



**Skystream 3.7™  
Owner's Manual**

INSTALLATION

OPERATION

MAINTENANCE

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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,

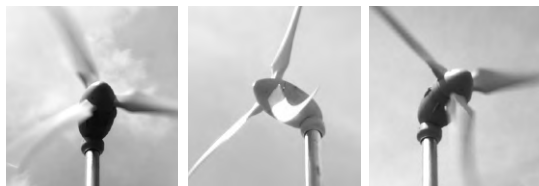
Southwest Windpower

**Enter the serial and model number below**

Serial Number \_\_\_\_\_

Model Number \_\_\_\_\_

**MADE IN THE USA**



Skystream Installation Manual  
Document No. 0313

## 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



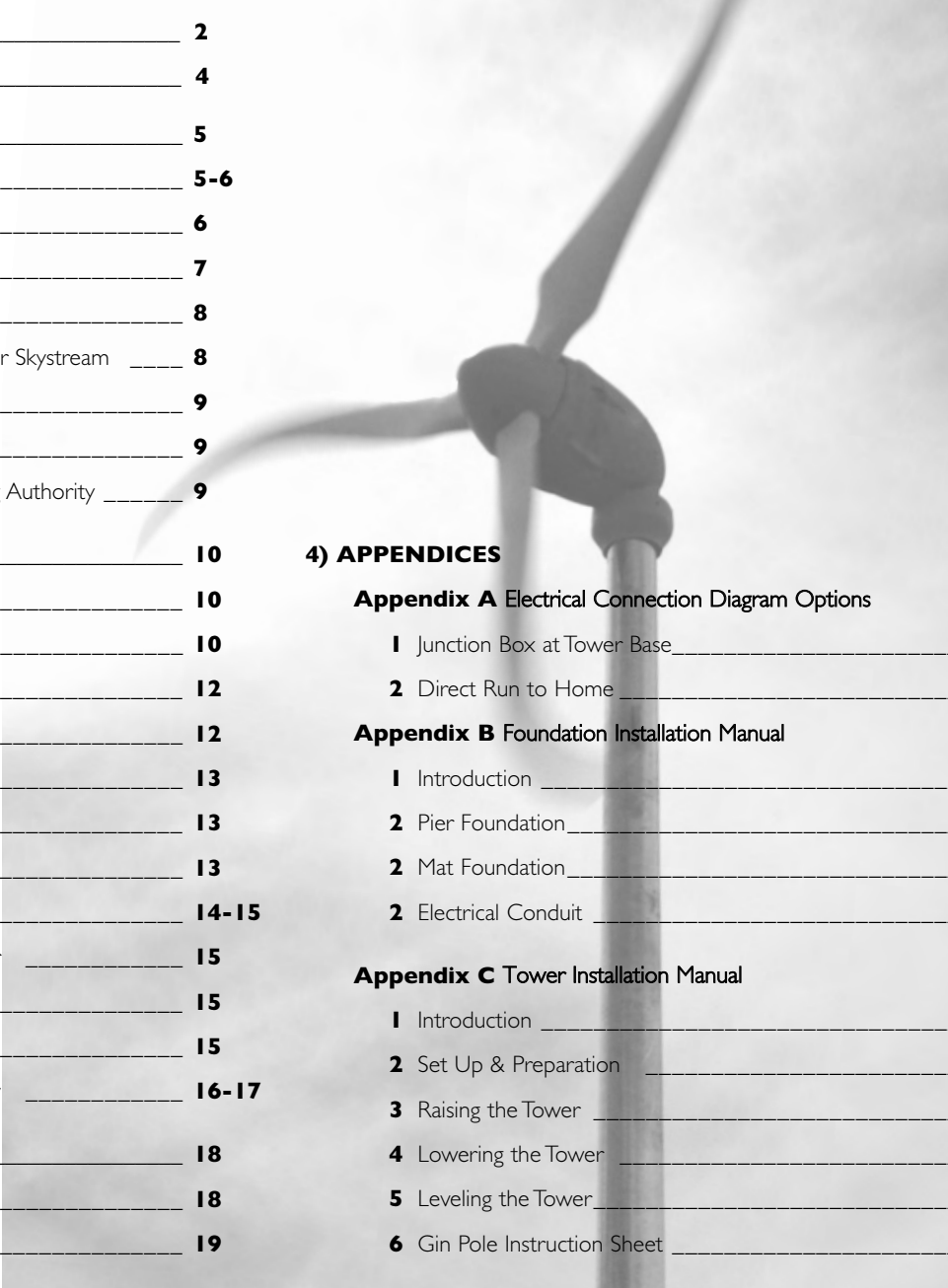
**Professional installation**  
highly recommended



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

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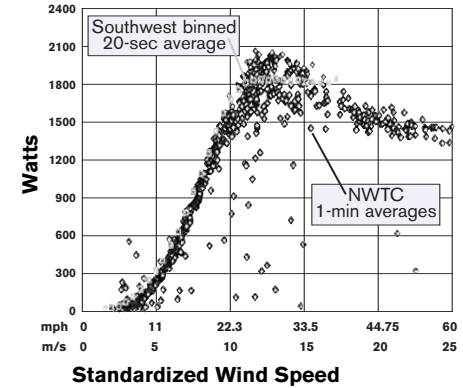
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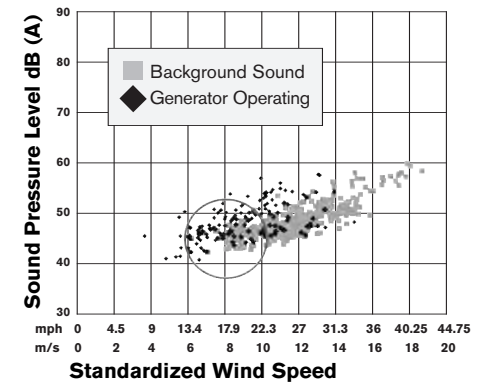
## Skystream 3.7™ Technical Specifications

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

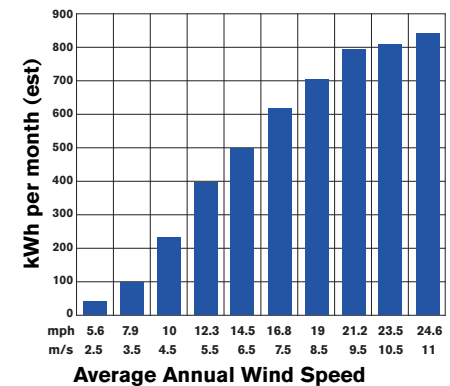
### PERFORMANCE GRAPH



### 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	7.5A	8.7A	7.5A
rated output power	1800W		
peak output power	2400W		
software revision	1.0.00		
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](http://www.skystreamenergy.com)

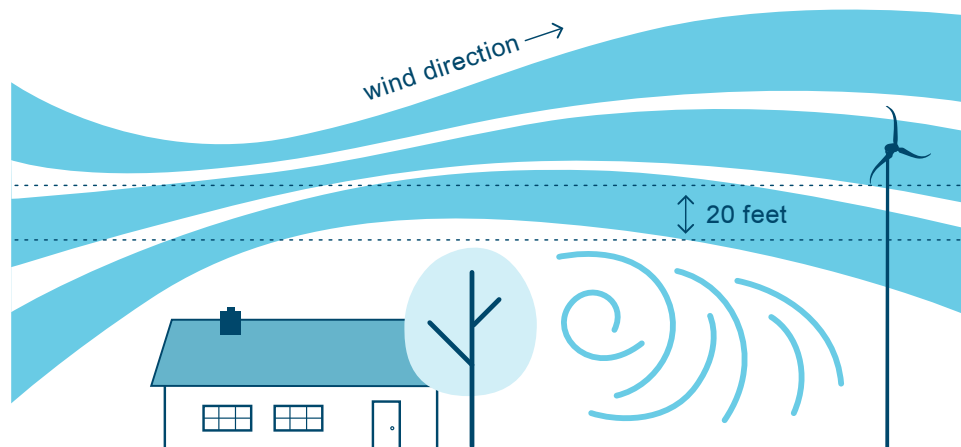
### I-4-1 Finding the Best Location for Your Skystream

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 at [www.skystreamenergy.com](http://www.skystreamenergy.com).

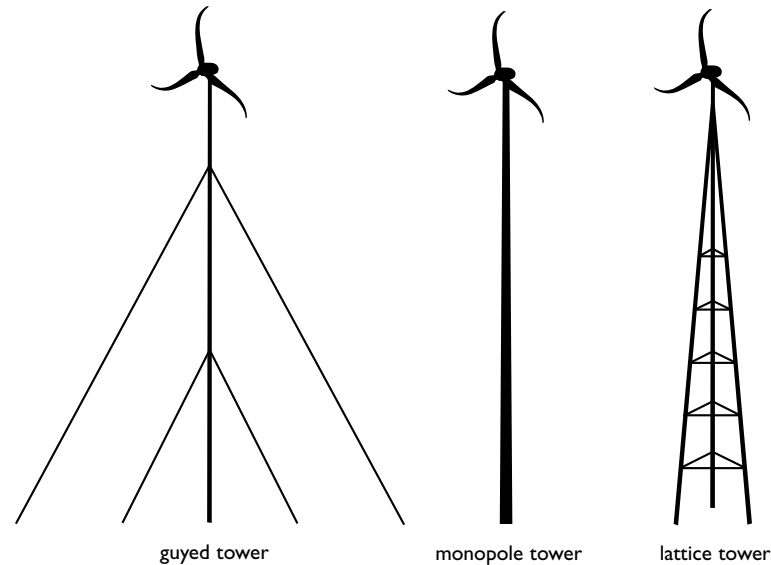


Fig. 2 Tower types

### 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](http://www.skystreamenergy.com)



**TIP:** See our website: [www.skystreamenergy.com](http://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](http://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.

#### 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 opposite 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.

