

## Appendix C



# Tower Installation Instructions

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## Skystream 3.7 Owner's Manual

### Appendix C: Skystream Tower Installation Instructions

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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 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.

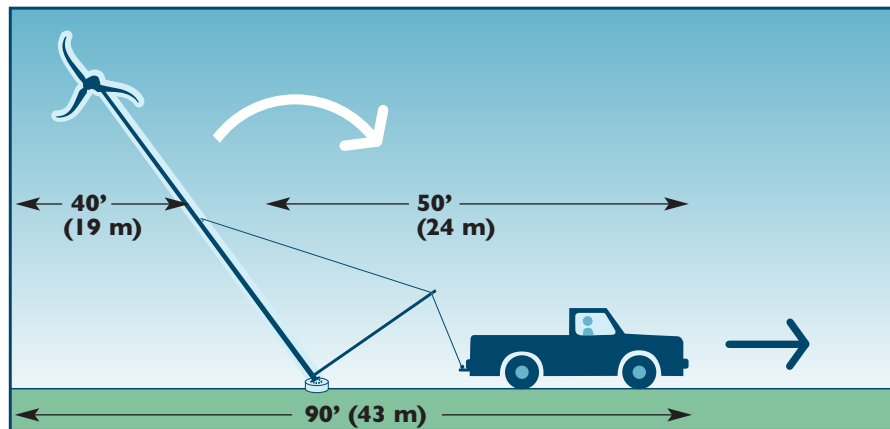


Fig. 1C

- 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.

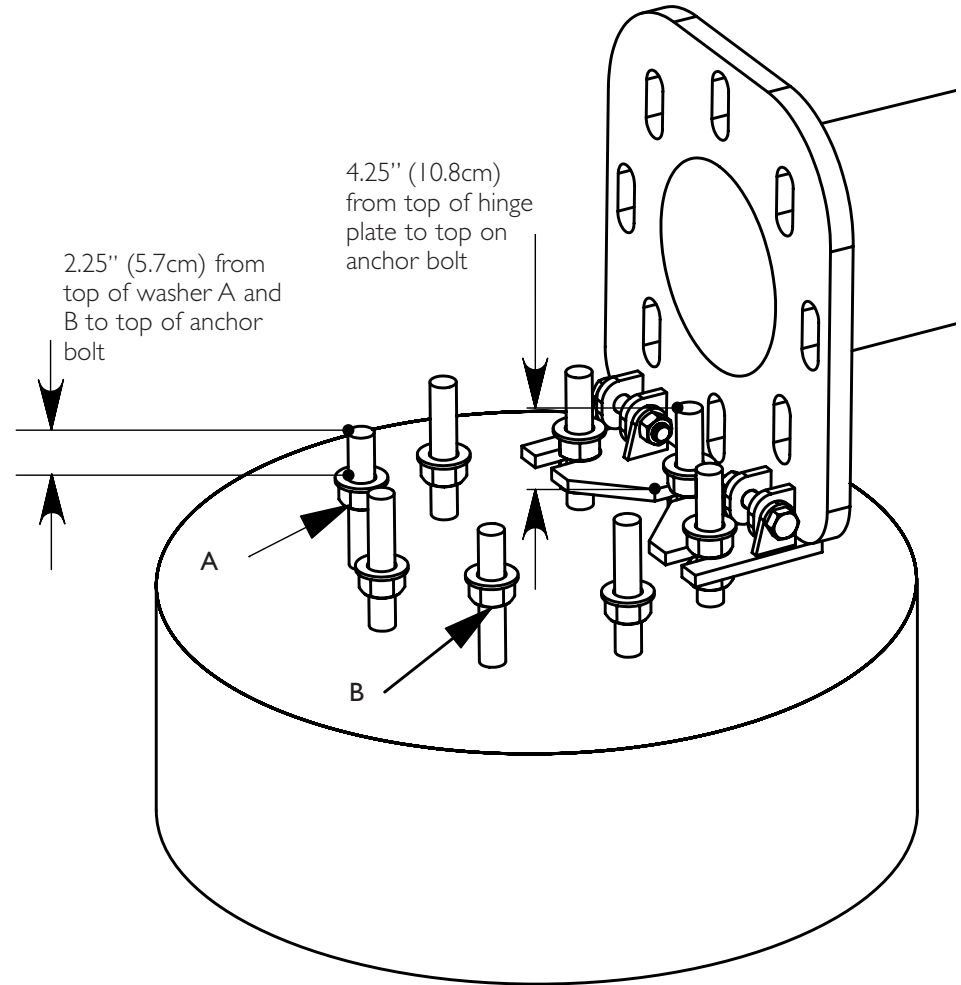


Fig. 2C Hinge assembly and nut placement.

