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BOOMERANGS

MAKING AND THROWING THEM

by HERB A SMITH

Acknowledgements

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Dedication

This book is dedicated to the Australian aborigine, for giving to the world a unique and fascinating throwing missile.

Introduction

Welcome to the fascinating sport of boomerang throwing.

Throughout the world there is a rapidly growing interest in the unique throwing missile of the Australian aborigine, the return type boomerang, and as a sport, boomerang throwing is becoming extremely popular amongst all age groups.

At nearly every major agricultural and cattle show in Australia individual throwing skills are demonstrated with the boomerang, and good throwers are always in great demand as added attractions at Fetes and Festivals.

Strange as it may seem, boomerang throwing is not only confined to Australia. There are thousands of enthusiasts throughout the world who practice regularly for the sheer enjoyment of throwing and for the beneficial exercise it affords.

In America a recent Boomerang Tournament attracted nearly a hundred enthusiastic competitors to the Mall in Washington, where throwing took place for best part of the day, with boomerangs which most of the competitors had made themselves. There were handsome prizes for the more skilful throwers.

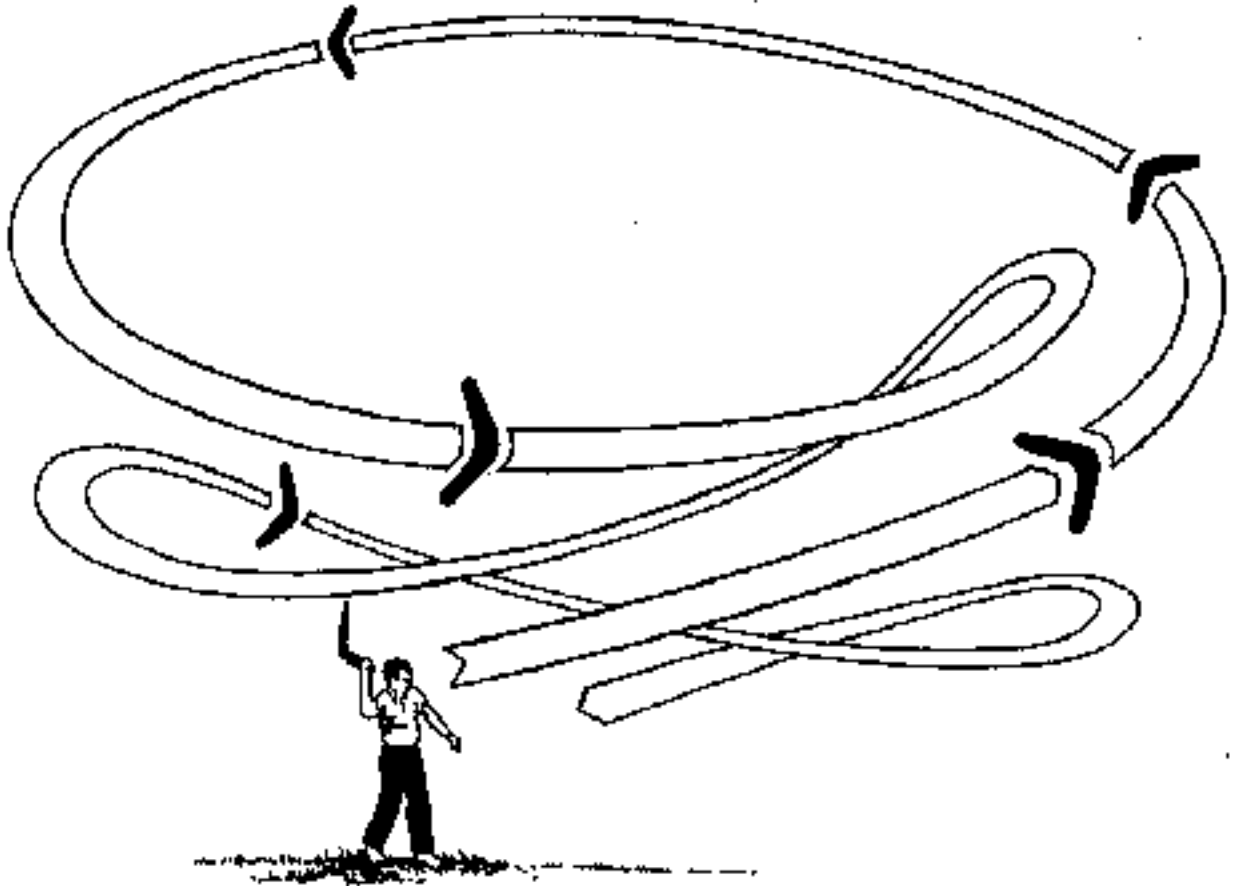
The interest in boomerang throwing in America is due in no small measure to Mr. Ben Ruhe of The Smithsonian Institute in Washington, who is himself a very keen and competent boomerang thrower, and has, for the past few years, been instrumental in organizing winter workshop classes at the Institute for boomerang enthusiasts. Mr. Ruhe also compiles and publishes a periodic circular which gives useful information on the latest in boomerang designs, and details of the various boomerangs which are available on the market.

In recent years, several scientific articles relating to boomerangs, have appeared in various publications and magazines. Notable amongst these is a detailed account of the boomerang and its aerodynamic properties, which was featured in an issue of the Scientific American and was written by Mr. Felix Hess of Groningen University. In this excellent article, Mr. Hess goes into the subject very deeply and explains in detail, with the aid of drawings and equations the reason why a boomerang will return back to the thrower.

Perhaps the world wide interest in boomerangs is not altogether surprising when we consider its uniqueness, for here we have a missile (which the humble aborigine has been

throwing for hundreds of years) with no rudder, tail fin, or other means of guidance, which when thrown outwards through the air will return, unerring, back to the point from which it was thrown. Incredible ! you might say, but nevertheless, perfectly true.

When thrown correctly, the boomerang will travel outwards on a near circular orbit, and, depending on the thrower's skill, return very accurately back to the throwing mark. Not only this, it will, during its flight, perform a series of bird like movements, as it spins away from the thrower, almost parallel with the ground. rises in the air, turns, and then comes swooping back, sometimes having made several pendulum like swings before finally coming to rest at the throwers feet or being caught by him before it touches the ground.



Flight pattern

The boomerang in flight is really amazing to watch, as I'm sure you would agree, seeing one thrown for the first time. The wonder of its flight is even more amazing, and fascinating, when you have learnt to throw it yourself, imparting to it on its release from the hand, varying angles of tilt, and using all your skill and guile in an endeavour to outwit the ever changing breeze.

I have been making and throwing boomerangs for several years, but am still just as amazed by their flight behaviour, as on the day I threw my first boomerang, and stood, unbelieving as it went spinning away, and then, returned as if under the control of some unseen influence.

Boomerang throwing is not only a fascinating sport, but also a healthy outdoor activity, and because boomerangs can be made in a variety of weights and sizes, to suit each individual, it is a sport in which the whole family can participate with equal success and enjoyment. Furthermore, the art of throwing is not difficult to [earn. or physically exhausting.

I have taught the basic techniques of throwing to seven year olds and folk in their seventies. Many beginners have made successful return throws after only a few minutes tuition whilst others have had the thrill and satisfaction of an accurate return flight on their very first attempt. However, like any other sporting activity where accuracy and skill is required, "Practice makes perfect."

My interest in boomerangs can be traced back many years, when as a schoolboy, I tried to make one from a piece of bent hazel wood. The inspiration for my effort was derived from a school lesson which featured various weapons of Australian aborigines. I was so intrigued by accounts of the boomerang that I decided to try and make one for myself. Unfortunately, I had only an illustration of a boomerang to work from, which gave no indication of size and thickness, or the fact that it possessed a certain sectional shape. Furthermore, I didn't know how a boomerang was thrown. Consequently, my attempts to get a piece of bent hazelwood to fly and come back to me, were, to say the least, both disappointing and unsuccessful. So I gave up the idea of trying to make and throw a boomerang. The thought did cross my mind that perhaps boomerang throwing was an art and skill known only to the aborigines and perhaps there was something magical in the construction of a boomerang which made it return. Of course I had no aborigine playmates who could let me into the secrets of this "magical flying stick," and there were no books available on the subject to which I could refer. So my interest in boomerangs died there, or so I thought. Then a few years ago, after spending best part of my early adult life as an enthusiastic archer, I set out to discover if I could the secrets of the boomerang and how to throw it.

I then spent several months searching for information. For a start, I contacted friends with Australian connections and searched the libraries for books on the subject. I then wrote to the Librarian at Australia House in London who kindly supplied me with an assortment of photo copies of articles on the subject. Sifting through these I came across a great deal of useful information which included a short article (author Unknown) on how to throw a boomerang.

Finally, I arranged a visit to the Ethnographical Department of the British Museum, where I was able to view a selection of hunting weapons and boomerangs on display there. My visit was arranged with the Asst. Keeper of the Ethnographical Department, Mr. B. A. L. Cranstone, who in the meantime, had kindly and thoughtfully selected from the Museum's Library several books which contained articles and drawings relating to boomerangs. Like the articles from Australia House Library, most of these were written during the latter part of the last century, but never-the-less, contained useful information which I was able to note down, and so increase my knowledge on the subject of boomerangs.

My visit to the British Museum had proved most rewarding, for I now had a very good idea of the actual size, shape and thickness of the "Magic Stick," so, armed with this precious information I set about making a replica in birch ply. My first model was rather large and crude, but never-the-less, you can imagine my excitement on dashing off to the local sports field to try it out, I threw it, and to my utter astonishment it actually "flew" and came back on my first attempt. I then spent several hours throwing, and was most reluctant to leave the field, only doing so, when it became too dark and dangerous to continue.

I have been making and throwing boomerangs ever since. I have also taught dozens of others to do the same, and will no doubt go on doing so for the rest of my days. Such is the fascination of the boomerang for me.

Today, literally thousands of boomerangs are being made and sold throughout the world. The majority of these are well made and have very good flight qualities, whilst some others, which have found their way into various sports shops and stores leave much to be desired both in quality and performance.

If you are unable to purchase a good boomerang, why not make your own? The skills are not difficult to learn. With a few simple tools it is possible to make a really first class

performance model which will equal, and possibly out perform, the best available on the market.

In the following chapters you will find simple plans and instructions for making boomerangs, and also the correct method of throwing them, successfully.

Also included are "Hints on decorating boomerangs," "Catching techniques," "How to make a simple indoor boomerang" and finally, details, never before published, of a weight ballasting technique which I discovered, that enabled me to make a world record throw of over 108 yards outwards with a complete return back to the throwing position.

CHAPTER 1

A Brief History of the Boomerang and its possible evolution from the throwing club

For hundreds of years, curved wooden sticks have been used by the Australian aborigines for hunting, warfare and ceremonial purposes. These curved sticks have all become known generally, as boomerangs, but amongst the aborigines they were known as Wongium, Kirra, Kiley, Munkerara, etc. Not all, returning weapons.

The word boomerang is a corruption of a name from the Turawal Tribe of the George River near Sydney, and this word, which applied strictly speaking, to the return type of boomerang, was originally recorded as bou-mar-ang.

The origin of the boomerang, as we know it today, has, like the archers bow and arrow, been lost in antiquity.

It is believed that the boomerang evolved, over many thousands of years, from a short straight handled club, Fig. 1.

Judging from ancient cave drawings, a boomerang shaped weapon was in use thousands of years ago, not only in Australia, but other countries also. The Hopi Indians, up until quite recently, used a curved throwing stick for hunting rabbits, which was a popular sport amongst them.

Similar curved weapons were also used in India, parts of Africa, Europe and Egypt.

A small ivory boomerang, partly overlaid with gold, was found amongst the treasures of the boy king, Tutankhamun. This type of boomerang was commonly used as a fowling stick, along the banks of the Nile.

However, like the aborigines hunting weapons, the curved wooden throwing devices of other lands did not return to the thrower, but travelled outwards only on a curved flight path.

To the Australian aborigine alone, must credit be given for the returning boomerang. More about that later.

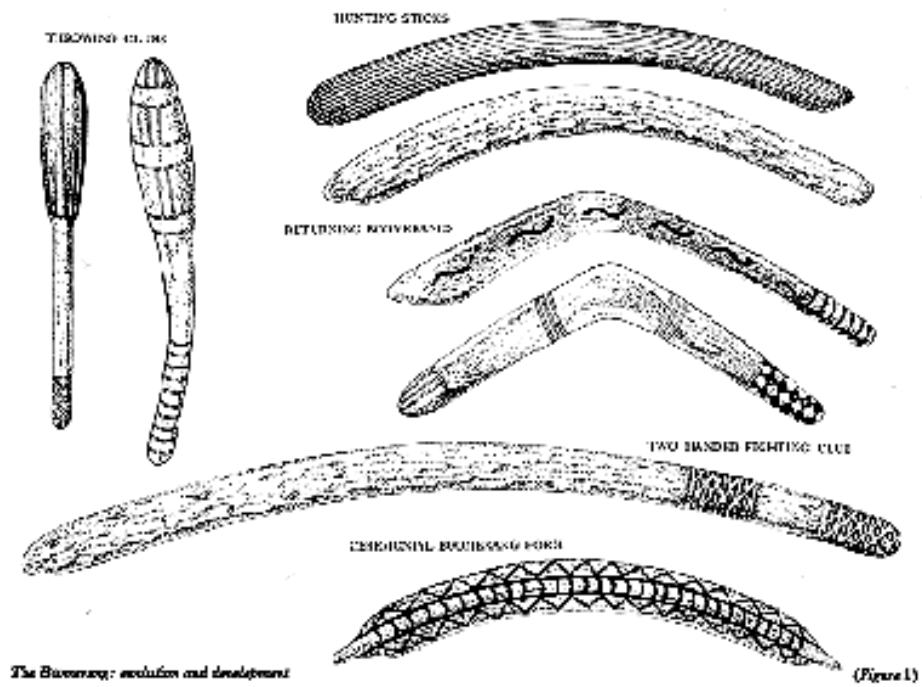
Curved missiles of the aborigines

In Australia, a large number of boomerang shaped objects were used for a variety of purposes.

