CHAPTER 5

Bird Kites

1 Introduction

I thought it would be interesting to write about bird kites from across the world emphasising the period from 1980 onwards and concentrating on commercial kites rather than 'one offs'. In particular I wanted to classify bird kite types in some way. I ended up using their wing structures – this seems to work and produces a classification of six types. And it was interesting to do.

Definition. For this article a *Bird Kite is one which is designed to suggest a bird in flight using any combination of structure, pattern and colour.*

Clearly in some cases the kite shape symbolises the bird in a way which might not be apparent outside that culture. Illustrations 1a and 1b are of a raven bird kite from Sri Lanka taken from Thiebault [1] and Illustration 2 is an actual raven kite.

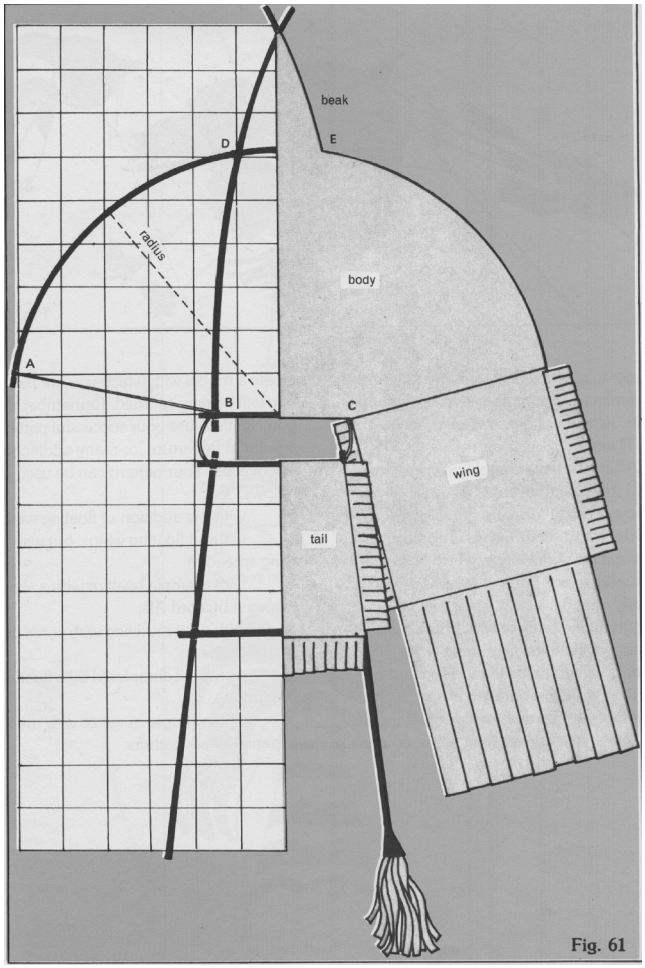

Illustration 1a: Sri Lankan raven kite

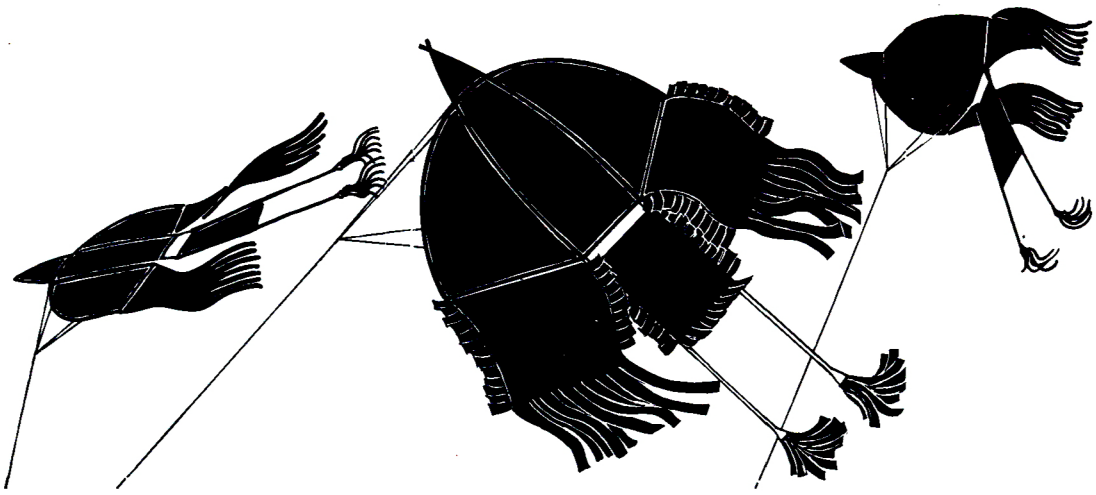

Illustration 1b: Sri Lankan raven kite

Illustration 2: Sri Lankan raven kite

No I haven't seen a raven like it. But it does have 'wings' and a 'tail' section which will move in-flight, and a commercial version is now available. Some variants of the Chinese Rigid Wing kites (see Section 4.4 below) also use symbolism which to my eyes clashes with realism.

I have excluded:

- bats and pteranodons;
- bird men (New Zealand and Icarus);
- Thunderbirds and the Phoenix;
- and, for all I know, flying squirrels.

I've also excluded kites where the kite's plan isn't changed but a bird pattern is superimposed even though some very effective kites have been clear plastic Malays with a good bird print. I haven't seen an 'Indian Fighter' to include in the article although there are pictures of kites with a formalised bird design. I've seen a mylar fighter shaped to produce the hint of a head and tail.

