



Arctic Tern Manual & Electric Roof Hatch Installation & Operation Guide

Thank you for purchasing an Arctic Tern Roof Hatch from Total Composites!
We hope you have a great experience installing and enjoying the Roof Hatch for years to come. Here are some tips and guidance. Please review before installing.

Installation considerations:

1. Both the electric and manual hatches require 12V power. The electric hatch needs power for the drive motor and for the LED lights. The manual hatch requires power for the limit alarm and the LED light. The limit alarm on the manual hatch gives an audible signal that lasts approximately 3 seconds when the full lock or full open positions are reached. This assures that the drive mechanism is not over stressed. See the operation section for details. The power supplied should be fused at 5 amps. A ground wire must be provided as well
2. The roof area where the hatch is installed must be flat and smooth. If you are installing this hatch in a curved roof, a solid flat frame must be fabricated from steel, aluminum or some other rigid material to serve as the base for the hatch. Stressing the hatch to tighten against an uneven surface can cause the opening mechanism to bind. A spoiler is available, and must be used if the hatch is installed with nothing blocking the direct blow of wind and rain to the leading edge of the hatch. Some people have solar panels and other structures that serve to block this wind. The blocking structure must be at least 1.5" tall, and within a few inches of the leading edge of the hatch. The reason for this requirement is that the foam used in the hatch seal is a filtering foam material that is intended to block dust, but allow a small circulation of air through the cabin. This foam can be replaced with $\frac{3}{4}$ " x $\frac{3}{4}$ " closed cell foam, if you prefer that the lid be fully sealed.
3. Before you begin the installation, be sure that you have the correct parts for the roof thickness that you have. This hatch can accommodate roofs from 1 $\frac{1}{4}$ " up to 2 $\frac{3}{4}$ " inches with the parts provided by the manufacturer. Tern Overland produces kits that allow for the installation in 1" to 1 $\frac{1}{4}$ " (25mm) roofs, and also in roofs from 2 $\frac{3}{4}$ " up to 3 $\frac{3}{8}$ " (85mm).
4. The hatch must always be installed with the hinge at the leading edge into the direction of travel. Never to the side or rear!
5. Be sure that sufficient framing exists in the wall structure to support the hatch all the way around. Additional framing may be needed in some roofs. FRP composite roofs do not require additional framing.

Tools and supplies Required:

1. Jig saw or other appropriate cutting tool to open the hole for the hatch
2. Carpenter's framing square
3. Drill with a 1" hole saw, and 7/64" bit
4. Piece of plywood approximately 24" x 32" to make a cut hole template
5. Marking pen
6. Phillips screwdriver
7. Small flat bladed screwdriver
8. A tube of high strength polyurethane adhesive (Silaprene® SolidBond™ distributed by Tern Overland is highly recommended, however Sikaflex 252 or similar may be used)

Installation:

1. Create a template out of plywood with a rectangular hole measuring 27 1/2" x 19 3/4". The corners should be cut out with a 1" hole saw as shown in Figure 1. Smooth the edges so that a nice line can be drawn around the template.
2. Position the template where the hole will be cut, and mark the roof for cutting. Make sure that the position of the cut allows for the installation of the spoiler, if used. The trailing edge of the spoiler should be located 3 inches ahead of the leading edge of the hatch mounting flange. See Figure 2. If the spoiler is not used, allow room to the closest structure to allow for full opening of the hatch. There should be 1/2" minimum clearance from the open hatch to the nearest structure at full opening.
3. Route 12V power fused at 5 amps and a ground wire to the trailing left hand edge of the hatch. The electric hatch comes with a fuse.
4. Cut the hole in the roof, just as you did with the template, and smooth the edges.
5. With the hatch sitting in the hole, test fit the black mounting clamps (all 11 of them) all the way around to ensure that they are the correct length to draw up tight against the roof. These clamps are designed to be trimmed if needed to accommodate a wide range of roof thicknesses. Unless you ordered a special roof thickness kit from Tern Overland, your hatch will fit into roofs from 1 1/4" to 2 3/4". If trimming is required on the clips, use a hacksaw to carefully cut them. Some of the clamps may need to be shorter than others. The clamps should be slightly shorter than the span they will be drawing up. See Figure 3.

