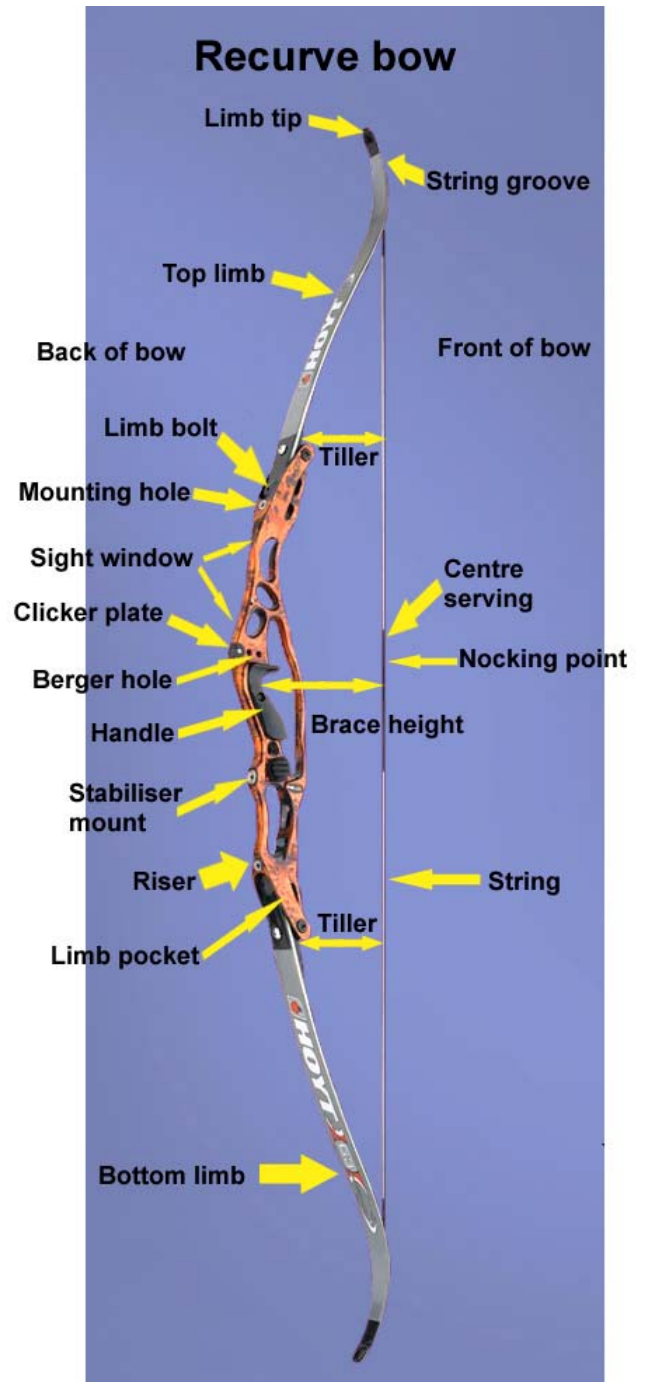
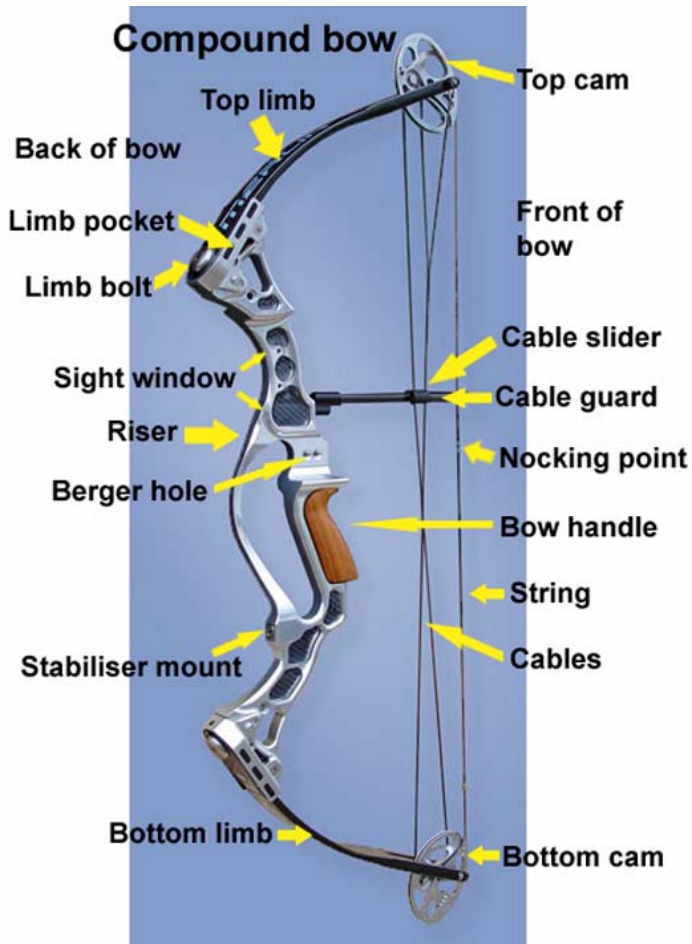


Compound and recurve bows

The following information is focussed mainly on recurve style archery, though much of it applies to compound, thanks again to Murray Elliot for the text.



