATION _____ 10**
 - 2-1 Electrical _____ 10**
 - 2-1-1 Wiring _____ 10**
 - 2-1-2 Electrical Connections _____ 12**
 - 2-1-3 Wire Sizing _____ 12**
 - 2-1-4 Grounding _____ 13**
 - 2-1-5 Fusing/Circuit Breaker _____ 13**
 - 2-1-6 Checking Grid Connectivity _____ 13**
 - 2-2 Installing Skystream on a Tower _____ 14-15**
 - 2-2-1 Mounting Skystream to the Tower _____ 15**
 - 2-3 Testing on the Ground _____ 15**
 - 2-3-1 Electrical Test _____ 15**
 - 2-4 Blade, Nosecone and Antenna Assembly _____ 16-17**
- 3) OPERATION AND MAINTENANCE _____ 18**
 - 3-1 Key Operating Characteristics _____ 18**
 - 3-2 Frequently Asked Questions _____ 19**

4) APPENDICES

Appendix A Electrical Connection Diagram Options

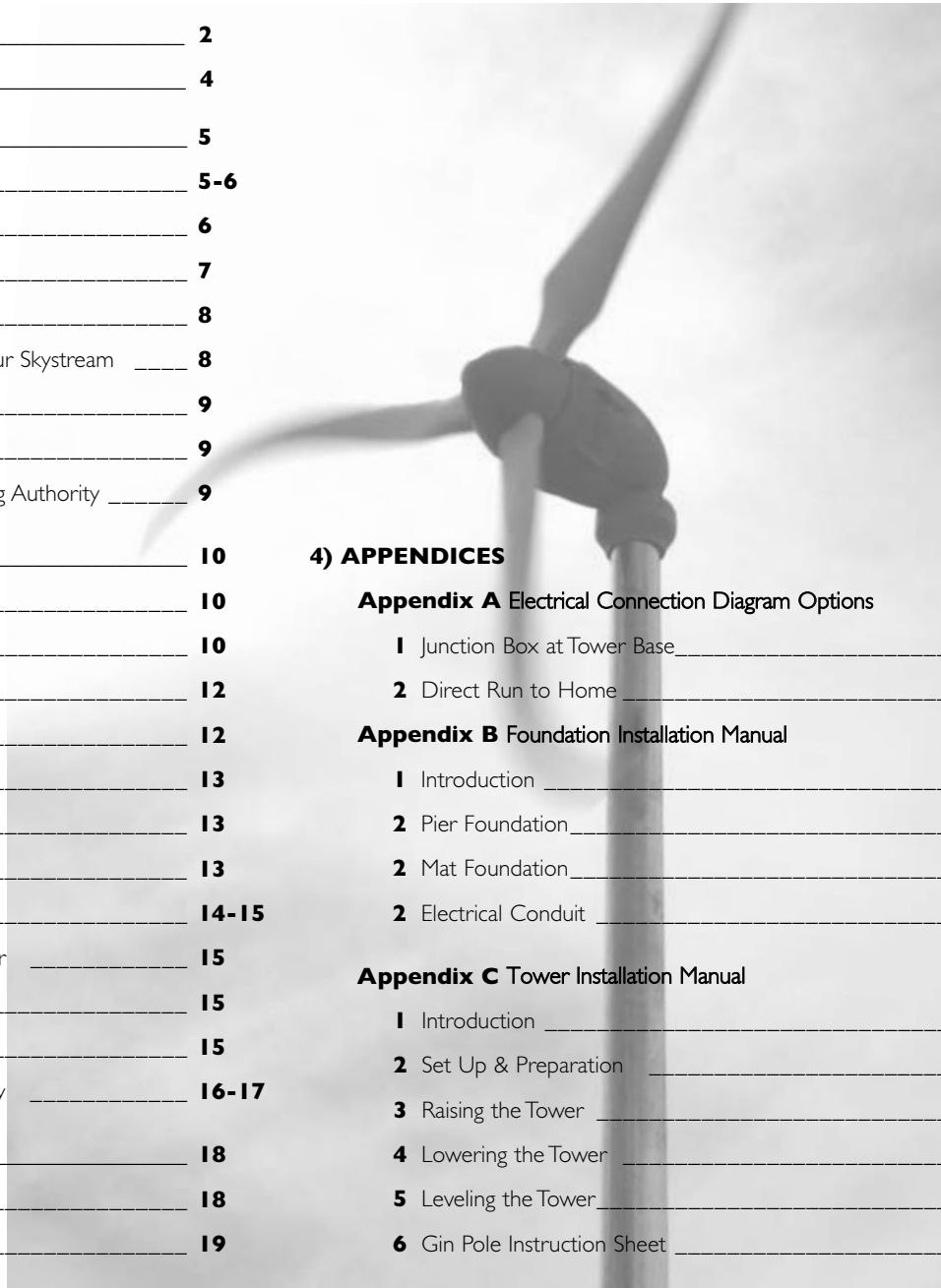
- 1 Junction Box at Tower Base _____ 1**
- 2 Direct Run to Home _____ 2**

Appendix B Foundation Installation Manual

- 1 Introduction _____ 2**
- 2 Pier Foundation _____ 2**
- 2 Mat Foundation _____ 7**
- 2 Electrical Conduit _____ 9**

Appendix C Tower Installation Manual

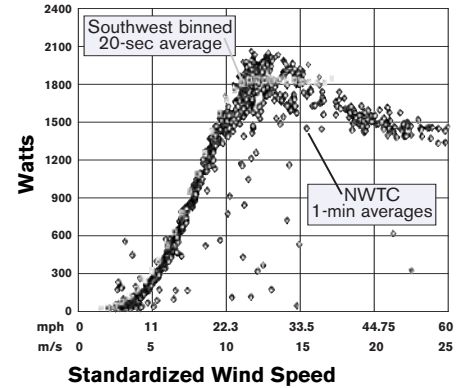
- 1 Introduction _____ 2**
- 2 Set Up & Preparation _____ 3**
- 3 Raising the Tower _____ 6**
- 4 Lowering the Tower _____ 7**
- 5 Leveling the Tower _____ 8**
- 6 Gin Pole Instruction Sheet _____ 9**



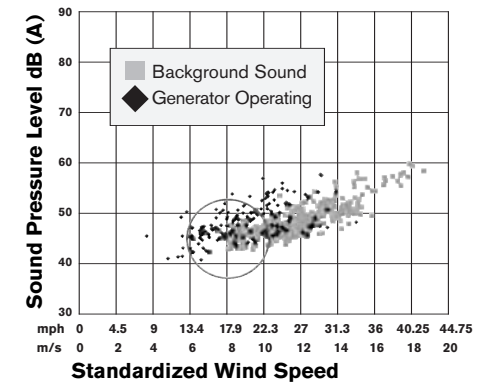
Skystream 3.7™ Technical Specifications

Model	Skystream 3.7
Rated Capacity	1.8 kW rated 2.4 kW peak
Weight	170 lbs. / 77 kg
Rotor Diameter	12 feet / 3.72 meters
Swept Area	115.7 ft ² / 10.87 m ²
Type	Downwind rotor with stall regulation control
Direction of Rotation	Clockwise looking upwind
Blade Material	Fiberglass reinforced composite
Number of Blades	3
Rated Speed	50 - 325 rpm
Tip Speed	66 - 213 f/s / 9.7 - 63 m/s
Alternator	Slotless permanent magnet brushless
Yaw Control	Passive
Grid Feeding	Southwest Windpower inverter 120/240 VAC 50-60/Hz
Braking System	Electronic stall regulation w/redundant relay switch control
Cut-in Wind Speed	8 mph / 3.5 m/s
Rated Wind Speed	20 mph / 9 m/s
User Control	Wireless 2 way interface remote system
Survival Wind Speed	140 mph / 63 m/s
Total Harmonic Distortion	2.7% at 2400W, meets UL1741 and IEEE1547.1 requirements.
Accuracy	+/- 0.5 Hz