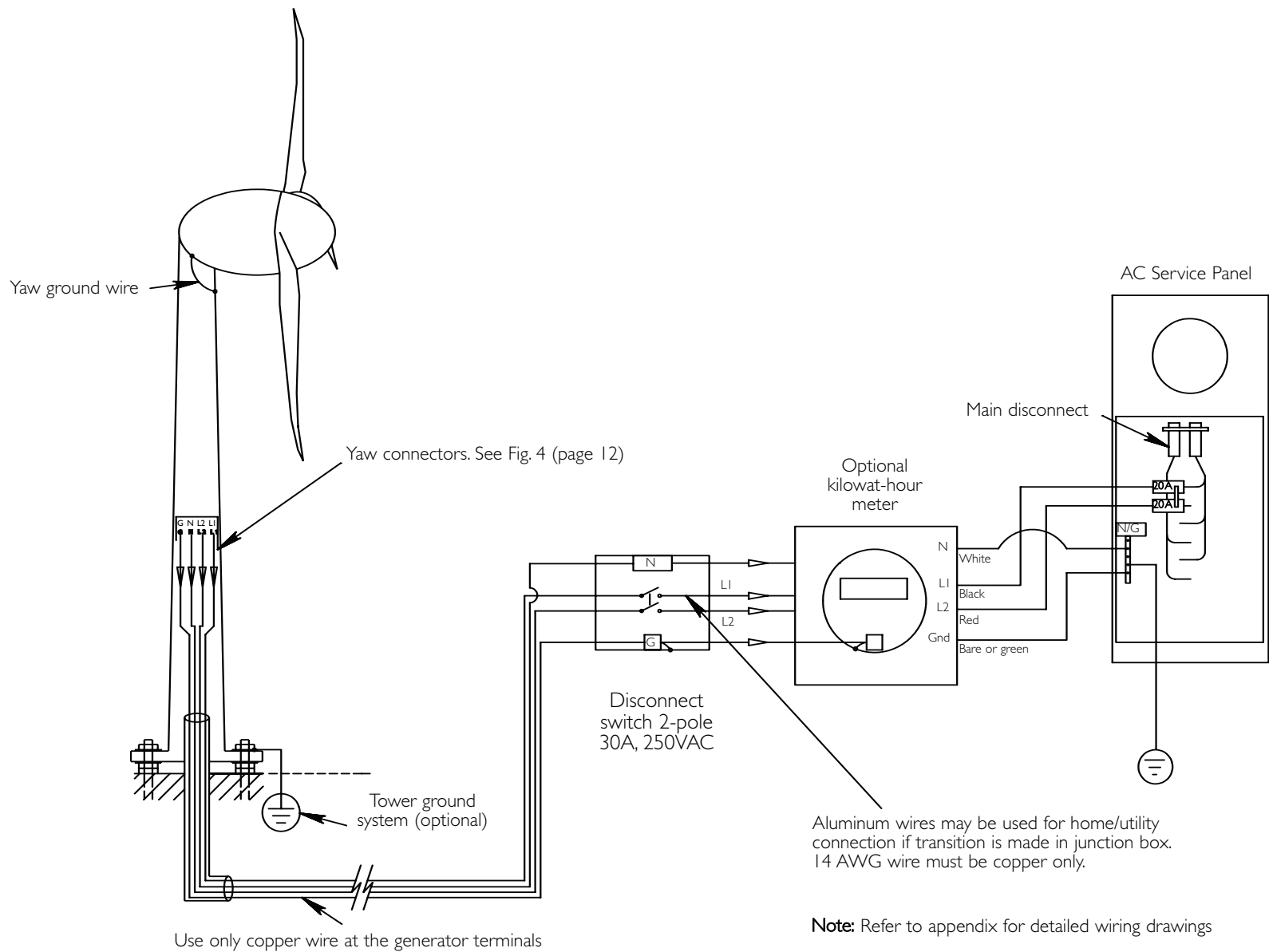


Fig. 3 Wiring diagram

### 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

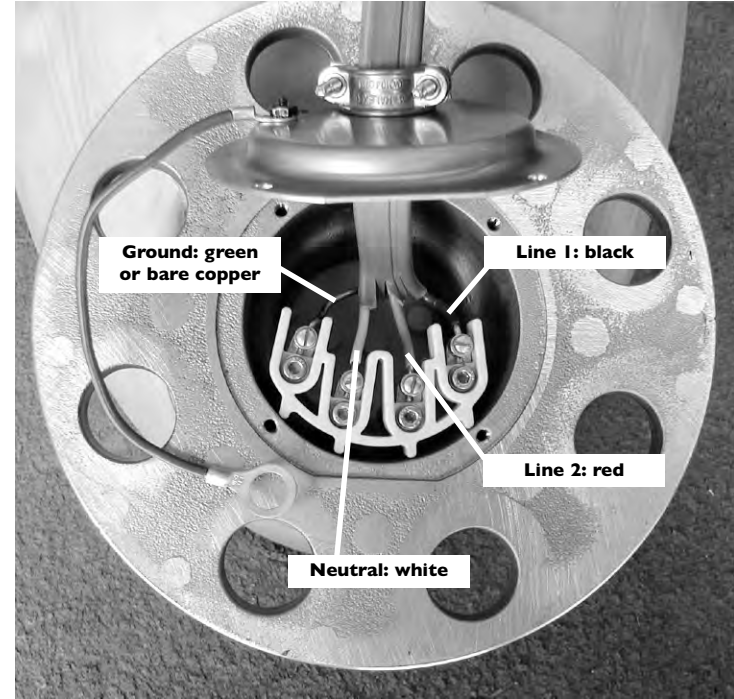


Fig. 4 Wire run to the yaw connection

### 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 <sup>2</sup> )
315 feet (92 m)	8 AWG	10 mm <sup>2</sup>
198 feet (56 m)	10 AWG	6 mm <sup>2</sup>
125 feet (37 m)	12 AWG	4 mm <sup>2</sup>
79 feet (23 m)	14 AWG	2.5 mm <sup>2</sup>

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.