Cams

There are four main types of Cam

Hybrid Cams



Hybrid cams are a mix of Dual cams and Single cams. The two cams are a different shape giving you the speed of a Dual cam, with the timing of a Single cam.

Dual Cams



Dual cams are the next step up from Target wheels. They help to increase arrow speed by having an exaggerated oval design.

Target Wheels



Target wheels the simplest type of cam and offer a smooth draw and release. They tend to offer less let-off than the other types of cam, usually between 55% and 65%.

Single Cams



Single cams were design to alleviate the tuning issues that Dual cams and Target wheels used to suffer from. Only the bottom limb has a cam, the top limb has an idler wheel with a central axle.



Equipment

This section is intended to provide the beginner and experienced archer, alike, with some insight into the various types of equipment available to us. Like all other sports, this information will quickly become out of date as progress is made in the design of better, lighter, stronger, more forgiving materials and their uses.

The ultimate attraction for some archers is not to shoot the best scores, but to have the best equipment - the shiniest riser, the most expensive limbs, the newest, most complicated looking sight. The "technoarcher" proliferates the shooting lines, but all archers should remember that no matter what we are shooting, the arrow will only go where we put it, and most equipment setups today are far and beyond the capabilities of their owner in terms of accuracy and consistency. Will we shoot better with a multirod stabiliser, a carbon riser and carbon/foam limbs? Maybe a little, but at the end of the day these things only make a difference to a good archer. Improving form and technique will produce a much more dramatic result than playing with new "toys".

Having said that, archery is almost as much a mind game as it is a physical one, and therefore anything that can increase the archer's self-confidence is good. If owning that nice shiny new bow will make you feel good, then go for it, but remember, there's nothing worse than buying a nice shiny new bow and realising you can't shoot it for buttons!

Bows

The modern recurve bow is a stunning piece of technological achievement. The lightness and strength of the riser, the accuracy of the limbs, the hi-tech materials used to make the strings all make for a lean mean shooting machine. This section is designed to give some insight into what these materials are, and what they mean to the average archer. The draw weight of the bow is usually written on the face of the lower limb.

The weight is noted in pounds (lbs) at a draw length of 710mm (28 inches), e.g. #20 @ 28. Which means at a full draw of 28 inches the force required to hold the bowstring at this length will be 20 pounds (approx. 9 kilograms). This 28 inches (as defined by the A.M.O. standard) is measured as 26.25 inches from the nock slot to the throat of the grip (usually corresponds to the position of the arrow rest) + 1.75 inches.

A VERY simple way to determine an approximate draw weight is to add or subtract 2 lbs for each inch more or less respectively (for more than 40 lbs add or subtract 3 lbs). A recommended draw weight for beginners would be between 15-20 lbs. for children and between 20- 25 lbs. for adults.

At competitive level, women can average a draw weight from about 28 lbs to 38 lbs, men can average from 35 lbs to 45 lbs, typically. Draw weights have decreased over the years as the performance of materials used in the manufacture of bows, arrows and strings have improved.

Selecting the correct bow length

Recurve bows range in length from 48 inches to 72 inches. Most target bows will average 66 or 68 inches in length.

As a rough guide to choosing the length of a bow to suit you:

Draw Length	Bow Length
Up to 27" Draw length	64"
24-29"	66"
27-31"	68"
29" or over	70"

Further complications arise in that these lengths can be made up of various combinations of riser and limb lengths, for example:
Hoyt and other manufacturers:

	Short	Med.	Long
Short Riser (23")	64"	66"	68"
Long Riser (25")	66"	68"	70"

And just to confuse matters further, Yamaha, Sky, Martin and other manufacturers also make 24" and 26" risers.

So – what's the difference? If I have a choice, should I go for a long riser with short limbs, or a short riser with long limbs? Opinions are mixed, and as always the advice here is to try as many as you can get your hands on, but to give you some rough guide:

Long handle, short limbs = Faster, more tendency to stacking, less stable.
Short handle, long limbs = Slower, more stable, less stacking.

Word of warning, however, some short risers can be difficult for people with long faces to shoot, simply because the pin can disappear behind the riser when shooting at short distances... let the buyer beware! As always, try before you buy.

Risers

The riser is the "heart" of the bow. Until approximately 30 years ago, most risers were made out of wood, often combinations of different types of wood, but the advent of modern materials (carbon arrows, Fast Flight strings) has meant that wooden risers could no longer cope with the strain placed upon them and the development of the metal-handled riser has been on-going ever since. Wooden risers are still fine for the beginner or "leisure" archer and

many good scores have been shot using them, indoors and outdoors, but the competitive archer must look at the metal alternatives in order to stay competitive. For target shooting at the top levels, you need enough arrow speed to give good sight marks, and little or no string creep, since many arrows are shot each day. This usually means using lightweight carbon arrows and strings made from Fast Flight or other modern materials, which impose large loads on the limbs and riser. Most wooden riser bows and most one-piece bows cannot take the loads from this equipment, and will almost certainly break eventually. There is also the issue of climactic variation, for example, wooden handle bows might have problems with variations in humidity which can affect the glues used to laminate them.