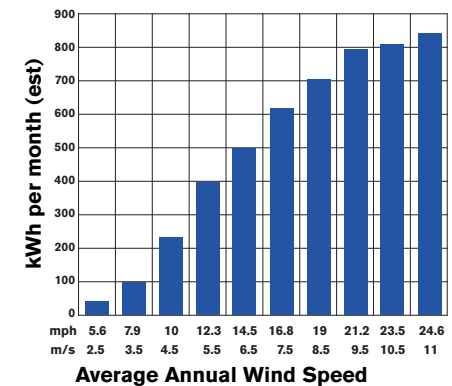
PERFORMANCE GRAPH



SOUND REPORT



ENERGY CHART



One - Before Installation

Instructions in this guide apply to Skystream Land and Skystream Marine U.S. models only. Please specify “land” or “marine” when ordering parts or requesting service as components differ.

I-I Package Contents

Before you begin, inspect the contents to make sure there is no damage or missing parts.

- Identify the parts of your Skystream system using the information on the next two pages.
- Inspect for damage and/or missing parts.

Your Skystream wind generator is shipped in two boxes:

Box One: rotor blades (three each)

Box dimensions: 76"L x 15"W x 12"H (102 cm L x 56 cm W x 69 cm H)

Weight: 40 lbs (18 kg)

Upon opening, carefully inspect each of the blades to make sure there are no fractures or cracks in the surfaces. Although the Skystream rotor blades are comprised of a durable compression molded fiberglass, damage can occur to the blades during shipping. Once inspected, be sure to set them away from the construction site and protect them from any damage until they are ready for assembly.

Box Two: Skystream 3.7 wind generator assembly

Box dimensions: 40"L x 22"W x 27"H (102 cm L x 56 cm W x 69 cm H)

Weight: 175 lbs (80 kg)

Your Skystream comes in several versions in accordance with local utility requirements. Be sure to inspect the package and confirm you have the right voltage and Hz. If you have ANY questions, call your dealer or the factory before continuing.

configuration	120/240V	120/208V	240V
output power factor rating	1.0		
operating voltage range (ac)	106-132V l-n		212-264V
operating frequency range	59.3-60.5 Hz		
nominal output voltage (ac)	240V	208V	240V
normal output frequency	60 Hz		
max continuous output current	10A	11.5A	10A
rated output power	1800W		
peak output power	2400W		
software revision	REV. 1.00 (DEV. REV.4)		
max ambient temperature	50C. output power is reduced above 60 C. nacelle temperature		

Your Skystream shipment includes:

Your Skystream shipment includes the following components. A spare of each fastener (bolt, washer or nut) is included. The quantities indicated below are quantities required to assemble Skystream:

RF Antenna

Loctite® 242

Turbine assembly with blade hub, retaining nut, blade plate and nosecone

Blades and blade mounting hardware

- M10-1.5 x 120 socket head bolts, grade 12.9 (quantity 12)
- M10-1.5 nuts, grade 12.9 (quantity 12)
- M10 flat washers, A2 stainless steel (quantity 12)
- M10 lock washer, A2 stainless steel (quantity 12)
- Blade plate
- Blade hub
- M42, hub nut

Nose cone with mounting hardware

- M6-1.0 x 12 socket head bolts, grade 8.8 (quantity 3)

Yaw vibration isolators with mounting hardware

- Vibration Isolators (quantity 8)
- M12-1.75 x 90 hex head bolt, grade 10.9 (quantity 8)
- M12-1.75 nuts, grade 10.9 (quantity 8)
- M12 flat washers, A2 stainless steel (quantity 8)
- M12 lock washers, A2 stainless steel (quantity 8)
- M12 snubbing washers (quantity 8)

Yaw shield (two halves) with mounting hardware

- M5-0.8x12 button head screws (quantity 4)

Strain relief cover assembly with mounting hardware

- Strain relief cover with ground wire
- M5-0.8 x 12 socket head bolt (quantity 4)
- M5 lock washer A2 stainless steel (quantity 4)



TIP: See exploded view on pages 16-17

I-2 Recommended Tools

You will need the following tools to complete assembly of Skystream and install on the tower:

- Crescent wrench up to 40 mm
- 17, 24, 33, 36 & 50 mm hex wrenches
- 19 mm hex wrench and socket for torque wrench
- Wire stripper
- Phillips head screwdriver
- Flat blade screwdriver and socket for torque wrench
- Multi-meter
- Torque wrench, 0-100 lb-ft (135 N-m)
- Torque wrench, 0-50 lb-inch (5.6 N-m)

Note: This list does not include tools you will need for the construction of the tower or wire trench.

I-3 Skystream Options

There are a number of options that can enhance the experience of using a Skystream wind appliance. Although your Skystream will operate without them, we suggest reviewing this chapter. Contact Southwest Windpower or your dealer if you have questions.



◀ Remote Display

The optional remote display allows you to observe Skystream's performance in real time. You can also collect data such as KWh per day, per month and per year. The display wirelessly connects via a 900 MHz frequency and works up to 1000 feet from the tower.

Remote Monitoring

There are a number of benefits to remote monitoring. A subscription to Fat Spaniel Technology allows a third party company to monitor the performance of your Skystream and communicate with a local dealer in the event there is a problem. Additionally, for states with "green tags" you could receive added revenue for each KWh your Skystream produces. Contact your dealer or Southwest Windpower directly for more information.



◀ Tower Adaptor

The tower adaptor allows you to attach your Skystream to a tower constructed of 5 inch schedule 40 pipe. Nominal internal diameter of 5 inch (12.7 cm).

USB Converter ▶

The USB converter allows you to connect the remote display to your computer and monitor Skystream real time. Specialized software allows you to create your own power curves, monitor performance remotely and even download and transmit the latest software directly to your Skystream to maximize performance. To connect Skystream to your computer, you must also use the wireless remote.



I-4 Skystream Project Preparation

There are several considerations before you begin the installation process of your Skystream. These considerations are more important if you intend to connect your machine to the electrical utility. Although Skystream is UL and IEEE certified, your local utility and zoning authority may require additional information prior to installation. This chapter will provide an overview of what to expect when working with your zoning authority and utility. Southwest Windpower has a number of resources that may assist you in the permitting and interconnection processes.

To learn more go to: www.skystreamenergy.com

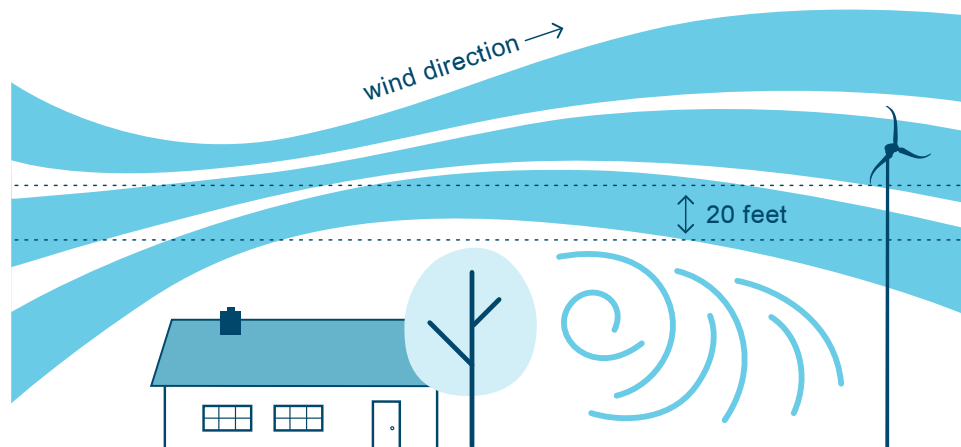
I-4-1 Finding the Best Location for Your Skystream

We have worked at simplifying the installation process of Skystream, but each installation is likely to be different. Skystream may require a different tower depending on trees, obstructions and soil types.