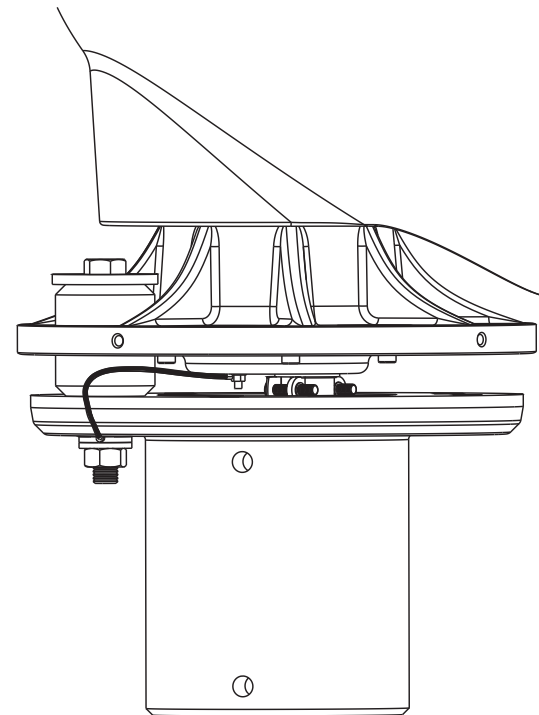


Fig. 5 Proper grounding of the yaw connection



## 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).

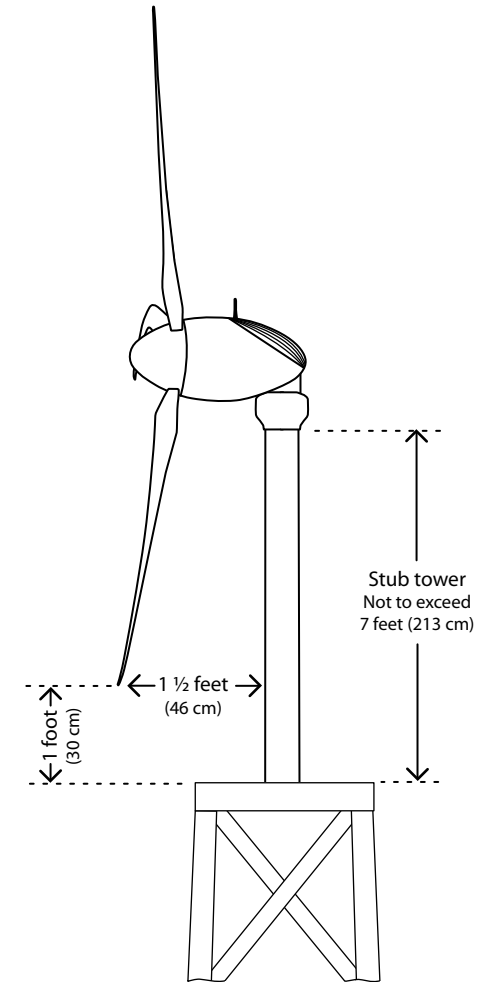


Fig. 6 Blade tip clearances

**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.

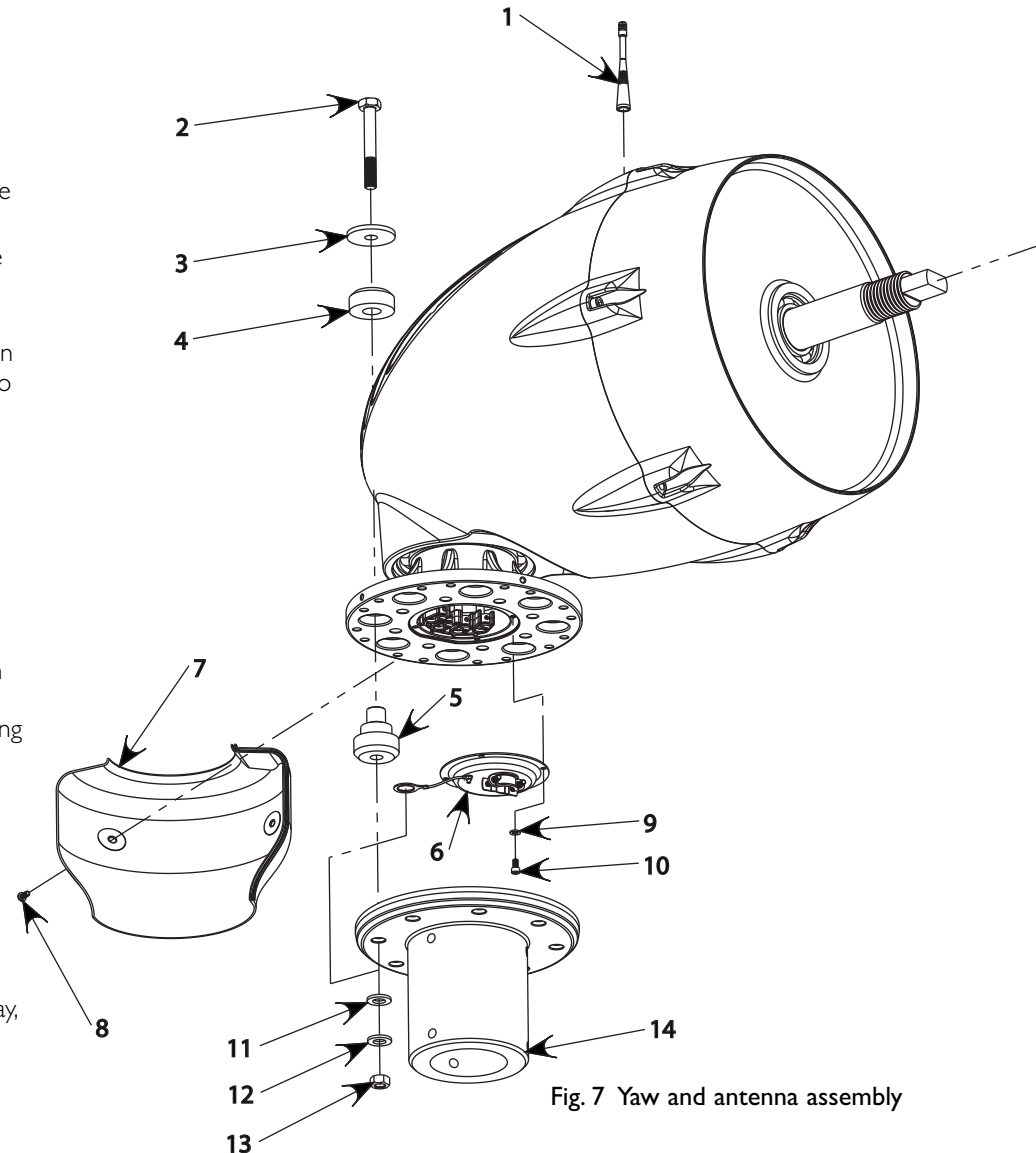


Fig. 7 Yaw and antenna assembly

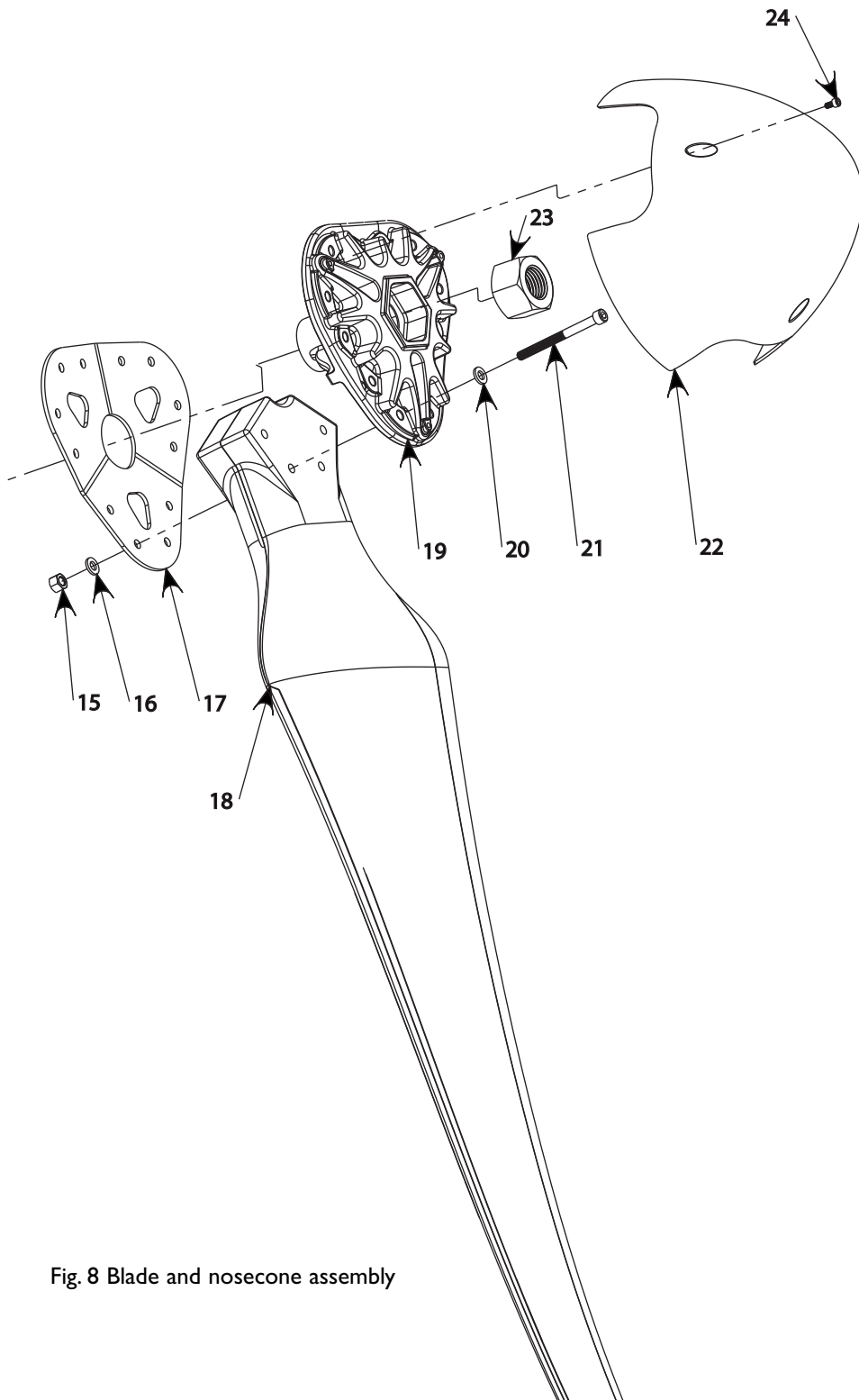


Fig. 8 Blade and nosecone assembly

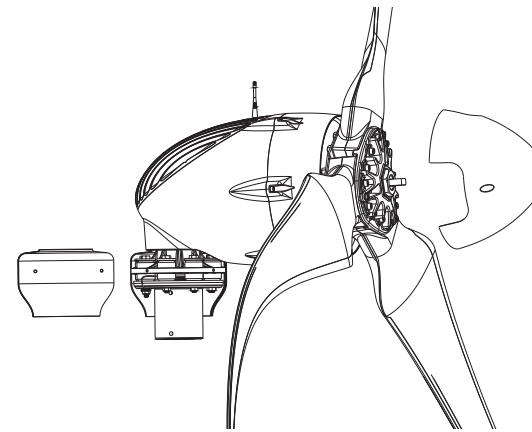


Fig. 9 Completed assembly

<b>Yaw Components</b>		
#	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
<b>Blade Components</b>		
#	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 adjust 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 until 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 increases 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, then 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.

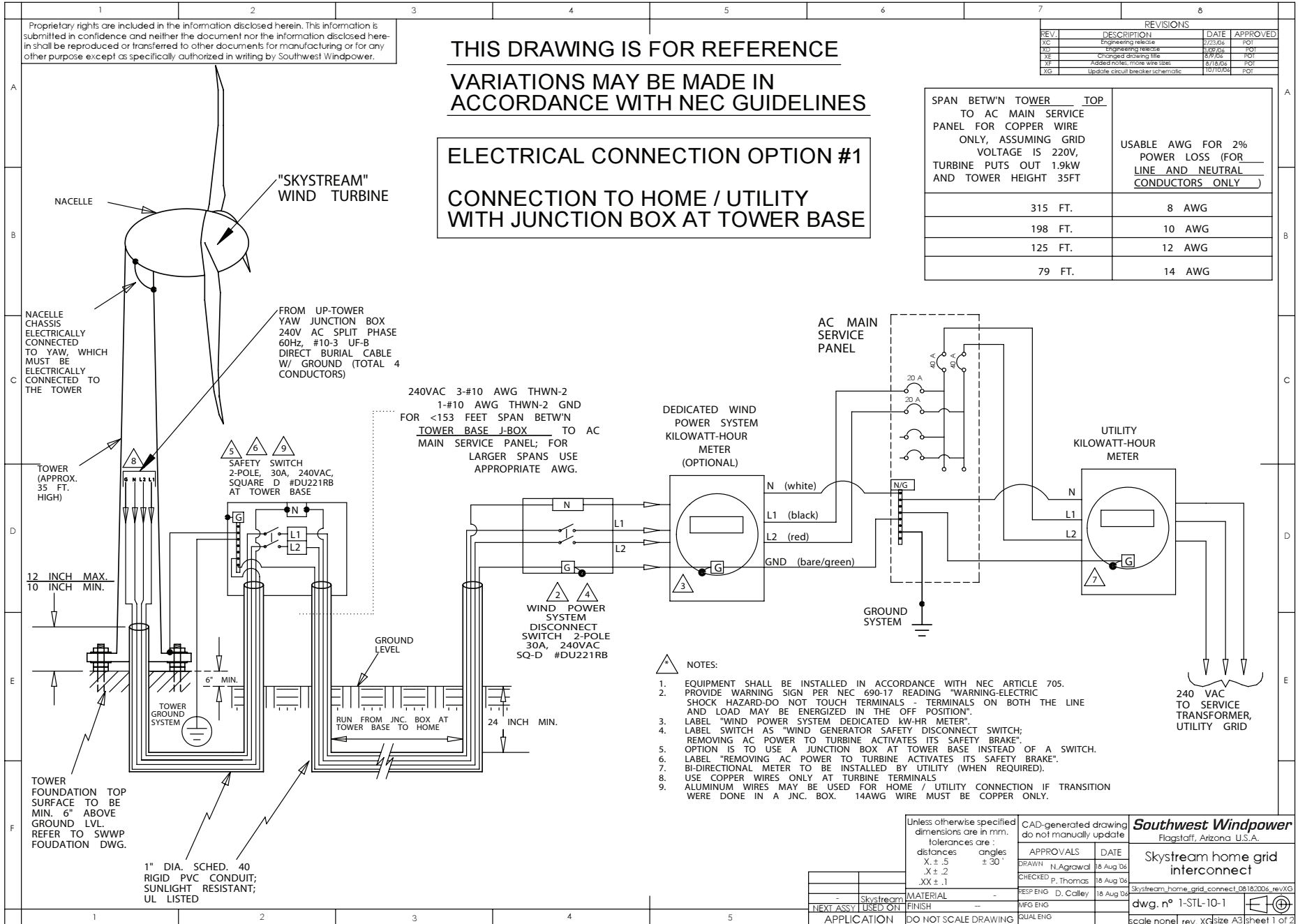
#### 8) Can I mount Skystream to my roof?

