

# Satellite Tagging Technology Methods

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## ARGOS CLS

The only earth-orbiting satellite system which provides daily global location data for monitoring transmitters attached to wildlife.

We recommend setting up service well in advance of desired start date, providing ARGOS with general coordinates of release location to improve first day or two location results, and testing location accuracy with known location information in prior to deployment.

<http://www.cls.fr>



## PTT Manufacturers

PTTs or platform transmitter terminals can be made in a variety of sizes and shapes depending on your needs. Most companies will program the transmitters in advance and all you have to do is turn them on. Others allow you to program duty cycles yourself.

We recommend you define your research question and then explore transmitters and their options. Additional sensors may be integrated into your PTT (i.e. water temperature, dive depth, dive duration). Manufacturers cannot complete orders before receiving PTT identification numbers from ARGOS. In general PTTs take a minimum of 6 weeks to manufacture, so plan ahead.

For a list of certified ARGOS transmitter manufacturers see:

[http://www.argosinc.com/documents/list\\_manufs.doc](http://www.argosinc.com/documents/list_manufs.doc)

## Reference:

Eckert, Scott A., Data Acquisition systems for monitoring sea turtle behavior and physiology. In Research and Management Techniques for the Conservation of Sea Turtles. K.L. Eckert, K.A. Bjorndal, F.A. Abreu-Grobois, M. Donnelly (Editors) IUCN/SSC Marine Turtle Specialist Group Publication No. 4, 1999.

# Satellite Tagging Attachment Methods

## Methodologies

There are three basic methods to affix transmitters to sea turtles:

- 1) Tether
- 2) Harness
- 3) Directly to carapace using screws, guy wires, fiberglass or epoxy

The best method for your research will depend on the species and habitat (i.e. a tether may not be the choice in coastal or coral reef areas and a harness has been the choice for leatherbacks). The most common attachment for hard-shelled turtles has been with fiberglass or epoxy and the following recommendations will pertain to this method:

## Recommendations

Protect turtle from injury and shade from sun, rain, wind, splashing water

Prepare shell properly (smooth & dry) to ensure secure attachment

Position transmitter on carapace to best get transmission (usually 2<sup>nd</sup> vertebral scute – perhaps move forward on smaller animals)

Consider antenna orientation (forward for best for transmission, but vulnerable to shearing)

Avoid direct sun, as it will raise the heat in the epoxy/fiberglass – test all materials and become acquainted with their characteristics before using on turtle

Create a faring to reduce drag and, when dry, sand any sharp edges to avoid catching on obstruction or entangling in a net

Return turtle to water as soon as possible

## Common Mounting Materials

Fiberglass resin, hardener, and cloth

Silicone elastomer and catalyst

Cool setting 2-part epoxy (Foil-Fast® ,Power-Fast® )



## References:

Balazs, G.H., R.K. Miya and S.C. Beavers. 1996. Procedures to attach a satellite transmitter to the carapace of an adult green turtle. pp.21-26. In. Proceedings of the Fifteenth Annual Symposium on Sea Turtle Biology and Conservation. NMFS-SEFSC-387.

Eckert, S.A. and K.L. Eckert. 1986. Harnessing leatherbacks. Marine Turtle Newsletter 37: 1-3.

Mitchell, Sarah V. 2000. Poster presentation: Use of epoxy in telemeter attachment. pp.254-255. In. Proceedings of the Eighteenth Annual Symposium On Sea Turtle Biology and Conservation. NMFS-SEFSC-436.

Timko, R. E. and Kolz, A. L. (1982). Satellite sea turtle tracking. Marine Fisheries Review 44(4):19-24

# Satellite Tagging

## Attachment Methods for Hard-Shelled Turtles

### Secure Turtle

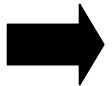
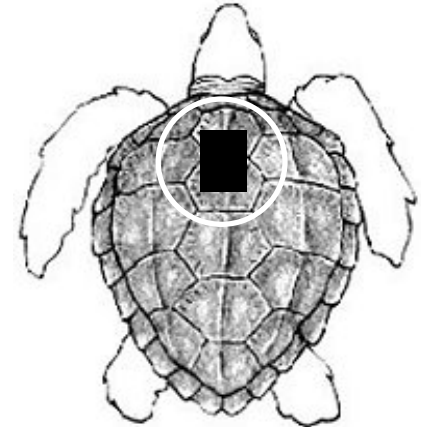
- Depending on your circumstances, you may wish to confine turtle in a pen or tub to keep it from moving about during the attachment process.
- Often draping a wet towel over the turtles eyes reduces its desire to move around.
- You can reduce the drying out of the skin with Vaseline, K-Y Jelly, or with wet towels.
- It is important to keep turtle shaded from sun, rain, or cold winds during the process.