Very Important: Proper siting is essential to a well performing wind generator.

The taller the tower, the more energy your Skystream will produce but keep in mind, this will also increase the cost of the installation. It is extremely important to balance performance (tower height) to installed cost in order for you to achieve the lowest cost of energy and quickest payback. Also, keep in mind zoning regulations that may restrict the height of your tower. See section I-4-4 regarding zoning.

Our General Rule: For optimal performance, Skystream should be 20 feet (7 m) above any surrounding object within a 250 foot (76 m) radius.



TIP: Your dealer can help you determine the best location for Skystream on your property.

Fig. 1 Optimal Skystream location

I-4-2 Tower Types

Depending on your site needs, Skystream can be mounted on several different tower types as long as they meet the tower load specifications determined by Southwest Windpower and are certified by a Professional Engineer (PE). While a guyleless monopole tower is the most desired tower type, it may be more expensive than some other options such as a guyed tower or latticed tower. You can find out more about available tower options provided by Southwest Windpower in Appendix C and at www.skystreamenergy.com.

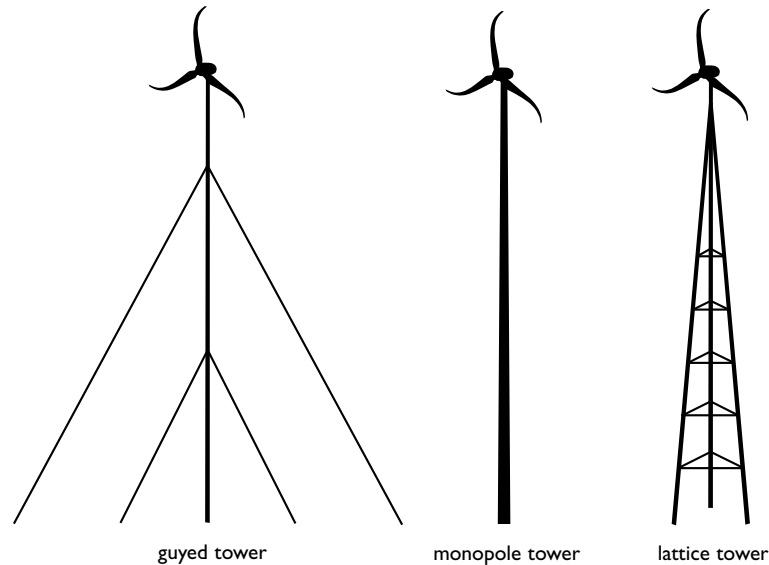


Fig. 2 Tower types

I-4-3 Working With Your Utility

Call your local electric utility, tell them your intentions and ask for their "interconnection agreement". They should have one. Depending on your utility, the interconnection agreement may be one page or many. Keep in mind that small utility-connected solar and wind systems are relatively new industries and utility connection requests may be unfamiliar to them. If you are the first, realize the process may take longer. Southwest Windpower has people and tools that may assist in the process.

Your utility may request documentation demonstrating that Skystream is UL 1741 certified. You can download these at our website: www.skystreamenergy.com



TIP: See our website: www.skystreamenergy.com for a sample interconnection agreement that may be used by a utility that has yet to establish a program.

I-4-4 Working With Your Local Zoning Authority

Like your utility, the local planning and zoning authority may or may not have experience with an individual installing a small wind generator at their home or small business. The most important issue is the height of the tower. Prior to purchasing your Skystream tower, check for local zoning limitations. Determine what your community allows for towers and determine if the height is appropriate. Specific data and statistics that may be required by your zoning authority can be found at www.skystreamenergy.com.

Two - Installation

Southwest Windpower designed the installation process of Skystream to be as easy as possible by minimizing the number of connections between the machine and circuit breaker. Depending on your local utility requirement, you may or may not need to install a separate disconnect and/or second meter.

You will notice the rotor shaft on Skystream is extremely difficult to turn. This is normal. As a safety precaution, the default position of Skystream is in brake mode when the inverter is disconnected from the utility-supplied power. The reason is if there is a fault in the utility line, Skystream must shut down to prevent back feeding of electricity into the line while it is being repaired.

2-1 Electrical

One of the most common causes of wind generator failures is a poor electrical connection. Be sure to follow the instructions and tighten all fasteners appropriately.

IMPORTANT: It is extremely important that the installation of your Skystream is done in accordance with local and national building codes as specified by the NEC, UBC (Uniform Building Code) or IBC (International Building Code). These codes will vary from city to city and even country to country.

The AC input and AC output circuits are isolated from the enclosure. System grounding, if required by section 250 of NEC, ANSI/NFPA 70, is the responsibility of the installer.

2-1-1 Wiring

Skystream has a built-in utility-connected inverter compliant with UL 1741. This means Skystream connects directly to your existing electrical system. Appendix A includes two reference drawings for utility-supplied power interconnection of your Skystream generator. These drawings are for reference and may be modified for submittal and approval by your local authorities.

Refer to Fig. 3 on the next page for a complete overview of Skystream wiring.



Warning: For your safety, make sure power is turned off before working on any and all electrical connections.