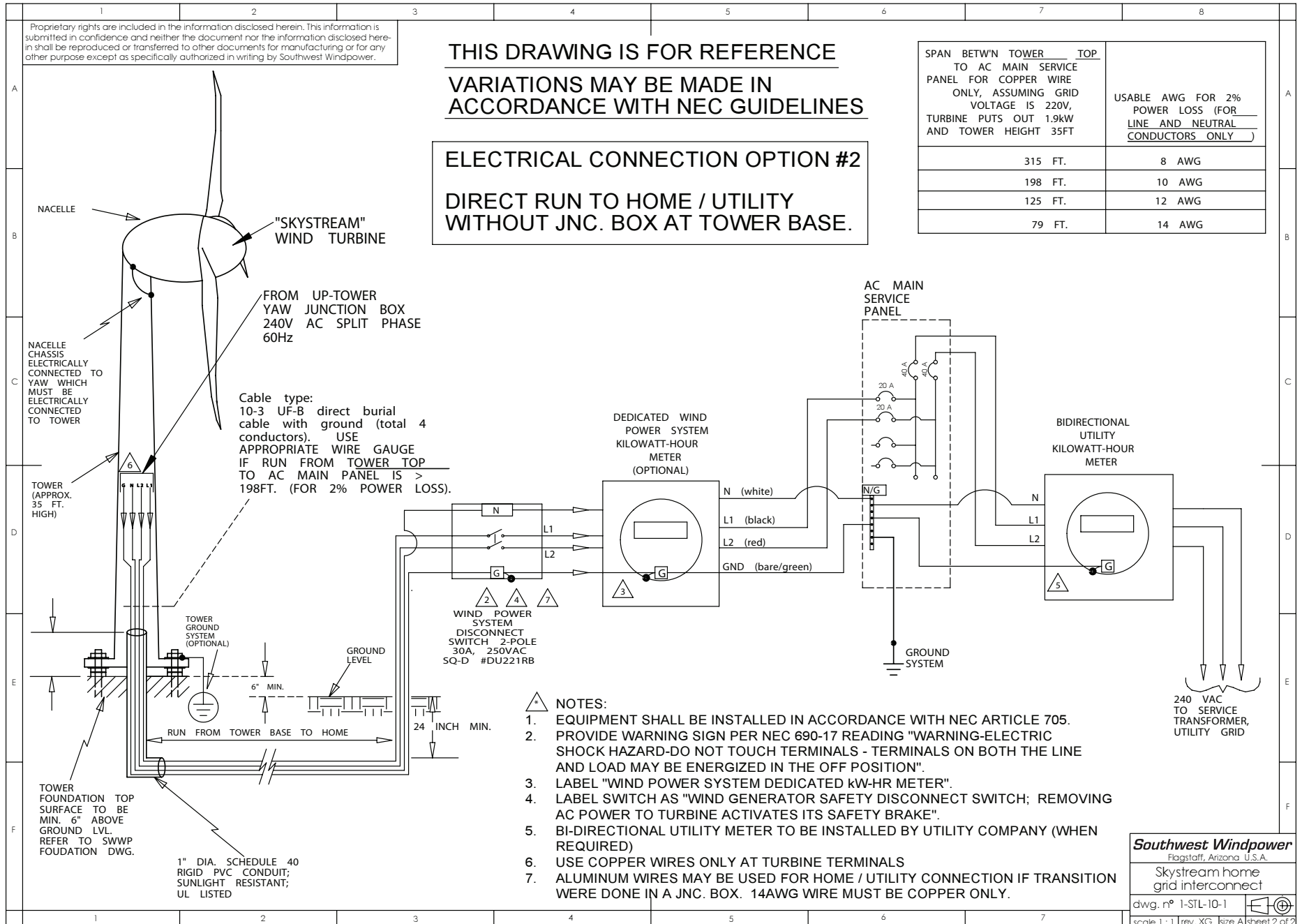
Roof and building mount is not recommended. Because of the size and weight of the wind generator, Skystream needs to be mounted on a PE certified tower to ensure the quietest and safest system. Roof mounting will invalidate the warranty.

# **Appendix A**

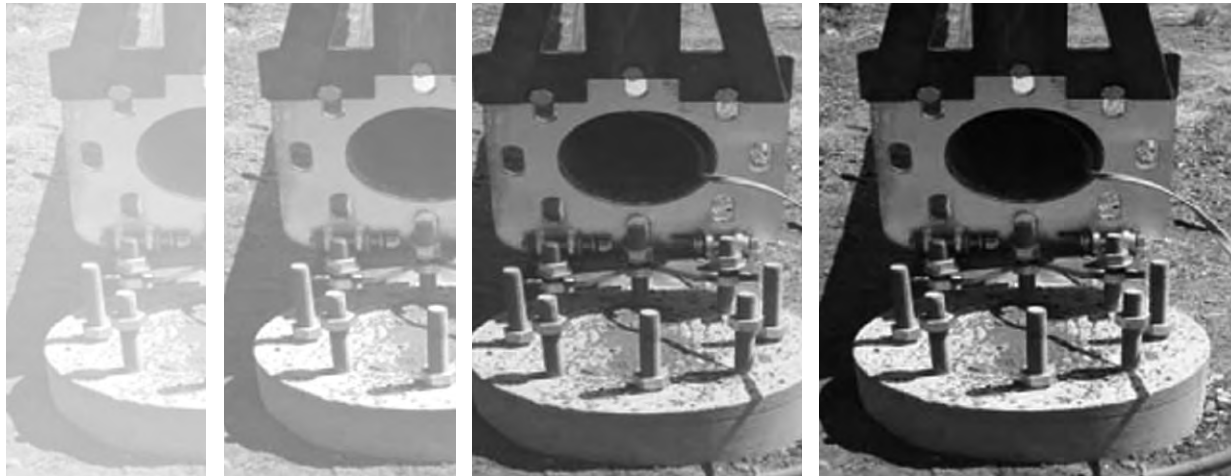
## **Electrical Connection Diagram Options**

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





## Appendix B



# Foundation Installation Guidelines

SOUTHWEST WINDPOWER, INC. - 1801 WEST ROUTE 66 - FLAGSTAFF, ARIZONA 86001 - PH: 928.779.9463 - FAX: 928.779.1485

[www.skystreamenergy.com](http://www.skystreamenergy.com)

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## Skystream 3.7 Owner's Manual

### Appendix B: Foundation Installation Guidelines

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## IMPORTANT SAFETY INSTRUCTIONS

READ THESE INSTRUCTIONS IN THEIR ENTIRETY BEFORE INSTALLING.



**Professional installation**  
highly recommended

- 1) **SAVE THESE INSTRUCTIONS.** This manual contains important instructions for Skystream foundations that must be followed during installation.
- 2) Read, understand and respect all warnings.
- 3) Install Skystream foundation in accordance with National Electric Code (NEC) and local building codes.
- 4) Always obtain a building permit before construction.
- 5) When moving heavy objects to the site, use a cart to prevent back injury.
- 6) Use only proper grounding techniques as established by the NEC.
- 7) The Skystream foundation 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.
- 8) Skystream uses high voltage and is potentially dangerous. Be sure to use all safety precautions at all times.

### In this guide



**TIP:** Helpful information to ease the installation



**Professional installation**  
highly recommended



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

## One - Introduction

This guideline provides directions for the construction of two tower foundations – the Pier and Mat foundations. Either foundation is suitable to mount the Southwest Windpower 33-foot monopole tower and Skystream 3.7 wind turbine. Please read and understand the entire installation guideline before proceeding. Local building codes and regulations shall have precedence over this installation guideline.

### I-I Foundation Bolt Kits

A bolt kit is available for each foundation configuration. Use of the bolt kits is strongly recommended. Each kit is designed for its particular application with the bolts, nuts and washers hot-dip galvanized and constructed of the appropriate steel alloys.

Each bolt kit also includes a template that must be used to correctly position the foundation bolts in the foundation. A copy of the template is depicted in Fig. B1.

## Two - Pier Foundation

Technical drawings for the pier foundation are presented in **Figs. B2 and B3**. The pier diameter is 24 inches (61 cm) and the depth of the pier will vary from 5 to 11 feet (1.5 m to 3.35 m) depending on soil classification. Refer to **Fig. B4** (found on pg 4 ) to determine the soil classification.