One special type, rejoicing in the name of Kalawali, was used ceremonially in Arnhem land N. W. Australia, for the ritual defloration of young girls in the Kunapipi ceremony.

Another type was used in New South Wales and Victoria and was called a Nula-Nula. This was an awesome spade shaped weapon with a curved handle, and was used, both as a club and throwing weapon.

Curved wooden staves, slim in section and width, and up to 6 feet in length, were used by some tribes as weapons of war, in hand to hand combat, in a similar manner to the Quarter Stave of Medieval England. These long fighting boomerangs were also thrown by using two hands, and because of their thin sharp edges would cause serious injury to anyone unfortunate enough to be in their flight path.



The Boomerang: evolution and development.

(Figure 1)

Figure 1: The Boomerang: evolution and development

Other boomerang forms were used for digging, and rooting out grubs from rotting trees. also for beating out rythm time, when used as clapper sticks at ceremonies and corroborees throughout the continent.

The Hunting Boomerang

It is very difficult. when viewing the large variety of boomerang shaped sticks on display at various museums to distinguish one from another. and say exactly for what purpose each variety was intended.

Generally speaking, the most common form of aborigine hunting boomerang was a curved wooden stick approximately 30 inches long $2\frac{1}{2}$ - 3 inches in width and roughly $\frac{3}{8}$ - $\frac{1}{2}$ inch in thickness. The shape resembled an ordinary household coat hanger. i.e. in relation to its length, it had a very shallow curve throughout. In section it was flat (or almost so) on the underside, with a convex shape above, and like all the other boomerang forms mentioned, it was carved from one piece of wood, often from a branch of mulga or the stout root of the mangrove, possessing the required shape. Sometimes it was carved from the junction between branch and trunk, which was a laborious and time consuming task, considering the primitive flint tools which were used for the purpose.

It is claimed that these hunting weapons, some of which would weigh anything up to $1\frac{1}{2}$ lbs. in weight, could be thrown to distances which were truly remarkable, often in excess of 150 yards. However, be that as it may, the hunting boomerang did not return to the thrower (nor was it intended to do so) but travelled outwards only in a curved flight path, by being thrown across. and slightly down wind.

Some fine examples of these weapons can still be seen today in museums throughout the world. I have two in my possession, which I was fortunate enough to purchase from an antique shop for a small price, and which judging from their appearance and patina, would be well over 100 years old. They are both tooled all over the surface with fine gouge marks. which I believe was the method used for shaping them down to the desired thickness and section. Truly remarkable works of art !

The Return Type Boomerang

I have mentioned in detail the hunting boomerang in order to give you some idea how confusion has arisen over the years between this and the return type boomerang .

The returning boomerang has mistakenly been regarded by most people as the true hunting weapon of the aborigines, and it is commonly believed that when it was used for hunting animals, should the hunter miss, he would get his weapon back for another throw.

Now the return type boomerang was never intended as a hunting weapon, but as a "plaything" amongst the aborigines, who threw it in competition with each other to see who could get it to return nearest to a peg or marker set on the ground. Its use for hunting anything other than birds or rodents at close range, was limited, due to its peculiar rising, circular flight path.

Generally speaking, the returning boomerang was a much smaller and lighter missile than the hunting weapon, and the angle between the blades was more acute. In the more common type. this angle would be approaching 90° although examples were to be found with angles varying between 70° and 120° . It was a thin, well balanced missile with an average weight of eight ounces.

Not all aborigine tribes made a returning boomerang, in fact, in some regions it was unknown. The most popular regions, seemed to be in Queensland, New South Wales and Victoria.

Dual Purpose Boomerangs

Now to add to the confusion, many hunting boomerangs were of a similar shape to the returning type, i.e. the angles between the blades approached a right angle. However these were generally much larger, thicker and heavier models, and wouldn't return to the thrower, but never-the-less it would be almost impossible by looking at them to tell whether they were capable of return flight or not. Such was the subtlety of their shaping. Fig. 2 shows an example of such a weapon.

Some writers have suggested that by heating his boomerang over a fire and then twisting the limbs, the aborigine could make it into either a returning boomerang or non-returner.

I am inclined to agree with this suggestion for I have found with some of my own boomerangs, that, by deliberately bending one or both blades downwards by setting in a press over-night (sometimes this has accidentally occurred by warping) or twisting both blades in opposite directions, the boomerang will travel a long way outwards in a curving flight path and pitch downwards without returning.

It is not certain just how or when the returning boomerang came to be discovered. Even the aborigines themselves are uncertain of its origin. Possibly it was stumbled upon accidentally, or, in all probability a natural progression from the hunting weapon.

Whatever theories are put forward as to its origin, (and there have been many) the returning boomerang was only to be found amongst the Australian aborigines. There is no evidence to suggest that any of the curved throwing sticks of other lands, were capable of returning to the thrower in the manner of the boomerang.

So we can thank the humble aborigine for a most fascinating and unique throwing missile.



CHAPTER 2

Making the Boomerang

Tools and materials required

Unlike the aborigine, who to his credit, shaped all his boomerangs and hunting weapons with flint scrapers, we are fortunate in having at our disposal a variety of modern tools, but even so, it is not necessary to own a well equipped workshop in order to make a good boomerang.

You will only require a few simple tools. Believe it or not, I have made several excellent performance boomerangs using only a small piece of hacksaw blade, a tobacco tin lid, punched out like a nutmeg grater, (this was used in place of a wood rasp) and a piece of sand paper. However, without being too primitive you should find the following tools and materials easily available :

Fret or pad saw, small wood plane; (this is optional, but can be used to do part of the surface shaping if required) $\frac{3}{4}$ or 1 inch half round wood rasp; quantity of coarse and fine grade sandpaper, small tin of clear cellulose or polyurethane, and finally, of course, a piece of wood for your boomerang.

To make a durable boomerang requires a material that is easy to shape, reasonably strong and not too heavy. Best quality birch ply answers these requirements admirably.

Most of my own large boomerangs are made from $\frac{3}{8}$ inch ply, whilst for smaller models, $\frac{1}{4}$ inch material is used. There are other suitable materials besides plywood, such as fibre glass, fibre board and plastic laminates, but these are fairly expensive and more difficult to shape. Perhaps you may wish to experiment with these alternative materials at a later date. However, for the time being, I'm sure you will be more than satisfied with the results obtained from birch ply.

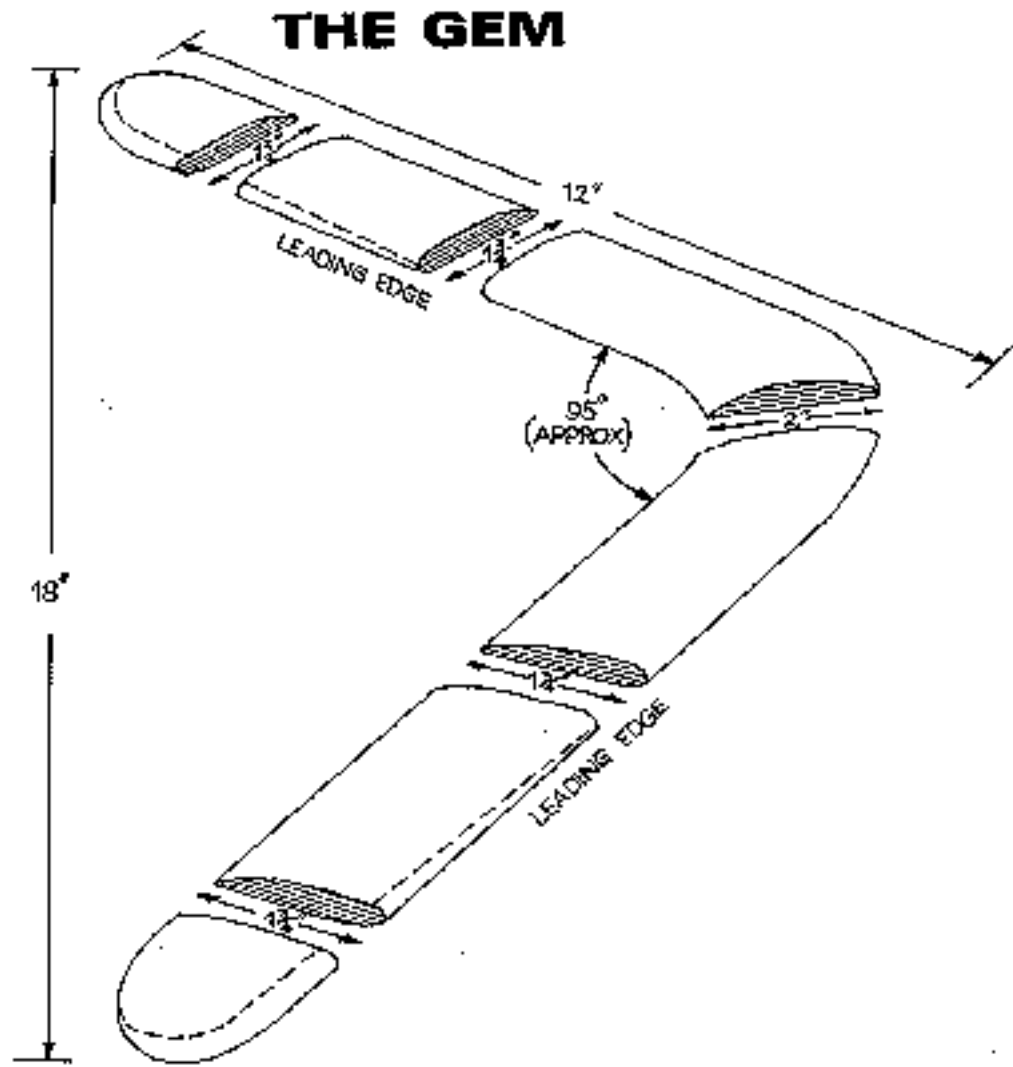
Various Boomerang Shapes

I have designed many boomerangs varying in shape, size, section and weight, and the following, which for the purpose of this book, I have named the "Gem," "Traditional" and "Sycamore" are but a few. All three models have been well proven in flight performance and return accuracy and are reasonably simple to make. However, because the "Gem" is the lightest of the three and therefore the easiest for the beginner to throw, I have chosen it as a basic model and will show you, step by step, with the aid of workshop photographs, how it is fashioned.

Stage 1

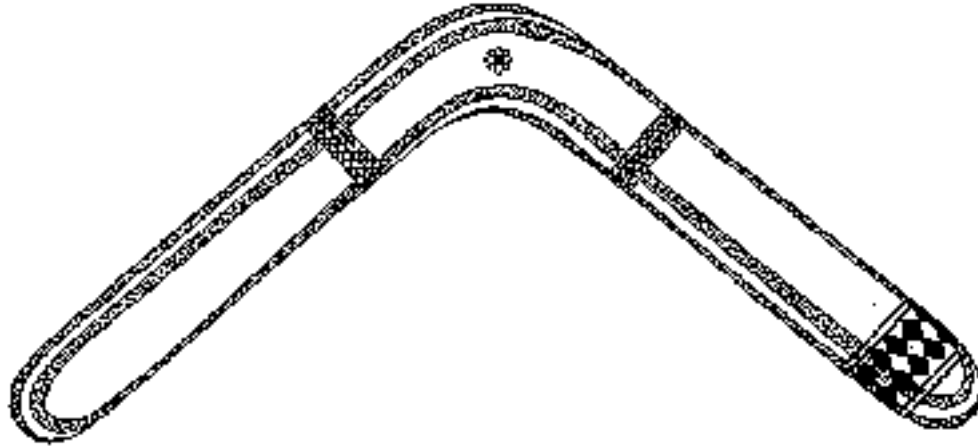
Select a piece of good quality $\frac{1}{4}$ inch birch ply (this is easily obtainable from most timber merchants or handyman stores) which is free of surface blemishes and not warped or twisted. You will find that a piece 18 inches square will be sufficient to make approximately five boomerangs, if care is taken when marking out.

Next, make a pattern of stiff cardboard to the shape and measurements of the "Gem" boomerang shown on the plan Fig. 3 (this pattern will be handy to keep for future use).



The Gem: plans and pattern

Made with 1/4" Birch Ply
 Span from tip to tip 18"
 Length of blades 12"
 Width of blades 1 3/4"
 Weight Approximately 3 ounces



The finished boomerang showing the area to be rasped and sanded down. Also the pleasing effect of simple line decoration.

