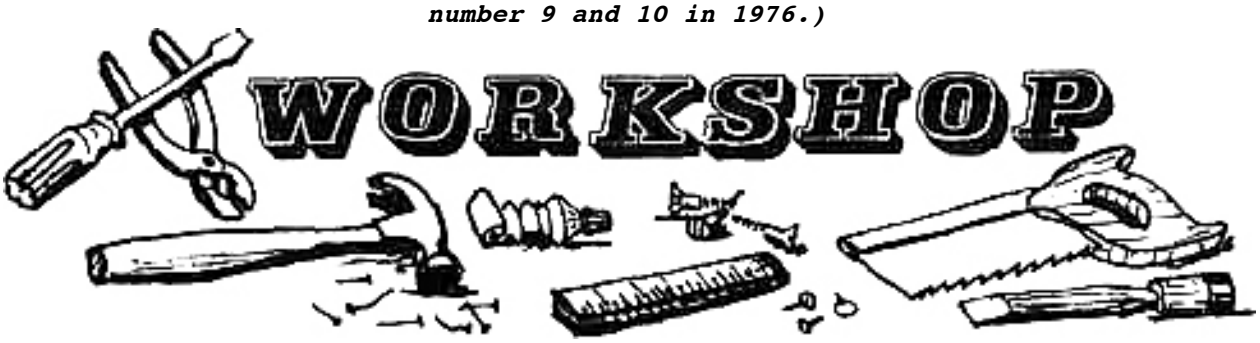
(Editor's note: This article is a slightly modified reproduction of the original which first appeared in the Australian Bowhunter magazine, issues number 9 and 10 in 1976.)

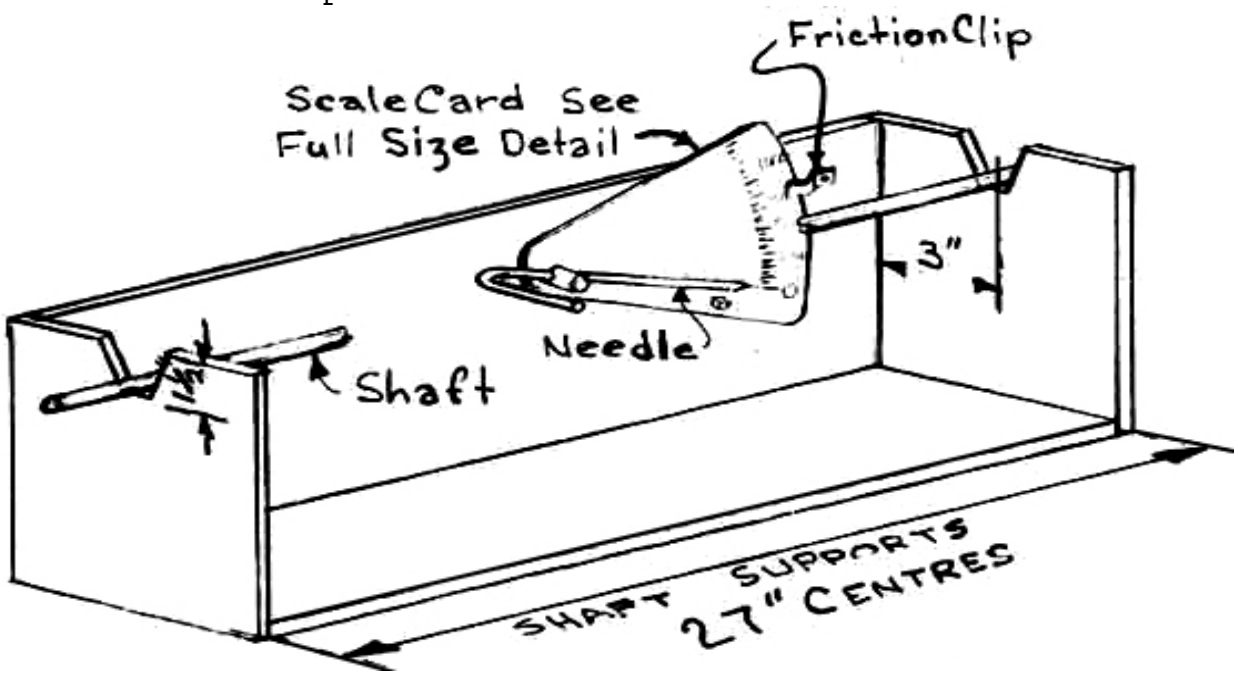


FROM AUSTRALIAN BOWHUNTER ISSUE No 9.