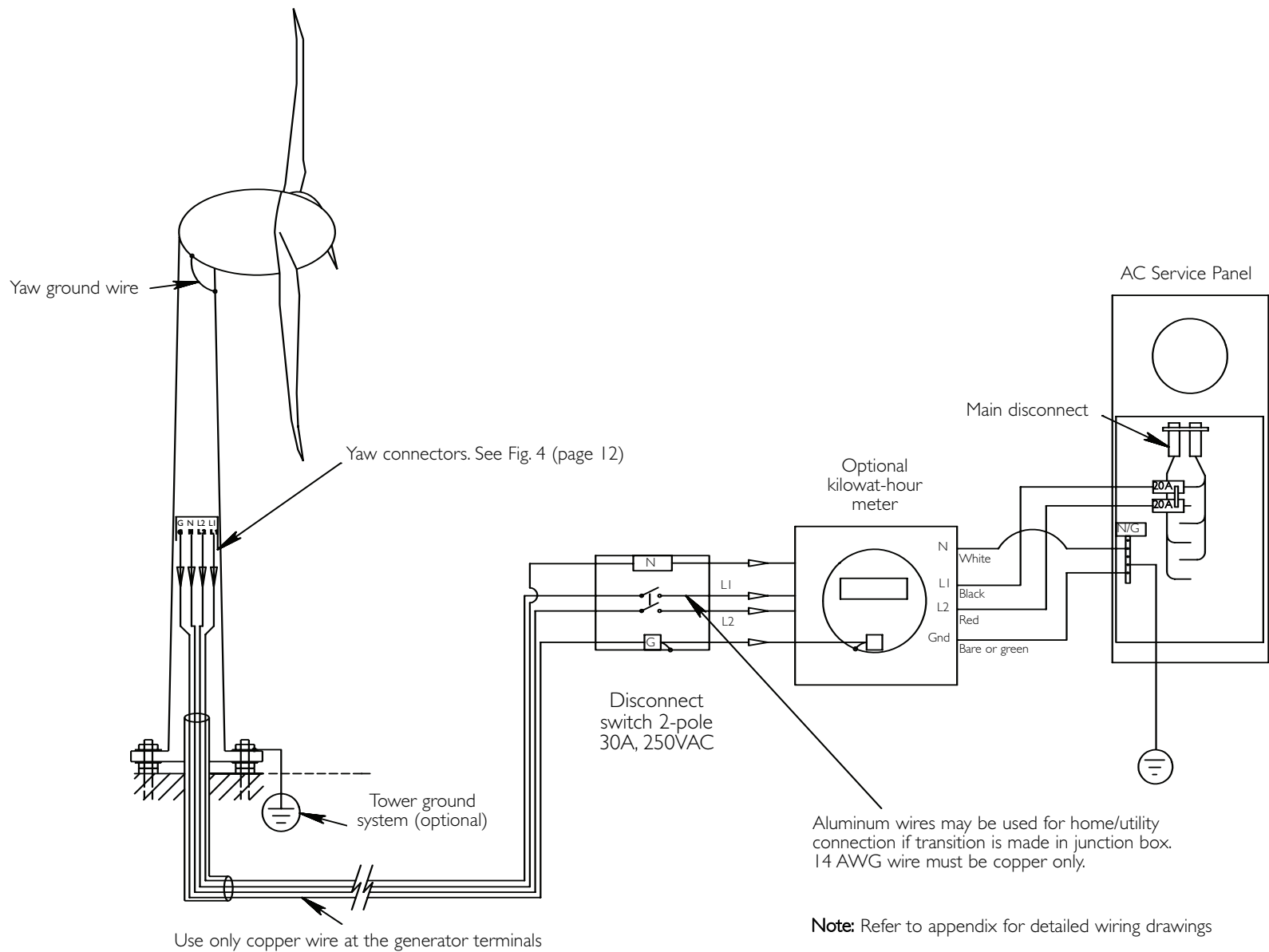


Fig. 3 Wiring diagram


2-1-2 Electrical Connections

CAUTION – Be sure power is turned off when making electrical connections.

- Position Skystream on its side to access the wire terminals.
- Remove approximately 2 inches (5 cm) of protective sheathing from cable and strip approximately 0.375 inches (1 cm) of insulation off wire leads.
- Pass cable through strain relief cover so approximately 1 inch (2.5 cm) of cable sheath protrudes through as shown in Fig. 4 at right. Tighten strain relief clamp to secure cable.
- Connect the red, black, and white wires to the matching color coded terminals on Skystream yaw assembly. Connect the green or bare copper wire to the green terminal. Tighten each screw to 20-25 inch-lbs (2.3-2.5 N-m).

Before attaching the strain relief cover, test the electrical connections by turning on power and measuring voltage at the yaw terminals. Additionally, with AC power switched on, wait 5-7 minutes and attempt to rotate the blade shaft. The shaft should be noticeably easier to rotate. Turn off power and Skystream should revert to “brake” mode. If Skystream fails this test, check all connections and repeat test. Test must be passed before proceeding.

- Turn power off and secure strain relief cover using four M5-0.8 x 12 socket head screws and split lockwashers. Use Loctite® 242 and torque screws to 20-25 inch-lbs (2.5 N-m).

 **Caution:** Make sure AC power is switched OFF before proceeding with installation

Wiring Symbol Definitions

L1 = Line 1, AC Line Voltage, Black Wire
L2 = Line 2, AC Line Voltage, Red Wire
N = AC Neutral, White Wire
G = Gnd. = AC Ground, Green or Bare Wire

 Indicates AC Ground

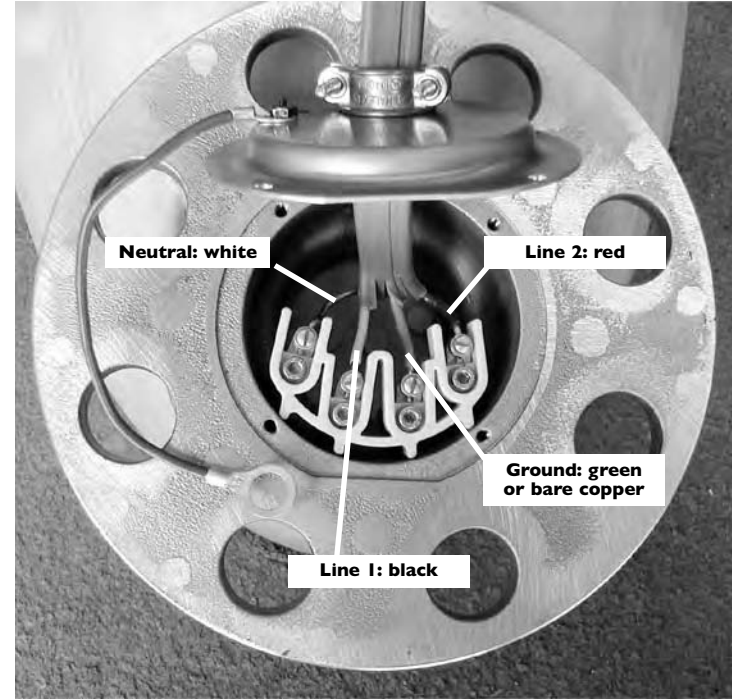


Fig. 4 Wire run to the yaw connection

2-1-3 Wire Sizing

Measure distance from AC Service panel to Skystream (be sure to include tower height). Refer to the accompanying wire chart and select the appropriate gauge wire. Indicated wire sizes will include length from top of tower to connection at main utility panel.

Distance AC Service Panel to Tower Top	AWG American Wire Gauge	Metric Wire Size (mm ²)
315 feet (92 m)	8 AWG	10 mm ²
198 feet (56 m)	10 AWG	6 mm ²
125 feet (37 m)	12 AWG	4 mm ²
79 feet (23 m)	14 AWG	2.5 mm ²

Use copper conductors only - Minimum wire temperature rating is 75°C (167°F)

2-1-4 Grounding

Every electrical system must be grounded in accordance with local and national standards. This will provide some protection against voltage surges and built-up static charges (see reference drawings in Appendix A).

Section 810 of the National Electrical Code ANSI/NFPA No. 70 (USA only) provides information with respect to proper grounding of the tower, size of the ground wire, type of discharge unit, size of grounding conductors, location of discharge unit, connection to grounding electrodes and requirements for the ground electrode.

Note: The AC output neutral is NOT bonded to ground within Skystream. AC neutral is bonded to ground at AC distribution panel.

The instructions in this section are for reference only as the requirements in your area may be different.

2-1-5 Fusing/Circuit Breaker

Skystream connects directly into your electrical panel. Wiring will vary with local zoning authority and utility (see reference drawings in Appendix A). Some installations will require a visible lockable disconnect switch located next to the electrical meter and/or at the base of the tower. The disconnect switch is utilized by your local utility in the event of a power outage to ensure no voltage is placed on the utility line during repair. Again, it is extremely important to install in accordance with local and national zoning regulations.

Note: Only 20 Amp circuit breakers may be used to connect Skystream to AC service panel. Refer to Fig. 3, wiring diagram.

2-1-6 Checking correct grid connectivity

IMPORTANT: All electrical connections should be completed before testing.

To check for correct connections:

- Check that all connections are complete.
- Switch on all of the disconnects between the turbine and the utility power.
- Wait for 5-7 minutes.
- Check that the rotor spins free.
- **Important:** Disconnect the turbine from utility power.
- Check that the rotor no longer spins free.

