



## SS Fin Straps by Simon Richards



### BACKGROUND

The definitive article on spring fin strap construction by Dave Dalton, Jr. and Dave Dalton, Sr. can be found at <http://www.cisatlantic.com/trimix/fins/sprstrps.htm>. The following idea is a variation using the same basic construction.

### END CAP AND D-RING METHOD



This method is based on the use of a rubber end cap and the D-ring attachment method from the Dalton's instructions. The D-rings I used came from <http://beaconfabric.com> (search on the term D-ring).

Also in a slightly different form:



What I did was:

(1) Obtain some rubber end caps. McMaster-Carr <http://www.mcmaster.com> supplies both vinyl and rubber end caps with 1/2 inch internal diameter (9753K48 and 6448K53); I got some of each, and there really doesn't appear to be much in it, but the rubber ones are harder to drill neatly so I used the vinyl ones.

(2) Place the rubber end caps over the ends of each spring and cross-drill them:



(Putting them on the spring is an easy way of holding them for drilling.).

(3) Remove the end caps, slightly bend the spring ends in so that they should not accidentally become detached from the fixing hardware, and fit the cave line:







I used a bowline knot <http://www.porter-az.com/scuba/images/bowline.jpg> for the cave line. It's an excellent knot that creates an end loop that won't slip but should have some protection to ensure that the knot doesn't loosen up over time if the loose end flops around. There are a number of ways which this could be done; including using a half hitch, a rubber band, some electrical tape, or by tying a stopper knot (like a granny knot) in the end. I used some heat-shrink tubing over my knots. Greg used a bunt-line hitch <http://www.porter-az.com/scuba/images/buntline-hitch.jpg> which is a slipknot that snugs up tightly and doesn't creep or loosen up even when subjected to repeated loading/unloading. This hitch is also great for tying off cave line to bolt snaps for many other diving applications. It's a low profile hitch which requires very little line and has been used by seamen in wet environments for centuries.

Greg also had a neat method using compressed air to blow the cave line through the spring, whereas I looked more like a monkey with a stick ...

(4) Replace the end caps and insert a cut 1 inch D-ring through the cross-holes, checking that the D-ring also engaged with the cave line (by stretching the spring):



(Note that the version on the right in this picture has an over length piece of inner-tube over the whole strap - more on this below.).

(5) Remove the existing attachment hardware from the fin, and drill out the holes in the mounting lug a little

(6) Cut some one-inch lengths (just under, actually) of hollow steel tube and insert them into the enlarged holes using channel lock pliers:



I used 4.5 mm internal diameter/5.0 mm external diameter/0.25mm wall thickness stainless steel thin wall tubing from McMaster-Carr (50415K214).

(7) Fit the D-rings to the fins and close them up with channel lock pliers - see:



Here's how Greg Porter's turned out. Greg used Duane Liptak's suggestion <http://www.porter-az.com/springstraps-a.htm> for using 10/4 electrical cable sheathing for the spring covers:



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### **INNER-TUBE COVER VARIATION**

The Extreme Exposure straps have a length of tubular webbing over the spring. I assume that this is to reduce the possibility of line becoming trapped between turns of the spring when they are stretched. For my straps I placed an over-length piece of inner tube over the whole strap prior to step (4) above. It is not fastened to the end caps, but just "floats" over them:



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and



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and the Extreme Exposure straps:



I do not know whether or not the covering is a good idea or a bad idea. However, it will be easy to cut the inner tubes off if they are no good, but it would be more difficult to "retrofit" them later (because the D-rings would have to be opened up again).

#### **OTHER COMMENTS**

The motivation behind these methods was not to address any problems with the functioning of the Dalton's or EE straps, but to come up with something which can easily be constructed with hand tools only.

I was initially concerned about the theoretical possibility that the cut D-ring could pull apart, but these fears were immediately dispelled when I tried to remove one of the D-rings with a pair of grips and found it very tough.

The hollow tube idea comes from the Daltons' instructions, which they report as being suggested to them by Brett Dodson. The idea behind it here is to reduce the likelihood of damage to the fin lugs from the ends of the cut D-ring, either when they are inserted or as they rotate during usage. It should also further strengthen the D-ring attachment (It increases the angle which the cut ends would have to bend through to get free.). I drilled the mounting holes out a little because I was concerned that the lugs might split after a while with an oversize piece of tubing inserted through the holes.

The EE extra large straps are about 12.5 inches long, compared with the 11 inch McMaster-Carr (#3932K24) springs usually recommended. Dave Dalton pointed out that this is the longest spring which McMaster-Carr supply in the recommended wire diameter (0.062 inch) (they do supply longer "continuous length extension springs" in the adjacent wire diameters). I adopted the rather pedestrian approach of stretching the center couple of inches of my springs by an inch, to give a 12 inch length (I have size 11 feet). Clearly this is not ideal, but this has not been a problem (Otherwise the ends of springs would also have been failing where these have been bent, when people shorten springs.). At least the center part is hidden by the rubber tubing.

Over the past few years these straps have done hundreds of cave dives and continue to hold up well.

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