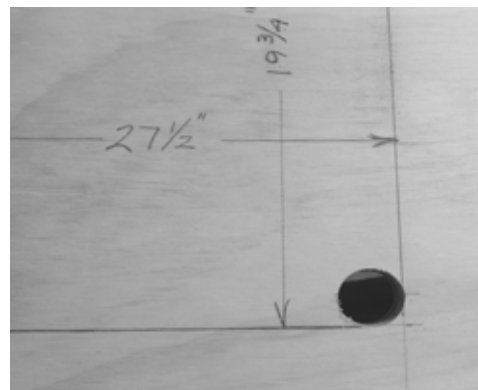


Figure 1

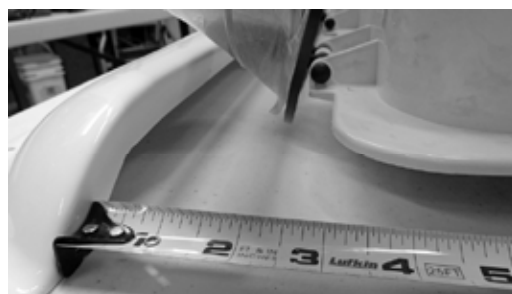


Figure 2



Figure 3

6. Once all the clamps have been trimmed, you are ready to glue the hatch in. Clean both the roof surface and the glue channel in the hatch with denatured alcohol and allow to dry. **Fill the glue channel with two generous beads of adhesive.** A typical installation requires a full tube of adhesive! You want enough to see a small amount of squeeze out once the hatch is snugged down. Place the hatch into the hole and gently press the mounting flange down all the way around. Water curing polyurethane adhesive requires humidity and temperature to cure. Insure your adhesive is completely cured before putting vehicle on the road. See adhesive manufacturer's recommendations.

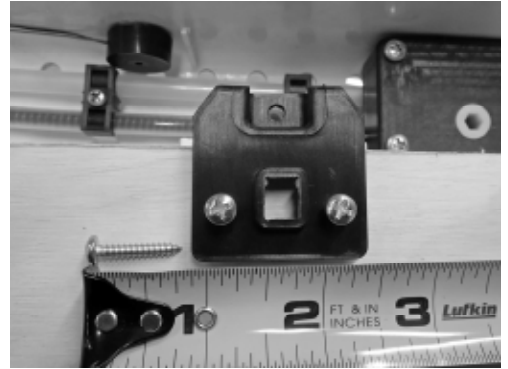


Figure 4

7. Working quickly, move to the inside of the camper and begin screwing the black mounting clamps into the ceiling using two $\frac{3}{4}$ " screws in each clamp as shown in Figure 4. Pilot holes ($\frac{7}{64}$ ") may be needed depending on the composition of your roof. Snug all of the screws down using a hand screwdriver. Do not over tighten. They just need to be snug. Once all the clamps are secured to the roof, install the longer mounting screws to draw the hatch and clamps together. It is suggested that you leave them all just a bit loose, then do the final tightening in a cross pattern to draw the hatch down evenly. Once again, a hand driver will give much better feel and prevent over tightening. The mounting flange should be drawn down flush with the roof surface, all the way around without distortion. Clean up any excess adhesive before it dries. Note: Different lengths of screws are available to draw the roof hatch down, depending on roof thickness. These screws should thread in $\frac{3}{4}$ " to $1 \frac{1}{4}$ ", but no more. If the screws you have do not fit within this range, different screws will be required. We try to supply the correct length screws based on the information we receive regarding roof thickness.

Screws that are much too long can penetrate the frame and jam the drive mechanism!

This is a good stopping point if you want to continue the installation later.

8. Now you may install the trim ring. Use the ten 1" screws to attach the trim ring. A $\frac{7}{64}$ " pilot hole will be required. The screw locations are shown in Figure 7. Leave these screws loose so that the wires may be pulled out for attachment. Make sure your incoming power and ground are situated near the corner where the hatch terminals are. For the electrical hatch, route the wires out the switch plate hole. It helps to have an extra hand for this step! Once all the electrical connections have been made, these screws can be snugged up.



Figure 7

9. **MANUAL HATCH ONLY:** Locate the electrical connection lug as shown in Figure 8. Both the wires from the interior LED trim ring and the incoming power/ground wires connect to the same ports. You will find the LED wires taped inside the trim ring. It is best to twist the paired wires together before insertion into the connection lug. A narrow bladed straight screwdriver is needed to tighten the lugs. Secure the wires with zip ties as needed and push them back under the trim ring. Once everything is secure, check to see that power is supplied to the LED lights. Skip to step 11.

10. **ELECTRICAL HATCH ONLY:** Route the 3 pin electrical connector through the switch plate hole and connect to the matching plug on the hatch. Connect the chassis ground wire and 12V power wire to the lug connector on the switch assembly, as well as the LED wires from the trim ring. Refer to Figure 8. You will find the LED wires taped inside the trim ring. Secure the wires with zip ties as needed and push them back into the trim ring. The switch plate may now be installed. Once everything is secured, test the function of the drive motor and lights.

