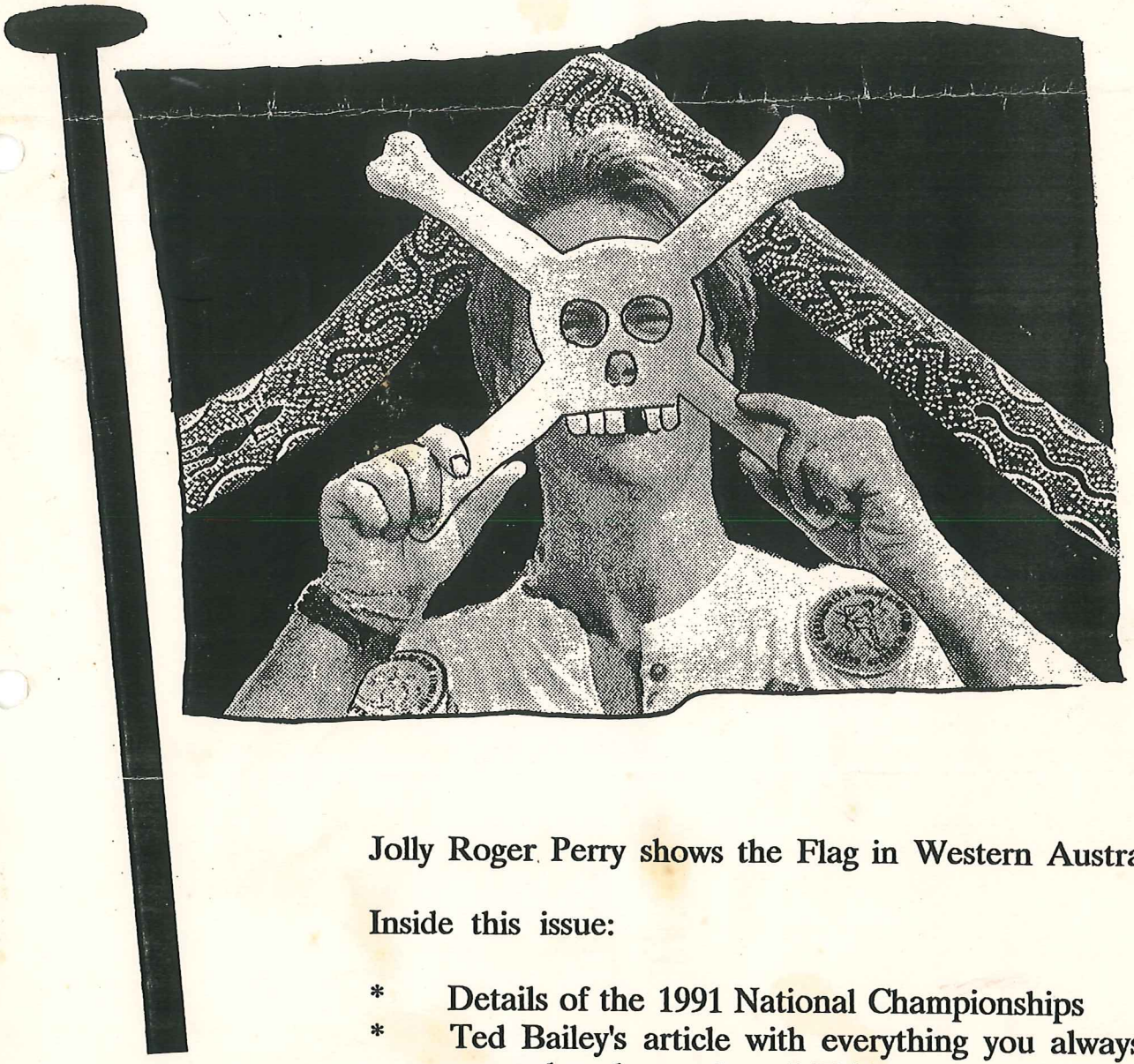
# BAA BOOMERANG BULLETIN

December 1990 Number 68

BOOMERANG ASSOCIATION OF
AUSTRALIA INCORPORATED
(Est 1969)