**A typical pier foundation ►**



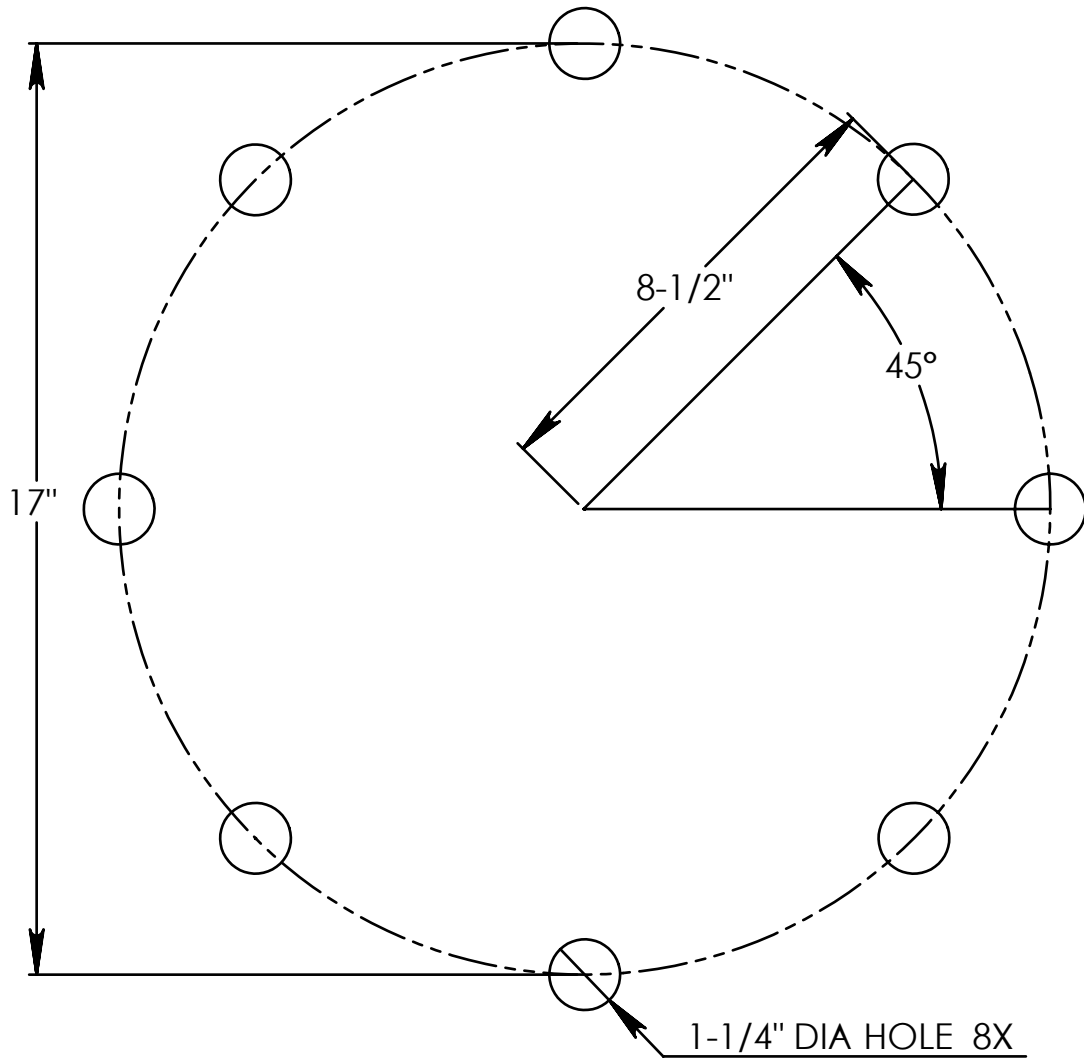


Fig. B1 Bolt template

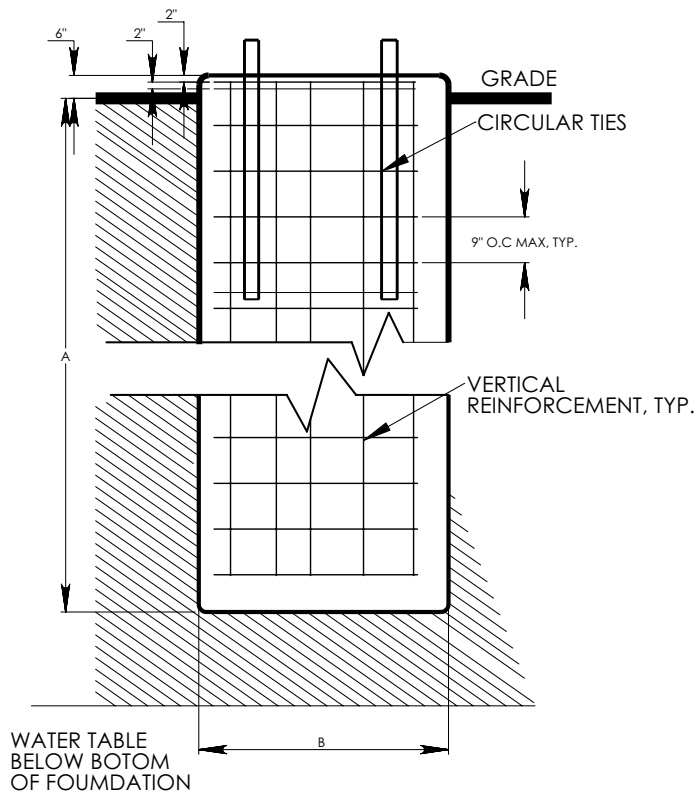


Fig. B2 Technical drawing for Pier Foundation

**TIP:** Because special equipment is required to cut and bend the reinforcing bar it may be most economical to contract with a local concrete company to manufacture the reinforcement structure for the pier foundation.

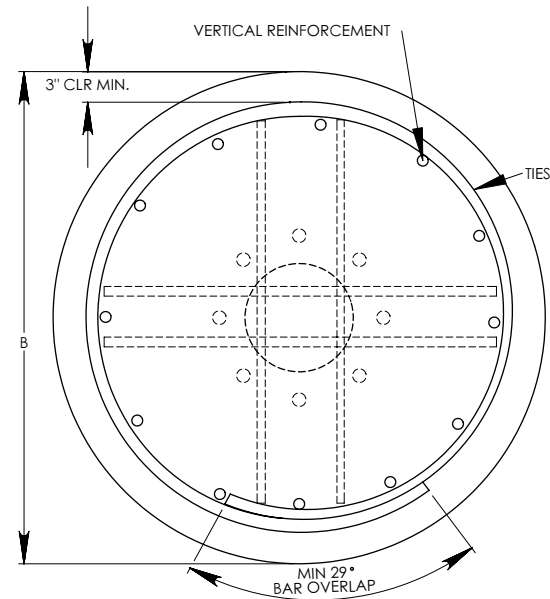


Fig. B3 Technical drawing for Pier Foundation

Soil Classification		Allowable Soil Pressure		Design Loads at Tower Base*			Minimum Pier Dimensions**			Reinforcement	
		Lateral psf	Vertical psf	Shear (V) lbs.	Moment (M) ft-lbs	Vertical (P) lbs	Depth (A) feet	Diameter (B) inches	Projection (C) inches	Vertical	Ties
Class 1	Crystalline bedrock	1200	12,000	867	26,290	760	6	24	6	(8)-#6	#4 @ 9"
							5			O.C. max	
Class 2	Sedimentary and foliated rock	400	4000	867	26,290	760	8	24	6	(8)-#6	#4 @ 9"
							7			O.C. max	
Class 3	Sandy gravel and/or gravel (GW and GP)	200	3000	867	26,290	760	10	24	6	(8)-#6	#4 @ 9"
							9			O.C. max	
Class 4	Sand, sity sand, clayey sand, sity gravel and claye gravel (SW, SP, SM, SC, GM and GC)	150	2000	867	26,290	760	10	24	6	(12)-#6	#4 @ 9" O.C. max
Class 5	Clay, sand clay, sity clay, clayey sit, silt, and sandy silt (CL, ML, MH and CH)	100	1500	867	26,290	760	11	24	6	(12)-#6	#4 @ 9" O.C. max
							10				

\* These Are the unfactored wind turbine extreme loads using a hub-height w ind speed of 62.9m/s (140 mph), a w ind shear of 0.20 and a tower drag coefficient of 0.28 [ from polhamus, E.C., NASA CR 3809, 1984].

\*\*\*installation of cirvular ties and anchor bols shall be in accordance with the drawings.

Fig. B4 Soil chart

## 2-1 Forming and Reinforcing Bar

Position reinforcing bar per Fig. B2. Circular ties require a minimum 29 inch (73.6 cm) overlap and a minimum 3 inch (7.62 cm) clearance from outside diameter edge of pier. Circular ties are #4 reinforcing bar with maximum 9 inch (23 cm) spacing. Vertical reinforcement bars are 12, #6 reinforcing bars equally spaced about circular ties. Forming is most easily accomplished using 24 inch (61 cm) sonotube. Forms must be removed before backfilling. The sonotube need not extend full depth of foundation if excavation is in solid undisturbed soil. See Figure B2. Position 4, #6 cap bars as shown in Figure B2.

## 2-2 “J” Bolts & Template



**Note:** Take the time to prepare an accurate and strong template to position and secure the J bolts. This will save much time and difficult rework.

- Before pouring the foundation the “J” bolts **MUST** be **SECURELY** locked in position.
- A paper template is provided with the bolt kit. Use this template to drill a wood template to hold the “J” bolts in position while concrete is poured.
- Two methods of framing the “J” bolts are presented in Figure B4. The first method uses a single template while the second method utilizes two templates sandwiched between lengths of 2’x4”lumber. Regardless of the method be sure bolts are correctly positioned prior to pouring concrete.
- Fabricate a wood template by securing the paper template to the wood template material (3/4” plywood works well).
- Center punch the center position of each “J” bolt. Remove the paper template and drill a 1.25 inch (3.1 cm) mounting hole for each bolt. If possible compare the template to the tower base to assure bolts will be positioned correctly.
- Mount each of the “J” bolts to the wood template by using a pair of foundation nuts to clamp the template between the nuts.
- Adjust the “J” bolts to extend 7 – 8 inches (17.8 cm-20.3 cm) above foundation as shown in Figure B4.
- Assure all bolts are vertical and parallel to each other.

