

THE MANUFACTURE OF LEG FLAGS IN THE LIGHT OF EXPERIENCE.

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The following article is an update of the article - Leg-flagging in Australia - Why and How? by Mark Barter and Megan Rush that appeared in Stilt 20. Diagrams are modifications of those appearing in that article. Since publication of the Barter and Rush article in 1992, the techniques employed by the Victorian Wader Study Group have been modified to cope with the demand for large numbers of high quality leg flags, needed by the VWSG and the Australasian Wader Studies Group.

Material

The material used for leg-flag manufacture is 0.5 mm thick unplasticized PVC sheet made by Imperial Chemical Industries in the UK under the trade name of "Darvic". Darvic has been used before for the manufacture of both colour bands and flags. The dyes are colour-fast and serious fading does not occur.

Darvic can be purchased from:
AC Hughes
1 High Street
Hampton Hill
Middlesex. TW12 1NA
UK

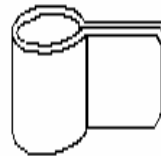
Tel: (0181) 979 1366
Fax: (0181) 979 5872

The plastic is manufactured by ICI in 6ft x 4ft (1.83m x 1.22m) sheets and AC Hughes will cut sheets up into 24 x 1ft x 1ft (30cm x 30cm) squares

upon request. The smaller size is more easily transportable and very convenient to handle. The need to purchase Darvic should be planned for well in advance as it can take over 8 weeks to obtain it from AC Hughes.

Manufacture of Leg-flags

Flags are made slightly larger in diameter (D) and the same height (h) as the equivalent Australian metal band (Table 1). This is to take account of the slightly larger size of the tibia in most shorebird species. In some species, which are size dimorphic, the larger sex may require a larger size leg-flag than the band. For example, some female Bar-tail Godwits require a size 8 flag. This may also be true for different sub-species so try the flag on before you "glue" it and keep a list of appropriate sizes for each species with the flags.



The basic design, illustrated left, shows that the flag portion has sides which can be glued to ensure that the leg-flag remains secure on the bird's leg.

The first stage in the manufacturing process is to cut the plastic squares into strips with a width which is equal to the height of the flag to be made (Table 1). This can be easily done on a sharp, office paper, guillotine. The wide strip which is inevitably left over at the end (unless you want to slice the tips of your fingers off) can be utilised by slicing off the

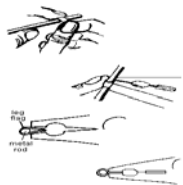
Table 1. Measurements for leg-flags currently used on Australian shorebirds.

Band size	Internal diameter of flag (D) - mm	Width of plastic strip (h) - mm	Length of flag blank - mm
03	3.0	5.0	27
04	3.5	5.0	30
05	4.5	7.0	32
06	5.0	7.0	35
07	6.5	8.0	43
08	7.5	8.0	43
09	9.0	10.0	45
10	9.0	10.0	45

appropriate widths at right angles to the original cutting direction. The yield will be virtually 100% if the width of the remaining strip is equal to the flag blank length required. Pre planning will achieve this.

Flag blanks are made from the strips by cutting to the desired length. The required blank length can be calculated by allowing for the circular part of the flag and for a flag length of approximately twice the flag diameter or use Table 1. Following trimming, the resulting flag length will be about 1.5 times the internal diameter of the band.

To make the flags you will need a metal rod such as a knitting needle or drill bit (a plastic rod can be used if metal is unavailable), of the relevant size (D) (Table 1), a shallow dish in which to heat water, several pairs of thick-nosed pliers and some dishes of cold water. It is important that the pan be clean and free from oil and grease that could coat the internal surfaces of the flag and interfere with the "gluing" action. The pan should be thoroughly cleaned with hot water and detergent (more than once if necessary).



Flags are formed by bending the blank around the rod using the thumb and index finger as shown here in the top diagram. The pliers are used to grip the plastic against the rod to form a circle

taking care not to squeeze the plastic against the rod as this will tear the plastic, see diagram 2.

The rod and blank are then held in the hot water for 10 seconds. The flag and pliers are then plunged into a bowl of cold water to set the flag into the new shape. The flag is gently slid off the end of the rod and left for a few minutes in the container of water. The cold water should be renewed at regular intervals as it heats up due to the pliers being plunged into it. The flags will not set properly if they are plunged into warm water!

It is very important to get the correct squeezing action so both the surfaces of the flag sides are firmly in contact with each other in the finished flag. If the sides are separated to any extent, the "springiness" of the flag tends to work against the "glue" when the flag is being attached to the bird's leg and satisfactory "gluing" takes longer. The possibility of subsequent separation of the flag sides, and consequent flag loss is also greater. It is

also important to make sure that the ends of the flags are square or the resultant flag will be twisted and therefore unusable.