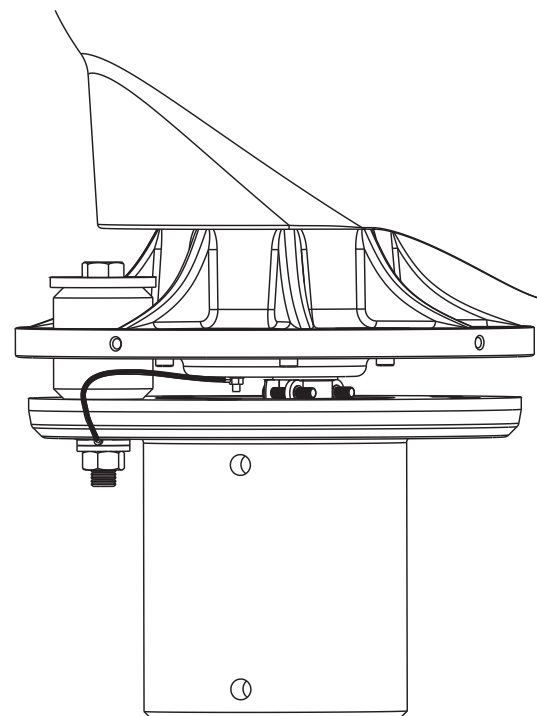


Fig. 5 Proper grounding of the yaw connection



2-2 Installing Skystream on a Tower

There are several types of towers that can be used with Skystream. It is essential that Skystream is installed on a properly engineered tower. One of the leading causes of wind generator failure is use on a poorly designed tower.

Southwest Windpower has made available various tower designs that meet our criteria. We have established a program allowing tower manufacturers to include their designs on Southwest Windpower's website list of recommended towers.

Regardless of the tower design and height you select, there are two critical areas that must be considered when selecting the tower. These are the stub tower height and blade clearance (see Fig. 6).

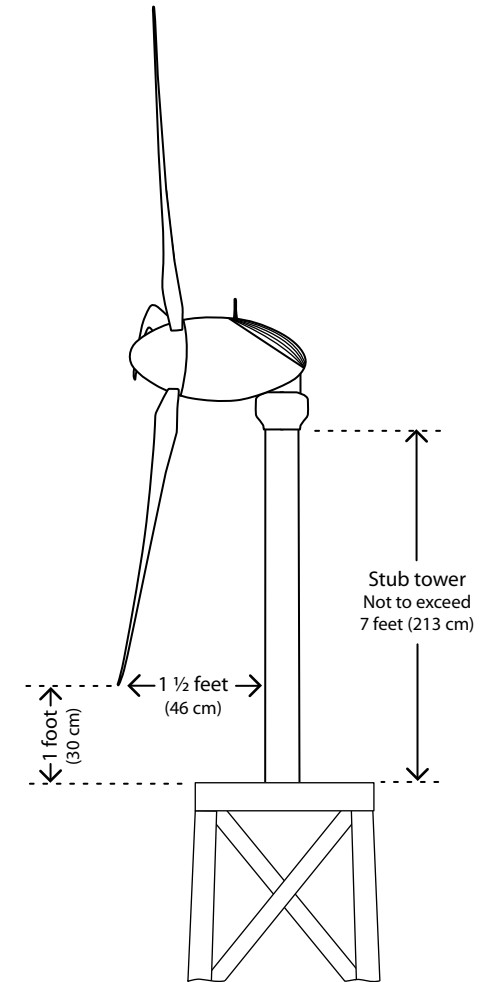


Fig. 6 Blade tip clearances

IMPORTANT: Southwest Windpower's Warranty is only extended to installations that are made on a properly engineered tower. Southwest Windpower reserves the right to deny any warranty claim in which an improperly designed tower is used.

2-2-1 Mounting Skystream to the Tower

Refer to Fig. 7 (page 16) for visual aid.

Note: The following directions assume Skystream will be bolted to tower on ground and tower will be tilted into position. Alternately Skystream may be completely assembled on the ground and “hoisted” into position.



Warning: Working on towers is dangerous and should be left to professionals with proper safety equipment and training.

To ease mounting Skystream, support the upper end of the tower approximately 2-3 feet (0.6-1.0 m) above the ground.

- Install the vibration isolators on yaw flange as shown in Fig. 7 (page 16). Install snubbing washers and bolts in vibration isolators.

Note: The orientation of the vibration isolators is very important. Refer to Fig. 7.

- Using an appropriate lifting device and sling, lift Skystream and align vibration isolator bolts with holes in tower flange.
- Install nuts, flat washers and lock washer on bolts to secure Skystream to tower.
- Torque vibration isolator bolts to 80 lb-ft (108 N-m) in two steps. First torque all bolts to 40 lb-ft (54 N-m) then to 80 lb-ft (108 N-m).
- Mount yaw shield halves using four M5 button head screws. See Fig. 7 (page 16). Use Loctite® 242 supplied with Skystream.

2-3 Testing on the Ground

Though Skystream is thoroughly tested at the factory, it is very important to conduct one more test prior to erecting the tower. Skystream should be wired and mounted to the top of the tower. The blades should not be attached. To do this test, you must have all wires and breakers installed with at least one disconnect switch open (off).

2-3-1 Electrical Test

- Attempt to rotate the rotor shaft. It should be difficult to turn.
- Now turn on all power going to Skystream. Turn on all breakers, connect all switches and wait 5-7 minutes.
- Grab the rotor shaft again and try to spin it. If assembled correctly, it should spin easily.
- Before you go any further, turn the power off and disconnect any switches. Again, try spinning the shaft. It should be difficult to turn.

If Skystream does not spin freely after electrical test, then check for loose or disconnected wires. Repeat the test until you are successful.

2-4 Blades, Nosecone and Antenna Assembly

Refer to Fig. 8 (page 17) for visual aid.

The Skystream blades may be bolted to the blade hub and mounted on Skystream as a complete assembly by performing the following steps.

- Remove the blade mounting hub and plate from Skystream by “unscrewing” the hub while holding the rotor shaft stationary.
- Place a blade between the blade hub and blade mounting plate. Refer to Fig. 8 (page 17) for proper orientation. **Note:** the blades may only be installed in one position due to the “triangular” boss cast into one side of the blade root (base).
- Loosely install the bolts, flat and lock washers for one blade leaving enough play so remaining blades can be installed.
- After all blades and bolts are loosely installed between blade hub and mounting plate, tighten bolts enough to clamp blades between hub and blade plate.
- Torque blade bolts to 50 lb-ft (68 N-m) in two steps. First torque all bolts to 25 lb-ft (34 N-m) then to 50 lb-ft (68 N-m).
- Blade assembly may now be mounted on Skystream. Slide blade assembly completely onto shaft. With assembly completely on shaft, large mounting nut can be started on shaft threads.
- Completely “spin” on blade assembly. Securely tighten blade assembly by holding blades and tightening “flat” on rotor shaft. **Note:** the blade assembly is self-tightening in operation; however it should be securely tightened during assembly (200lb-ft).
- Install nosecone with three M6-1.0x12 socket head bolts. Use Loctite® 242 supplied with Skystream.
- Install RF Antenna on matching fitting on top of Skystream. Finger-tight is sufficient.

Important: Do Not Forget to install RF Antenna

Even if you have not purchased the optional remote display, the RF antenna may be used by service personnel to diagnose, troubleshoot or upgrade your Skystream without removing it from the tower.