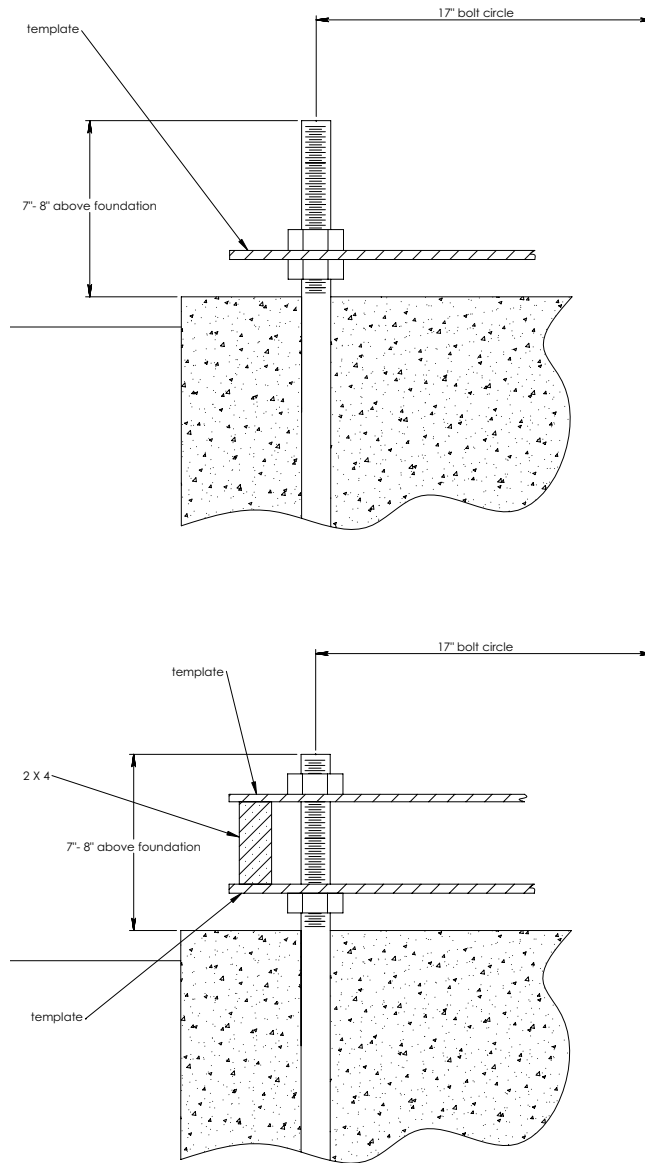


Fig. B5 J bolts and template

**2-3 Pier Foundation Specifications:**

Diameter	24 inches (61 cm)
Depth	Depends on soil conditions
Concrete	Minimum 2500 PSI, 28 day strength, 5% air entrapment
Pier Projection Above Grade	6 inches (16.24 cm)
Reinforcing Bar	ASTM A615 Grade 60
Circular Ties	#4 reinforcing bar, 17-18 inch (43 cm) diameter, 29 inch (73.6 cm) overlap
Vertical Reinforcement	12 equally spaced #6 reinforcing bar
Anchor "J" Bolts	42 inch (1 m) length, 1.25 inch (3.1 cm) diameter, 6 inch (16.24 cm) "J"
"J" Bolt Projection Above Foundation	7-8 inches (17.8 - 20.3 cm)

## Three - MAT Foundation

The MAT foundation is presented in **Fig. B6**. The foundation is a 6 foot by 6 foot (1.8 m x 1.8 m) square with a depth of 3 feet (.9 m). The MAT foundation is designed for an allowable vertical bearing pressure of 1,500 PSF (IBC Class 5 Soil per Table 1804.2).

### General notes

- 1) The mat foundation was designed in accordance with the IBC 2003
- 2) A professional engineer registered in the state where the project is located shall assume responsibility for the site – specific design. The P.E. shall assure design suitability for varying site and soil condition such as soil classifications, water table, existence of expansive/collapsible soils, susceptibility to liquefaction, frost depth, etc.
- 3) The mat foundation is for a allowable vertical bearing pressure of 1,500 PSF (IBC class 5 soil per table 1804.2)
- 4) All foundation elements shall bear on properly prepared soil
- 5) Soil types and properties shall be verified by the project P.E.
- 6) Concrete work shall be in conformance with the requirements set forth in ACI 301/318
- 7) Anchor bolt design shall be provided by others. Anchor bolts numbers, size, type, and configuration shall be capable of resisting all applied moment, shear, and axial forces
- 8) Concrete shall have min 2,500 PSI 28-day strength and 5% air entrainment +/-1% Concrete unit weight shall not exceed 150lbs/ft3
- 9) Reinforcing steel shall be ASTM A615 grade 60 deformed bars
- 10) Wind loads per IEC 200x were calculated by others:
 

Base moment:	26,290 ft-lbs
Base shear:	867 lbs
Axial load:	760 lbs

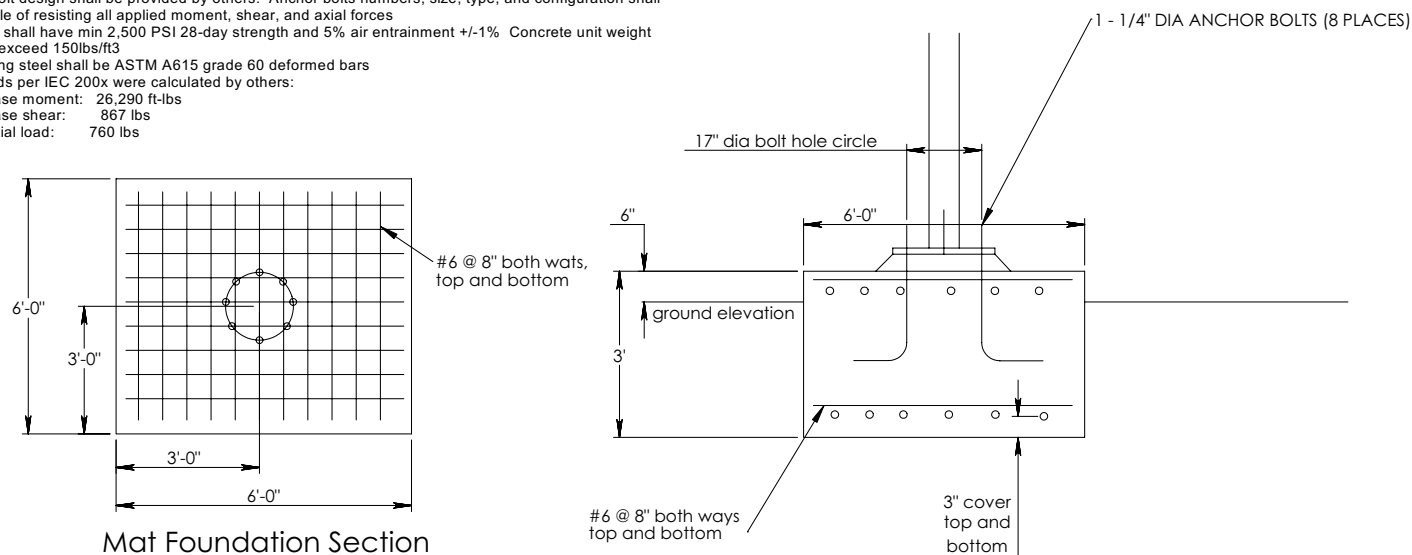


Fig. B6 Technical drawings for Mat Foundation

### 3-1 Reinforcing Bars

Position reinforcing bar “mats” as indicated in **Fig. B6**. Reinforcing bar is #6 bar spaced at 8 inch (20.3 cm) intervals. Reinforcing bar mats positioned with minimum 3 inch (7.6 cm) concrete cover top and bottom.



### 3-2 “J” Bolts and Template



Note: Take the time to prepare an accurate and strong template to position and secure the J bolts. This will save much time and difficult rework.

- Before pouring the foundation the “J” bolts **MUST** be **SECURELY** locked in position.
- A paper template is provided with the bolt kit. Use this template to drill a wood template to hold the “J” bolts in position while concrete is poured.
- Two methods of framing the “J” bolts are presented in Figure B4. The first method uses a single template while the second method utilizes two templates sandwiched between 2”x4” lengths of lumber. Regardless of the method be sure bolts are correctly positioned prior to pouring concrete.
- Fabricate a wood template by securing the paper template to the wood template material.
- Center punch the center position of each “J” bolt. Remove the paper template and drill a 1.25 inch (3.1 cm) mounting hole for each bolt. If possible compare the template to the tower base to assure bolts will be positioned correctly.
- Mount each of the “J” bolts to the wood template by using a pair of foundation nuts to clamp the template between the nuts.
- Adjust the “J” bolts to extend 7 – 8 inches (17.8 cm-20.3 cm) above foundation as shown in Figure B5.
- Assure all bolts are vertical and parallel to each other.

### 3-3 MAT Foundation Specifications

Dimensions	6 feet x 6 feet x 3 feet (1.8 x 1.8 x .9 m) deep
Reinforcing Bar	ASTM A615 Grade 60
Anchor “J” Bolts	32 inch (81.3 cm) length, 1.25 (3.1 cm) diameter, 6 inch (16.24 cm) “J”
Concrete	Minimum 2500 PSI, 28 day strength, 5% Air Entrapment

## Four - Electrical Conduit

Electrical conduit may be cast into the foundation such that the conduit continues below grade to electrical panel. Alternately wire may be routed between tower base plate and foundation. Refer to local building codes **BEFORE** pouring concrete.