Figure 3 (above)

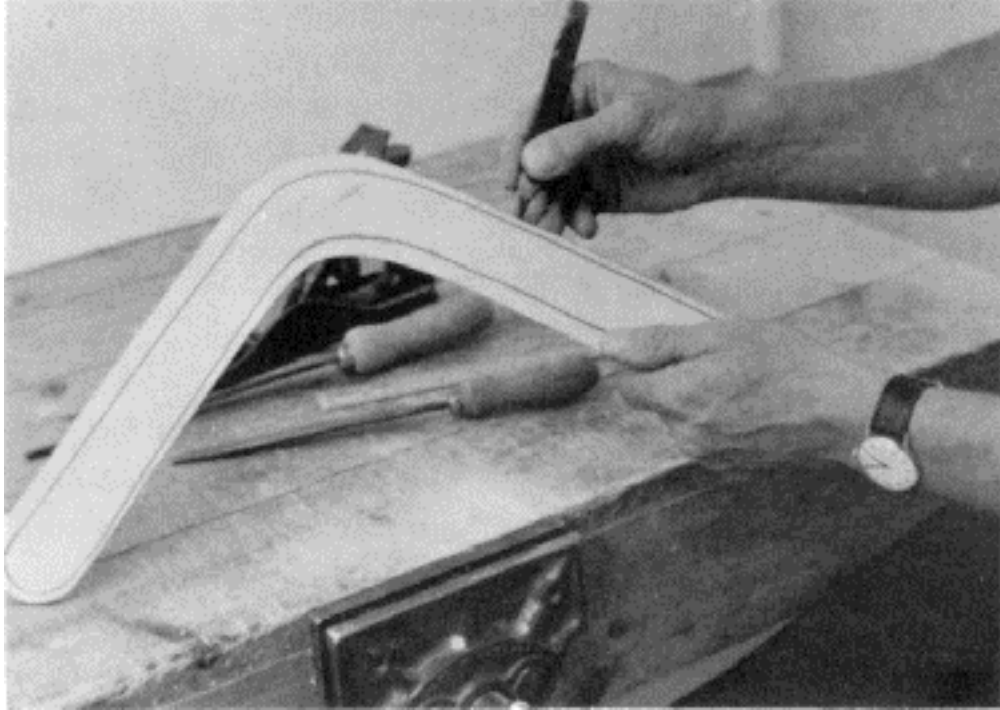
Then, having first decided which side of the ply you are going to use for the upper surface of your boomerang, place the pattern on the ply and mark round it with a pencil. A word of caution here: should you find that your plywood is not perfectly flat, but slightly "dished," it is most important that the pattern be placed on the concave surface before marking out. Otherwise you will find that the blades of your finished boomerang will have a downward tilt, which will cause it to pitch downwards in flight when thrown. By marking out on the concave surface, the blades will tilt upwards slightly which will not affect the boomerang's flight performance. You may be fortunate in finding a perfectly flat piece of ply, in which case you will have no problems!

Stage 2

With your fret or pad saw, carefully cut round the outline of your marked out boomerang to form the blank. (If you own, or can borrow a motorized band saw, this operation will be greatly simplified). Then, having cut out the blank, lightly sand off any rough edges at the same time round off the blade tips if necessary, before going on to the next stage.

Stage 3

Before commencing to shape the surface of the boomerang, it will be helpful to have some shaping guide lines, (these will help prevent you from rasping off too much wood)
Fig. 4



With a pencil, mark a line all round the upper surface of the blank, approximately $\frac{1}{4}$ of an inch in from the leading edge of the blade, and $\frac{1}{2}$ inch in from the trailing edge (see plan which indicates leading edge). Another line, which will assist shaping, should be marked on the edge or wall of the blank, all the way round, at approximately $\frac{1}{8}$ of an inch from the base of the blank, i.e. for $\frac{1}{4}$ inch ply, this would in fact be the centre line of the wall.

Having marked out your guide lines you are now ready to commence shaping the boomerangs blade sections.

Stage 4

First of all we will deal with the underside of the blank. All that is required here is to sand off a small wedge shaped portion of the leading edge of each blade Fig. 5 (area indicated by a dotted line on the plan) to give a slight tilt or bevel to the blade. Apart from this bevel, the underside of the blank will remain perfectly flat.

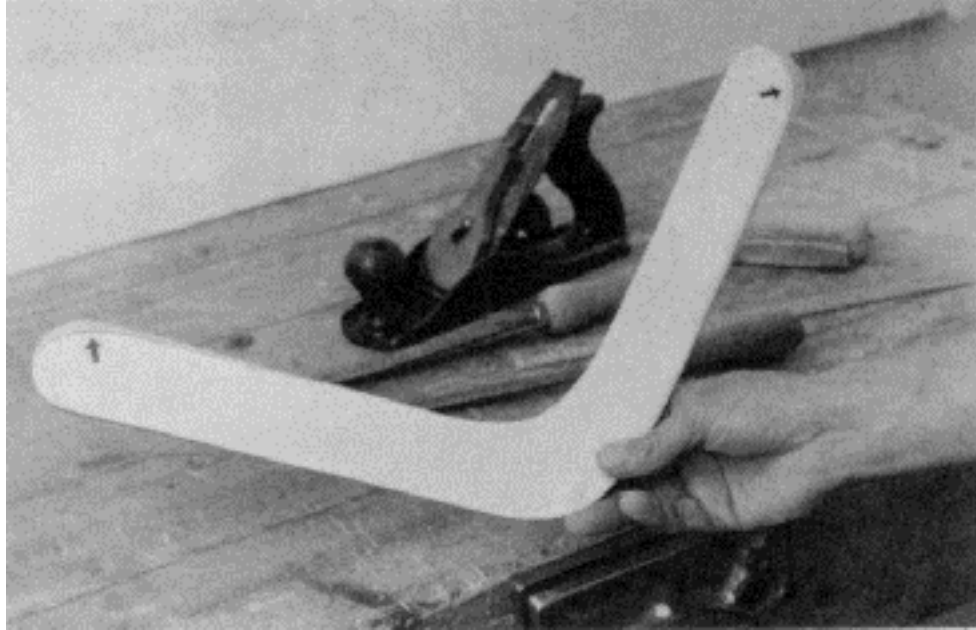


Figure 5 - Arrows indicate area sanded off underside of the blank

Please note that this bevelling makes the boomerang a right hander. If you are left handed you must shape the bevel on the opposite underside of each blade and reverse the angles on the upper surface also. Remember: a left handed boomerang is the mirror image of a right hander.

Stage 5

You are now ready to start the upper surface shaping.

Place the blank, together with a thin backing strip of wood in your vice Fig. 6. This backing strip is only: to prevent the blade from whipping about whilst shaping with the rasp or plane, and need only be the length of one blade, i.e. approximately 12 - 14 inches long.

Using your wood rasp, commence to rasp away the surplus wood, working from the top edge of the blade tip in a downward movement using light even strokes. Don't put too much pressure on the rasp, otherwise you may tear the plywood laminates. Work along the top edge of the blade, a few inches at a time towards the bend or "elbow" of the boomerang. (The outside edges of the blade can be shaped with the wood plane if desired. Figs. 6 and 7). Turn the blank round in the vice as required.

When using the rasp, you will find it helpful to stand "sideways on" to your work bench in order to use a downward movement with the rasp. This may seem a little awkward to begin with, but after a short while, you will find it quite easy and comfortable.

When you have rasped the surplus wood away, keeping within your guide lines, your blank should now begin to look like a rough boomerang and will be ready for the final finishing.



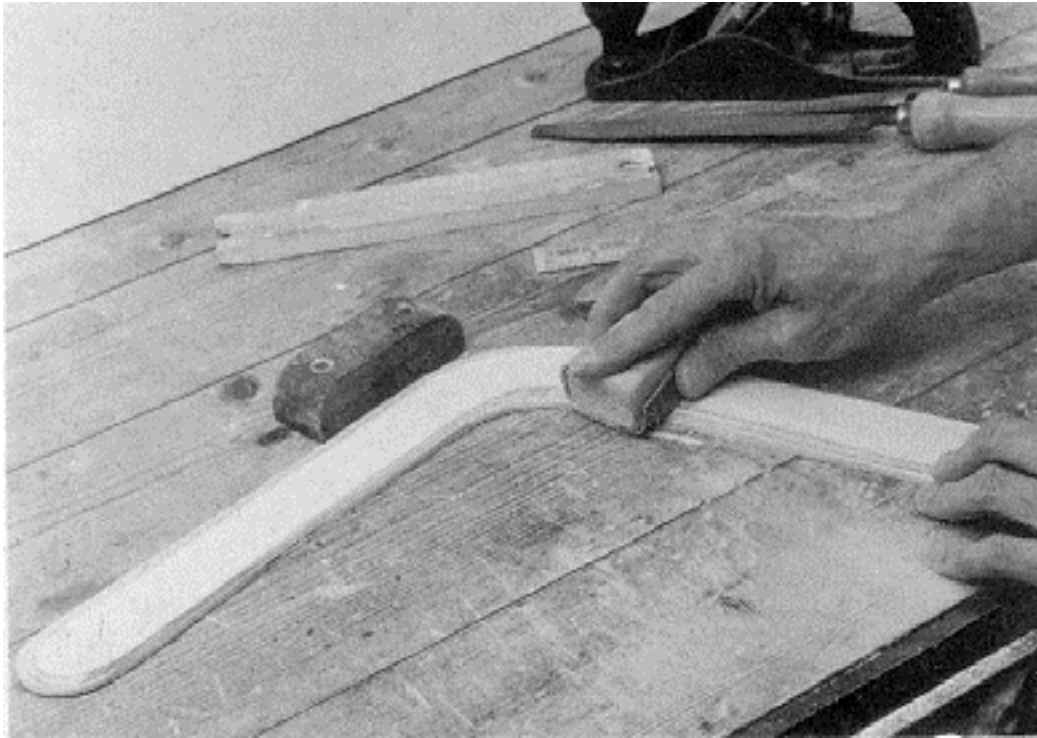
Figure 6 - 1st position of blank in the vice. Figure 7 - 2nd position of blank. Note wooden strip placed behind blank, and working angle of rasp. Here it will be necessary to hold the rasp at a slightly steeper angle to shape the trailing edge of the blade. Again the wood plane can be used at this stage, if preferred.



Figure 8 - 3rd position of blank. Rasp angle the same as in 1st position. The wood plane cannot be used at this or final stage of shaping Figure 9 - 4th and final position of blank. Note how the right arm is positioned behind the work at this final stage. Rasp angle as in 2nd position.

Stage 6

Take the blank from the vice and place it flat side down on your work bench and up against a suitable "stop" Fig. 10.

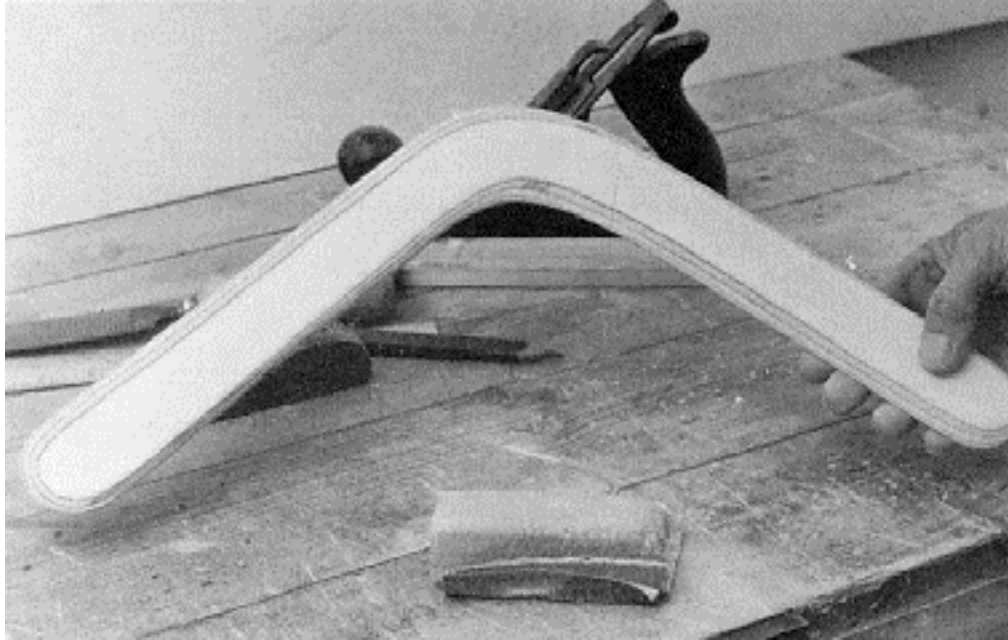


Next, using a coarse piece of sandpaper wrapped round a suitably sized block of soft wood or cork, complete the shaping, taking out all the rasp marks until you have a fairly even surface all over.

To round off and finish the blade tips and extreme edges, you will find it necessary to hold the blank near, or slightly overlapping the edge of your work bench.

When you are satisfied that all the rasp marks have been sanded out, use a finer grade of sandpaper to bring your boomerang to a fine, smooth finish. Not forgetting the underside also.

Your boomerang is now ready for decorating and cellulosing. Fig. 11.



Having followed the instructions for making the "Gem" you should have no difficulty in making the larger "Traditional" and "Sycamore" boomerangs in exactly the same way. For the "Traditional" $\frac{3}{8}$ inch ply is recommended, but the "Sycamore" may be made from either $\frac{1}{4}$ inch or $\frac{3}{8}$ inch ply without affecting its flight performance. If $\frac{1}{4}$ inch material is used for the "Sycamore," it will naturally be much lighter in weight and more suited to the weaker thrower. The hand grip may also be narrowed down slightly to suit a smaller hand without affecting its performance in flight.

CHAPTER 3

Cellulosing, Decorating and Staining

The finished boomerang should be given a couple of coats of clear cellulose or polyurethane to seal the surface against dirt and moisture. Clear polyurethane is ideal for this purpose, as it dries with a very hard finish and doesn't flake off easily. Two coats would be sufficient, although a third could be used if desired.

After brushing on the first coat, allow to dry thoroughly before rubbing down lightly with fine sandpaper and applying subsequent coats.

When using cellulose or polyurethane, use a soft brush and apply evenly all over. Take care to cover the ends of the blade tips and edges of the boomerang. Patches over these areas can easily be missed, thus allowing moisture to seep into the wood.

Hang the boomerang over the back of a wooden chair or other suitable object to dry. If you use a chair as a drying rack, don't forget to cover the back with a piece of non absorbent paper or other material to prevent damage or marking from the wet cellulose.

Cellulose is highly inflammable, so never use near a naked flame or fire and follow the manufacturers instructions regarding suitable room temperatures when using.