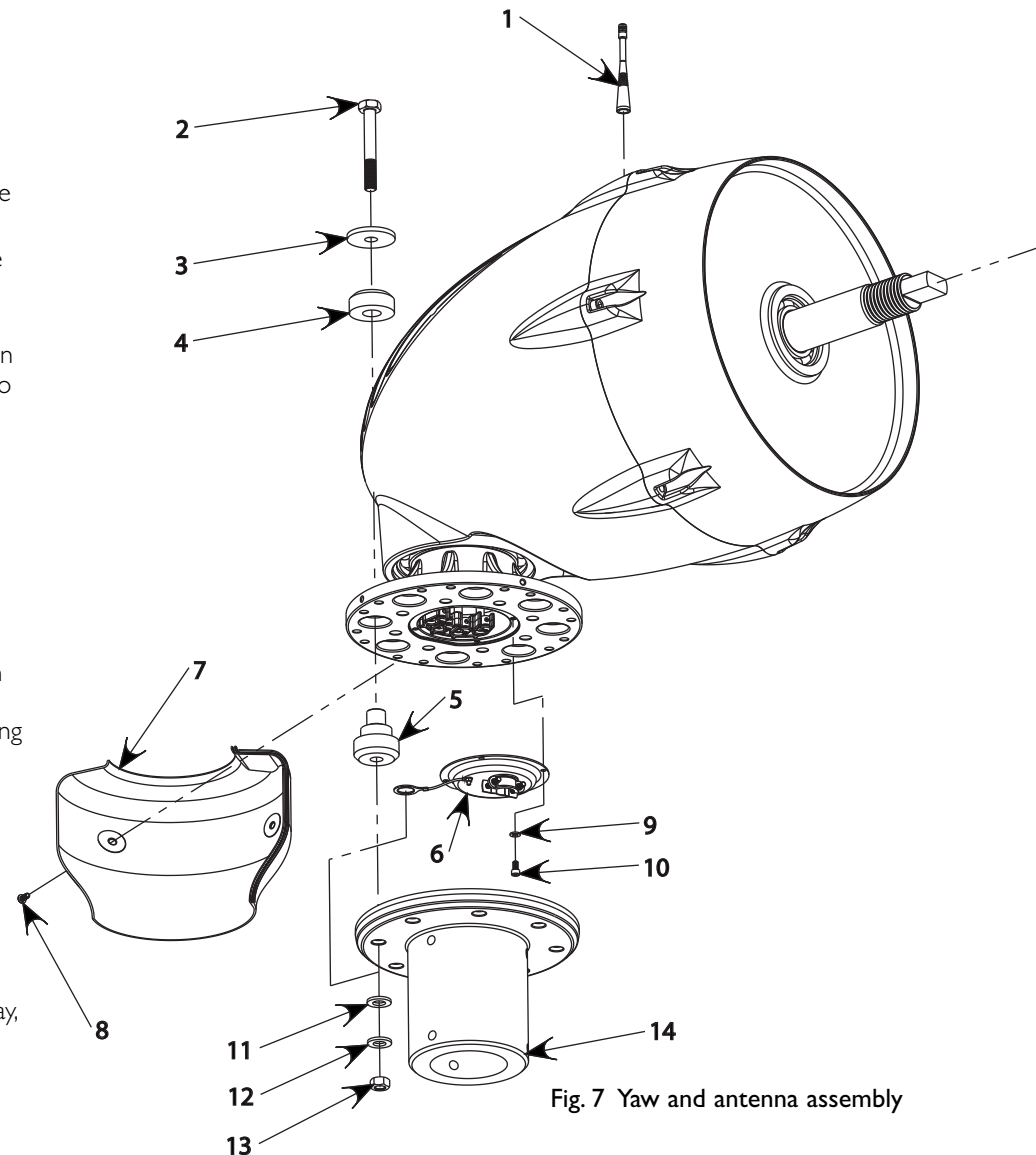


Fig. 7 Yaw and antenna assembly

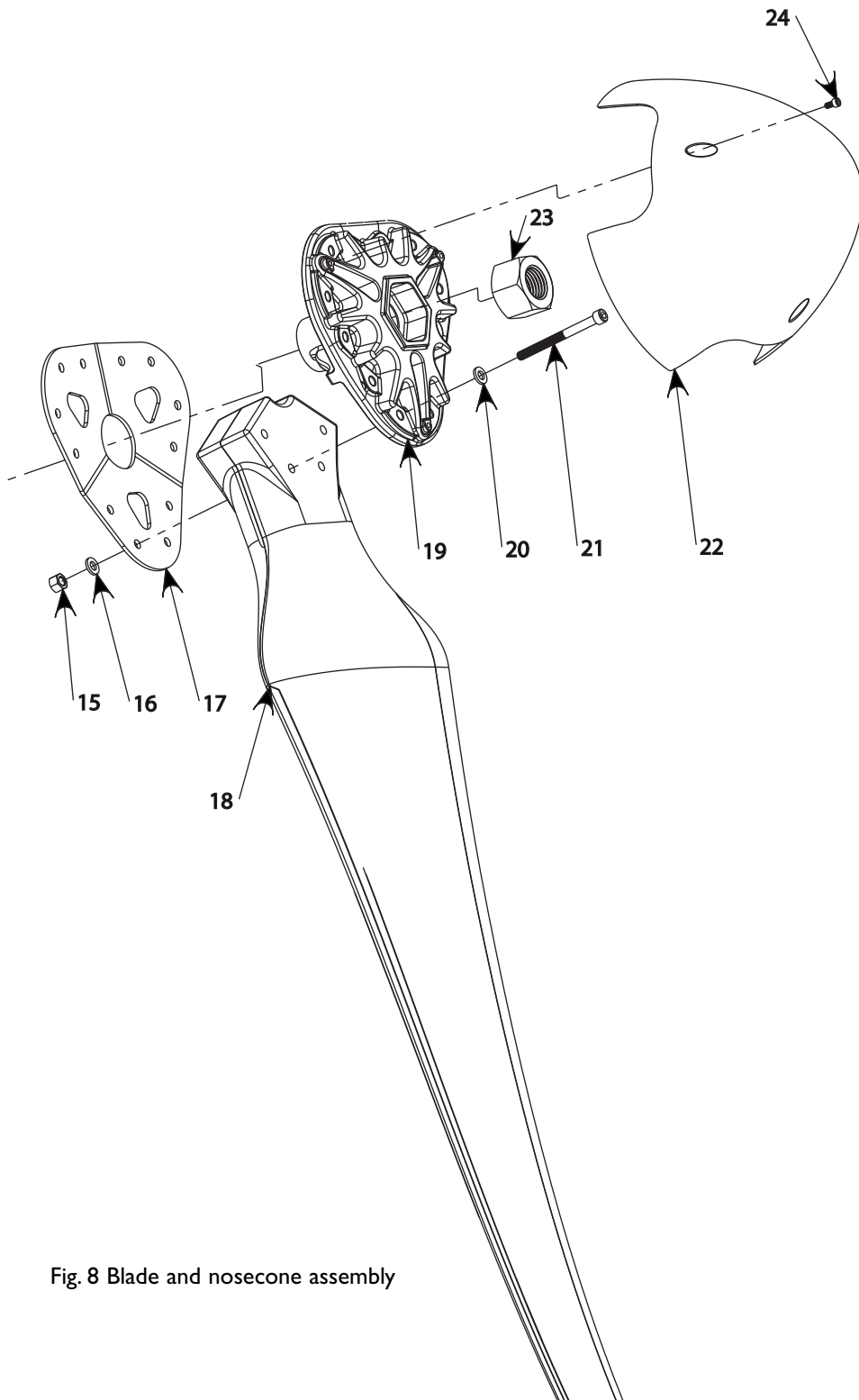


Fig. 8 Blade and nosecone assembly

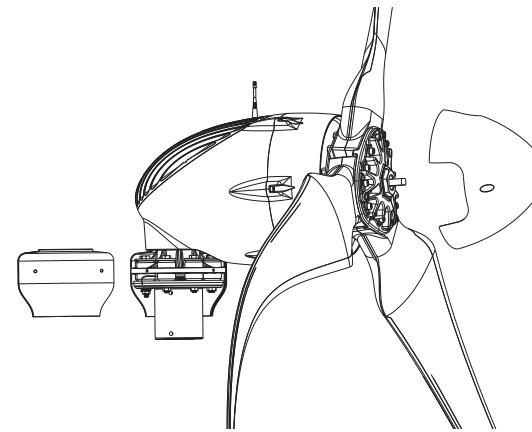


Fig. 9 Completed assembly

Yaw Components		
#	Description	Qty.
1	RF Antenna	1
2	M12x1.75x90mm Hex Bolt grade 10.9	8
3	Snubbing Washer	8
4, 5	Vibration Isolation Ring (4) and Bushing (5)	8
6	Strain Relief Cover Assembly	1
7	Shield	2
8	M5x.8x12mm Button Head grade 8.8	4
9	M5 Lock Washer A2 stainless steel	4
10	M5x.8x12mm Bolt SHCS grade 8.8	4
11	Flat Washer (M12) A2 stainless steel	8
12	Lock Washer (M12) A2 stainless steel	8
13	M12x1.75 Nut grade 10.9	8
14	5" Tower Insert (optional)	1
Blade Components		
#	Description	Qty.
15	M10x1.5 Nut grade 12.9	12
16	Lock Washer (M10) A2 stainless steel	12
17	Blade Plate	1
18	Blade	3
19	Blade Hub	1
20	Flat Washer (M10) A2 stainless steel	12
21	M10x1.3x120mm Bolt SHCS grade 12.9	12
22	Nose Cone	1
23	Hub Retaining Nut grade 10.9	1
24	M6x1x12mm Bolt SHCS grade 8.8	3

Three - Operation & Maintenance

3-1 Skystream 3.7™ Key Operating Characteristics

The Skystream 3.7 operates by converting the kinetic energy of the wind into rotational motion that turns an alternator and ultimately produces usable electric power. In actuality this is a great over simplification of Skystreams operation since it must very precisely match the frequency and voltage of the electricity supplied by the local utility company in order to power your home and its appliances. Additionally, Skystream monitors and adjusts its performance to provide safe operation and extract the maximum energy from even low speed winds.

Skystream will begin producing power in a wind of approximately 8 mph (3.5 m/sec). At that speed the blades will rotate at approximately 120 rpm. As the wind speed increases the blade speed will also increase. At about 20 mph (9 m/sec) wind speed the blade speed achieves a rotational speed of 325 rpm. This is Skystreams rated speed. Should the wind speed increase above 20 mph the blade speed will remain fixed at 325 rpm.

If a condition occurs that causes the rotational speed to exceed 360 rpm, Skystream will shut down for approximately 10 minutes after which it will resume normal operation unless a fault is detected causing it to remain shut down. This is an unlikely scenario that should never occur in normal operation.

As the wind speed exceeds 25 mph Skystream enters a reduced power mode marked by lower power production and reduced blade speed. Should the wind speed continue to increase and achieve 65 mph Skystream will assume storm conditions exist and shut down for one hour. After one hour Skystream will restart operation in the reduced power mode. It will remain in reduced power mode until it determines that the wind speed has returned pre-storm levels at which time it will resume normal operation.