Building codes typically require direct burial cables be buried to a minimum depth of 24 inches (61 cm) while cables in conduit may be buried at a depth of 18 inches (46 cm). Additionally, most codes prohibit embedding cables directly in concrete. Refer to local codes for conduit size and minimum depth requirements.



**Note:** Space between foundation and bottom of tower base plate should be filled with high strength non-shrink grout after final positioning of tower on foundation.

## Appendix C



# Tower Installation Instructions

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

**Web: [www.skystreamenergy.com](http://www.skystreamenergy.com)**

## Skystream 3.7 Owner's Manual

### Appendix C: Skystream Tower Installation Instructions

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MADE IN THE USA



## IMPORTANT SAFETY INSTRUCTIONS

READ THESE INSTRUCTIONS IN THEIR ENTIRETY BEFORE INSTALLING.



**Professional installation**  
highly recommended

- 1) **SAVE THESE INSTRUCTIONS.** This manual contains important instructions for raising, lowering and leveling the tower that must be followed.
- 2) Read these instructions in their entirety before beginning the installation.
- 3) Be extremely careful of overhead power lines.
- 4) Do not start installation unless all required equipment and tools are on site.
- 5) Foundation concrete must be completely cured. (Minimum 2500 PSI, 28 day strength)
- 6) Install tower in accordance with local zoning and building codes. Obtain all necessary building permits PRIOR to installation.
- 7) Remain at a safe distance when raising and lowering the tower. Do not walk or stand under the tower and keep clear of cables.

### In this guide



**TIP:** Helpful information to ease the installation



**Professional installation**  
highly recommended



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

## One - Introduction

These instructions require use of Southwest Windpower's Hinge and Gin Pole Kits, which were specifically designed for this application. Additionally, these instructions assume a bolt kit was purchased and the correct foundation nuts, bolts and washers are available.

Once the tower is raised into position the hinge and gin pole are removed. It is therefore not necessary to purchase these items. Should it be necessary to lower the tower, the hinge and gin pole may be reinstalled and used to lower and raise the tower.

### I-1 Required Tools & Equipment

The following tools and equipment are necessary to install the tower:

- Hinge Mounting Kit - Part Number 3-CMBP-3063
- Gin Pole Kit - Part Number 3-CMBP-3054
- 16 Flat Washers, 1 1/4" ID, galvanized SATM F436, (SWWP part number 3-HDWA-917)
- 19 Nuts, 1 1/4", galvanized, (SWWP part number 3-HDNT-908)
- Bubble level, (easier with two levels)
- Pair of 2" open end wrenches.
- Pair of adjustable wrenches to install hinge plates and gin pole, tape measure.

## Two - Set Up & Preparation

Carefully read and perform the following steps to prepare for raising the tower.

- Determine the three foundation bolts to be used to mount the hinge. The hinge is installed in the direction the tower will be “tilted down”. Refer to Fig. 2C.

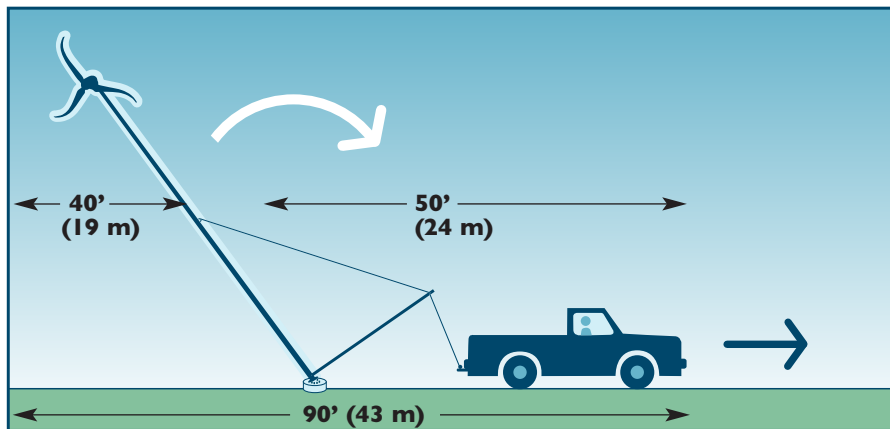


Fig. 1C

- Screw a 1 1/4" nut on each of the three foundation bolts that will be used to mount the tower hinge. Thread the nuts down so the top of the nut is approximately 5" (13 cm) from the top of the foundation bolt. Refer to Fig. 1C.
- Screw a 1 1/4" nut on each of the eight foundation bolts. The foundation bolts used to mount the hinge will have two nuts. Leave a gap of approximately 7/8" (2 cm) between the nuts to accommodate the hinge.
- Bolt the hinge to the tower base plate using the 7/8"x 5 1/2" bolts and nuts supplied with the hinge kit. Fully screw the nuts onto the bolts. The bolts act as hinge pins, therefore, it is not necessary to overly tighten the nuts on the bolts.
- Using suitable lifting equipment, lift the tower base (with hinge) and position the hinge slots between the nuts and the foundation bolts. Refer to Fig. 1B in Appendix B.



**TIP:** Approximately 90 feet (43 meters) are required to raise the tower vertically into position. Forty feet (19 meters) are required on one side of the foundation for the tower and wind generator. An additional 50 feet (24 meters) are required on the other side of the foundation for the gin pole and pulling vehicle. See Illustration 1.



**TIP:** The 5' adjustment is temporary. The height of the hinge must be adjusted as described in latter instructions.

- Tighten the hinge plate nuts such that the top of the hinge plate is 4 1/4" (10.8 cm) from the top of the foundation bolts.

**⚡ WARNING:** The 4 1/4" height adjustment is VERY important to insure the foundation bolts will clear the slotted holes in the base plate allowing the tower to fully tilt into position.

- Adjust the remaining nuts as shown in Figure 2C. The "A" and "B" nuts should be adjusted such that 2 1/4" (5.7 cm) of the bolt extends above the washer. The remaining three nuts should be adjusted lower than the "A" and "B" nuts. These nuts will be tightened after leveling the tower.
- Adjust the remaining nuts as shown in Figure 2C. The "A" and "B" nuts should be adjusted to be level with nuts securing the hinge. The remaining three nuts should be adjusted to a lower level than the "A" and "B" nuts. These nuts will be tightened after leveling the tower.

**💡 TIP:** Install the gin pole bolts from above to ease removal when the tower is raised into position.

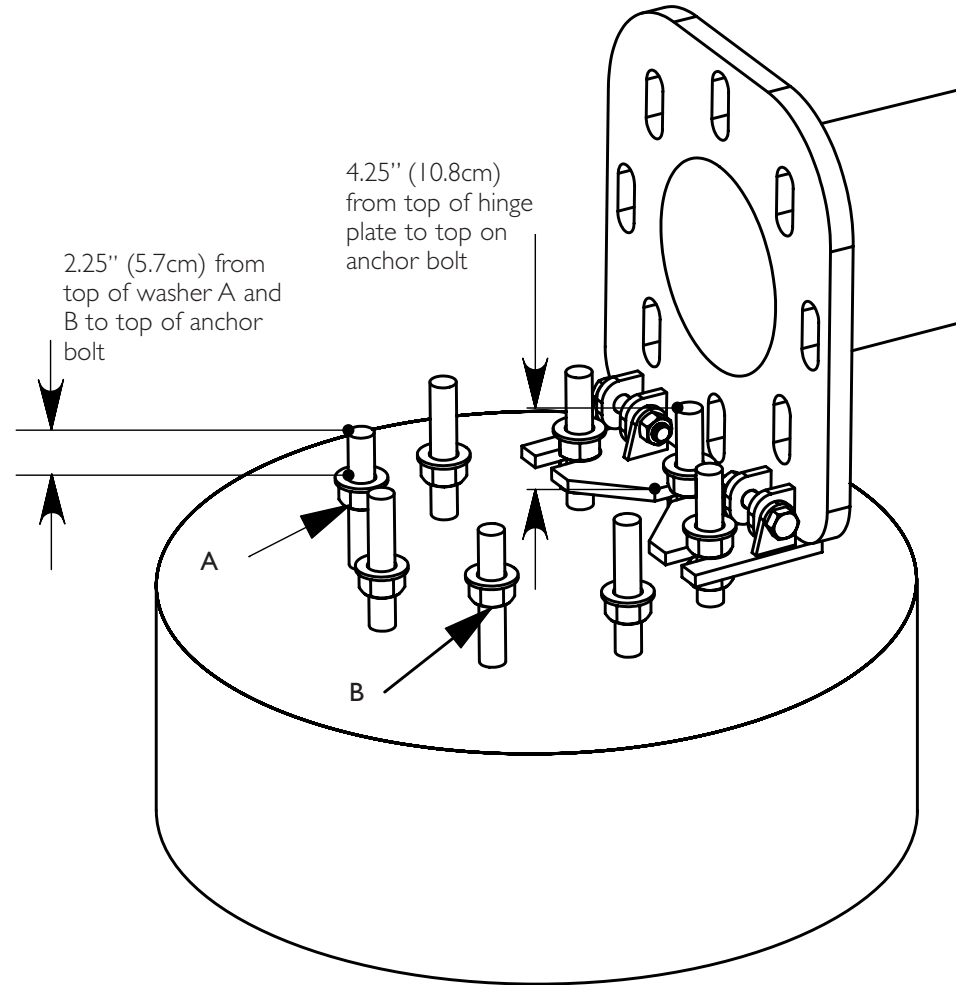


Fig. 2C Hinge assembly and nut placement.



- Using an M16 nut and bolt install one of the gin pole cables on the lever arm of the gin pole. Using a shackle supplied with the gin pole secure the opposite end of the cable to the tower. Refer to the Figures A and B below.
- Install the second gin pole cable to the weldment on the gin pole using the shackle provided.
- Securely connect the other end of the cable to the vehicle to be used to raise the tower.