Back in the 1970's Helen Bushell made a very birdlike version of her trefoil delta just by putting black wingtip colour on the trailing edge. But there has to be a limit — and the Ostend Bird (Illustration 3) just scrapes in as being enough of a bird kite to qualify.

Illustration 3: Ostend Bird kite

Starting to write about bird kites it soon becomes clear that you have to realise:

- that you are writing from a particular corner of the kite world
- that even from my limited knowledge of what has been done you have to be selective while still trying to show the enormous variety of bird kites.

The layout of the chapter is:

Section 2 – History;
Section 3 – Compound Birds;
Section 4 – Wings;
Section 5 – Heads etc.;
Section 6 – Exceptions;
Section 7 – Omissions;
Section 8 – Conclusion

2 History

While expert opinion has now swung to believing that kites were invented in South East Asia/South Pacific, rather than in China, it is from China that we get the earliest clear written records and they describe wooden bird kites. Not so surprising as until quite recently humans imitated the natural form which had the properties they wanted. For example, castles were attacked with 'battering rams', the business end of which were shaped to look like a ram's head. Rams are known for battering each other. Similarly, birds could fly, therefore the best shape for a flying device was a bird.

The earliest Chinese kite maker was Gong Shaban who, it is claimed, made a wooden kite which imitated sparrow hawks circling the sky. Others credit Motzu (also pre 380BC) who took 3 years to make a wooden bird which was wrecked after one day. His followers said 'What skill the Master has to be able to make a wooden kite fly'. He answered 'It is not as clever as making a wooden ox-yoke peg'. (We all

know the feeling). A contemporary called Kungshu Phan is said to have made a bird from bamboo and wood which flew for three days (I feel for Motzu).

At about the same time Arelytas of Tarentum, a Greek, is claimed to have made a 'flying dove'.

Yolen [2] has a photo of a clay model of a bird shaped kite in the Cairo Museum which at 2,200 years easily pre-dates the other claims. But no one is very sure.

Japan imported kites, together with its pick of the rest of Chinese culture, in the 7th century AD.

Maori kites sometimes resemble flying men, but not birds. Bird kites are not a feature of traditional Indonesian/Malaysian kites. This is 'not quite true', for the Malaysian Wau does have bird named variants. But they are even less bird-like than the Raven from Sri Lanka.

Bird kites in the West (I really mean Britain) were flown in the 18th and 19th centuries (see Chapter 2), making use of their resemblance to a hawk to scare birds either to keep some game birds on the ground or to scare birds away from crops. I have one just over 100 years old, made of wood and thin treated cotton with a thin metal head of a bird in profile (Illustration 4). Full cup drogues are used and the instructions suggest putting a stone in one cup to provide extra stability in strong winds. Karl Longbottom now makes some very good replicas.

Illustration 4a: a Sportsman's Kite

Illustration 4b: a Sportsman's Kite

None of the 19th century developers of kites for lifting or traction used a bird kite. Of those who were after powered flight, to my knowledge only Lilienthal seemed to use bird shapes (Illustration 5). So the practical use of bird kites has largely been as bird scarers in one form or another.

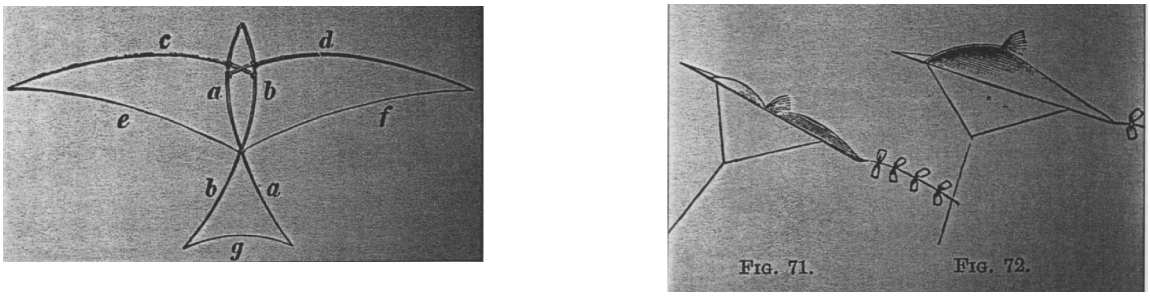

Illustration 5: Lilienthal's bird shapes

So 'adult' kites in the first half of the 20th century used Malays, Conynes and box shapes from Hargreaves *et al.* Many children's kites were home made so the builders had enough problems using gardening materials to get archtops, diamonds and three sticks to fly without going for bird designs. Of course there were some bird kites sold as toys and Brookite had a compound bird design (see Section 3). Hunt's book [3], published in 1929, shows an Owl kite in the shape of a face-on sitting owl where the beak projects from the front surface to provide both a fin and the bridle point. The outline is to be formed by steam bending sticks made from orange crates. I don't really understand the plan but Hunt was a kite builder to the U.S Weather Bureau.

Four things affected western bird kite development in the second half of the 20th century:

- the development of the delta
- the spread of knowledge of the Papagaio
- wider knowledge of oriental kites
- new materials. Not only ripstop but light stiff wing spars and flexible thin spars as a base for feathers etc.