KEV WHITING SPINE JIG

(Adapted from a design by Denis Lambert)

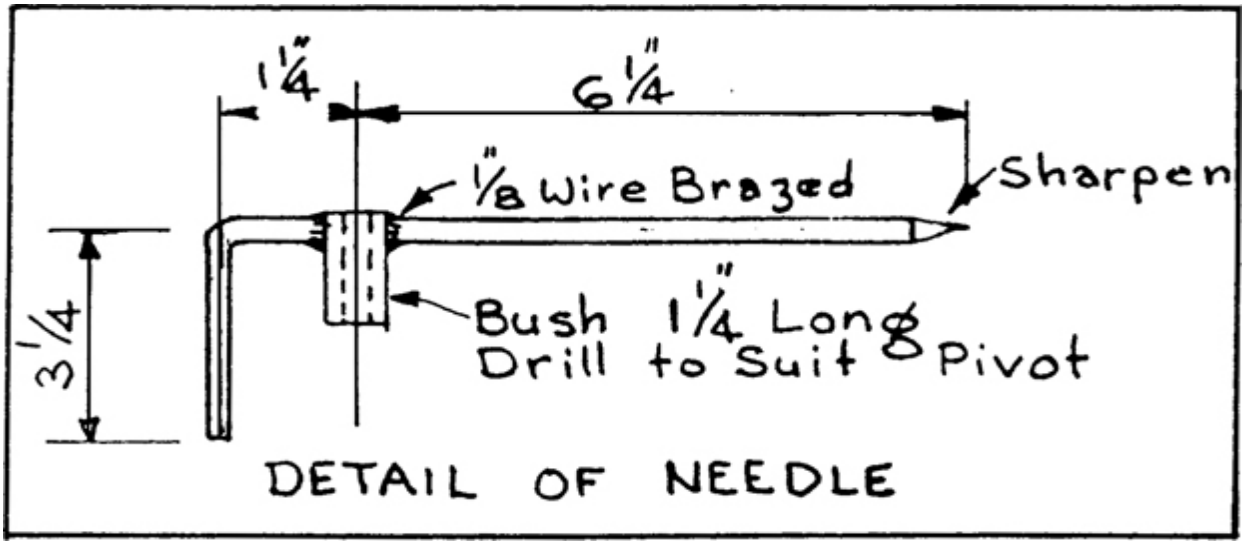
The jig consists of a simple box made of particle board or ply. It should be of rigid construction to prevent sagging which could cause inaccurate readings. Particle board of 1/2" thickness should prove suitable.



SHAFT supports are simple notches cut in the two end walls of the jig. The horizontal surface at the bottom of the notches should be filed to a rounded edge so that the shaft is suspended at a point rather than on a flat area. It is important that shaft supports are at exactly 27" centres[1].