Decorating

You may of course wish to decorate your boomerang before cellulosing, and although the choice of decoration is naturally a matter of individual taste I think you will find a simple design the most pleasing, and will serve to enhance the appearance of the finished boomerang. Most of my own boomerangs are decorated by using simple "line decoration."

To do this, I use a strip of flexible plastic which I hold round the curved surface of the boomerang Fig. 12 and then, with a broad black ball pen draw a series of closely spaced lines across the surface. These lines are often alternated with different colours and gives the appearance of close "whipping" which is both pleasing and effective, if placed on one or both blade tips and on each side of the "elbow" of the boomerang. I sometimes cover these parallel lines with a series of diagonal lines also. This gives an even more pleasing effect, particularly if the spaces between the lines are coloured in afterwards. Fibre tipped pens are ideal for this purpose, as the ink dries very quickly and the colours show up brightly on the light wood surface.

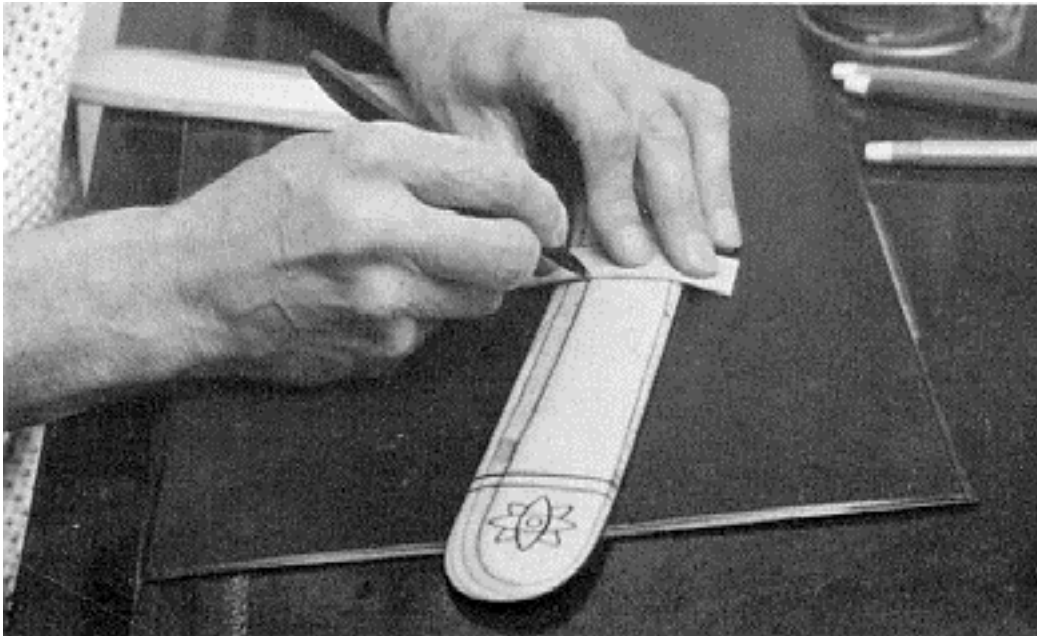


Figure 12

Painting the boomerang can be quite effective too. There are some beautiful enamel paints available which give an excellent finish. Furthermore by choosing bright colours such as red, orange or light blue, the boomerang is easily identified when landing in tall grass or hedgerows.

Staining

If you don't choose to decorate or paint your boomerang, you might like to try wood stain.

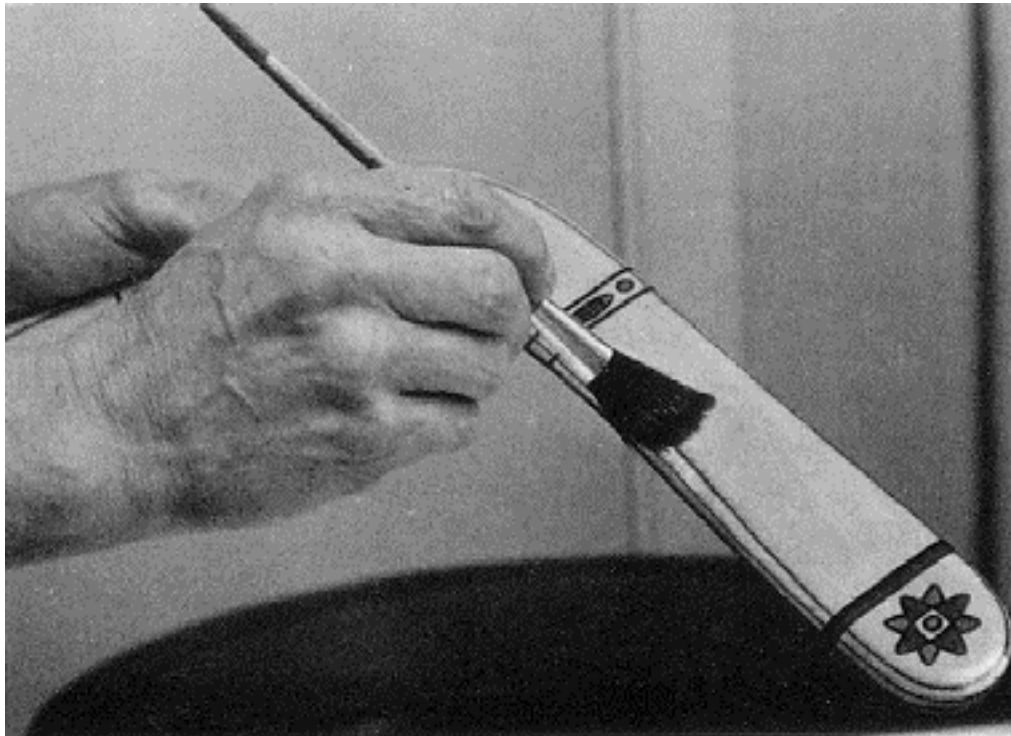


Figure 13 - Cellulosing the finished Boomerang

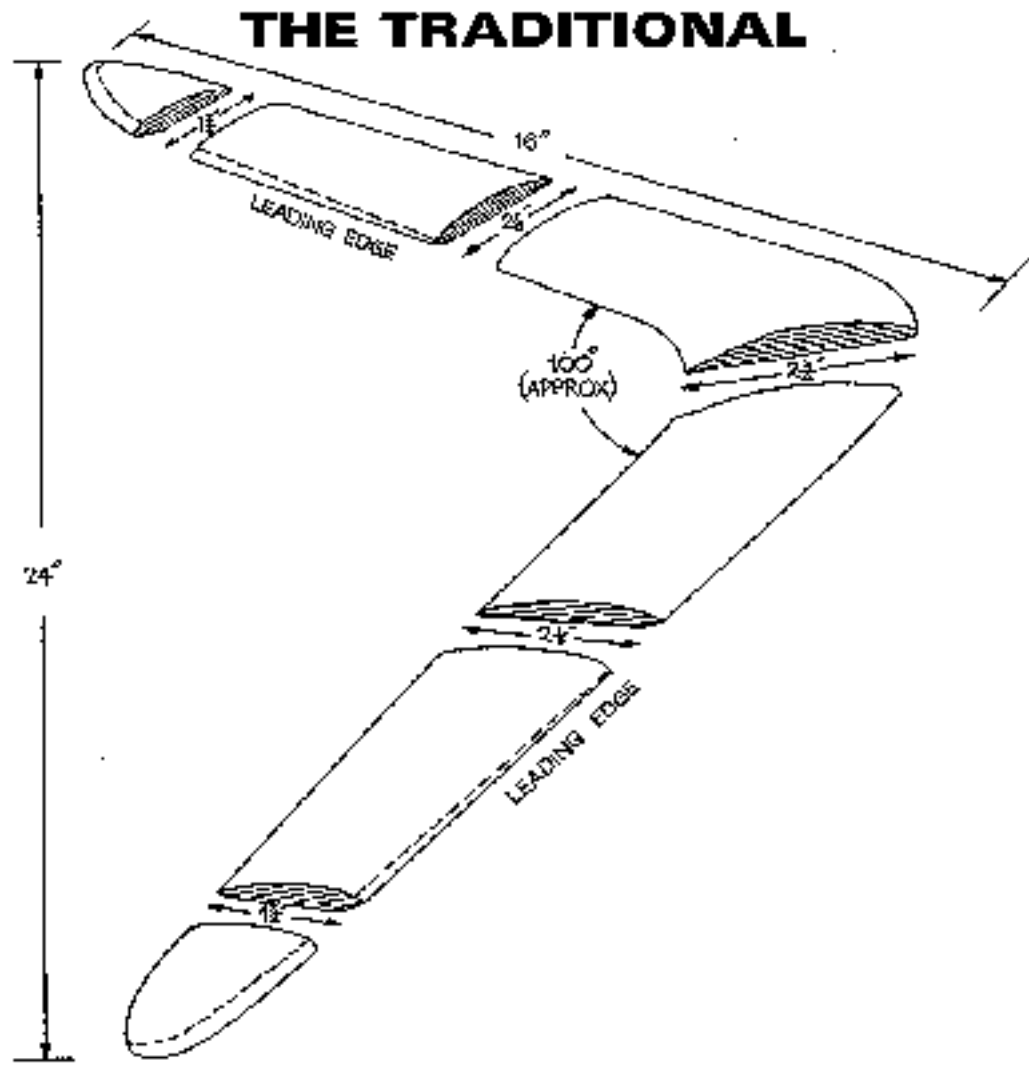
There are some very fine stains on the market in a variety of natural wood colours, i.e. teak, mahogany, walnut, rosewood, etc. These stains, particularly the spirit based types are most suitable for use on birch ply and give a really natural wood effect.

Finally, whichever method of decorating you choose, always decorate before cellulosing.

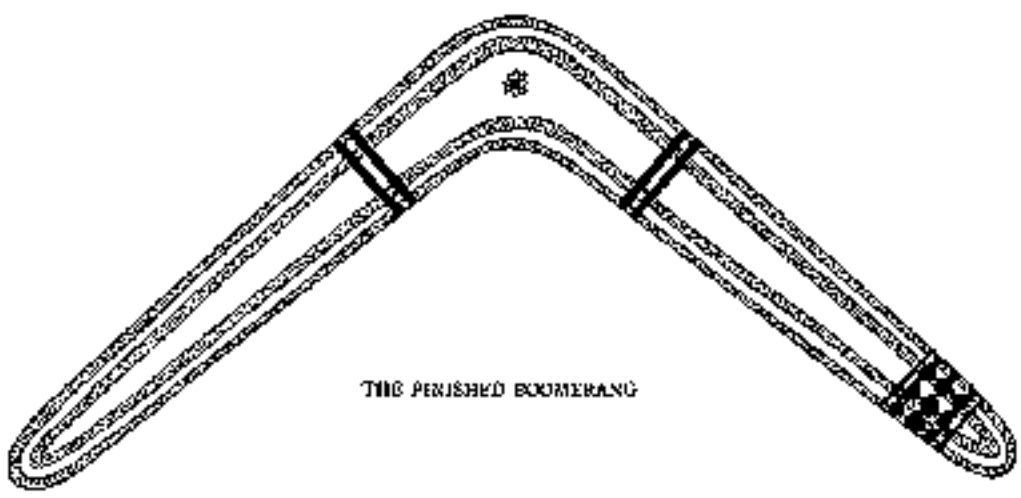
Please note: When making the pattern for your boomerang blank from any of the plans shown, a figure is given for the angle between the two blades, but this angle is not critical. In other words, if it should vary by a few degrees either way, it will have no significant effect on the boomerang's flight performance.

You may wish to experiment with boomerangs possessing widely differing blade angles and varying blade sections.

Some unusual shapes are shown on the back outside cover of this book. These are all models which I have designed and made myself. Should you care to copy any of them. The scale is approximately $\frac{1}{8}$ full size.