What was happening to Chinese and Japanese kites is a separate specialist area (see the books by Ha & Ha [4], Streeter [5] and Hosking [6]). Briefly: traditional Chinese kites have always had a high artistic and craftsmanship content. As well as traditional designs they seem free to invent new designs. Going for western shapes hasn't always been successful (I have a flexible-winged squatting Kangaroo) but they have now established large scale manufacturing.

In Japan craft kite making seems always to have been in the hands of relatively few makers who kept to traditional local designs. While there has been a resurgence of interest in some traditional kites, kite flying in Japan –associated with culture and tradition– is declining.

Back to the 'west'. *Kitelines* Vol. 3 no. 3 (Fall 1980) had a great review article 'Tal Streeter on Kites as Art' with eight bird kite illustrations. Curiously he didn't include the Larus Seagull and the Papagaio, probably as his main concern was the 'one off' hand built kite.

A list of some of the kites which will be mentioned later, and their dates, is given below. One of the dates is 'before' as I couldn't research launch dates.

before 1983 Windy Kites Seagull
1984 George Peter's Skybird, Martin Lester's Goose etc.
1987 Joel Scholz's Parrot
1990 Jackites. Dove in 1996
1992 Martin Lester's Hawk
1996 R Tiens 'l'oiseau'
2001 Didakites 'Ostend Bird'
2003 Schmidt-Pitts Feuervogel

3 Compound bird kites

There is a range of kites to consider before going on to bird kites proper. None are very 'realistic'. These examples are:

- Will Yolen's Bird Kite (Illustration 6)
- Pelham's Compound bird (Illustration 7)
- the Sherbird (Illustration 8)
- the Austrian 'English kite' (Illustration 11)

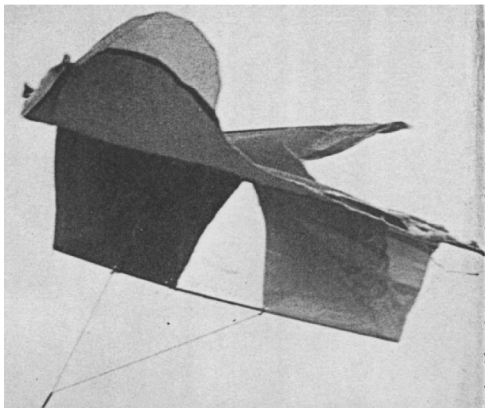

Illustration 6: Will Yolen's bird kite

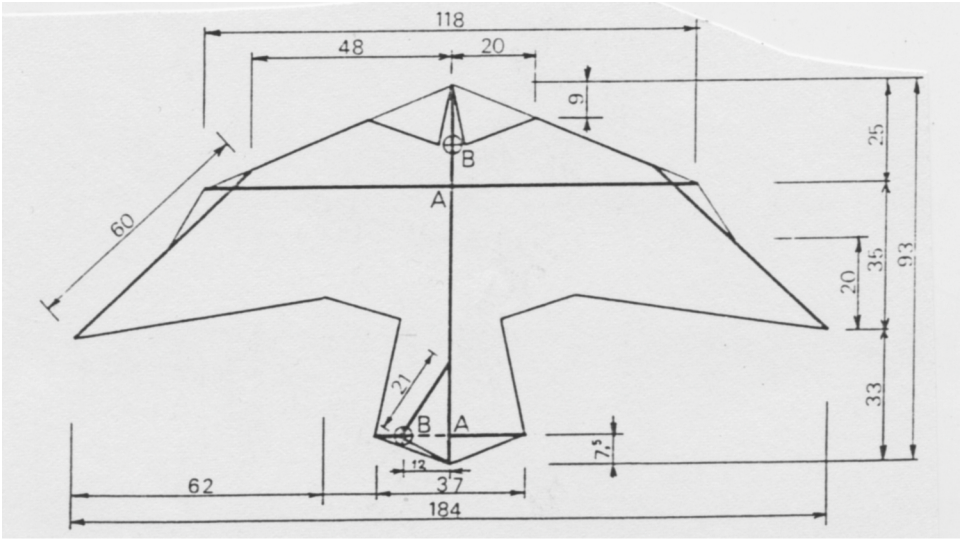

Illustration 7: Pelham's compund bird kite

Illustration 8: Sherbird kite

The basis of these kites is a Conyne centre section with the two cells connected by a horizontal surface. To this would be added a pointed 'head' as shown and then one of a variety of wing/tail shapes. In some cases the triangular cells were braced round their sides and became Bell cells.

Yolen used a papagaio wing/tail shape. Pelham shows a type of Pearson wing. The Sherbird has a delta wing and a small winged tail (Illustration 8). See Don Eccleston's Delta Conyne (Illustration 9). A Brookite Eagle kite from about 1910 had a very similar plan but with a papagaio wing. I have a 1950–70 cloth design (Illustration 10).