In addition to adjusting its operation in response to wind conditions Skystream also monitors the electrical utility grid and its own internal health. Should the electric utility voltage or frequency differ from Skystream's voltage, for example due to a power failure, Skystream will disconnect from the grid and enter a "braked mode". While in this mode the blades are held stationary while the Skystream monitors the utility power. If Skystream determines that the power has returned to within specification, it will re-connect to the grid and resume normal operation. This is the same cycle that occurs when Skystream is initially powered.

Additionally, should Skystream determine an internal fault exists it will execute an emergency shutdown – an E-stop. An E-stop will only take place if a severe fault that requires servicing internal components has occurred. For that reason resetting an E-stop requires gaining access to the interior of Skystream. It cannot be reset from the ground.

As a final note, Skystream is factory configured for operation up to 1000 meters (3,300 feet) above sea level. If your installation exceeds this elevation please consult Southwest Windpower technical service for assistance in resetting the configurations for your elevation.

3-2 Frequently Asked Questions

1) What happens if I lose power from my utility company?

If there is a power outage the Skystream will shut down within one second. It will resume normal operation when power is restored. There are many safety requirements of a utility-tied inverter. The Skystream meets all of these requirements per UL 1741.

2) Does the Skystream have lightning protection?

Yes, the Skystream has lightning protection. The Skystream can handle 6000 Volts as required by UL 1741. If you live in a lightning prone area SWWP recommends an additional lightning arrester at the base of the tower.

3) What should I do if I'm expecting a severe storm?

The Skystream is designed for very high winds, but it is always a good idea to shut Skystream down if there is going to be a severe storm to protect against any flying debris.

4) How do I shut down Skystream?

To turn off Skystream all you need to do is turn off the breaker Skystream is connected to. This will cause NO damage to the unit.

5) Can I leave Skystream unattended?

Yes, the Skystream is designed to operate without any user input. If there is any fault it will shut down on its own.

6) What do I do if Skystream is facing upwind even though there is a strong wind?

If the Skystream is not tracking correctly, you should check to see if the tower is level.

7) When should I contact an authorized service technician?

- a. If there is any unusual vibration coming from Skystream.
- b. If you hear any noise that sounds like mechanical interference.
- c. If the Skystream is connected to the utility power (i.e. all breakers and disconnects are turned on), the wind is blowing, but the Skystream is not turning very fast.

