

Design and fitting method for a thoracic harness to carry a tracking device, as recommended by SAVE for use on South Asian vultures

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The harness design and method described here is based upon the thoracic X-strap harness and fitting method described by Orr-Ewing, Anderson & Weston in Anderson *et al.* (2020: p.27). This method has been successfully used on Golden Eagles *Aquila chrysaetos* and White-tailed Eagles *Haliaeetus albicilla* in Scotland and on four species of *Gyps* Vultures in Asia. It is the method of satellite tag harness attachment approved by SAVE and recommended for use on vultures in South Asia.

Equipment needed:

- Ornitela or Microwave Telemetry 30g/Ornitela 50g or MTI 70g Argos/GSM tags (other tags and manufacturers are available)
- Teflon ribbon: 11.2 mm wide (0.44”) for 30g or for larger tags 17mm wide (0.55”)
- Prepared circular breast disc template made from a PVC milk bottle or similar material
- Linen thread (Hemline or similar, widely available)
- Surgical clamps (UK NHS or similar), 4 small bulldog clips
- Sharp knife (e.g. Stanley knife) and cutting board
- Small sharp scissors
- Curved needles
- Superglue/leather or general purpose glue (Bostik/Gorilla)
- Neoprene foam material
- Black permanent marker pen and white/silver paint pen with fine nib (Edding)

Attachment of the satellite tag to the harness is carried out in advance to reduce handling time of the bird.



Fig.2.1 Equipment and materials.

Measurements and preparations: Key stages/steps

- 1) Take two pieces of Teflon ribbon. Cut lengths - White-rumped Vulture - 760 mm for the back ribbon and 700 mm for the front ribbon; Long-billed Vulture - 800mm back/800mm front; Slender-billed Vulture - 860mm back/800mm front; and Himalayan Griffon Vulture - 920mm back/880mm front. For LBV/SBV and HGV use Teflon 55'' ribbon and for WRV either 44'' (for 30g tags) or 55'' ribbon.
- 2) For tags with single anterior lug (Ornitela or Microwave Telemetry 30g/Ornitela 50g tags), pass the front ribbon length (as above) from the top downwards through the front attachment lug at the front of the device using clamps to pull through as required. Tie a simple loop knot at the centre and over the lug making sure the loose strands are of equal length and the base of the knot when tightened will be flat with the underside of the tag. The knot can be lightly superglued as required but not essential. Ornitela tag requires attachment of neoprene foam base using leather glue (Bostik). The surface area of the neoprene base should be wide enough to cover whole tag including lugs. (Most other tags already come with neoprene base).
- 3) Take back ribbon length (as above) and pass from the top downwards through the two attachment lugs with the strap going flat around the back end of the device. When tight and with the two Teflon ribbon strands of equal length, press the ribbon against the back of the tag to prevent slippage, and then take each end of the ribbon back downwards through the two respective side lugs again from the top and then tie a knot at each back lug by passing the Teflon back through the tape loop. The two back ribbons will then be pointing backwards away from the tag. Ensure again that the two back ribbon strands are of equal length. No sewing is needed for these knots, however knot can also be lightly superglued as required.
- 4) Using a paint-pen, mark 150mm in a line across the four tape ribbons measuring from the edge of the knot outwards along the tape. Then mark each tape at 50mm intervals with a line across the tape and then at 10mm intervals dot the tape between the lines. This marking will ensure an accurate fit of the tag and equal back and front tape lengths when it comes to fitting.



Fig 2.2 Marked Teflon ribbon.

- 5) Using a thin plastic sheet or other durable material (e.g. UK plastic milk bottles), make round circular discs c50 mm in diameter. Using the black marker pen, mark the top and bottom of the disc at 3, 6, 9 and 12 o'clock. Using a black marker pen and a sharp knife, mark and cut out eight slits with sharp scissors around the disc and at 1, 2, 4, 5, 7, 8 and 10 and 11 o'clock (see images below), big enough through which tubular Teflon ribbon can be passed.



Fig. 2.3 Circular disc.



Fig. 2.4 Prepared harness.

- 6) Fit front two straps through the top two slits of the disc from 1 to 7 o'clock and 11 to 5 o'clock and therefore diagonally across the disc so the two front ribbons cross in the middle of the disc.

Restraint and hooding

Using this method, the tag is best fitted by one person holding the vulture upright whilst the person holding the bird is leaning against a table or similar. The holder of the bird will have one hand around the legs of the bird with finger between legs and another holding the neck below the head of the bird. The breast of the of the bird should face forward. A falconry hood should be fitted to keep the bird calm. The other person then fits the tag. An experienced holder will be able to help move the bird to allow ribbons to be easily passed under wings and manoeuvre the bird into the right positions for fitting the tag. This work is therefore best done by two experienced practitioners.

Fitting to the bird

- 1) Pass the front two straps attached to the harness over the head of the bird. Ensure tag is placed on upper back of the bird and below the nape where it should sit when finally fitted, and adjust disc to align with the sternum avoiding the crop. Then bring back two straps over and under wing, carefully ensuring that no wing feathers are caught up in the harness, and thread diagonally through remaining slits on disc from 4 to 10 o'clock and from 8 to 2 o'clock. All harness ribbons should now cross at the centre of the disc at sternum. Ensure that no ribbons are twisted. Clamp in place using surgical clamps or bulldog clips. Then preen ribbons into place (noting long flank feathers of e.g. Long-billed Vulture) to ensure that ribbons are next to the skin of the bird. Using clamps/bulldog clips to hold ribbons in place on the disc, adjust ribbons to ensure good fit on bird allowing two index fingers to fit under tag on back of bird. Ensure that front and back ribbons are each the same length using the paint length markings on the four straps as a guide.



Fig. 2.5 Clamping the harness in place.

- 2) When the tag is correctly adjusted take a length of doubled linen twine passed through the needle and knotted at the two ends. Then with a curved needle sew through the middle of the four ribbons where they cross at the sternum, starting from the top of the ribbons to ensure no knots are on the underside of the harness and adjacent to the skin of the bird. The presence of the disc ensures that you cannot sew the skin or feathers of the bird. Sew through the middle of the four ribbons 5-6 times spreading the sewing across the area where the four strands of tape cross the sternum and to ensure that all

strands are tied in. Then seal the knot by sewing through it and binding it on the top side; and then remove the clamps. Check all four ribbons are correctly sewn together.



Fig. 2.6 Securing the harness.

- 3) Check the harness and fit of the tag on the bird again, by running your fingers around the Teflon loops and putting index fingers under the tag. Use a small amount of Superglue to seal the knot on the sternum. Cut the four ends of Teflon ribbon at the disc to make them shorter, and then seal each Teflon ribbon at the four ends and inside the hollow tubing with a strip of 5 mm of Superglue to prevent unravelling. Then carefully cut off the circular disc from the outside edges using sharp scissors, avoiding cutting the harness.

Reference

Anderson, D., Arkumarev, V., Bildstein, K. Botha, A., Bowden, C. G. R., Davies, M., Duriez, O., Forbes, N. A., Godino, A., Green, R. E., Krüger, S., Lambertucci, S. A., Orr-Ewing, D., Parish, C. N., Parry-Jones, J. & Weston, E. (2020). A practical guide to methods for attaching research devices to vultures and condors. *Vulture News* 78a: 1 -72. IUCN Species Survival Commission Vulture Specialist Group Technical Publication No.1. <http://dx.doi.org/10.4314/vulnew.v78ai1.1>