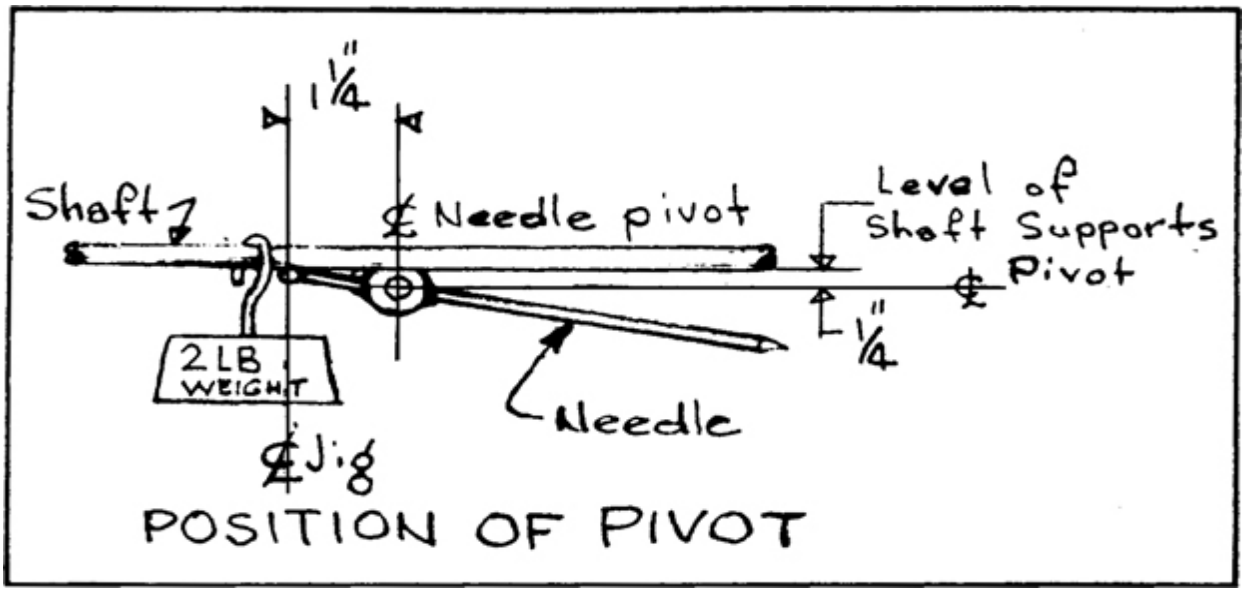
[1] The universal standard for measuring spine is for 26" centres. Although the dimensions of this jig show 27" centres, by substituting an 894g weight instead of the standard 2lbs (907g), the readings will then match those obtained on the standard 26" jig.

The needle must be accurately bent and brazed to a bush as shown in the sketch. A wire of approximately 1/8" diameter should be suitable. A pivot pin must fit the bush neatly without noticeable play. A pivot diameter of 3/16" should be suitable.



The position of the **pivot pin** is critical and must be placed as shown in the detail below. Care must be taken to ensure that the pivot pin protrudes from the back face of the jig horizontal and at right angles to the surface.

It could be advisable to adhese a stiffening block to the outside of the jig's back. By making the back thicker where the pivot occurs, we have a better base for the pivot.



The **scale card**[2] can be made by adhesing the full size drawing cut from this issue's supplement, to a stiff card or acrylic sheet.

[2] The dimensions shown on the scale card diagram must be strictly followed in order that a true reading may be obtained. When photocopying the diagram, it may be necessary to adjust the reproduction percentage up or down depending upon the copier used so that a correct size scale card is obtained. See page 7.

If clear acrylic is used, then the card is adhesed to the back of the sheet using acrylic cement.

If sheet aluminium is used it would be as well to treat the face of the card with clear varnish to make it more durable.

A **friction clip** should be mounted on the back of the jig as shown to prevent the scale card from slipping.

In **operation,** the shaft to be spined is placed on the shaft supports. The shaft will be resting at its centre on the bent portion of the needle. The scale card is then slipped through its friction clip until the Zero position on the scale card is exactly opposite the pointer needle.

Next a two pound weight is suspended from the centre of the shaft. The new reading on the scale shaft is the shaft's spine rating registered in A.M.O. units, or thousandths of an inch deflection.

SO WHAT?
Being able to determine the spine rating of a shaft is only the beginning. To determine the suitability of a shaft for a particular bow weight/draw length combination, a **spine selection chart**[3] is needed.

With the next issue of the Australian Bowhunter (No 10), a liftout chart will be provided as a free supplement. This chart is specially compiled for broadhead tipped arrows and is very comprehensive in so far as it relates Port Orford Cedar shafts to Aluminium and Glass shafts.

[3] The scale card and spine selector chart are included with assembly instructions on the pages 7 and 8, and instructions on use are on page 8. Because the scale card is calibrated for a 28″ draw, the spine selection chart is not needed if the basic rules of thumb for spining arrows are followed on the bottom of page 9.

FROM AUSTRALIAN BOWHUNTER ISSUE No 10.

SPINE SELECTION
In the last edition I described a spine rating jig. The jig was based on a design submitted by Dennis Lambert of Bremer River Bowhunters, and we found it worked quite accurately and was very simple in operation.