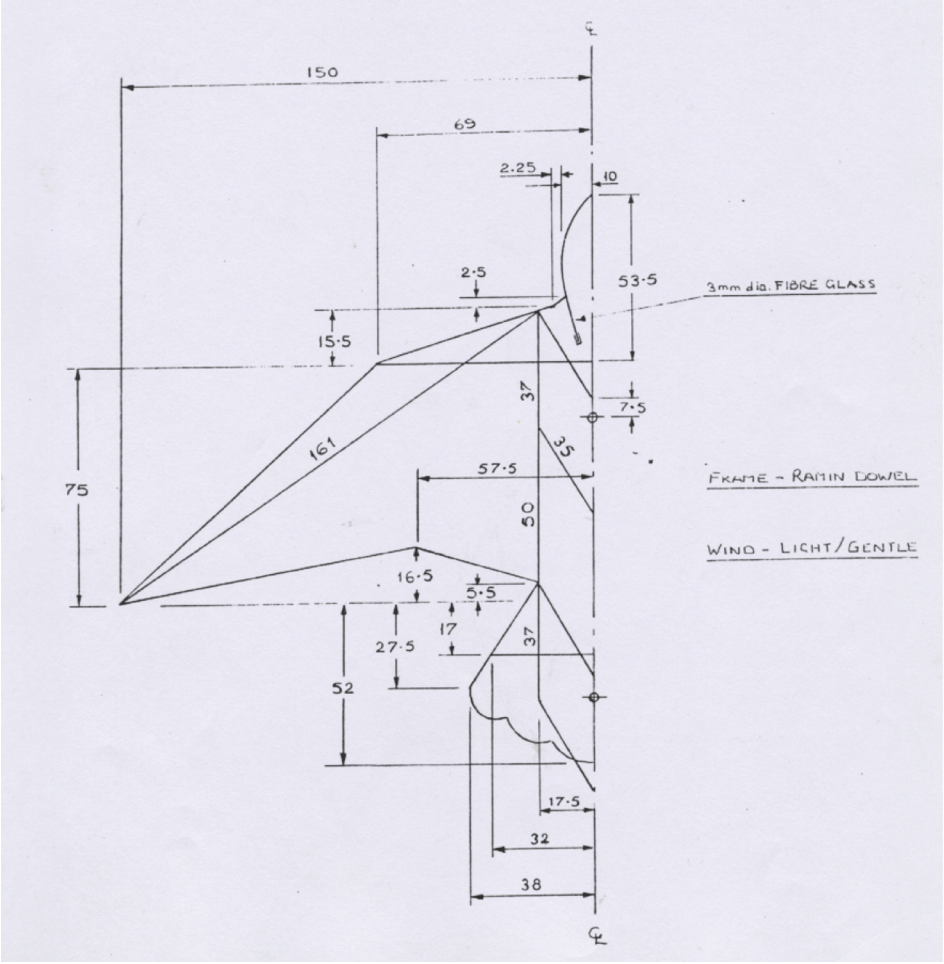

Illustration 9: Don Eccleston's Delta Conyne

Illustration 10: Brookite Eagle kite

The 'English Kite' from Austria is very similar to the Yolen kite in that the cross spar goes to the wing tips and is not 'delta-located' as is the Sherbird. This one has a 2-piece keel designed to kink upwards (Illustration 11). Obviously using the triangular sections gave the designers stability and the ability to cope with stronger winds at a considerable cost in realism.

Illustration 11: 'English Kite' from Austria

4 Types, classified by wing design

Wing Designs. The obvious feature of a kite representing a flying bird is the design of the wings. I believe that, with very few exceptions, bird kites can be classified into six types:

1 Papagaio
2 Delta
3 Pearson
4 Chinese Hard Wing
5 Chinese Soft Wing
6 Japanese

4.1 Papagaio Wings[1]

How and when the papagaio was developed in Brazil I have no idea except that ot was in the 20th century, but I also know that there was only limited information about the kite in Europe and USA until into the 1970's. English kitefliers know the story that Martin Lester got into kites after being asked to make a kite as an art school project — the kite he made was based on a papagaio which he had seen some time earlier. Illustration 12 shows Martin flying one in 1977; compare with the kite in Illustration 17)).

1. 'Papagaio' is Portuguese for Parrot.

Illustration 12: Martin Lester with papgaio kite

Illustration 13: a papagaio kite

The key distinguishing feature of a papagaio wing (Illustration 13) is that there is a single cross spar which extends to a firm fixing at the wing tip. This is an obvious way of adapting a basic Malay shape. Traditional papagaios as shown in Illustration 14 (the sheet of bird kites from Bondestam [7]) have some slack bracing lines which limit the flap and encourage a lift making shape.