Jolly Roger Perry shows the Flag in Western Australia

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# MTA Tuning and Throwing

## by Ted Bailey

Introduction

There are two methods of tuning and throwing MTA boomerangs that I learned and developed in 1985. The first method, described below, is the easiest and was basically the only method which I observed accomplished throwers using in competition during the summer of 1985. This method, called the rotary glider technique, allows the thrower to put full power behind the throw, resulting in the boomerang spiralling upwards as if it were climbing the threads of a screw to its zenith point. One can average about 30 seconds per flight with this method in decent weather. The second method of tuning and throwing, which I call the samara technique, produces less consistent results, but many of my flights which exceeded one minute duration were accomplished using this technique. The samara is a winged fruit such as a maple seed pod, I developed this method by trying to simulate a ground-to-air samara launch using two large artificial samaras made by Ray Rieser. The MTA boomerang climbs almost straight up to a point higher than with the rotary glider technique and if the throw is done correctly, it can produce extra long duration flights.

The instructions given below must be memorised and precisely followed in order to achieve consistently long flights. The habitual sidearm thrower must be extra cautious when following these instructions as a very narrow launch window is needed for both techniques. Left-handed throwers must assume mirror image symmetry when following the instructions. Frequent tuning may be necessary, especially with minis, because of warpage that may occur due to storage, shipping, temperature changes and catching.

MTA Boomerang Terminology

Note that the two arms are of different lengths. The long arm is referred to as the lift arm and the short arm is referred to as the dingle arm. The arms connect at the elbow. To define the elbow, suspend the boomerang by each arm (blade) tip and drop a line straight down through the center of gravity to where the vertical arm intersects the opposite arm. Mark the intersection on each arm with an X mark. The elbow section lies between the two X marks and must always remain perfectly flat for all tuning techniques or the instructions below will become meaningless.

Flecture of the blade between the tip and the X mark to produce a gentle concave upward warpage is called adding positive dihedral. When the elbow section is pressed flat against the table top, the blade tip should be elevated above the surface.

Twisting the blade such that the leading edge is elevated above the trailing edge gives the blade a positive angle of attack. If the blade is twisted such that the trailing edge is elevated above the leading edge, then the blade has negative angle of attack, also referred to as washout. The twist should always be made by holding the blade between the tip and the X mark. The leading edge is the edge of the airfoil that enters into the air as the airfoil rotates about its center. The trailing edge follows the leading edge in rotation.

Figure 1 illustrates the above defined terminology. The boomerang illustrated is a very efficient mini-MTA boomerang made of 2mm-3mm plywood and has a tip to tip length of only 14 inches.

The Rotary Glider Technique

Tuning Both arms require a gentle concave upward bend from the X mark to the tip. The lift arm requires a positive angle of attack twist and the dingle arm requires a negative angle of attack twist. This results in the outside perimeter of the boomerang resting higher than the inside perimeter when the boomerang is placed on a flat table top. The boomerang would lie nearly flat if it were resting on the inside of a shallow conical bowl. The boomerang requires further fine tuning in the field. If thrown correctly, the boomerang should make from one to three complete circles, with each circle successively smaller than the one preceding it. The boomerang should spiral upward as if climbing the threads on a screw. If the boomerang is thrown and it makes circles without climbing to sufficient height, then you must add more dihedral to the lift arm. The closer the bending is made to the X mark, the higher the boomerang will climb. Do not add too much dihedral or the boomerang will climb straight up and return to earth in a chaotic mode. Stability is controlled with three basic mechanisms; dihedral in the offset dingle arm, the negative angle of attack in the dingle arm, and the positive angle of

attack in the lift arm. High values of the angle of attack provide more stability when the boomerang is drifting to earth, but stability is not without sacrifice as the drag forces are also higher, resulting in a lower rotational speed and a faster sink rate. Beginner MTA throwers should use high angles of attack. Experienced throwers should use high angles of attack in windy weather and reduce the angles of attack during calm weather to take advantage of controlled rotational speed and sink rate.