Being able to determine the spine rating of a shaft is, of course, only the beginning. To select the correct shaft to suit such factors as bow weight, arrow length and broadhead weight we need to refer to a chart of tables.

SUPPLEMENT
As a supplement to this issue, we have included a Spine Selector, which is fairly comprehensive, covering Synthetic shafts as well as wooden shafts. The assembly and operation of the selector are quite simple, but the following notes might answer some questions on spine selection which you could possibly ask.

ARROW LENGTH / DRAWLENGTH
Spine selection should relate to the Length of the arrow (measured from the back of the broadhead to the front of the nock groove) and NOT to the archer's draw length. The draw length is important in determining the actual poundage acting on the arrow when the bow is released from the full draw position. For example if an archer uses a bow rated at 50lbs draw weight (measured at 28" draw) but actually draws 30" then he is, in fact, holding a higher poundage, say 55 pounds. If he follows the normal practice of using arrows 1" longer than his draw length then he should refer to the chart to read spines relating to 31" arrow length and 55 pounds bow weight.

BROADHEAD WEIGHT
The weight of the field point or broadhead has an important bearing on the correct spine of an arrow as the weight positioned at the front of the shaft is a critical inertive mass. The heavier the head is, the more the shaft will bend on release as it first tries to shift the weight in front of itself.

For this reason, bowhunters using very heavy poundage bows are usually well advised to use the lighter weight broadheads if they are using wooden shafts. 11/32 shafts with a spine rating at 400 A.M.O. units or less (stiffer) are fairly rare and the supply of 3/8 shafts is quite unreliable; so to enable the Use of the more readily available 11/32 shafts with big bows, simply use a lighter head[4].

NOCK DIRECTION

Archers are often advised to position the nock groove at right angles to the stiffer grain of wooden arrows. This was relevant in the days when various timbers were used for shafts. Some of these timbers, such as oregon pine had strength factors ‘across the grain’ as much as 30% higher than they had ‘along the grain’. Not so with Port Orford Cedar. This timber is remarkable in that it is of consistent strength regardless or grain direction. Tests conducted on hundreds of P.O.C. shafts indicate that spine variations (because of grain direction) of 5% or more were quite rare. Some brands of glass shafts have a slightly stiffer axis at right angles to a s1ightly weaker axis, but here too, the variation is only minor. So go ahead, position the nock any way you like[5].

COLOUR CODING

The colours shown on the spine jig scale are used as a simple shaft grading system. When I determine the spine rating of a shaft I fit the appropriately coloured nock to it. Then when I determine the grain weight of the shaft I can ‘file’ it in a rack marked with the shaft weight only. Later I can select the shaft" from their weight-marked bin and I can tell at a glance by their nock colour that they are the correct stiffness. Similar identification could be made if a dab of coloured paint or ink was applied to the end of the shafts. Or, if the colours aren’t handy, then the first letter of each colour could be written on the shafts in pencil.

TOLERANCE

The allowable tolerance of spine variation depends on factors such as the smoothness of the individual archer's release, the amount of "centre shot" of the bow and the type of bow.

If a longbow or ‘shoot around’ riser is used then spine selection is quite critical and variations should be limited to about 50 A.M.O. units up or down.

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[4] The spine selector chart included with this article on page 9 can be used with the heavier heads so long as shafts of the required spine rating can be found. This claim applies only to Port Orford Cedar shafts available at the time the article was written. Judicious application of the rules of thumb of spining arrows on page 8 also allows one to extrapolate up to heads in excess of the 170gns shown on the chart.

[5] The editors of this article have not found this to be necessarily correct; possibly because the quality of POC has deteriorated in recent times. However, from the standpoint of safety, it is strongly recommended that the reed of the arrow grain lay against the bow and the rift always point forwards on the top of the arrow shaft as it lay in the bow (See notes 1 and 2 on page 8 and 9.).

With a centre shot bow, unless it is tuned 'coarse', (arrow plate packed well out) a much larger tolerance can be invoked. Finely tuned bows seem to be able to cope with spine tolerances of about 75 units up (weaker) and 100 units down (stiffer). An archer with a bad release, causing string disturbance, will find spine selection more critical than a bowman who releases smoothly.