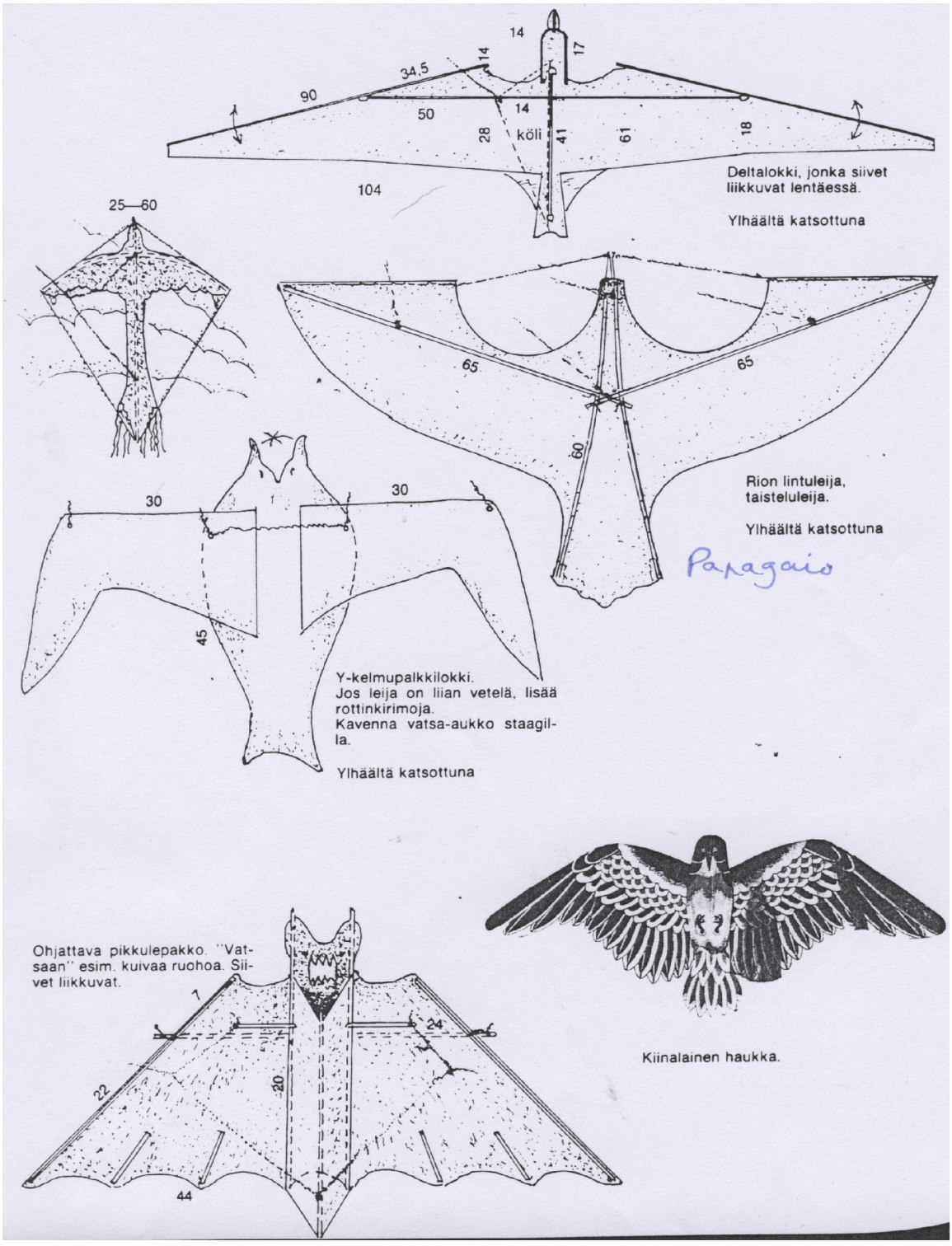

Illustration 14: bird kites from Bondestam

My own papagaios, bought in 1982, are made from fairly light printed cotton with a cotton stuffed head and 1cm. x 0.6cm. spars. The method of fixing the cross spars and dihedral is 'quaint' — see Illustration 15. Each wing spar fits loosely into the metal tube. The fit is achieved and the dihedral formed by the spars being pulled back by the bracing line going through the eye of the metal strut. A commercially produced dihedral would be far better.

Illustration 15: one method of fixing cross spars on a papagaio

Illustration 16 shows the not very realistic, but a very impressive flier, Vogel by Arno Haft — an East German designer of the 1950's onwards.

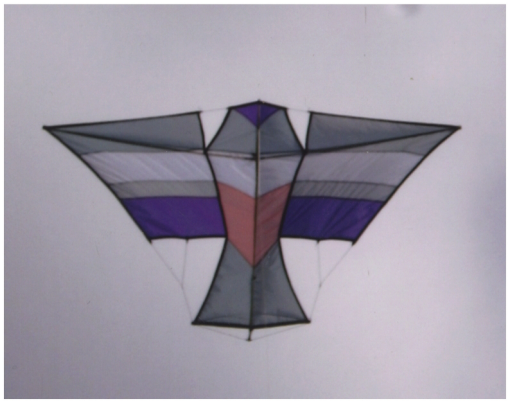

Illustration 16: Vogel kite by Arno Haft

There was considerable 'hype' about papagaios in the early 1980's (Illustration 17).