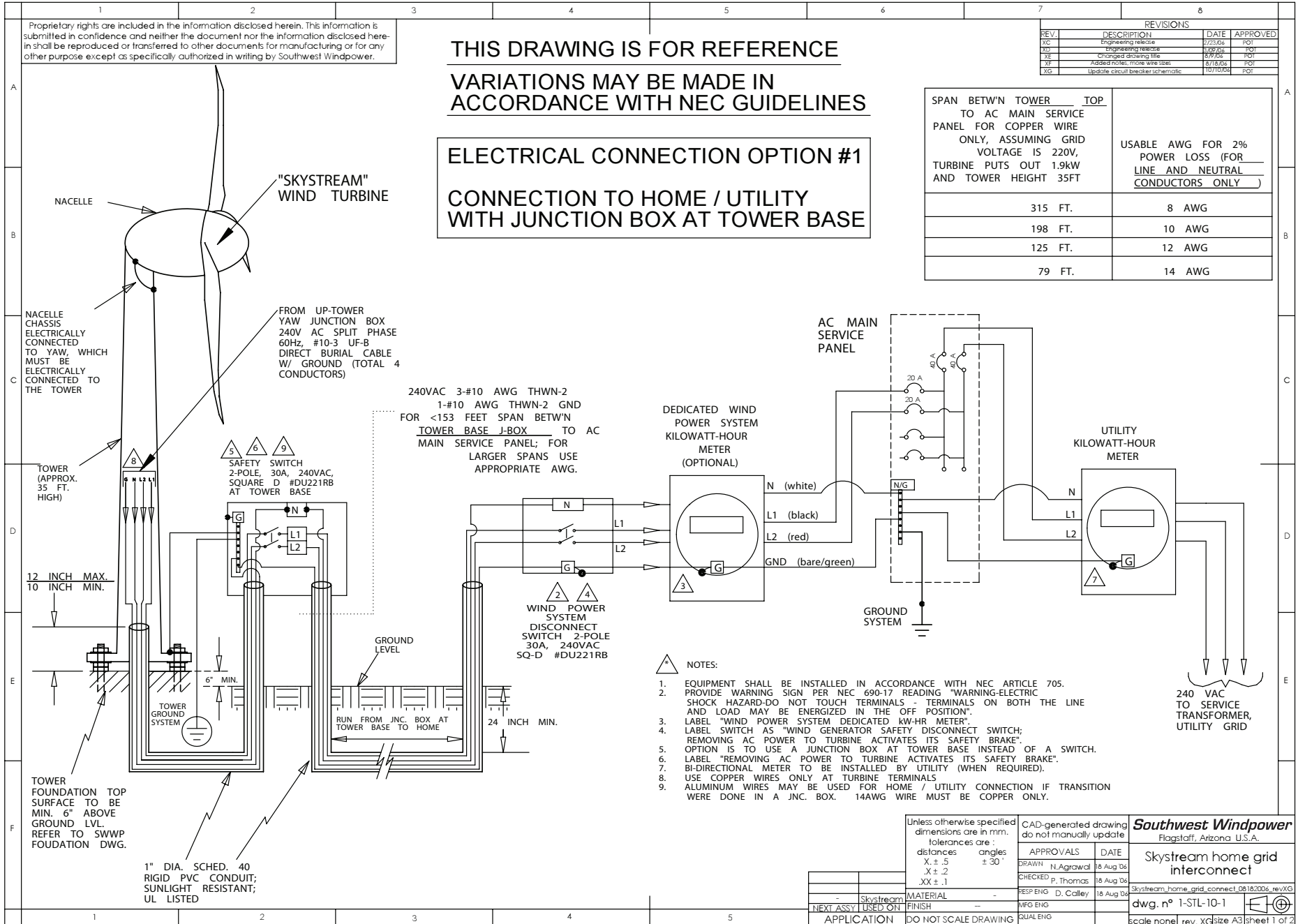
8) Can I mount Skystream to my roof?

Roof and building mount is not recommended. Because of the size and weight of the wind generator, Skystream needs to be mounted on a PE certified tower to ensure the quietest and safest system. Roof mounting will invalidate the warranty.

Appendix A

Electrical Connection Diagram Options

Option 1: Electrical connection to home/utility with junction box at tower base.

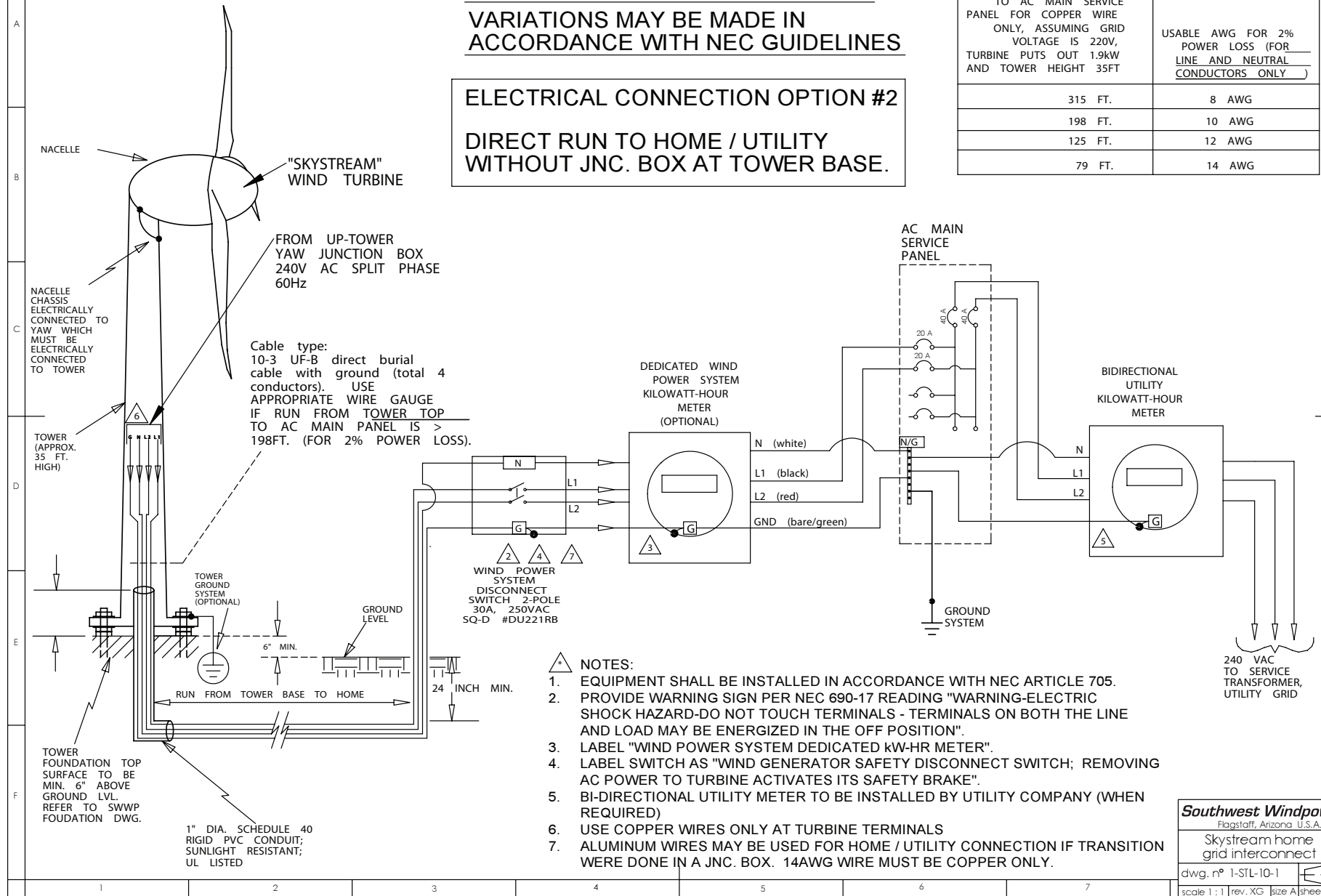


Proprietary rights are included in the information disclosed herein. This information is submitted in confidence and neither the document nor the information disclosed herein shall be reproduced or transferred to other documents for manufacturing or for any other purpose except as specifically authorized in writing by Southwest Windpower.

**THIS DRAWING IS FOR REFERENCE
VARIATIONS MAY BE MADE IN
ACCORDANCE WITH NEC GUIDELINES**

**ELECTRICAL CONNECTION OPTION #2
DIRECT RUN TO HOME / UTILITY
WITHOUT JNC. BOX AT TOWER BASE.**

SPAN BETW'N TOWER TOP TO AC MAIN SERVICE PANEL FOR COPPER WIRE ONLY, ASSUMING GRID VOLTAGE IS 220V, TURBINE PUTS OUT 1.9kW AND TOWER HEIGHT 35FT	USABLE AWG FOR 2% POWER LOSS (FOR LINE AND NEUTRAL CONDUCTORS ONLY)
315 FT.	8 AWG
198 FT.	10 AWG
125 FT.	12 AWG
79 FT.	14 AWG



Southwest Windpower
 Flagstaff, Arizona U.S.A.
 Skystream home grid interconnect
 dwg. n° 1-STL-10-1
 scale 1 : 1 rev. XG size A sheet 2 of 2