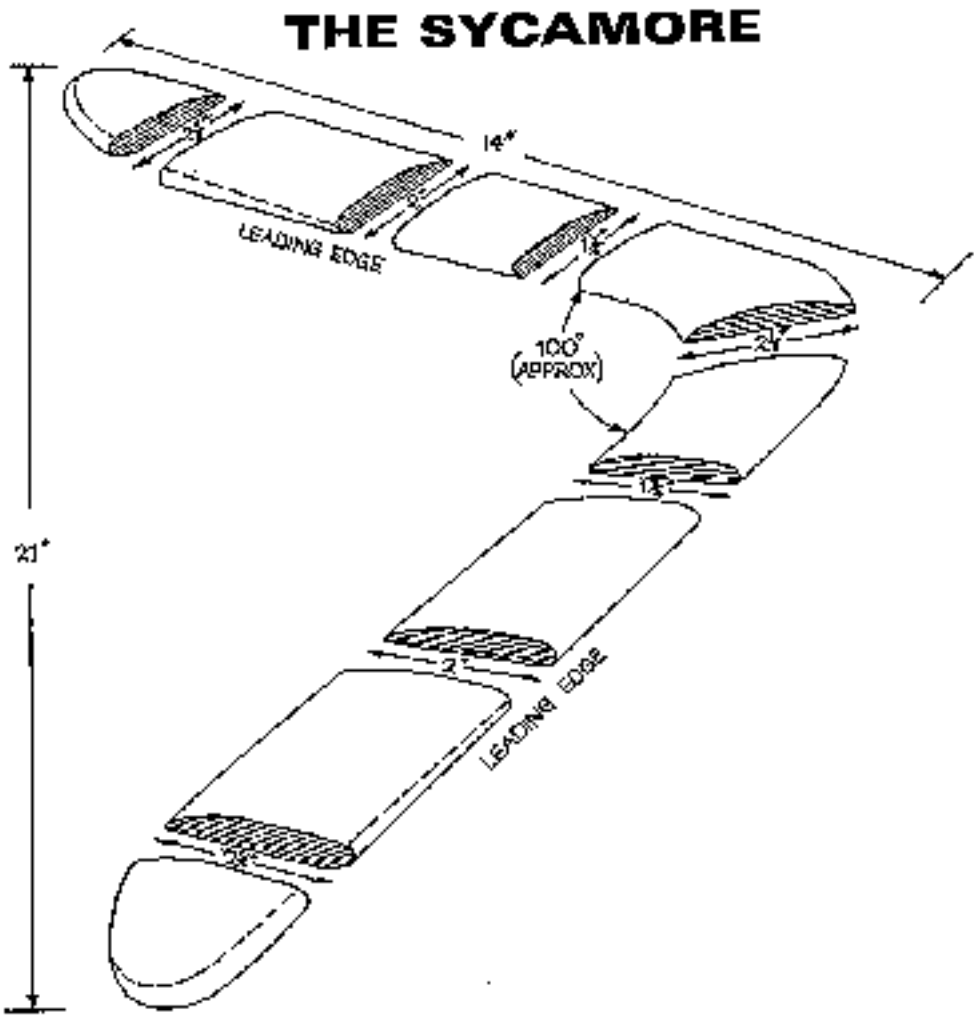


The Traditional: plans and pattern

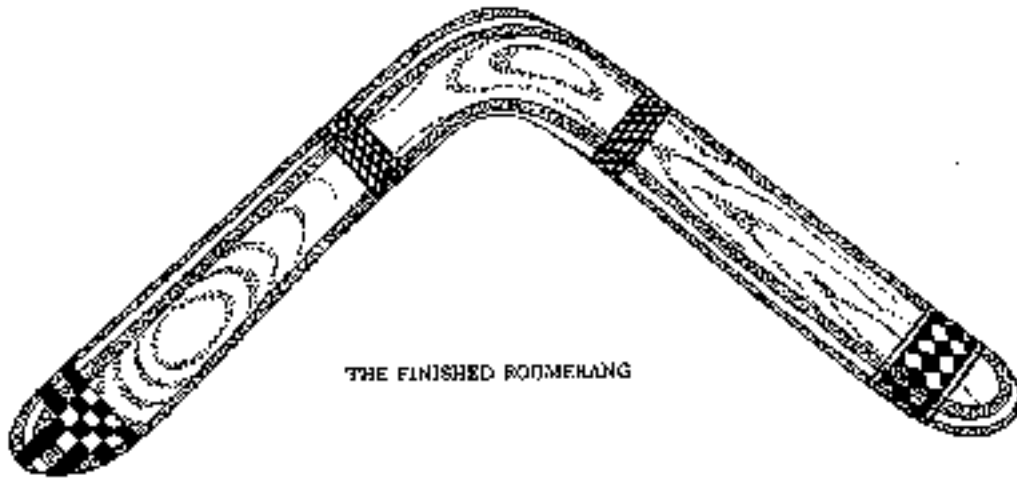


THE FINISHED BOOMERANG

The Traditional
made with 3/8" birch ply
span 22"
length of blades 16"
convex section
weight approximately 7 ounces



The Sycamore: plans and pattern



THE FINISHED BOOMERANG

The Sycamore
made with 3/8" birch ply
span from tip to tip 21"
length of blades 14"
both blades narrow slightly towards elbow section
weight approximately 6 ounces

CHAPTER 4

How to Throw the Boomerang

These instructions are for a right handed thrower. If you are left handed, you will have followed the instructions in Chapter 2 for making a left handed boomerang. Now, when you come to throw it, simply substitute left for right when reading these throwing instructions.

This chapter on throwing is probably the most important part of the book, so please study the following instructions very carefully.

You have no doubt spent a great deal of time and care in making your boomerang, so you don't want to spend a short time breaking it !

Many a good boomerang has come to grief through a lack of knowledge of the simple techniques involved in the art of throwing, so a few minutes study at this stage will save a great deal of disappointment and will be well rewarded in the long run.

Here are a few points to remember before you start to throw.

(1) Never attempt to throw in strong windy conditions as this is liable to lift the boomerang high in the air and carry it over the roof tops. A light breeze of 3-5 m.p.h. is ideal.

(2) Never throw in a restricted area close to trees or buildings. You will require an open space of at least 70 yards each way.

(3) Always throw on grassland. never on concrete, tarmac or other hard surfaces.

(4) Always practice at a safe distance from other people and animals, because even the light weight boomerangs can give a nasty wallop, so take special care when practicing. with emphasis on safety and consideration for others.

(5) Keep your eyes on the boomerang while it is in flight, and try not to throw into the sunlight. Pack up throwing when it gets too dark for safety.

Holding the Boomerang

Take hold of the boomerang in your right hand by gripping the blade as illustrated in Fig. 14 with the flat side on the palm of your hand.

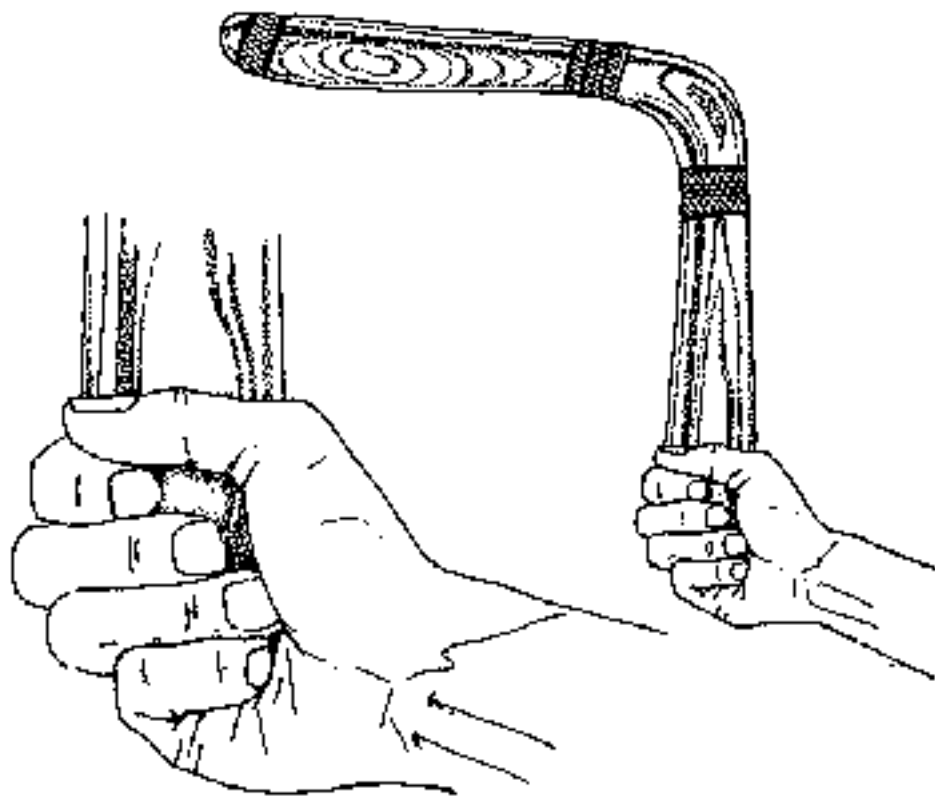
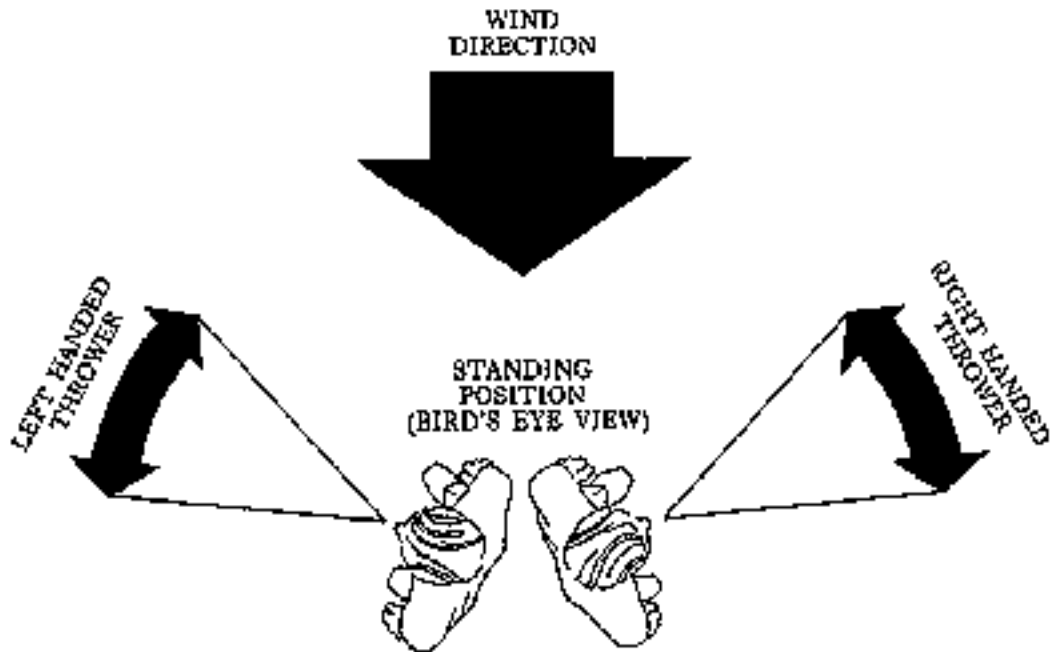


Figure 14 - Holding the boomerang: with inset "close-shot" of grip

When held correctly the thumb should be in a position across the blade no more than two inches from the blade tip. N.B. It is purely a matter of choice which end of the boomerang you hold, but it is most important to remember that the flat side must always be placed on the palm of the hand, with the shaped upper surface facing you.

Standing position in relation to the wind

The boomerang is always thrown against the wind. It will not return successfully if thrown down wind.



Standing position and wind direction

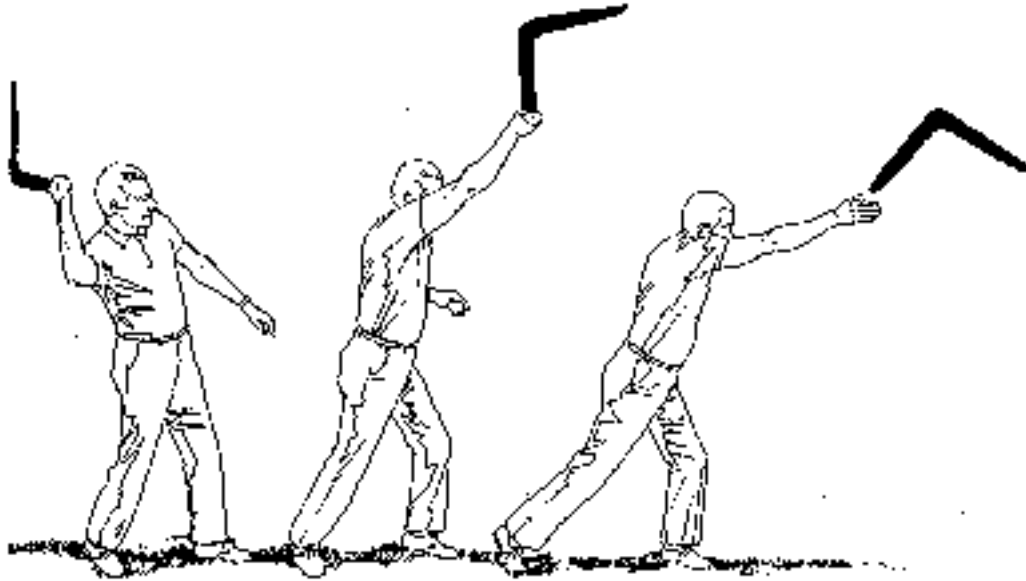
(Figure 15)

Stand in a position facing the wind, then turn your body approximately 45° to the right. Fig. 15. Next, with feet comfortably apart, left foot slightly in front of the right, raise the boomerang over your right shoulder, keeping it (the boomerang) in a near vertical position. Bend backwards slightly at the waist, then bring your arm forward swiftly in a whip like movement and release the boomerang in front of your body (at a position just above shoulder height) by stopping the arm suddenly and opening the hand. The boomerang should be kept in a near vertical position during this forward movement. On no account should the boomerang be released from the hand in the horizontal plane with the palm facing upwards, otherwise it will climb rapidly, in the air and dive downwards in a vertical spin and possibly shatter on impact with the ground.

When thrown correctly, the boomerang should spin away vertically for approximately 20 yards gradually turn over on its back (the flat side) then climb away to the left in an anti clockwise circular movement and return, spinning in a horizontal position like the blades of a helicopter.

Don't try and spin the boomerang, or put too much force into the throw to begin with, but concentrate on releasing the boomerang at the correct angles. When you are getting a reasonably good flat return, a little more force can be used if necessary.

If the boomerang lands consistently in a position to your left on its return, then turn your body a little more to the right, i.e. away from the wind before the next throw. Should it land consistently to your right. turn a little more into the wind, i.e. to your left.



Throwing: action sequence

Take note of any slight changes in wind direction, as this will alter the boomerang's flight path and return position, which will require a change in your original standing position.

If the wind drops altogether, and you find your boomerang is not making a full return, but circling in front of you, give it a few more degrees of tilt to the right on the next throw. You may have to lean it over at an angle of almost 45° - 50° .

Should the boomerang land consistently behind your throwing line on a calm day, try throwing with a little less force. If this doesn't correct the fault, throw it upwards at an angle of 30° - 40° releasing it more vertically (i.e. without any right hand tilt). This also applies when throwing in a fresh breeze, if the boomerang tends to land too far behind the throwing line.