- 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.

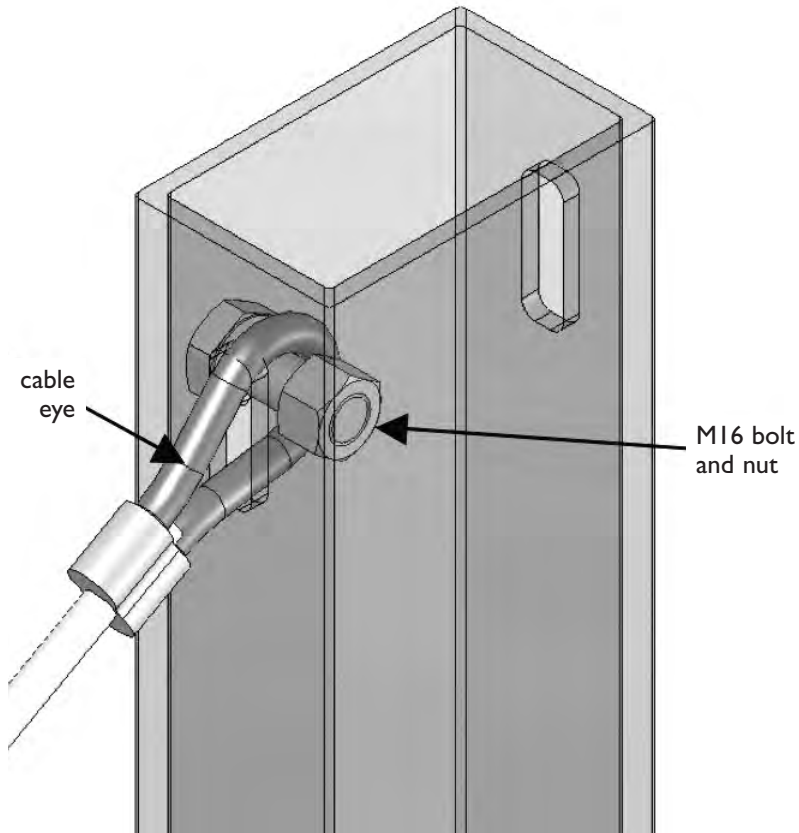


Fig. 3C cable-gin pole assembly details

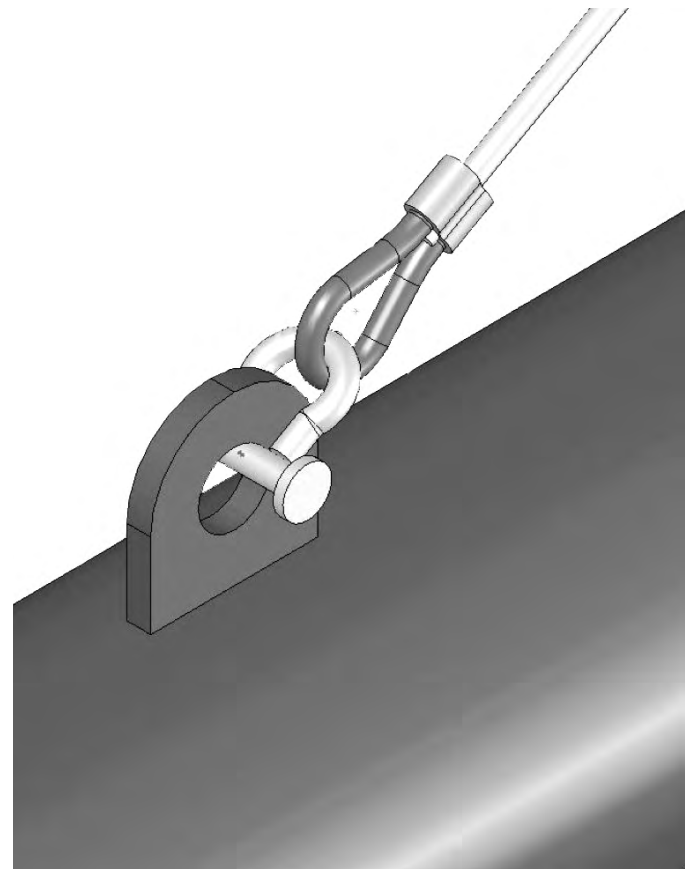


Fig. 4C cable-tower assembly details

### 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.

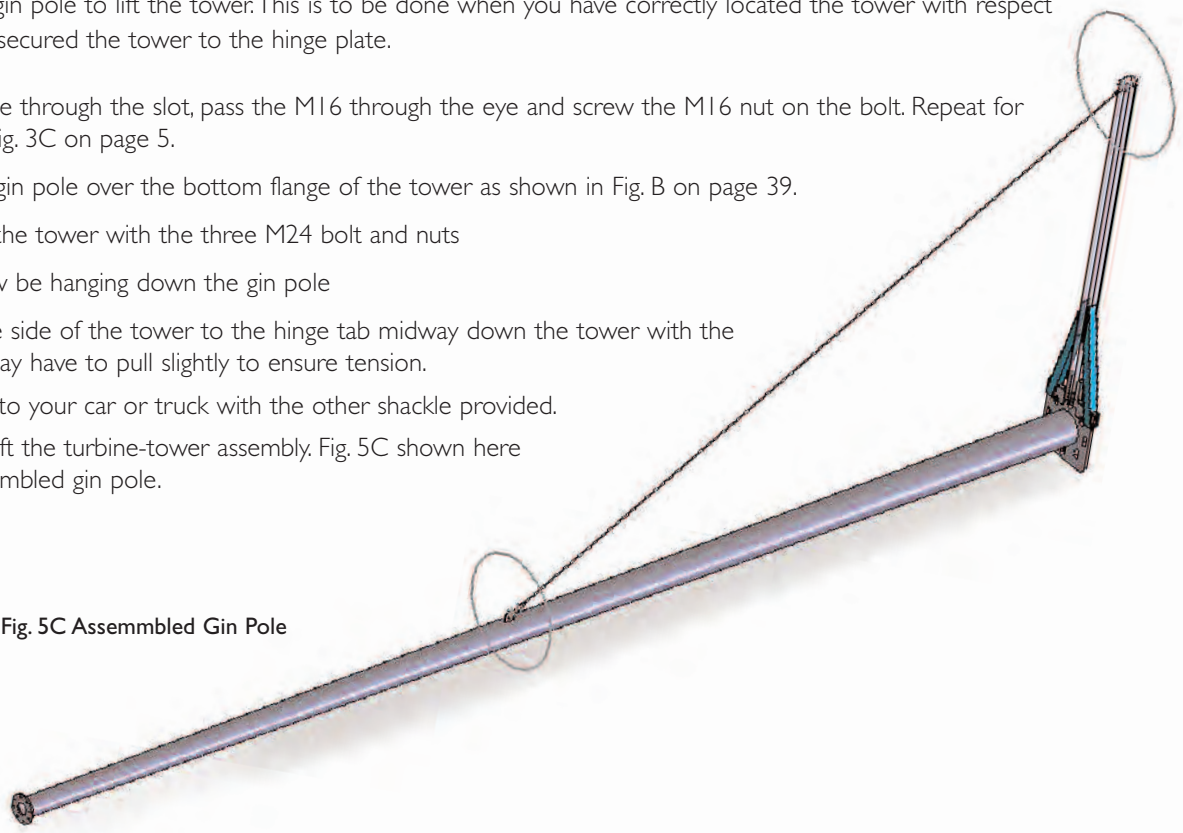
- Gin Pole Kit (includes):
  - gin pole
  - two aircraft cables
  - two shackle
  - two M16 (metric 16 mm) bolts
  - two M16 nuts
  - three M24 (metric 24 mm) bolts
  - three M24 nuts

### 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







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