Badly formed leg flags can be re-used by putting them in the hot water which will cause them to return to the unformed flat state.

Slightly mis-formed flags can be renovated by replacing them on the metal rod, gripping to the correct shape with the pliers and re-immersing for a short time in hot water. The flag can then be removed as before, and dropped into cold water.



The formed flags are trimmed with a sharp pair of nail clippers or scissors to make both sides of the flag of equal length and to remove any sharp corners - see diagram opposite.

Old 35 mm plastic film containers hold a convenient quantity of flags - don't forget to label both the lid and the base with the flag size.

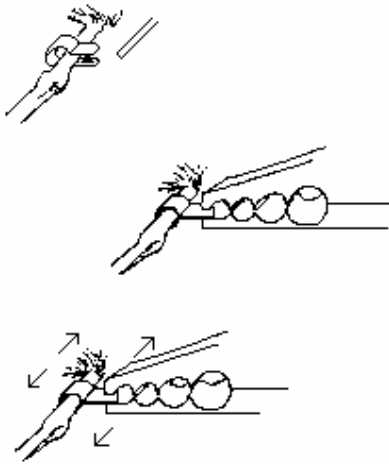
The trimmed flags are then air-dried, and thoroughly cleaned by agitating in a suitable solvent. Priming fluid for PVC pipes and fittings used by plumbers is suitable (Methyl ethyl Ketone, 53%, (V/V)). Flags should be cleaned for 20 seconds, air-dried again, clipped (see below) and kept in labelled containers. It is best to wash the bands outside away from any sources of ignition as Methyl ethyl Ketone is highly flammable. Do not leave the flags in the solvent too long or the legs will stick together making the flag useless.

Only clear Methyl ethyl Ketone should be used as the dye in the type used by some plumbers will colour the flags. This is especially important when flags are washed in red dyed fluid as the colours of the flags will change beyond recognition.

Leg-Flag Attachment

The most suitable method for "gluing" the flags has been found to be the solvent cement used by plumbers to glue PVC pipes and fittings (UPVC Solvent Cement, produced by Marley Extrusions Ltd, Lenham, Maidstone, Kent, UK, phone Maidstone 0622 858888 or fax 0622 858725). The solvent cement contains Methyl ethyl Ketone as a solvent and partially dissolves the plastic and upon setting, forms an adherent bond. Super Glue is

unsuitable as it does not work by solvent action and is not an effective adhesive for the hard, shiny Darvic surface especially in the marine environment. Additionally, Super Glue is more hazardous to use because of its propensity to glue “anything” to “anything”, including fingers to flags and birds and bird's legs to flags.



The most successful technique for attaching the flag is to, firstly, open the flag portion just sufficiently to push over the bird's leg and then to place a drop of solvent between the flag sides using a screwdriver, whilst they are still separated by the leg (see top figure above). The flag is then pushed completely on to the leg and it should snap shut due to the inherent spring in the plastic. The flag sides are then clamped lightly with a pair of pliers for at least 20 seconds until the solvent has had time to dissolve some of the plastic and then evaporated sufficiently to hold the two sides together (see middle figure above). The exact drying time will depend on the air temperature. It is important to only use just enough solvent to cover the joint surface when the sides are clamped by the pliers. Excess solvent will be squeezed out and may cause the flag to adhere to the feathers on the bird's leg. It is good practice to continuously move the flag relative to the leg whilst the flag is clamped by the pliers (see lower figure above). The solvent evaporates rapidly and a flag that is moving freely on the leg after 20 seconds will remain free thereafter. Slide the pliers gently from the flag, as opening them may cause the flag to spring open if they are contaminated with solvent.

Birds can then be released after checking that flags are properly glued and moving freely on the leg (see lower figure above).

It is very important not to open the flag sides too much during application to the bird's leg or the flag will become permanently distorted and it will be difficult to get a satisfactory bond between the two sides of the flag.

Removal of Leg-flags

Sometimes retrapped birds have been found that have worn or faded flags. Flags are easily replaced by gently cutting the “legs” of the flag near the birds leg and this will enable the flag to be removed.

ACKNOWLEDGMENTS.

Special thanks go to Doris Graham of the Victorian Wader Study Group for organising leg-flag making “parties” where members of the VWSG spend many hours over hot pans in sometimes trying circumstance to produce the many thousands of flags used in Victoria and the north-west of Australia.

REFERENCES

- Barter M. & M. Rush. 1992. Leg-flagging in Australia - Why and how? *The Stilt* 20, 23-26.