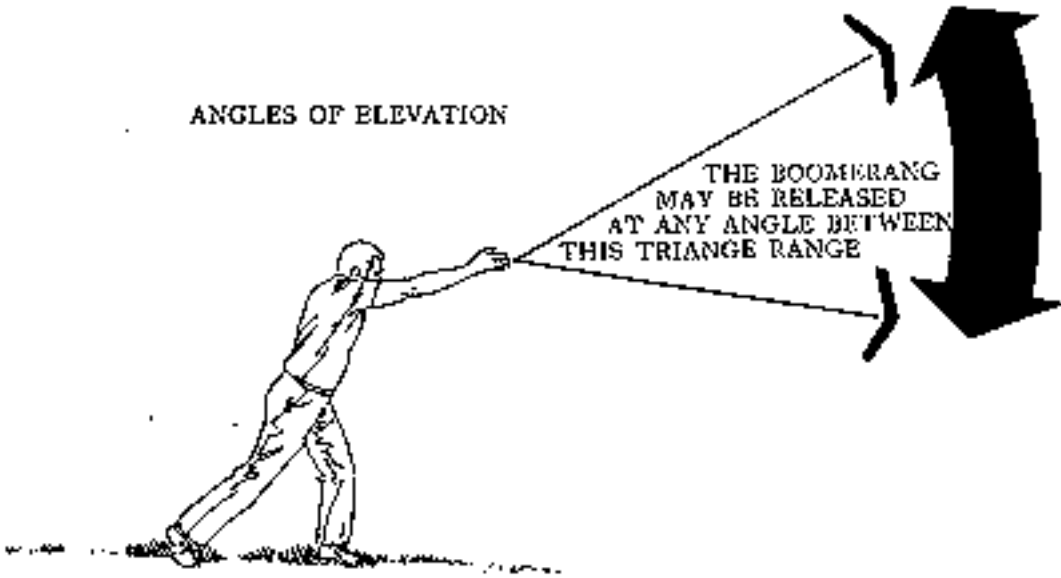
As an aid to better throwing, it would be wise to keep a note of each boomerang's best throwing angles under differing weather conditions, particularly if you are using several at the same time for practice. No two boomerangs will fly on exactly the same flight path, unless they are skillfully trimmed, or the product of a mould or machine.

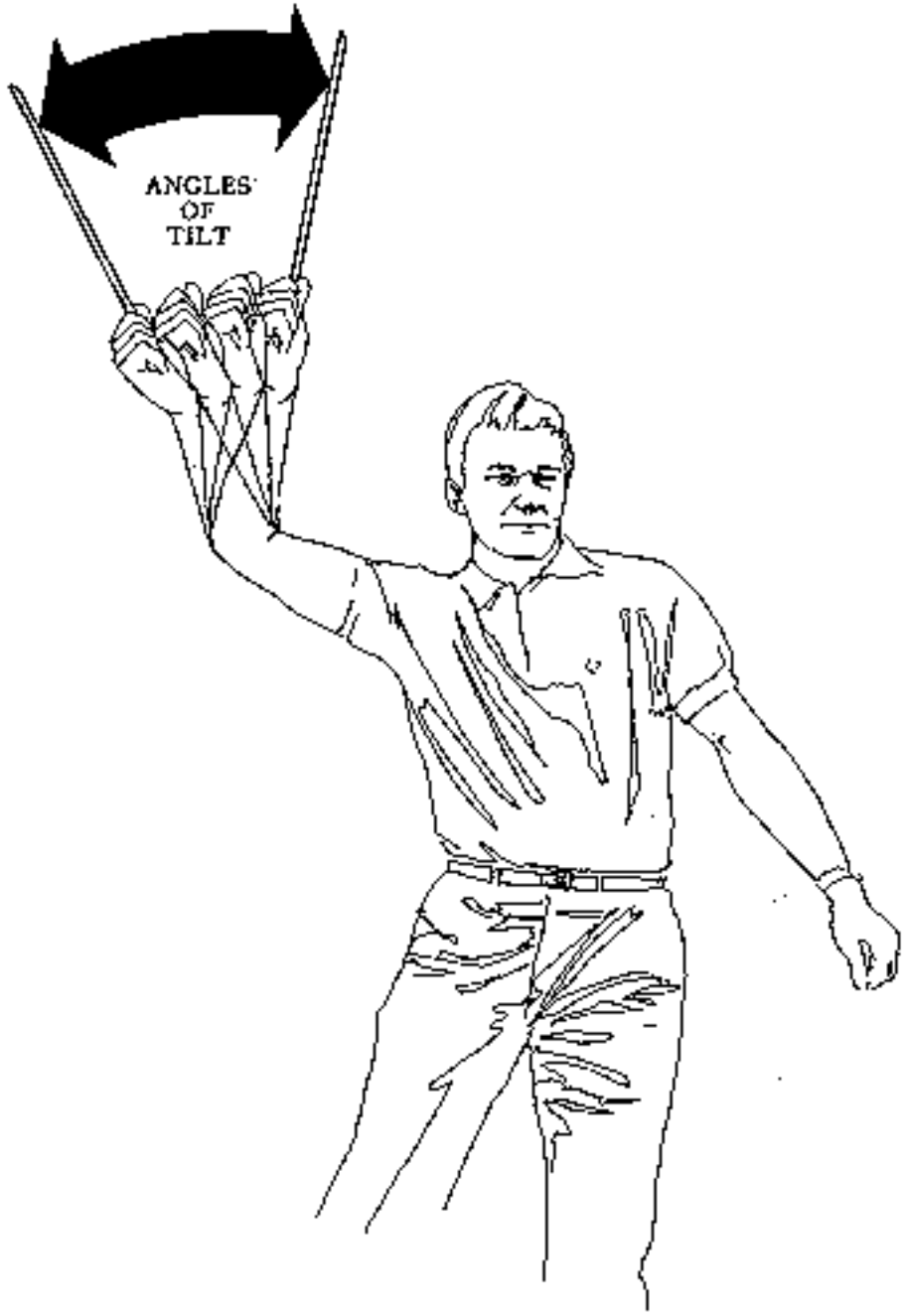
With practice, you will soon learn the art of throwing consistently so that your boomerang makes an accurate return with each throw.

When you have reached this degree of skill (perhaps even before) you will then be ready to go on to the next chapter which deals with catching the boomerang.

ANGLES OF ELEVATION

THE BOOMERANG
MAY BE RELEASED
AT ANY ANGLE BETWEEN
THIS TRIANGLE RANGE





ANGLES
OF
TILT

CHAPTER 5

How to Catch the Boomerang

Having mastered the art of throwing a boomerang successfully, you will, no doubt, wish to learn how to catch it also.

Although the boomerang is fascinating to watch in flight, from a spectators point of view it must seem to be the ultimate in boomerang skills to see a thrower catch it on its return.

Not all boomerangs are easy to catch, particularly the large heavy models. However, I don't think you will have any difficulty with the three illustrated in Chapter 2. Of these, the "Gem." being the lighter model is ideal for catching practice.

The two hand trap

The simplest method of catching, and by far the most popular amongst boomerang throwers is by the two hand trap technique. This is not unlike the technique used by bricklayers when catching batches of bricks for stacking, by sandwiching them between their hands.

The first essential is to be in the right place at the right time. This should pose no great problem if your boomerang is making an accurate return. However, due to variables in wind direction, and slight errors in throwing angles, you may have to do a certain amount of running about when you start to practice catching your boomerang, which is great fun and good exercise.

To catch the boomerang, first make a few practice throws to determine the flight path and return height, then, as the boomerang flies in towards you. place your body in line with its flight path and when it has descended to approximately waist height, clap the spinning blades between the open palms of your hands. Fig. 16.



Catching: two handed

(Figure 16)

You may find it necessary to make a few quick, backward steps in order to allow the boomerang to slow down, as it will, on occasions, be a few feet above your head and perhaps returning a little faster than expected.

Try and make the catch from waist height if possible, as this is, without a doubt, the safest position.

When making the catch, it will depend at which angle the boomerang is tilting whether you position your left hand over right or right over left before bringing the palms together.

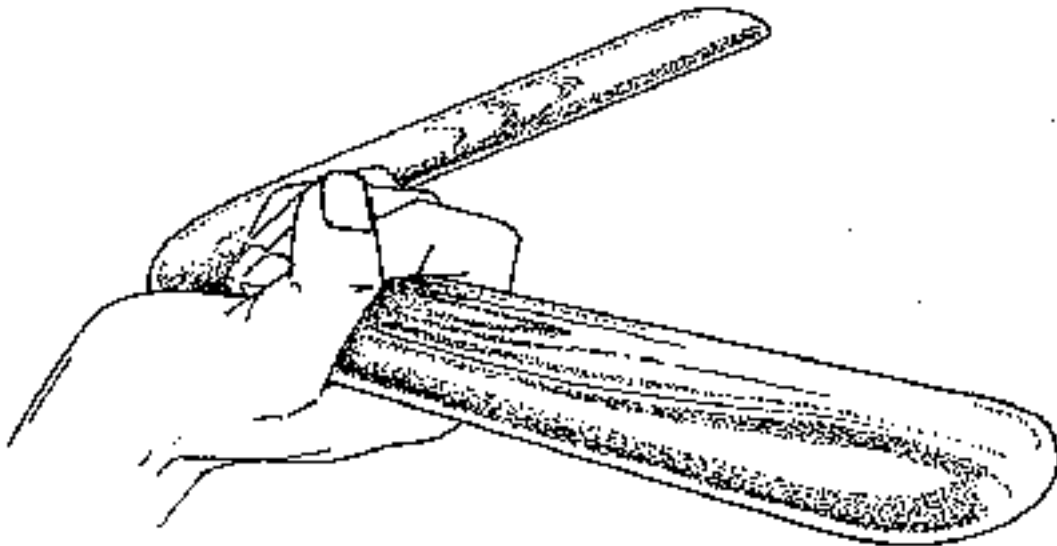
Catching one handed

A slightly more difficult method of catching, is with one hand only, but this too can be mastered with practice.

If you watch a boomerang as it spins in the air, you will notice, what appears to be, a small circular "light window" in the centre of the boomerang. To make a one handed catch, simply grasp the boomerang inside this "window," with the fingers of the hand together and thumb outstretched, closing the thumb at the last moment. Fig. 17. Don't push your hand too far through the "window" otherwise you may rap your wrist or knuckles.

If the boomerang is not spinning too fast, try catching it by the blade tip.

In time you will master the art of catching with one and two hands, and furthermore, you will discover that, as the boomerang starts its initial turn in the air, you will be able to determine fairly accurately, by its speed and height, where it is going to land, and thus have a few seconds in which to position yourself for the catch.



Catching : one handed

(Figure 17)

Don't be frightened by the spinning boomerang, it won't chop your fingers off! And above all, don't get frustrated if you keep on missing the catch, even the experts have their "off days!"

Remember, "practice makes perfect," and after a while, you will feel a sense of pride when you can catch a boomerang consistently without moving more than a few paces from your throwing mark.

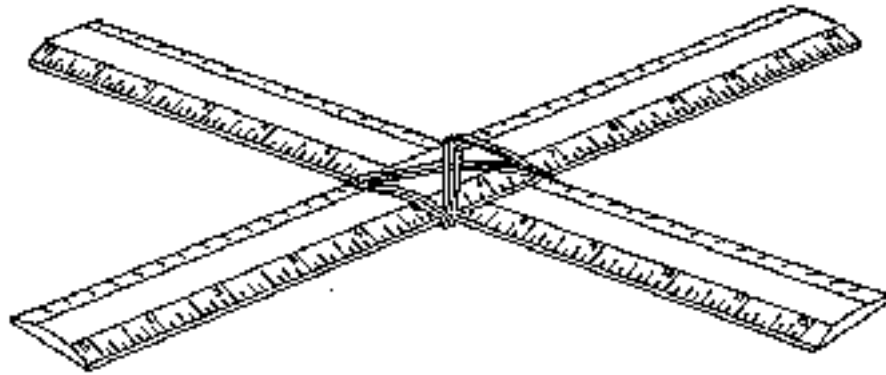
It would be advisable to wear leather gloves when you first start catching practice. These may be discarded when you feel confident enough to catch without them.

CHAPTER 6

A four bladed "Boomerang" and cardboard "Spinner"

A simple four bladed "boomerang" which a child would have no difficulty in making, can be fashioned in a few seconds by joining together two ordinary school rulers. This novel boomerang can be thrown either right or left handed, and as its outward range is limited to a little over 12 yards in distance, it can be thrown quite safely in a restricted area.

To make this four blader, take two 12 inch wooden or plastic rulers, and place them one on top of the other, bevel side up, to form a cross as shown in Fig. 18. Join them both together at the centre with a strong elastic band, or strip of adhesive tape, and you have a Four Bladed Boomerang.



Boomerang: made with two wooden rulers

(Figure 18)

This is thrown in exactly the same way as the conventional boomerang, i.e. with the flat side on the palm of the hand and bevel side towards you. etc.

Incidentally, a boomerang form in the shape of a cross was often made by the aborigines from two pieces of wood, roughly shaped and joined together with vegetable fibre or leather thongs. One such model was on display amongst the boomerang exhibits at the British Museum.

It is believed that this simple type of boomerang was made by the aborigines for the young boys of the tribe, to teach them, at an early age, the art of throwing the hunting boomerang.

The Cardboard Spinner

Another four bladed novelty which is simple to make, and can be thrown quite safely indoors is the cardboard spinner boomerang.

This is made from a piece of thin cardboard to the shape and size shown in Fig. 19a.

This would be an ideal pastime for the children to make and throw indoors on a rainy day, and even adults would be fascinated with one of these, especially the exhausted executive with nothing to do for an hour or two! I know one man who spends hours throwing one round the office filing cabinet, trying to get it to land on his blotting pad.

To launch this little novelty, hold one blade tip between finger and thumb as illustrated in Fig. 19c, and give it a gentle flick forwards releasing it on a plane parallel with the ground. It will then spin away in a circle of 8 - 10 feet in diameter and can be caught quite easily on the palm of the hand or through the hole in its centre on the end of a pencil.