**TIP:** The tower is now set to be raised. Southwest Windpower recommends raising the tower once without the wind turbine installed. This permits checking the proper operation and installation of the hinge and gin pole and also allows inexperienced installers an opportunity to practice raising the tower without risking damage to the wind turbine.

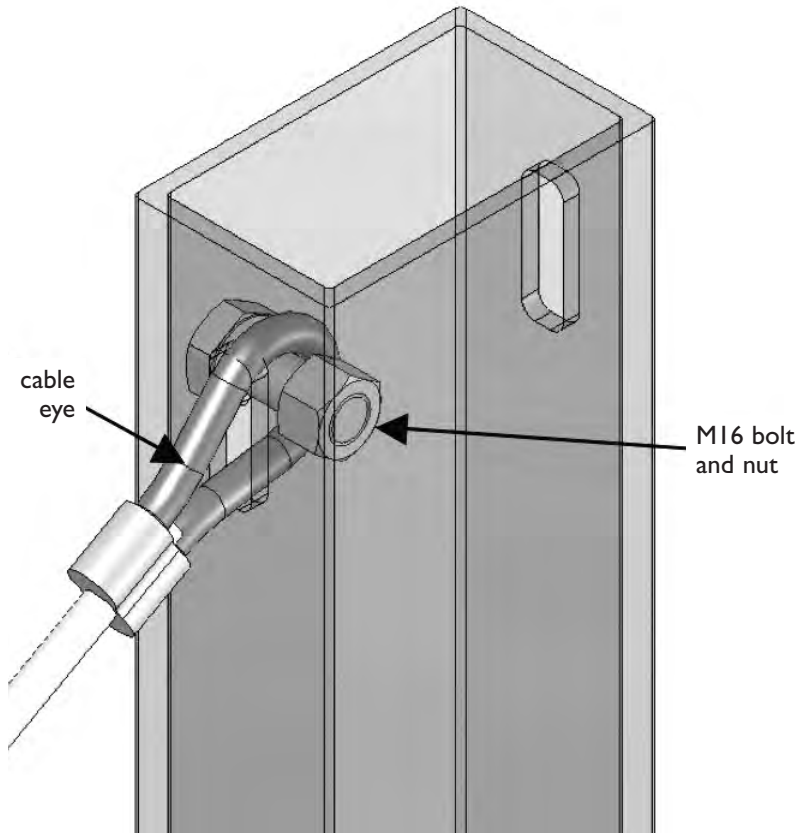


Fig. 3C cable-gin pole assembly details

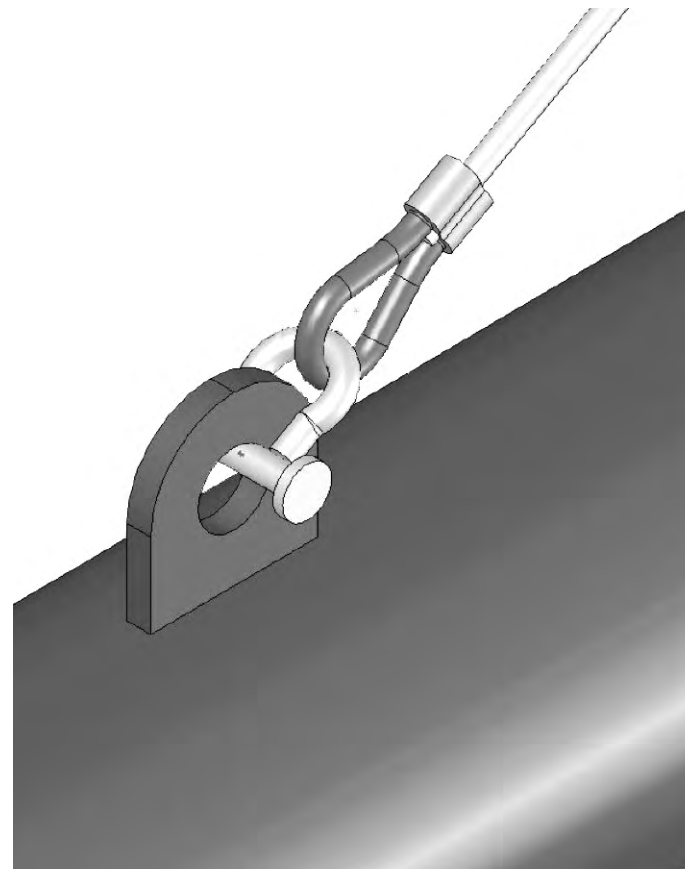


Fig. 4C cable-tower assembly details

### Three - Raising the Tower

Refer to your Skystream Owner's Manual for directions on mounting Skystream on the tower. If you have not raised a tower before it is also recommended to first raise the tower without the turbine. Raising the tower without the turbine provides the opportunity to practice the procedure without risking damage to the turbine.

A minimum of three people are required to raise the tower.

- Position the remainder of tower mounting hardware and tools close to the tower foundation.
- Securely connect the gin pole cable to the raising vehicle.
- Very slowly, drive the vehicle away from the tower taking the "slack" out of the cable. Keep the vehicle inline with the tower while slowly raising the tower.



**WARNING:** Use extreme caution when raising the tower. Keep well away and to sides of tower and cable. Beware of overhead power lines.

- As the tower approaches vertical it will reach a "balance point". At this point two people can take over from the vehicle and use the gin pole to manually "lower" the tower into the full upright position. The goal is to prevent the tower from "falling" into the final vertical position after it passes the "balance point".
- With the tower fully vertical and supported on the foundation bolts, install remaining washers and hand tighten remaining nuts.
- If the tower was raised without the wind turbine, refer to the Lowering the Tower section and follow the instructions. If the tower was raised with the wind turbine proceed to Leveling the Tower section.

## Four - Lowering the Tower

Lowering the tower is essentially the reverse of raising the tower. The same precautions should be observed, including positioning the hinge so the tower base plate clears the foundation bolts. As with raising the tower a minimum of three people are recommended.



**WARNING:** Use extreme caution when lowering the tower. Keep well away and to sides of tower and cable.

- Position suitable bracing support the top of the tower after it is lowered. The support should be located approximately 8 feet (2.5 m) from the top of the tower to clear the turbine blades.
- If not already in place, install the hinge plate by sliding the hinge between the lower and middle nuts on the foundation bolts. Slide the 7/8" diameter bolts that act as hinge pins through the hinge and tower foundation plate and snugly tighten the 7/8" nuts.
- Securely tighten the 1 1/4" nuts that secure the hinge to the foundation bolts. Check the distance from the top of the hinge to the top of the foundation bolts is 4 1/4". Adjust if necessary. Refer to Fig. 2C.
- Bolt the gin pole to the foundation plate and connect the cable from gin pole to the weldment on the tower.
- Connect the second cable to the gin pole and lowering vehicle.
- Position the vehicle so it is in line with the tower and there is approximately 1 foot (30 cm) of slack in the gin pole cable.
- Remove the remaining 1 1/4" nuts and washers from the foundation bolts.
- The lowering process is started by two people lifting the gin pole so that the tower starts to tilt and takes up the cable slack.
- Once the tower passes the balance point the the vehicle can then be used to fully lower the tower.



**WARNING:** Someone MUST be in the vehicle at all times to control lowering the tower. The "pulling" force the tower exerts greatly increases as the tower approaches the horizontal. In other words the tower is lowered using the vehicle brakes to slow the descent of the tower. During lowering keep the vehicle engine running to provide power brake assistance.

## Five - Leveling the Tower

Leveling the tower is most easily accomplished using only four of the eight foundation bolts. Once the tower is leveled the remaining bolts can be fully tightened to secure the tower.

Be aware that leveling the tower may require some trial and error adjustments – even though the base is level, the upper tower flange may be off level due to manufacturing tolerances.

To level the tower:

- Level the tower on a calm day to minimize movement of Skystream. Start by loosening all the upper foundation nuts about a full turn.
- Loosen and lower the four nuts on the “sides” of the foundation base plate. In other words the tower should be supported by the four “corner” nuts of the tower base plate. (refer to Fig. 2C, Bolts A and B are “corner” bolts)
- Using two bubble levels set perpendicular to each other on the base plate adjust the foundation nuts until the tower is level. Magnetic bubble levels may make this process easier.
- Once the tower is level tighten all nuts and recheck level.

Observe the position of Skystream on calm days. If the wind turbine seems to favor a single position with no wind, the tower may require fine tuning even if it appears level using the bubble leveling technique.

To fine tune the tower realize that the nose cone of the wind turbine will “point” in the direction of the tower low side. Therefore, to level the tower, slightly raise the side of the tower under the nose cone or lower the side of the tower opposite the nose cone. Make fine adjustments. Approximately one turn of a foundation nut equates to slightly more than 1/8” (6.4 mm) so even a half turn adjustment will make a difference.

## Six - Gin Pole instruction Sheet

### 6-1 Package Contents

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

- Gin Pole Kit (includes):
  - gin pole
  - two aircraft cables
  - two shackle
  - two M16 (metric 16 mm) bolts
  - two M16 nuts
  - three M24 (metric 24 mm) bolts
  - three M24 nuts

### 6-2 Preparations

Instructions to prepare the gin pole to lift the tower. This is to be done when you have correctly located the tower with respect to the foundation and have secured the tower to the hinge plate.

- Pass the eye of the cable through the slot, pass the M16 through the eye and screw the M16 nut on the bolt. Repeat for the second cable. See Fig. 3C on page 5.
- Slip the bottom of the gin pole over the bottom flange of the tower as shown in Fig. B on page 39.
- Secure the gin pole to the tower with the three M24 bolt and nuts
- The two cables will now be hanging down the gin pole
- Secure the cable on the side of the tower to the hinge tab midway down the tower with the shackle provided. You may have to pull slightly to ensure tension.
- Secure the other cable to your car or truck with the other shackle provided.
- You are now ready to lift the turbine-tower assembly, Fig. 5C shown here demonstrates your assembled gin pole.

Fig. 5C Assembled Gin Pole