Throwing - The most important rule to remember for this technique is; DO not layover! The boomerang at the moment of release must be orientated essentially at a right angle relative to the horizon. The second most important rule to remember is: The boomerang needs substantially more incline (at release) than other boomerang throws require. The incline angle is usually 40-50 degrees but can be more or less. The general rule is: more dihedral in the lift arm requires a higher release or incline angle and a harder throw. The angle thrown into the oncoming wind varies with the boomerangs tuning and wind conditions. Try several different angles each day to see what will work best. Some throwers like to throw downwind. It is easier to throw by holding the dingle arm. Some throwers feel that the lift arm throw allows you to transfer more energy into the boomerang at release. Try throwing by using each arm and use whatever is most comfortable for you.

The Samara Technique

As in the rotary glider technique, the dingle arm requires positive dihedral and negative angle of attack. The lift arm requires a positive angle of attack but only a very small amount of dihedral should be placed into the arm. With the lift arm almost straight, height must be achieved with a different throw. With this technique, it is best to throw by holding the dingle arm. The incline angle is higher (50-70 degrees) and the thrower needs to use a layover angle of 45- 75 degrees from the horizontal position for best results. This method does not work well in calm conditions. Under ideal conditions, the boomerang will climb to a very high zenith point, resulting in longer fight times. This technique is not recommended for the beginner MTA thrower.

Catching Instructions

Be careful when you catch your MTA boomerang. These high speed and low drag models store lots of energy, especially if they are large and weighted. The leading edges are often quite sharp out of necessity and can cut if caution is not exercised. Avoid catching with one hand and always protect your eyes from damage.

The experienced competitor will always catch his boomerang as close to the ground as possible to gain several extra seconds of flight time as the boomerang drops the last few feet.

Practical Tips

If the above instructions are followed and success is not realised, then have an experienced thrower watch you. More often than not, the beginner has difficulty with a vertical release, and throws with too much layover and without incline.