If necessary, its range can be increased by simply attaching a small paper clip to each blade tip.

To reduce its range "dish" the blades, by bending upwards slightly.

If it strikes the ceiling when thrown, try launching from a seated position or else, throw with a little less force. Please be careful of the china figures on the shelf !

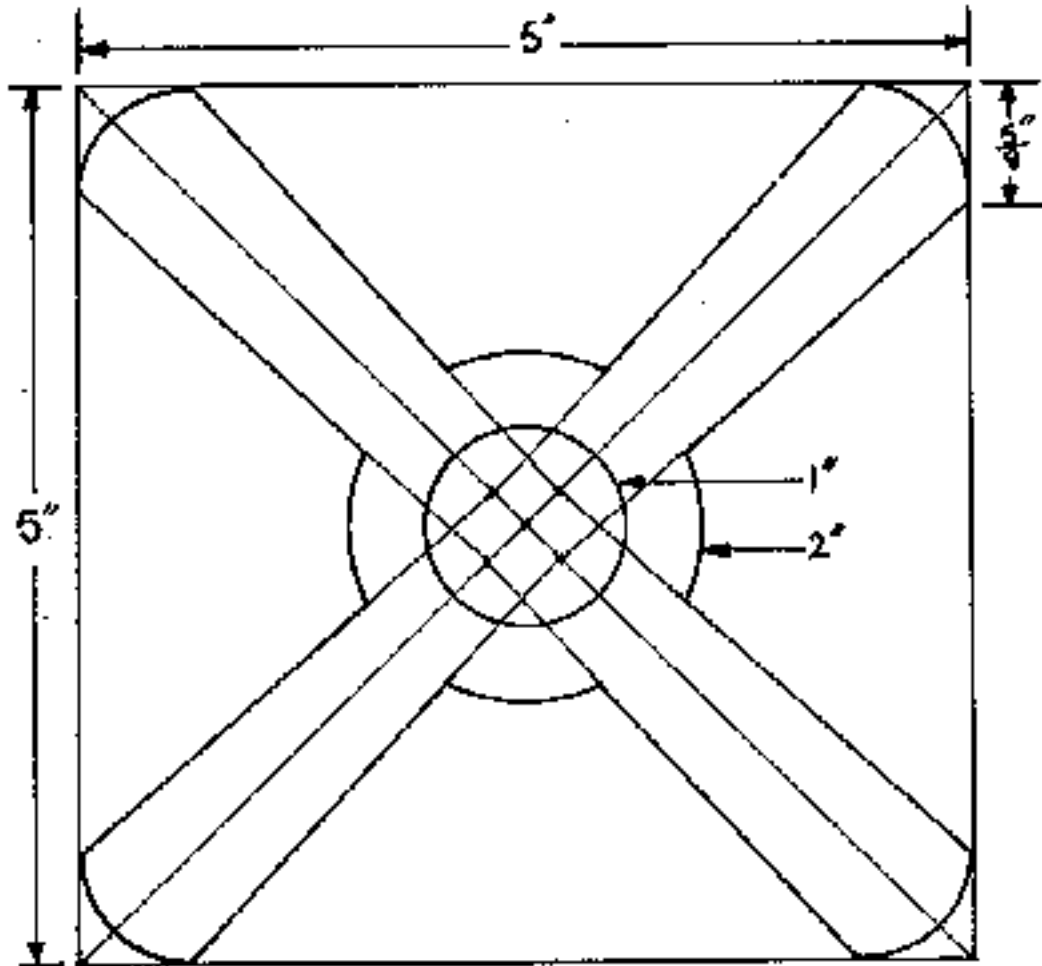


Fig. 19a

Plans of cardboard spinners and throwing grip

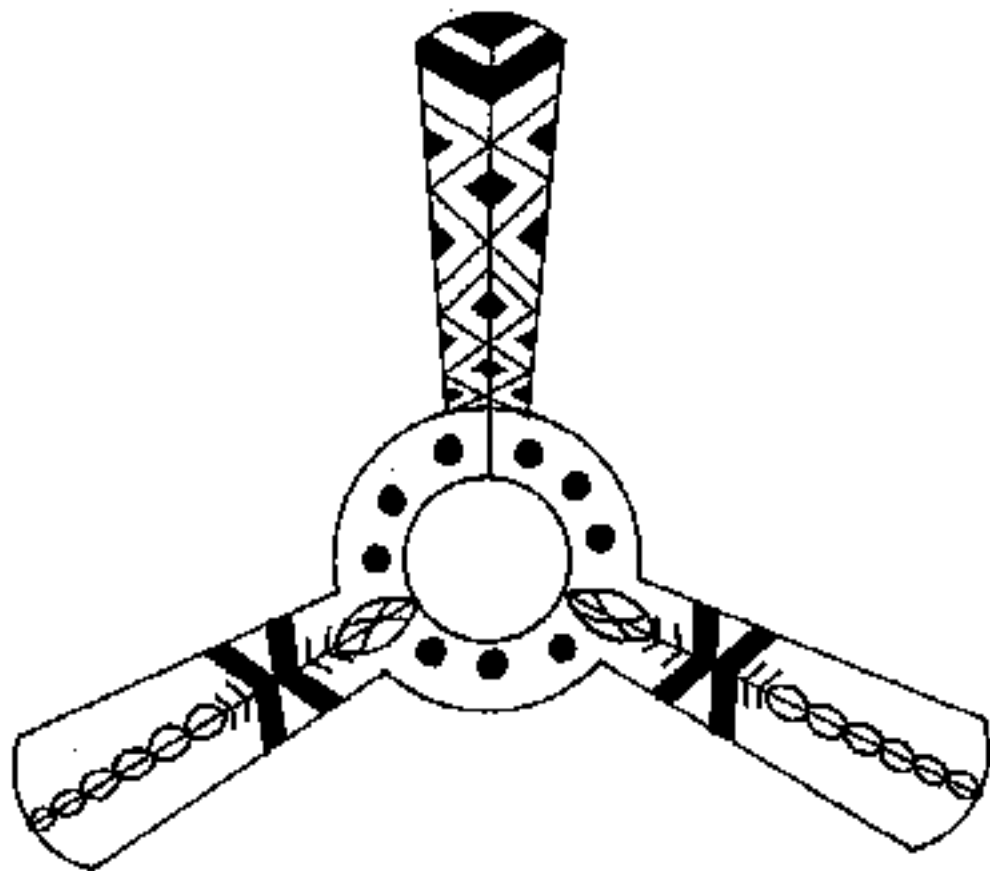


Fig. 19b

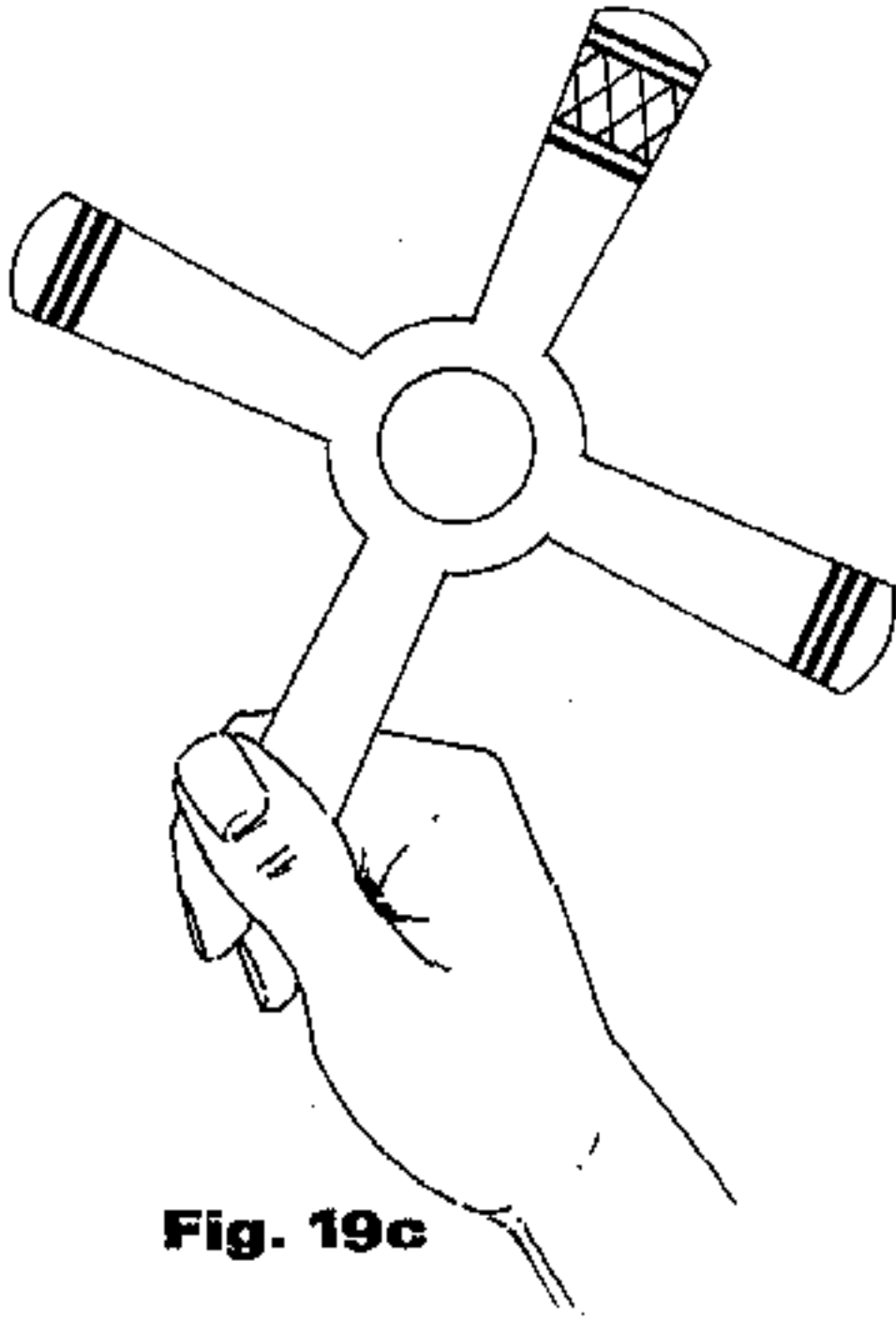


Fig. 19c

N.B. By using thick mounting board, plastic sheet or thin plywood, larger models of the spinner may be made for throwing outdoors on a calm day. If the material used is over $\frac{1}{8}$ inch thick, it will be necessary to round off the top edges of the blades to allow free passage through the air.

An alternative three bladed spinner is shown in Fig. 19b

CHAPTER 7

Distance Boomerangs and how to make them

In the past so many contradictory articles have been published regarding the distance an aborigine could throw a returning boomerang, that the reader has the utmost difficulty in separating fact from fiction.

The majority of these articles appeared in a variety of publications before the turn of the century, and were supposedly from eyewitness accounts by early explorers of Australia.

It would appear from many reports that the observer was blessed with a vivid imagination, and not adverse to a great deal of colourful exaggeration.

One eye witness reports to have seen an aborigine throw his returning boomerang nearly 200 yards and then waited several minutes for its return "Whereupon it suddenly appeared and landed with a thud, burying itself deeply into the hard ground a few paces from the thrower." A highly dangerous practice, I would say.

Others have attributed to the boomerang almost supernatural powers by stating to have seen them "Climb heavenwards to a height of several hundred feet and circle freely about the sky as if unwilling to return to earth" and then, miraculously . . . "drop at the throwers feet."

Now these accounts of a boomerangs performance in the hands of the aborigine would make exciting reading were they to be written for a school boys comic or novel, but unfortunately, (with all due respects to the aborigines skill) they are not altogether true.

In the opinion of many other more serious enthusiasts of the boomerang who have spent years living amongst the aborigines and learning their culture and various skills. The more accurate and less romantic accounts of the returning boomerangs true performance, both in distance and flight duration have recorded it as having an average outward range of 40 yards, with duration of flight averaging 10 seconds.

From my own limited experience and observations, these latter figures are much more realistic.

It is possible that some of the earlier observers have somehow confused the returning boomerangs performance with that of the non-returning hunting boomerangs which I understand, could be thrown to greater distances, by throwing them, as the aborigines did, across, and slightly down wind.

If on the other hand, the writer was referring to the overall flight distance of the returning boomerang, as being nearly 200 yards (and not the distance it travelled outwards) then this would have been a very fair estimate for a boomerang, travelling as it does, on a near circular orbit, particularly if the boomerang in question had performed a series of "pendulum swings" or possibly, as some do, a second smaller circle, before returning to the thrower.

However, this explanation doesn't answer the question of the long flight durations which one eyewitness recorded in minutes.

Possibly, from the point of view of someone observing for the first time a boomerang in flight it would appear to be airborne for a long time, performing its various manoeuvres in the air, but this is only a "mental time illusion" and the observer would probably be surprised to learn that he had just witnessed a flight which could be timed in seconds only.

Some of my own long distance boomerangs, which have a flight path of approximately 300 yards, have been consistently timed in flight at only 10 - 12 seconds from the moment they leave the hand to the time they return back to the throwing mark.

Making boomerangs for distance throwing

Almost all the boomerangs available commercially are of the type which have an outward range of between 15 and 35 yards. It is rare to find one that will exceed the latter distance by more than a dozen yards. These could be described as "short distance models" as also could the "Gem," "Sycamore" and "Traditional", which appear in Chapter 2.

