

Application of Transmitters in Small Insectivorous Bats

By Tim Carter – Ball State University ©2016

This “how to” is written primarily for students and other professionals that are learning to put transmitters on small bats such as little browns bats (*Myotis lucifugus*) or red bats (*Lasiurus borealis*). However, perhaps even the seasoned bat biologists may pick up a tip or two from this. The process of transmitter applications is very similar regardless of the bat species you’re working with. I have found that with this series of steps I can get transmitters to stay on some species for 2 to 3 weeks no problem. My record is over 30 days. However, some species do not tolerate transmitters well (*M. septentrionalis*) and will actively work to remove the transmitter and can have it off within a few days. Of course the type of glue you use will also greatly affect retention times.

Ingredients:

1. A bat!
2. A transmitter
 - If a solder-activation type...
 - a. Soldering gun (I prefer the newer battery powered units)
 - b. Solder (usually provided by the transmitter manufacturer)
 - c. Birthday candle
 - d. Lighter
3. A good headlamp
4. A telemetry receiver - to check to make sure the transmitter is working
5. A telemetry antenna and cable - to track the bat after you release it to make sure it gets off ok
 - a. Make sure your telemetry gear is frequency matched with the transmitters
6. Small scissors
7. Alcohol pads
8. Small soft brush (Tooth brush)
9. Transmitter glue (e.g., Perma-type or equivalent)
 - a. Cut off three-quarters to seven-eighths of the applicator brush. The “factory” brush attached to the lid is way too large for bats!
 - b. Small disposable paint brushes work very well also
10. Extra set of hands (a helper)
11. Baby powder (small travel size is plenty for the summer!)
12. Appropriate WNS decon supplies

The Process: **Please read this write-up in its entirety before you go into the field.**

1. After your capture the bat you will want to do your entire work up of the bat (determine and record gender, forearm length, mass, put on band, etc.).
2. If you have helpers get one of them to hold the bat or place the bat in a secure and safe holding bag.
 - a. If you are by yourself read the section below about doing this process with one person.

3. Activate the transmitter per the manufacture's instructions. Use a telemetry receiver to confirm the transmitter is working and to determine the best frequency for your equipment. To water-proof the solder-activation type transmitter I remove the wax that is on the transmitter from the factory (I can't get that to work well for me). I use a birthday candle and hold above the lighter flame (but don't light it) and when the wax melts I "paint" the wax with the candle wick over the wire leads to water proof them. Careful not to add too much wax as it does add to the weight of the transmitter. Obviously if you are using magnet activated transmitters they are already sealed and ready to go with no further water-proofing.
4. To get the bat ready for the transmitter: I like to have my helper sit down in a chair and place the bat on one knee with its wings stretched out to each side. The helper can hold the bat in place with light pressure to the wings. The head of the bat should be pointing toward the helper. By doing this the bat should be fairly immobilized and it will allow you good access to the bats mid back area. **NOTE: all pictures were taken prior to WNS. Latex gloves can be worn, but I find they reduce my dexterity. I usually don't wear gloves and disinfect and wash my hands after working with each bat.**

5. Using a small pair of scissors (I like the curved nail scissors) to trim the fur from between the shoulder blades of the bat. If necessary you may need to hold the bats head down so it doesn't move too much. You can also "give" the bat a glove or something else to chew on to keep its attention. You will need to trim an area of fur about the same size as the transmitter. Trim the fur as close to the skin as possible. Be very careful to not cut the skin. Make sure there are no folds in the skin as you cut the fur or you will cut a chunk of skin off!



- a. If you do cut some skin don't freak out. The bat will be fine. The next few steps will clean the wound and the glue will help seal it closed. Just don't do it again ;-)
6. To clean the skin: All animals have natural oils on their skin that will reduce the hold of the glue. I use a disposable one-time-use alcohol pad. You can get a box of 100 for a few bucks from your local pharmacy. Ring out any extra alcohol so it is just moist. Then use the pad to wipe down the area you just trimmed. Get the surrounding fur a little bit also. Now you will need to dry the area. I find that blowing on the bat will speed the evaporation. You can also use a small brush (old tooth brush works very well) to help brush the fur and speed up drying much like someone might dry their hair with a brush and a hairdryer. Be careful when blowing on the bat. If you blow too much - too quickly you will hyperventilate and could pass out (seriously!!); if you get light-headed stop and take a break – be careful standing up!
7. Glue application: Once the hair is dry you are ready for glue. If you have not done so you should read my write-up about transmitter glues. Apply the glue to the transmitter first as that seems to take the longest to get tacky. Apply glue to all sides of the transmitter and to the first quarter-inch of the antenna. Apply only enough to lightly coat the transmitter. You don't want gobs or pools of glue – but you also want to make sure that you have coated all parts of the transmitter. Now place the transmitter somewhere to set up. I like to use the edge of a table or tailgate of a truck. Hang the body of the transmitter off the side and use something

heavy to sit on the antenna to stop it falling off. Be careful about where you put it – make sure you or someone else doesn't walk by and knock it off or get it stuck to their cloths!