The majority of modern recurve (Olympic) bows are CNC machined. In years gone by, other methods were used to produce the riser:

Casting

Risers are typically cast using one of two methods: die-casting, and sand-casting. The casting alloy for both methods typically uses a mix of aluminium and magnesium. Die-cast risers were once the primary riser in the market and are still important today, especially in low to middle-of-the-range bows. Die-cast risers are cheap to make (relatively speaking), but the mould itself can cost several hundred thousand pounds. Cast risers have been known to break due to hidden flaws such as air bubbles or uneven dispersal of the component materials. For this reason, they are often designed to withstand over a thousand dry fires (release without an arrow). **DO NOT** try this at home!

Bows with cast risers available today include: Hoyt Gold Medallist, Yamaha Eolla, and the Samick Agulla

Forging

Forged risers have been available for many years. The riser begins life as a bar of material which is placed in a die and then hammered under high temperature and pressure into the die shape. This process results in a very strong riser, but which requires much machining and straightening before it can be sold. Forged-riser bows include the excellent Yamaha "Superfeel Forged". Most forged parts are painted rather than anodised, since this produces a better finish.

Forging is an expensive process and thus there are often fewer variations of forged risers.

CNC Machining

Hand-machined risers were being manufactured in small quantities in the 1960s, but the process is extremely expensive these days. Modern CNC machines which became available in the late 1980s provided the ability to mass-produce risers at a much lower cost and higher quality.

The first new CNC machined risers came onto the market in the early 1990s from companies such as Stylist and Spigarelli, however it was the large American compound bow manufacturers who ensured the success of this technology. Prices were as much as twice that of a cast riser due to the investment required in machinery and the higher material costs. (e.g. a Hoyt Avalon Plus or Elan, a PSE Zone, or a Stylist are machined from a solid billet of high-quality, stress-relieved aircraft grade aluminium alloy weighing more than 20 pounds, finishing up as a riser weighing less than 3 pounds. The result is a large amount of expensive waste)

In order to reduce the costs, risers can be extruded (pushed using extreme force) through a die to minimise the amount of machining required, but like the forging process, this results in metal which requires much straightening due to the pressures involved. (The PSE Universal is made using this process).

A well-designed machined riser on a recurve bow can, in general, withstand thousands of dry fires due to the high quality of the material. Again, **DO NOT** try this at home! Stories of Avalons cracking are well founded, but are simply due to the minimalist approach used to reduce the weight of the riser. The cracks are related to the machined holes and are not related in any way to a weakness in the process used.

CNC risers can be anodised – this provides a hard wearing finish.

Limbs

No - not the archer's limbs – the BOW limbs! The limbs are arguably THE most critical parts of the bow. Ultimately it is the movement of the limbs which imparts movement to the arrow. Any twisting, or variation between limbs during that process and it will be very difficult to put the arrows in the 10-ring. Good limbs are very forgiving of a poor release and feel smooth to draw. Poor limbs will punish a mediocre release.

The draw weight printed on the limbs is usually the draw weight at a draw length of 26.25" to the pivot point (i.e. the deepest point in the grip) or the draw weight at a length of 28" to the back of the riser. Unfortunately, on some bows this is 28" to the button... be careful when buying a bow that you know how this is measured.

In order to calculate, roughly, your draw weight from the marked weight on the limbs, take your draw length, measured from the nock to the throat of the grip in inches, then apply the following calculation:

$$\text{Actual_weight} = \text{marked_weight} - ((28 - \text{draw_length}) \times ((\text{marked_weight} / 20) \times 1.5))$$

e.g. If your draw length was 27 inches, and the limb was marked 38lbs then the actual weight would be: $38 - ((28-27) \times ((38 / 20) \times 1.5)) = 35.15$

Note that this takes no account of the fact that poorly made limbs will “stack”, this means that the increase in weight becomes non-linear, i.e. a small increase in draw length produces a proportionally larger increase in draw weight.

Materials

There are three main types of limb on the market at this point in time:

- Laminated wood and fibreglass (all manufacturers)
- Laminated wood and fibreglass and some carbon fibre layers (many manufacturers)
- Carbon fibres and a core made out of some hard foam (e.g. "Syntactic Foam" in the "Carbon Plus" limbs from Hoyt) or ceramics (e.g. in the "Ceramics Carbon" limbs by Yamaha)

Wood/glass limbs perform well in areas where the temperature and humidity stay constant, however, wood is prone to stretching and warping when heat and humidity vary significantly. Carbon fibre layers help strengthen the limb and reduce the tendency to twisting. Modern carbon/foam limbs are highly impervious to climatic changes, and are therefore the most consistent. Newer techniques for forming the carbon core (e.g. as used in the Border XP10 Evolution and Hoyt FX limbs) are reported to provide even more consistent limbs resisting twist to a high degree, especially at the limb tips where they are weakest – the manufacturers claim that this provides a more forgiving limb.