There are many present day claims for long distance throws of up to 100 yards, but it would seem that the type of boomerang used was of a design and weight not available commercially, and further more, on closer investigation many of these 100 yard claims were for outward distance only with only partial return. With this fact in mind, I have included this final chapter for the benefit of the enthusiast who is interested in making long distance models, capable of reaching 100 yards or more and which will return completely back to the throwing mark. I have personally proved this by making a world record throw of 108 yards. This distance was achieved in the presence of official witnesses at the Littlehampton Sports Field in Sussex, on 17th June, 1972. Details and a flight plan of this record throw are shown on the inside back cover. The throw is also featured in the Guinness Book of Records.

The boomerang used for this throw was a large birch ply "Gem" shaped model, ballasted with several small metal weights (a technique which I discovered after several months of experimental work, the details of which have never before been published).
Fig. 20.

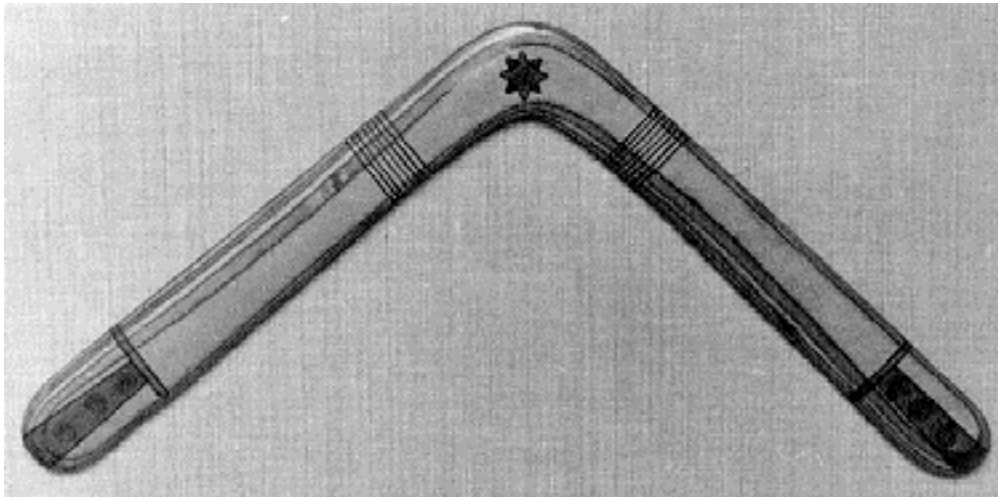


Figure 20 - The World Record Boomerang

My first distance attempts

When I first started to make boomerangs a few years ago, using birch ply as a basic material, I had difficulty in reaching distances in excess of 40 yards.

I did however, manage to improve this range by making much heavier models from alloy and fibre glass, but these were more difficult to shape and furthermore. required a great deal of physical effort to throw successfully.

I then hit upon the idea of ballasting my original birch ply models with small metal weights in an endeavour to increase their distance potential without appreciably increasing their overall weight in the hand.

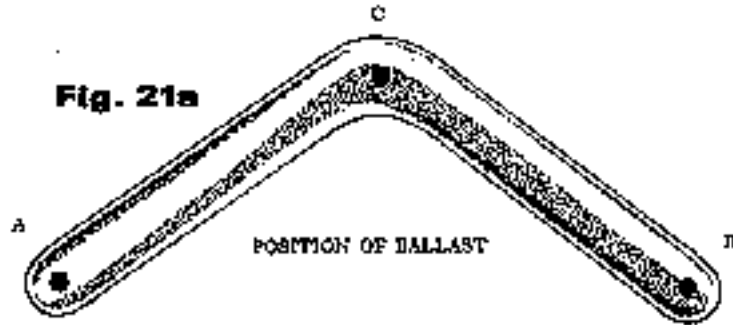
My initial experiments with ballast were carried out, by simply strapping thin discs of lead to the blades of the boomerang, by means of adhesive tape, moving the discs to various positions after each throw, and noting down their effect on the boomerangs flight.

I was quite amazed after a short time, to discover that it only required a small amount of ballast, set at the right position on the blades, to improve the boomerangs outward range by over 50 per cent, without affecting its return ability.

After more tests, and using heavier weights, I found the best possible position for ballasting, was at a point on the blades, approximately one inch from the tips and a small amount set at the "elbow" to give a more horizontal return. See Fig. 21 a.

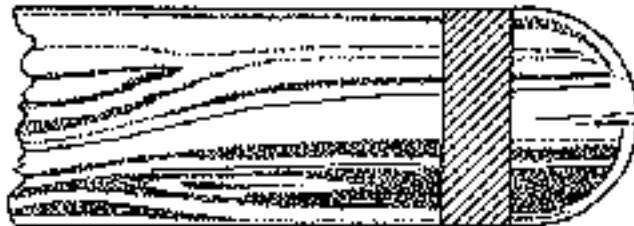
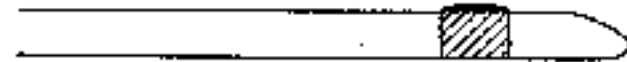
The amount of lead ballast which I used, depended on the original weight of the unballasted boomerang, but generally. an amount of ballast equal in total weight to a quarter of the weight of the boomerang was sufficient to more than double the boomerangs outward distance.

The boomerang I used for my world record. weighed six ounces before ballasting. To this I added just a fraction over two ounces of lead. which was divided into two equal amounts, and set permanently into the blade tips. To do this. I formed the lead into cylinder shaped plugs, each measuring $\frac{1}{2}$ inch in diameter, drilled holes in both blade tips and then gently tapped the plugs into position until they were flush with the surface of the boomerang. This was a simple operation and is the method I now use to ballast most of my distance boomerangs. See Fig. 21b.

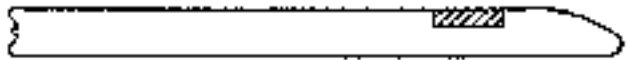


NORMALLY IT WILL BE FOUND SUFFICIENT TO BALLAST AT POSITIONS A AND B ONLY. HOWEVER, A SMALL AMOUNT PLACED AT POINT C WILL OFTEN GIVE THE BOOMERANG A LOWER FLIGHT TRAJECTORY, AND ALLOW IT TO RETURN ON A MORE HORIZONTAL PLANE.

SIMPLE METHOD OF BALLASTING **Fig. 21b**



ALTERNATIVE METHOD (USING CIRCULAR PLUG AT ELBOW IF REQUIRED)



The question now arises. How much ballast should be added to a boomerang in order to gain the maximum distance, without affecting its return qualities?

The answer to this question is, to a certain extent, a matter of trial and error. Heavy boomerangs won't require as much ballast as lighter models of the same shape. However, as a simple guide, a weight of ballast equal to one third of the boomerang's original weight, should not be exceeded otherwise the boomerang will be "overweight" and will not return successfully, unless thrown in a very strong wind, which in any case will reduce its outward distance and thus defeat the object of ballasting in the first place. Furthermore, should you get the boomerang back, it will probably have climbed high in the air and return on a steep downward flight path, which is both dangerous and undesirable.

Another question now comes to mind regarding the shape of boomerang best suited to ballasting, (some shapes are more successful than others).

I have always found that the most successful results are achieved with ballasted models of the "Gem" and "Sycamore" and other boomerangs with parallel blades.

I have never had a great deal of success with weighted versions of the "Traditional" shape. Perhaps there are aerodynamic reasons for this. However, like the aborigine, bless him, I am blissfully ignorant of the reasons a boomerang will perform in a certain way

when changes are made to its balance, shape, section and size (of which there are dozens of combinations). Nevertheless, by trial and error, I have gained a useful working knowledge which has enabled me to make successful returning boomerangs in numerous shapes and sizes. Furthermore, I have also discovered a method of increasing a boomerang's range by weight ballasting and am more than pleased to be able to pass on this knowledge to other interested enthusiasts. I am also fully confident that the reader of this modest little book will not only be in a position to make and throw his own boomerangs successfully, but will no doubt be able to improve on my own humble achievements.

Good luck to you all, good throwing and many happy returns !

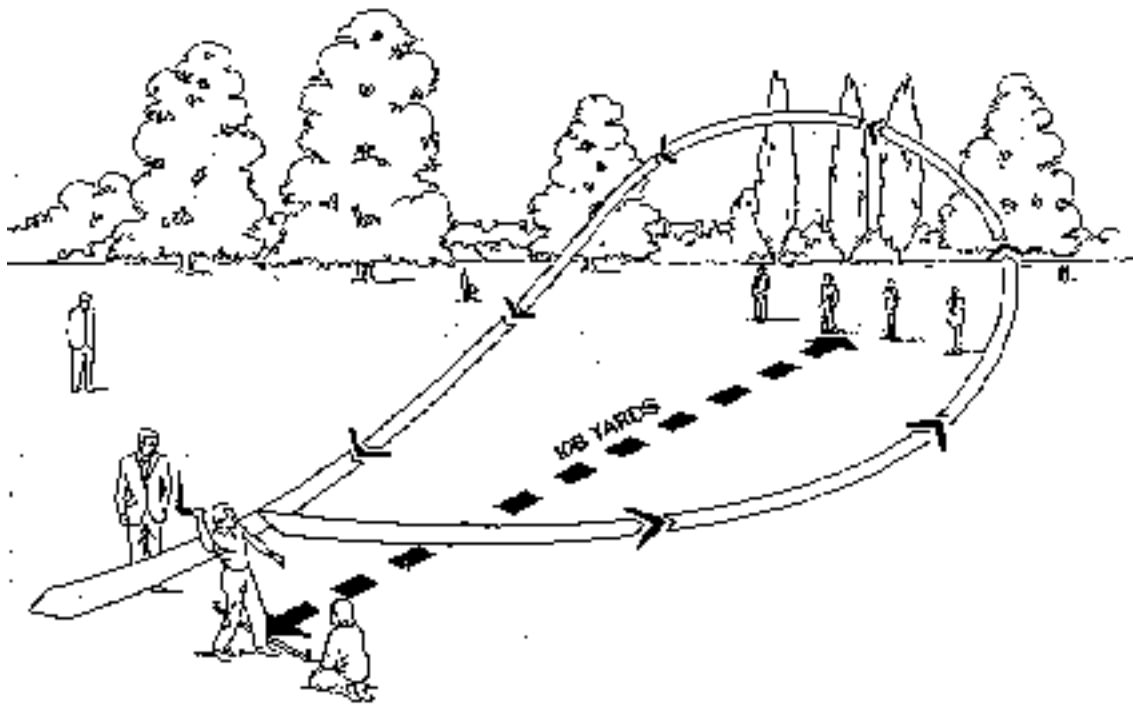
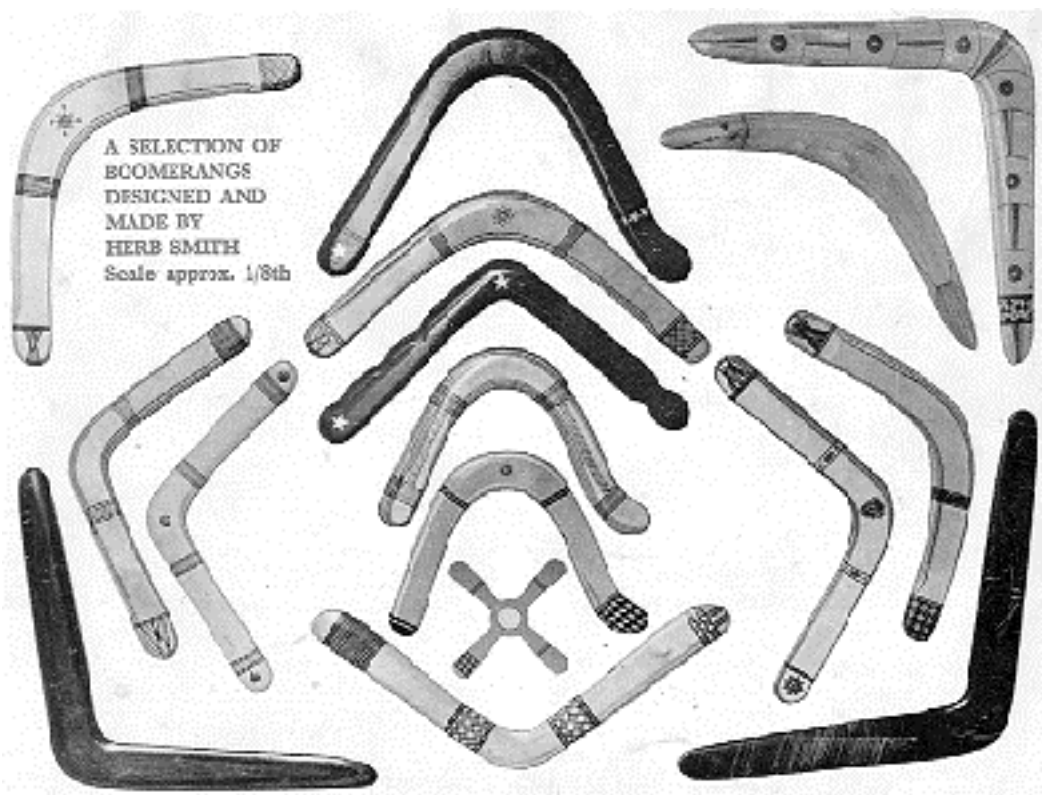


Diagram of World Record Distance Throw by Herb Smith achieved at the Littlehampton Sports Field on June 17th, 1972.



Boomerang Resources

The electronic version of this text is furnished as a service of:

<http://www.flight-toys.com/>

If you enjoy boomerangs as a sport or hobby, please visit Boomerang World at:

<http://www.flight-toys.com/boomerangs.htm>

A large number of quality boomerang products are available for sale at:

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<http://www.flight-toys.com/boomerang/auction.htm>

For more information about boomerangs, email Ted Bailey at boomflight@gmail.com or call (734)-971-2970 or write to: Ted Bailey; 3245 Edgewood Drive; Ann Arbor, MI 48106-6076; USA