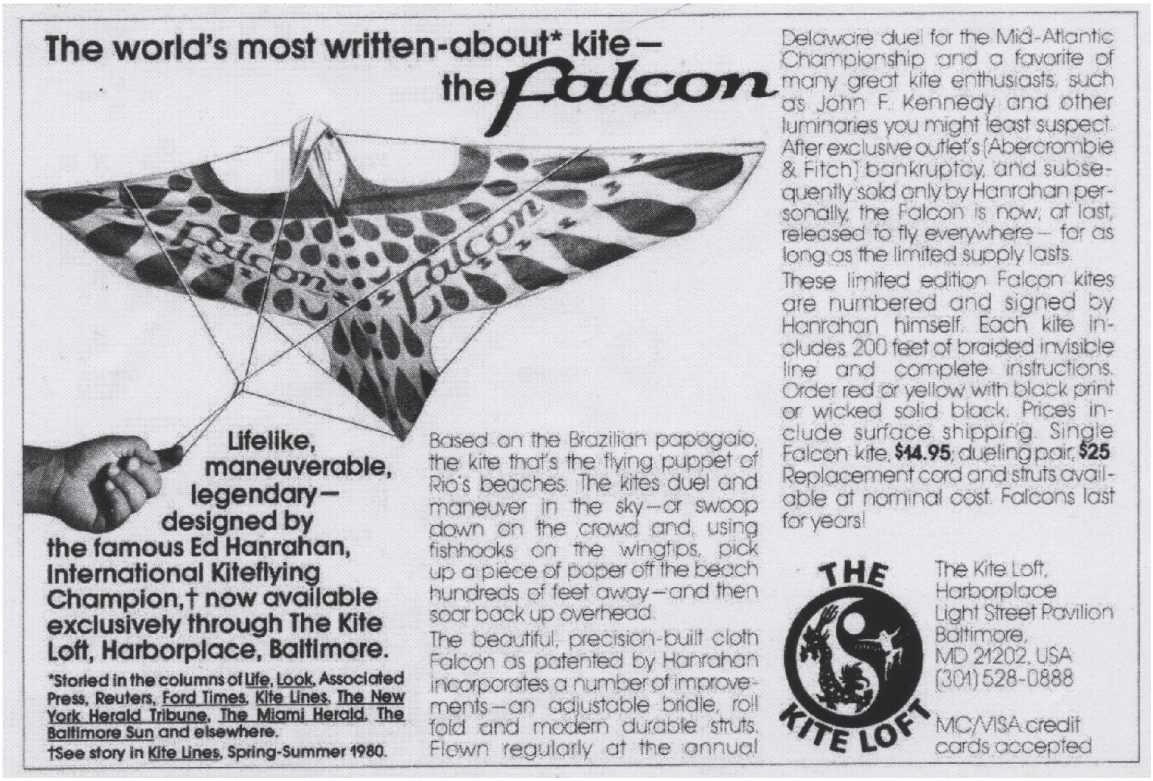

Illustration 17: an American advert for a papagaio

Some UK fliers began to believe that Brazil wasn't just girls, Ipanama and football but beaches decorated with swooping fish-hook carrying kites. Apart from personal UK experience –they need a strong breeze, flew at a low angle, were 'twitchy' but not really controllable– it all looked strange when *Kitelines* Vol. 10 no. 4 (Spring 1994) told us, and the Brazilian stand at the Dieppe Festival showed us, that the real kite of Brazil was the pipa — a fairly small paper or bamboo fighter kite derived from a rokkaku and often flown with a tail.

The papagaio wing principle has been used on a great range of interesting kites. Joel Scholz has used it in one of his most successful designs — the Sky Delight Buzzard (Illustration 18) in which the trailing edge can be held by a carbon fibre strut. Martin Lester's Hawk saves on spar weight with an ingenious reinforcing arrangement.

Illustration 18: Sky Delight Buzzard by Joel Schultz

The Indonesian bird kites that I have seen have been commercially made and sold in Bali. They have brilliant colours on opaque fabrics which together with the 3D bodies (Illustrations 19 and 20) and feet add to a sort of realism. Their wings have a bamboo spar attached to the leading edge and the tip of the wing which is designed to rotate around the fixing to the body so that the spar ends can bejammed into a Y fitting. The Dieu Cong Peacock kite from Vietnam has a similar system for fixing the wings; it is made from paper and bamboo (Illustration 21).

Illustration 19: an Indonesian bird kite

Illustration 20: another Indonesian bird kite

Illustration 21: Vietnamese Dieu Cong Peacock kite

A superb papagaio bird kite is the 'l'oiseau' developed by Ramlal Tien in (I think) 1996. This kite and the Sentinelle were attention grabbers at Dieppe 2000. Nothing could be further from the original papagaio than this superbly elegant kite using high tech materials. I hope that the two photos (Illustrations 22a and 22b) give an impression of its grace in flight and its elegant structure. Two things that don't show — there are small whiskers near the wingtips, the curved keel is narrowly 3D. But if you haven't seen one you would miss the other great attribute of the kite — it is very happy to be played with in the wind rather than simply looking serene in the sky.

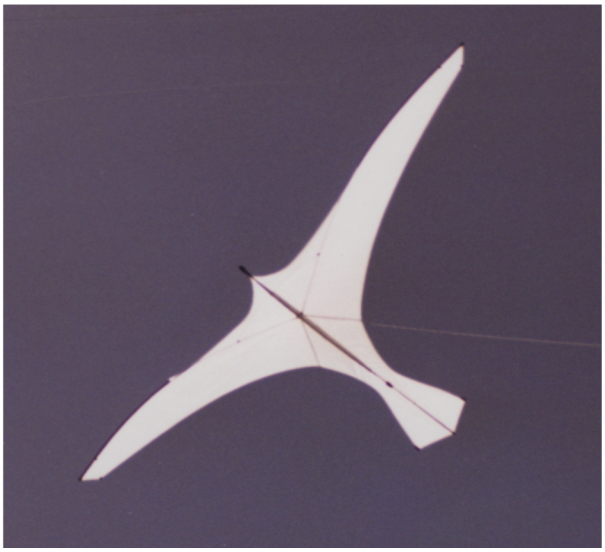

Illustration 22a: 'L'Oiseau' by Ramlal Tien

Illustration 22b: 'L'Oiseau' by Ramlal Tien

A recent kite (2004?) of great simplicity is Peter Schmidt's Feuervogel (Firebird) (Illustration 23). While I think something like it is available commercially there are also many handcrafted versions often in sophisticated colours. I prefer it to be

simple. All standard size kites need the mares tail although I believe a double-sized version has flown tail-less. Plans can be found in *Kiteflier* no. 124 (July 2010).