COMPOUNDS

The experts have recently found that compound bows are in a special category when it comes to spine selection.

Because a compound's effective string length shortens as the cables are drawn back through the pulleys after release, even minor string disturbance tends to be exaggerated, and this in turn affects the spine bending of the arrow.

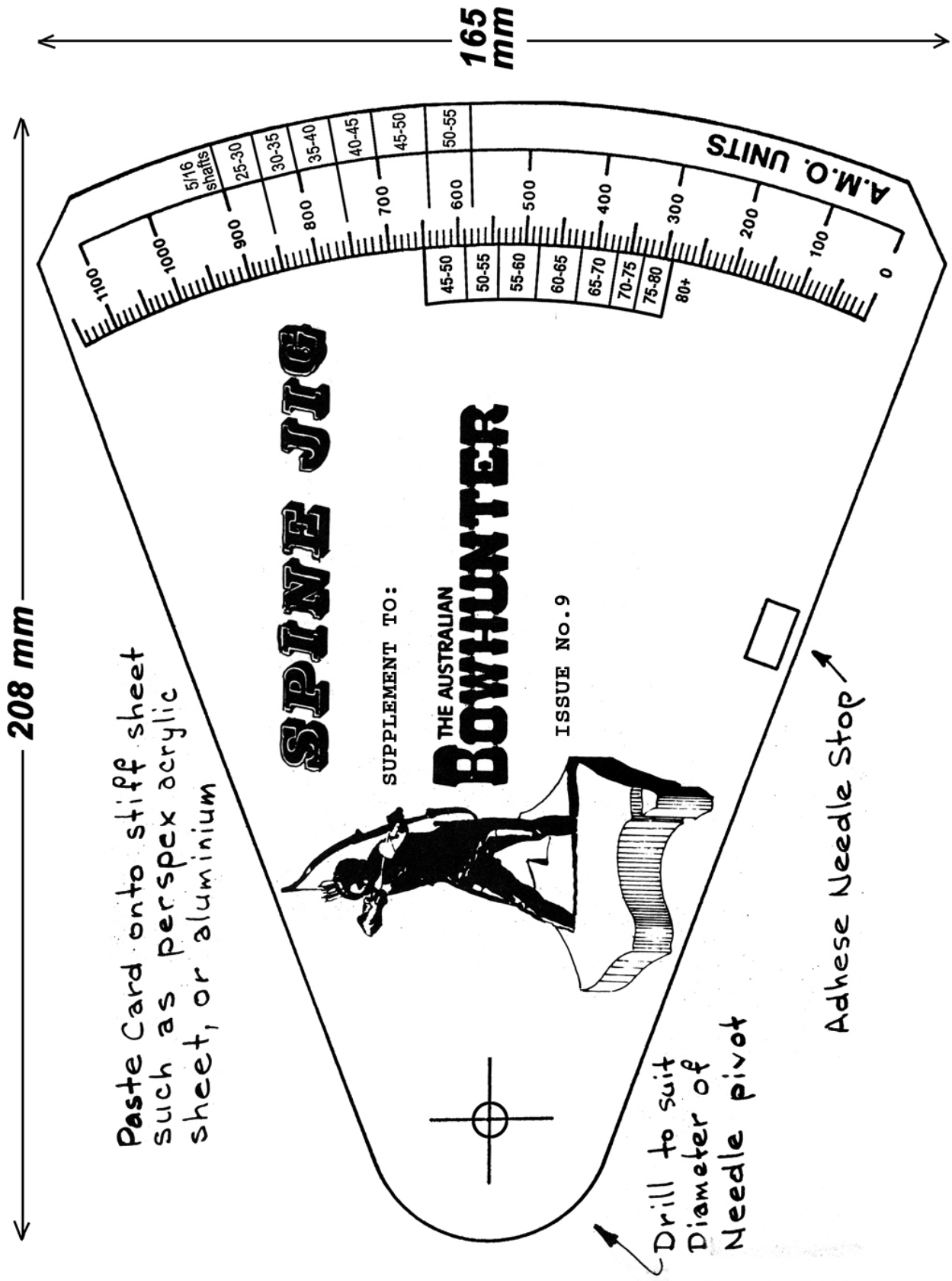
As a result of this, compound users are well advised to select shafts to match the bow's PEAK poundage or even slightly stiffer[6] if they are releasing with their fingers, whilst target archers using a release aid are able to match their shafts almost down to HOLDING poundage to get maximum speed and cast with the light weight arrows.