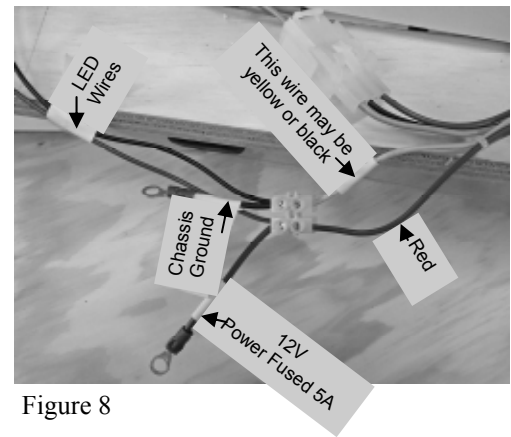


Figure 8

11. **MANUAL HATCH ONLY:** To prepare the crank assembly for installation, measure the distance from gear box mounted in the hatch to the interior roof surface. Add $\frac{3}{4}$ " to this measurement and cut the aluminum hex drive rod to this measurement. Deburr the rod and push into the black crank handle socket about $\frac{1}{2}$ ". Hold the crank assembly into the gear box and push to final seat the drive rod. Close the hatch completely using the crank. Remove the crank assembly. Now position the crank as shown in Figure 6, and install the crank assembly. Move the handle slightly to find the closest position where it will engage at this position. This step is critical to ensure that the proper locking tension is applied to the lid when closed. Note that an audible alarm will be heard for 3 seconds when the hatch is closed. This feature must not be defeated. Over tightening of the drive system can result in permanent damage. When properly installed, the crank will need to be turned a few degrees (about 10 to 15) past the point where the alarm sounds, to be folded into the lock position. It will feel springy. This is the correct operation of the crank latching system. The alarm will also sound when the hatch is at full open. Do not force the crank beyond this point.



Figure 6

12. With the hatch fully installed and functioning properly, snap in the LED light lenses, vent grids, and screw caps over the crank assembly or switch plate screws.

13. Read the operating instructions carefully!

Operation Instructions

MANUAL HATCH:

1. The manual hatch incorporates an audible alarm at the full open and full closed positions. This is to prevent over torquing the mechanism and causing permanent damage. To close the hatch, the alarm will sound 10 to 15 degrees before the handle is aligned with the locking slot. Continue turning that additional 10 to 15 degrees, and fold the handle into the locked position. This ensures that the locking pawls are fully engaged.
2. The LEDS are operated by a separate switch, simple on / off
3. The shell of the hatch is ABS and the dome is acrylic. Only use cleaners and polishes compatible with these materials. We recommend Novus products, which can be purchased from Tern Overland.
4. It is recommended to remove snow from the hatch before opening to avoid over stressing the opening mechanism

ELECTRIC HATCH:

1. The electric hatch stops automatically at the full open and full closed positions. The hatch may also be stopped at any point by simply releasing the switch. When closing the hatch, be sure to hold the button until the hatch has fully stopped. This will ensure the locking pawl has engaged.
2. The LEDS are operated by a separate switch, simple on / off
3. The shell of the hatch is ABS and the dome is acrylic. Only use cleaners and polishes compatible with these materials. We recommend Novus products, which can be purchased from Tern Overland.
4. It is recommended to remove snow from the hatch before opening to avoid over stressing the opening mechanism
5. The hatch should always be closed completely before the vehicle is moved.
6. An emergency crank is supplied. In the unlikely event that the motor fails, the emergency crank may be used to close the hatch. Follow this procedure. Cut the power to the hatch. Remove the switch cover to gain access to the drive gear box. Push and hold the white motor release button indicated in the photo in Figure 9. Insert the emergency crank into the white drive socket just off the end of the motor. Carefully raise or lower the dome as needed. If the system binds, try again to fully push the release button. Once the problem with the motor is resolved, normal operation may be resumed by simply activating the

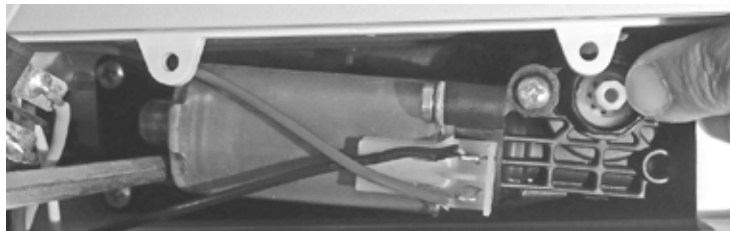


Figure 9