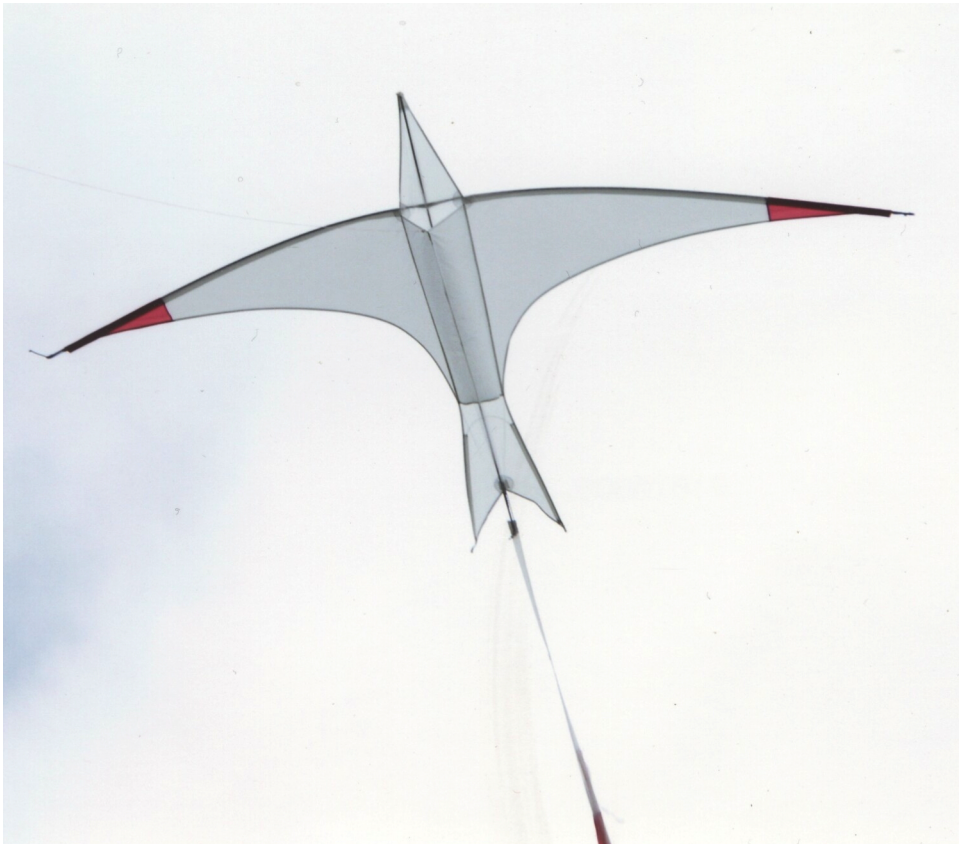

Illustration 23: Feuervogel by Peter Schmidt

4.2 Delta Wings

From the earliest days of delta development it was recognised that adding a 'head' to a fairly high aspect ratio wing plan produced a type of bird e.g. several Van Sant designs in older books. There was a favoured commercial kite with such a good bird print that it was claimed to have been mobbed by birds. (None of my bird kites has been assaulted by real ones who seem about as interested as they are in other soaring designs. But a sparrow did once perch on the line).

The key feature of the delta is, of course, the flexible mounting between the spreader bar and the leading edge spar. The necessity of a keel gives some 3D to the body although the ideal fin depth was usually too deep to help realism. Dan Leigh (Illustration 24) produced an elegant and quasi-realistic design by outlining the body with two light longerons, losing the fin into the body colour and using other colour to produce a quietly realistic bird kite.

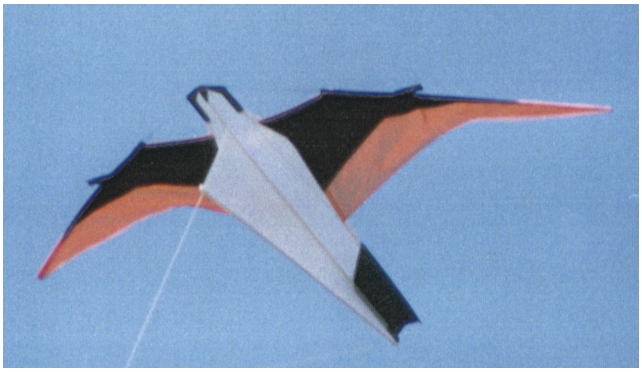

Illustration 24: bird kite by Dan Leigh

I have included two Japanese delta bird kites: the Hiroi Owl (Illustration 25) and a paper and tyvek model from Nishibayashi (Illustration 26).