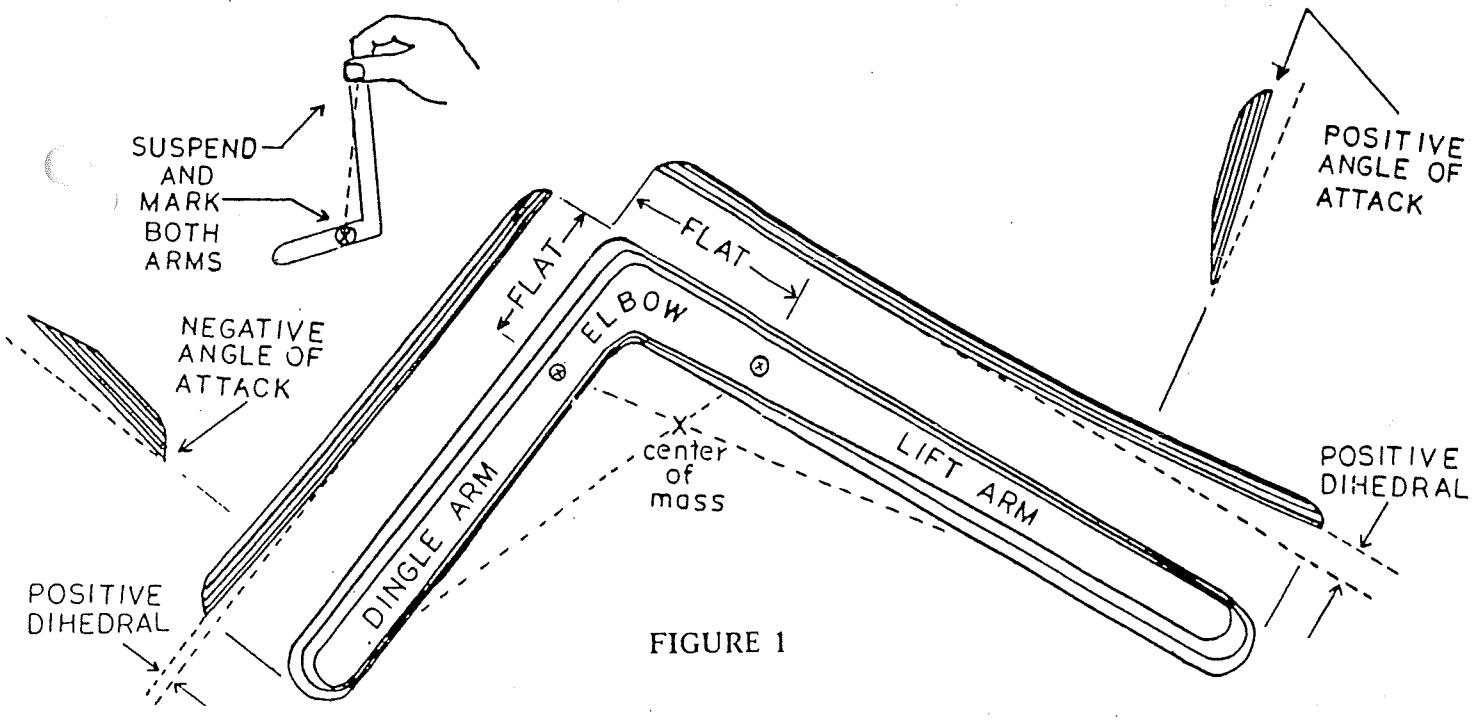
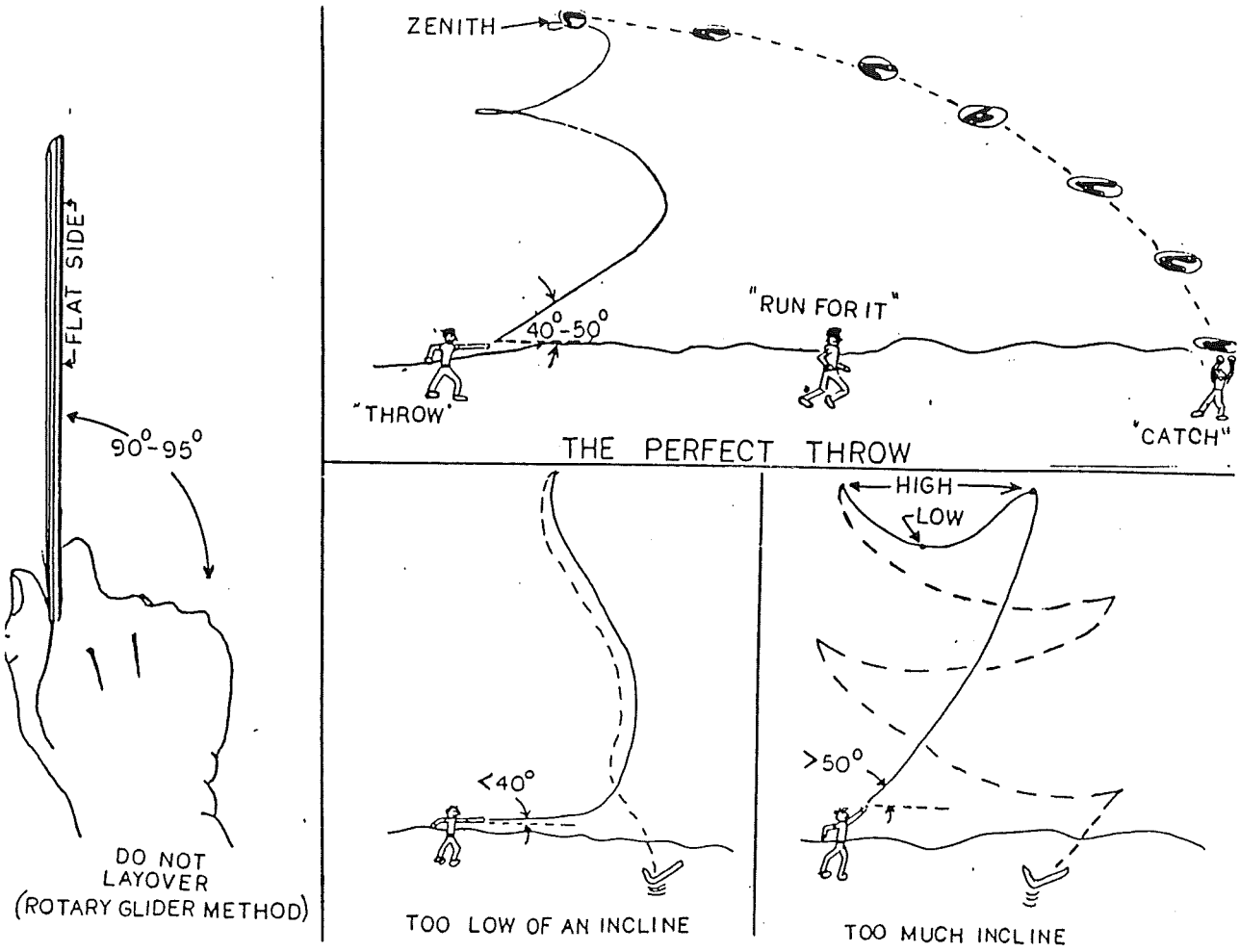