ACCURACY

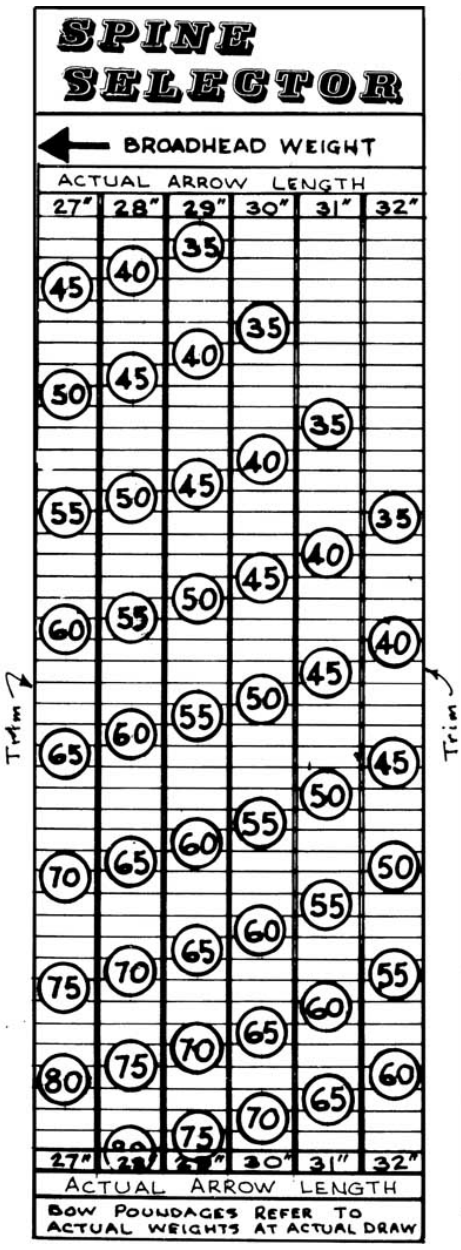
When we aim an arrow well and release well it should fly true. If it doesn't, then faulty spine selection is to blame more often than any other factor; except perhaps for grain weight variation... but that's another matter.

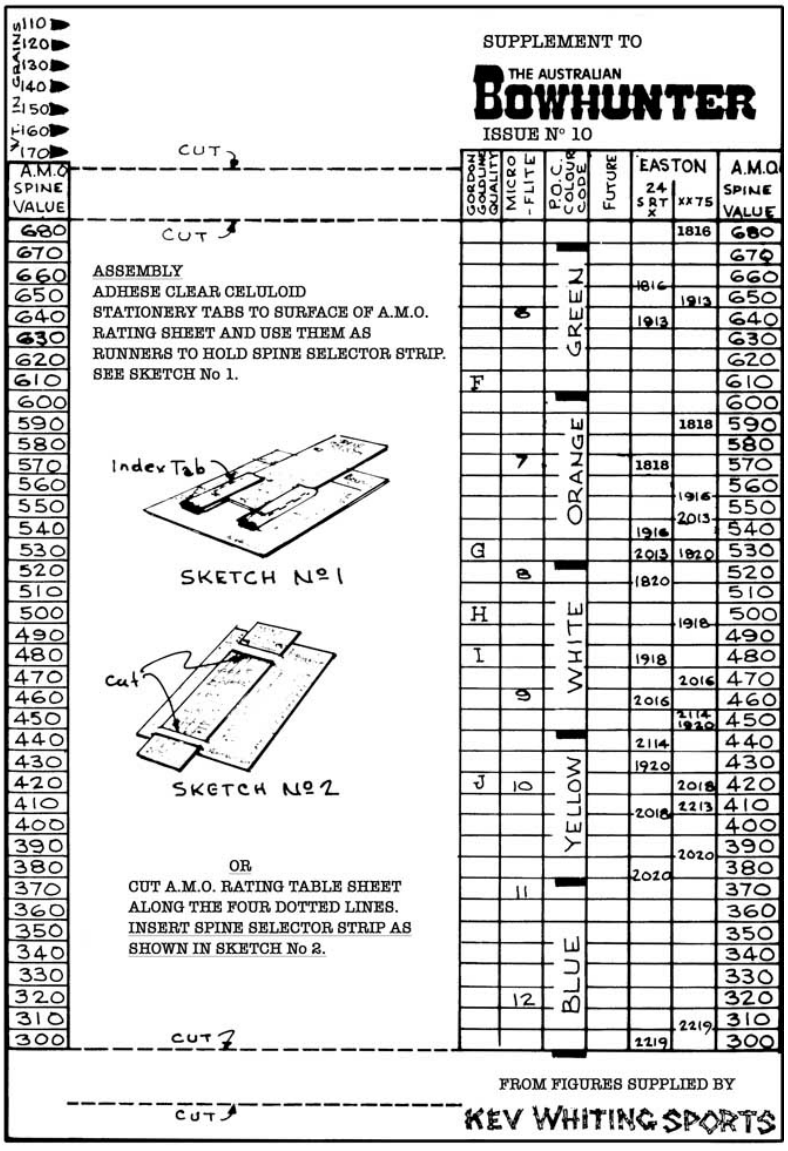
[6] Because of the great thrust upon the arrow generated by today's modern compounds, the editors strongly recommend on safety grounds that the spine rating of wood shafts exceed the peak draw weight of compounds by **at least** 10lbs regardless of loose technique.