8. Applying glue to the bat: Start with just a little bit of glue on the brush. Remember less glue is better! Too much glue is added weight and it will take forever to dry! Be careful to not get glue on the bat's ears or head; you don't want to glue its head or ears to its back!! If you have a lively bat you may need to hold down its head during this process. Bring the brush straight down from above place the brush in the middle of the area of trimmed fur. Grind the brush a little into the bat's back (lightly!) to make sure the glue gets all the way down to the skin (these are skin glues and not hair glue!!). Now take the brush and stroke out from the center of the trimmed area in all directions creating a "glue bowl". Remember you don't need a lot of glue just enough to lightly coat the skin and hair.
9. Allow glue to setup: Now sit back and wait. Depending on what glue you are using it maybe ready now or you may have to wait for 10+ minutes for the glue to set up. Setup times will also vary depending on temperature and humidity. You will know when the glue is set up when you lightly touch the glue and it is tacky but nothing comes off on your finger. Often you will see little bubble appear as it gets tacky. Because of the bat's high body temperature the glue on the bat usually sets up first. So watch the transmitter and when it is ready the bat should be also.
10. Applying the transmitter: You get ONE shot at this so take your time! When the transmitter touches that bat the glues will bond – you can't pull it off and try again!! Hold the transmitter carefully by the antenna about an inch from the body of the transmitter. Find the flattest side and that's the side you are going to put on the bat. Again hold the bat's head if needed. If the "glue bowl" has closed up from the movement of the bat, tease it back open using the point of the scissors or some other object. Line up the transmitter with the bat's body. Start by placing the tip (not antenna end) of the transmitter in the anterior end (head end) of the glue bowl. Now lower the rest of the transmitter into place. Use the scissors or some other object to gently seat the transmitter into the bat's back – grind it in a little to make sure you get good glue to glue contact. Now fold over the hair from the glue bowl over the transmitter as far as it will go. On short-haired bats it will barely go past the sides. On longer-haired bats it will completely cover the transmitter and it will disappear into a hair sandwich! Make sure on the posterior part of the glue bowl that you pinch the hair around the beginning of the antenna that has glue on it. This will help anchor the transmitter in.
11. Final steps: Once you feel like the transmitter is seated well and the hair is all folded over you are technically done. The glue should have been dry before your applied the transmitter so you shouldn't have to wait for anything else. If there is any part of the transmitter exposed and the glue is still tacky you can add a very small amount of baby powder on the area. Apply just a little bit and rub it in. Then blow away any



extra and the tackiness should be gone – plus your bat will smell baby fresh now ;-)

12. When you release the bat make sure you watch it carefully. Occasionally a bat will not take well to a transmitter. You want to make sure that every bat you release takes off and maintains sustained flight increasing in altitude until you can't see it anymore. Use a powerful flashlight or spot light to make sure you can see the bat for a hundred feet or so. Also you can check with the telemetry receiver and antenna that the bat is truly flying around. If the bat does crash to the ground you can use the telemetry equipment to help locate it if needed. If your bat went into torpor during this process you may need to warm it up in your hands and “harass” it a little to get it fired up for flight.
13. Congrats – you now have days and days of tracking ahead of you! Enjoy!

The one-man (person) method:

If you are unfortunate enough to be doing this entire process by yourself then you need to A) figure out whom to yell at because this is really a two person job and B) get ready for a challenging job. This will take a fair amount of dexterity and lots of planning and patience!

Getting the bat ready: This basically replaces step #4 above. Everything else is essentially the same except you have to do everything with one and a half hands! You need to read the entire process above very carefully and lay out all your tools and plan out all your moves carefully before you begin. Things like opening a bottle of glue or tearing open an alcohol pack are very difficult if you have a bat in one hand!

1. Put on a light-weight leather glove on your non-dominant hand (if you are a righty then on your left hand). Now place the bat on top of your middle finger with its head toward the back of your hand. If you have small hands the bat will sit over your middle and ring finger. Slide the bat's wings down between your fingers and squeeze your fingers together. The bat should look like it is hugging your finger(s). The bat should now be semi-immobilized on your fingers. You will now have your right hand free to do the rest of the steps to attach the transmitter.
2. If you are dealing with a small bat and you have big hands you can try the method described above for two people, but place the bat on your own knee and hold it in place with one hand (using thumb and index finger). However if the bat is large or you have smaller hands the bat will bite you between your thumb and index finger – and that hurts like hell!! However, this method also renders you much less mobile should you forget something and have to go get it.