FIGURE 1




In competition, do not try to set a worlds record on your first throw. Begin with a controlled throw, then try to improve with each successive throw. You can easily lose control by trying to overpower an MTA boomerang.

For extra height, try running before launching, and even jumping at the moment of release. More energy is transferred into the boomerang so that it can climb higher for longer flight durations.

It is important to throw with lots of spin. It is recommended that the boomerang be held with a pinch grip to accomplish this result.

Try juggling two mini- MTA boomerangs with half-power throws. This allows 15-20 seconds between catches so that the less athletic thrower can seriously compete with advanced throwers. MTA boomerangs do not make good jugglers in windy conditions.

Exercise caution when bending the arms to avoid breakage, especially if the model you are using is internally weighted in the vicinity you are applying the bend. Plywood can become quite brittle in cold weather. It is advisable to warm the section with your breath or steam before applying the bend.

Reduce sideslip or the rocking motion during the descent by changing the relative twist and dihedral between the two blades. Usually, corrections only need to be made to the lift arm because this arm is more sensitive than the dingle arm.

After adding positive angle of attack to the lift arm, decrease the angle of attack just at the tip section to improve stability without significantly increasing the drag forces on this blade.

Do not make any adjustments to the airfoil or the surface finish unless you are an expert. The airfoil chord and planform are aerodynamically tuned and can be quite sensitive to alterations.

The advanced thrower may wish to experiment with an unweighted boomerang by adding weight (lead tape) to the underside of the boomerang. Do not add anything to the upper surface of the boomerang. Lead tape of various thicknesses can be purchased at golf shops. Do not use too heavy a piece, especially with mini-MTA boomerangs, or the sink rate will be too high. After the weight is added, test throw several times and move the weight around until perfect balance is achieved. It is recommended that the weight should be added in the following proportions: 1 unit to the tip of the lift arm: 1 or 2 units to the tip of the dingle arm; and 1 or 2 to the elbow.