This scale card is almost full size. To obtain accurate readings, it will need to be printed out and photocopied to approximately 103% to obtain the dimensions shown.



To assemble the **Spine Selector** below, cut out the two parts as close to the outside line as possible. On the base board on the right, there are two sets of parallel dotted lines which must be slit so that the spine selector strip can be slid through top and bottom. The spine selector below can be photocopied as is. Size is not critical so long as both components are copied at the same time to maintain the proportions shown.





Once assembled, the spine of any arrow is worked out in the following manner —

HOW TO USE THE SPINE JIG

1. Firstly, the shaft is supported between the jig supports with the needle in place as shown in the diagrams above, and the edge grain (reed) of the shaft at right angles to the backing board of the jig.

2. Depending upon which end of the shaft is the nock end, the shaft must be rotated on the jig so that the reed of the grain is on the upper side of the shaft when it is the nocked position on the bow.

3. Next, 894g weight (see footnote 1 on page 1) is suspended from the shaft as shown in the diagrams and an AMO reading is taken from where the pointer aligns on the spine scale. This reading is in thousandths of an inch.

4. With the Spine Selector assembled the selector strip is aligned at the top with the weight in grains of the arrowhead being used.

5. Looking across the bar labelled 'ACTUAL ARROW LENGTH' (which refers to actual length of the arrow from the nock throat to the back of the head), you then look down the column representing actual arrow length to where you see the number corresponding to the AMO reading obtained on the jig. This will tell you what particular draw weight that particular arrow is spined for.

6. Conversely, to match a set of arrows from a bundle of bare shafts when you know your draw weight, draw length and arrowhead weight, you have only to align the selector strip with the arrowhead weight at the top of the selector, look down to your draw weight in the correct draw length column to find the required spine rating to match a set of arrows.

7. Matching a set of shafts then only requires spining a batch and selecting those of the same AMO rating. Those not making the grade can be spined and grouped together into spine batches for someone who can use them or a different weight bow.

BASIC RULES OF THUMB FOR SPINING ARROWS

1. For every 10 grains increase in arrowhead weight at any given draw length, arrow spine reduces by approximately 5 lbs - and vice versa.

2. For every inch increase in draw length using any given arrowhead weight, arrow spine decreases by approximately 5 lbs - and vice versa.

3. If BOTH draw length is increased by one inch and arrowhead weight is increased by 10 grains together, arrow spine is decreased by 10 lbs — and vice versa.

4. If either arrow length is increased by one inch, but arrowhead weight is decreased by 10 grains, arrow spine remains unchanged — and vice versa.

5. Read 1. to 4. several times.