### Preparing the Transmitter

- Transmitters should be tested **prior** to deployment!
- Painting the top and sides of the transmitter with anti-fouling paint **prior** to deployment may help in deterring fouling organisms.
- Turn transmitter on by removing or swiping with magnet. If you have a test box, check for transmissions, otherwise – have faith.
- Cover saltwater switches with electrical or masking tape to keep from getting adhesives on them. Seal computer ports with silicone and plugs if applicable.
- Sand or score the bottom of the transmitter with sandpaper and or utility knife and wipe with acetone.

### Preparing the Carapace

- Carefully remove epibionts from the area of the carapace you will affix the transmitter with a wood chisel or putty knife.
- Thoroughly scrub and clean area with a scrub brush, wipe clean, rinse with fresh water, and allow to dry.
- Lightly sand area with fine-grit sand paper getting rid of any peeling edges of the scutes.
- Wipe area with 70% alcohol or acetone to assure a clean dry surface.
- Draw an outline of your transmitter on the carapace as a guide for adhesive placement.
- Do not allow area to get wet or the adhesives won't stick!



### References:

Balazs, G.H., R.K. Miya and S.C. Beavers. 1996. Procedures to attach a satellite transmitter to the carapace of an adult green turtle. pp.21-26. In. Proceedings of the Fifteenth Annual Symposium on Sea Turtle Biology and Conservation. NMFS-SEFSC-387.

Katherine Mansfield, VIMS, personal communication

Mitchell, Sarah V. 2000. Poster presentation: Use of epoxy in telemeter attachment. pp.254-255. In. Proceedings of the Eighteenth Annual Symposium On Sea Turtle Biology and Conservation. NMFS-SEFSC-436.

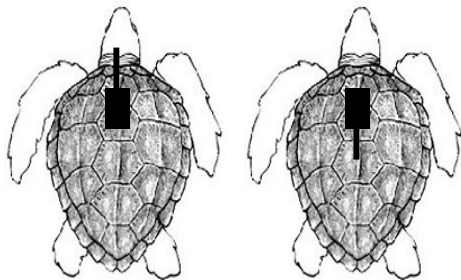
Sheryan Epperly, NMFS, personal communication

## Mounting the Transmitter

- You may wish to cover the turtle's head to prevent attachment materials or fumes from coming in contact with its eyes or face.
- Keep a towel handy to quickly wipe away any wayward adhesive and wear gloves.

### Part 1

- Create an even base for the transmitter to sit on using either a **cool curing** silicone elastomer with catalyst (NOT and adhesive) or with 2-part epoxy (adhesive).
- Consult package directions for mixing ingredients and work with small quantities (~ 4 ounces). If using epoxy, smear some on the bottom of the transmitter also.
- Work quickly to apply to carapace just so the transmitter is sitting evenly and material slightly seeps out the edges.
- Smooth the material with tongue depressor so there are no gaps under the transmitter and so that it creates a 90° edge with the carapace. **Watch to not cover saltwater switches!** If using elastomer you can cut away excess when dry, but not with epoxy. The epoxy is fairly manageable to mold with your finger just before it hardens.
- Sand elastomer and wipe area lightly with alcohol pad and allow to dry completely.



*Antenna orientation*

### Part 2

- Apply attachment materials around the sides to about half way up the edge of the transmitter. Be careful **NOT** to do this in direct sun!
- Try to spread materials on carapace so it is over more than one scute. If using epoxy, work as before and smooth with material up sides of transmitter and on carapace. **Watch out for saltwater switches!** Try to make as smooth as possible, but you can manipulate it a bit just before it hardens by pushing it lightly. If using fiberglass cloth and resin, work in small amounts (~ 2–4 ounces) and in layers (2-4). Use pre-cut strips of cloth fitted to the four sides of your transmitter. Follow package instructions and mix resin with hardener. Paint resin on carapace and half way up the transmitter with a bristle paint brush. One at a time, dip each strip in the resin so that it is saturated with resin and position on shell so it sits at a 90° angle, half on shell, half on transmitter. Spread resin with paint brush and tap out air bubbles.
- Work quickly and continually to tap out air bubbles and watch for drips or running.
- If resin or cloth accidentally covered the saltwater switch, score with utility knife before dry for easy removal.
- Allow to dry completely.
- If using fiberglass, repeat layers, next with longer strips over the top that will reach out to cross a scute. The last layer being resin only.

### Part 3

- Create a faring at the anterior end of the transmitter with either more epoxy or fiberglass cloth and resin as necessary.
- When everything is dry, sand any rough edges so the whole surface is smooth and free of snags.
- Remove tape from salt water switches and polish with sand paper.

## Protecting Antenna

- The antenna is the most vulnerable part of the transmitter. The more flexible it is, the more likely it will roll out of contact with an obstruction.
- Facing it to the back is one method of protecting it, but at a risk of fewer or poorer transmissions.
- You can protect the antenna by building a roll of fiberglass or epoxy in front of it to take the brunt of any impact to that area in either the forward or backward position.

## Release

- Check to make sure the turtle is in good condition and release!