Learn to read the wind by watching movements in the grass or in the trees. The best time to throw is about 4 to 6 seconds before a gust of wind reaches the thrower. light gusty winds are potentially the best conditions for throwing MTA boomerangs. Gusty conditions can frequently be experienced in the near vicinity of a cold or warm frontal system. Look for the special days when lots of small puffy (sheep) clouds fill the sky. Gusty conditions are usually found where the shadow of the cloud reaches the ground. On calm days, the best time to throw is mid-morning until the mid-afternoon when the thermals are at their peak intensity. Watch to see what time the large migrating birds take to the sky to take advantage of these thermals.

On very windy days, locate a fields with a tree line to break up the boundary layer of the wind. Try throwing in different locations on the field until you find a location where updraft conditions prevail.

For light wind conditions, find a triangle of a square field surrounded by trees in all directions except from which the wind is coming. Throw near the opening of the field and watch the natural updraft that is present as the air enters the field and is lifted above the surrounding trees. Do not throw your favourite MTA boomerang under these conditions unless you are prepared to lose it with an exceptionally long flight duration.

Conclusion

Dont be afraid to ask more experienced throwers for help. Most are eager for others to become involved in an event that has been open to only a few of the competitors in the recent past. Send in reports of extra long flights to the USBA newsletter. share your discoveries with others by publishing your experiences. the Sport of MTA boomerang throwing is still in its infancy and requires the input of all participants if it is to progress to an advanced state. MTA throwing is potentially the most exciting of all the boomerang events.

I am much in debt to Ted Bailey for this article which was written some time ago but still remains the best article of its kind on MTA rangs. Dont forget Ted is publishing his own newsletter nowadays details elsewhere in the Bulletin.

## Real High Flying Boomerang Throwing in Hot-Air Balloons

By Br. Brian Thomas, Australian Boomerang Coach.

It isnt every day you get a chance to throw boomerangs from hot-air balloons. So, when you do get a chance, you grab it. My chance came in January, 1990, when I was assisting with Camp Quality, a camp run for kids with cancer. It was being held at our schools camp at Tuross Head, NSW. This is a week of wonderful activities for these unfortunate kids, and the aim is to get them right away from hospitals and treatments, and let them have as much fun as a kid can. Each kid has a companion, who is at least 18 years old. The kids ranged from 4 to 16 years old.

Naturally I did boomerang throwing with them, which they loved.

On the two last days of the camp Australias leading balloonist, John Wallington, and his family came to Tuross to put up a hot-air balloon in the early hours of the morning...about 6a.m. I gave him a hand, and also showed his kids, and himself, how to throw boomerangs while we were waiting for the kids to arrive. His balloon was tethered to three cars on an oval so that it went up about 50 metres, hung around for a few minutes and then came down. The basket was quite large and held about eight people. There is no fear of falling out as the edge of the basket is quite high. It came up to my chest. This makes throwing a bit difficult to say the least. You cant get a good swing back with your arm, but have to do a short jerky flick. You also have the problem of ropes hanging down to hold the basket onto the balloon! Unlike the Toyotas it is not a case of Not so squeezy!..space is scarce.

When I normally throw on the ground I head for the horizon with my throw. In the balloon you tend to do the same first up... only to find that the horizon, when you are 50 m in the air, is well DOWN. The boomerangs circled all right, but came back under the basket.. eager kids gathered these as they floated picturesquely towards mother earth. I used short ranged boomerangs (the Hawes plastic Cubs were good) and other small boomerangs (a few of Rod Jones). I found that I had to aim my throw as high as possible ... then the boomerang came back in at the basket level. There were a few near misses at first with boomerangs hitting the side of the basket and the ropes hanging down.. and even a hand hanging out of the basket ! But finally one of Peter Byhams Egrets negotiated the gaps in the hanging ropes to drop into my hands (or chest actually). A few throws later a Cub came back on the opposite side of the basket, where pilot John Wallington grabbed it for his first-ever boomerang catch.. what a way to start a boomerang career!!

At this stage you must be thinking that the balloon went up loaded to the top with an endless supply of boomerangs. Not so, I took up about half a dozen at a time , but was fortunate enough to go up about six times, as John was keen for us to record a catch in the balloon. This feat has