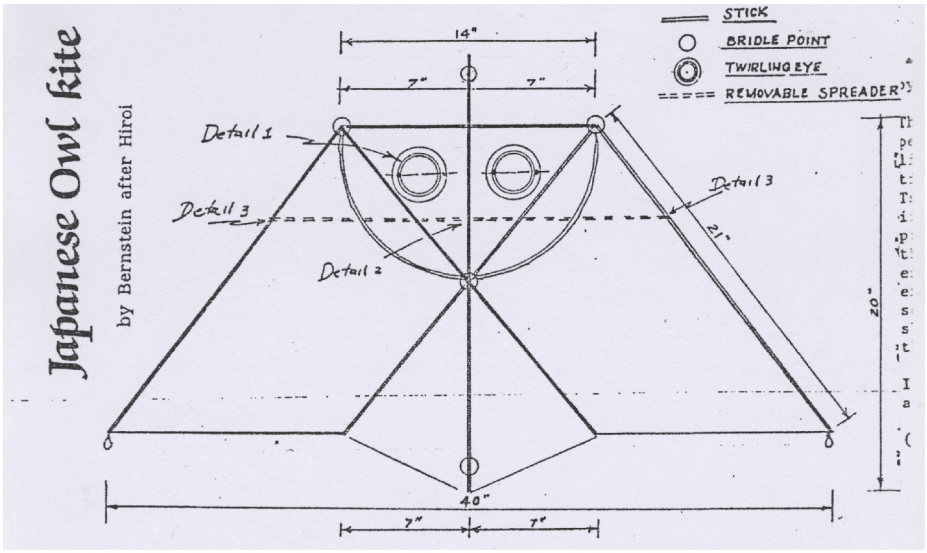

Illustration 25: Japanese Owl kite by Hiroi

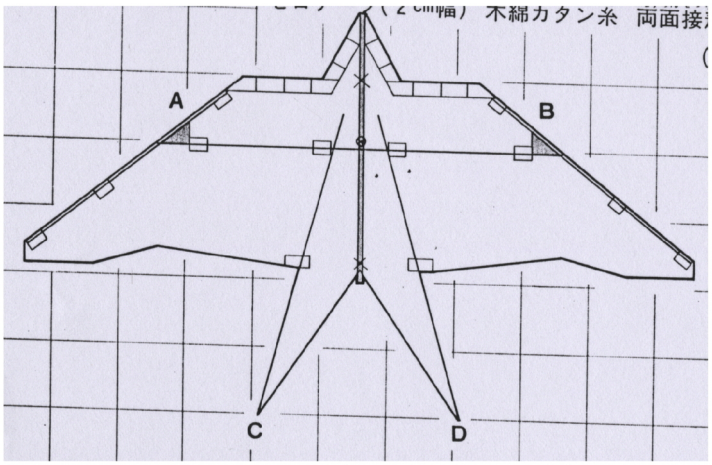

Illustration 26: bird kite by Nishibayash

One of the most innovative kite designers of the last 25 years has been Joel Scholz. His Buzzard has already been mentioned but for me his greatest design has been his parrot (Illustration 27). The photo shows the design to be a standard ratio delta with a long tail made interestingly from the extended spine and two light spars pocketed but not spread. I have seen a train of about twenty parrots more than once at the Bristol festival. They have wonderful colour combinations and are easy and reliable fliers.

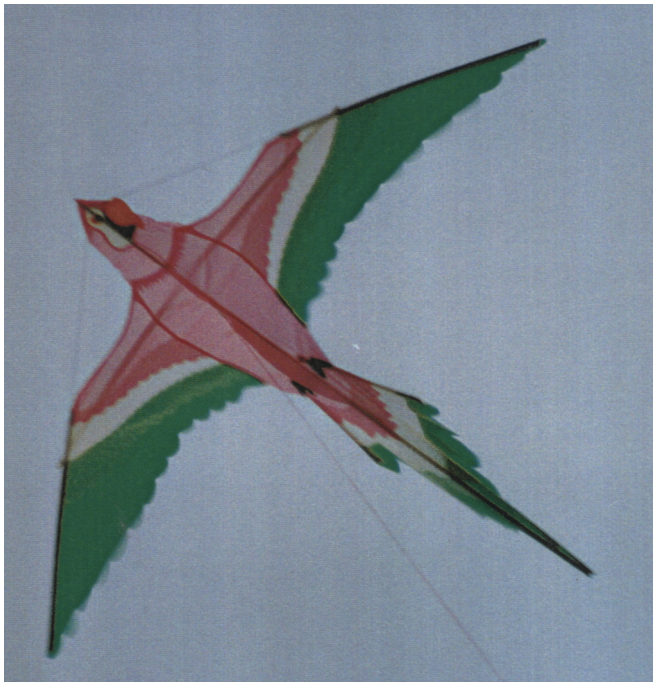

Illustration 27: Parrot kite by Joel Schultz

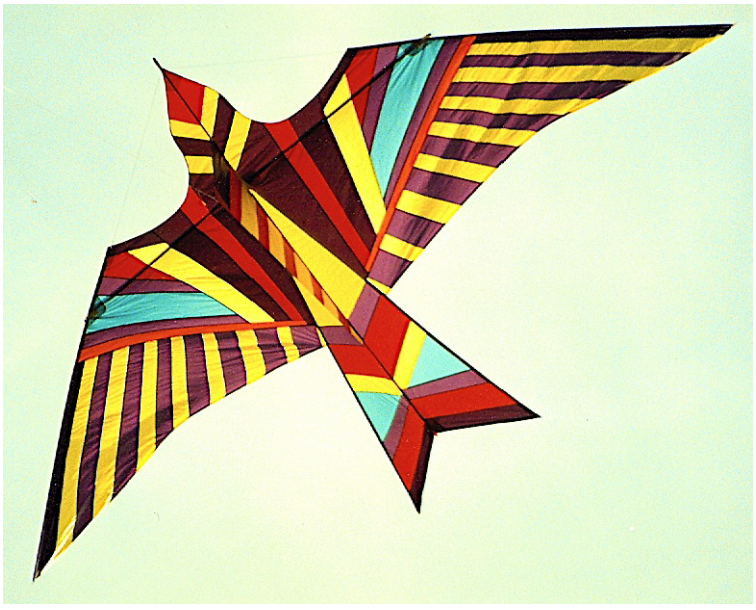

Illustration 28: Skybird kite by George Peters

However for me the greatest of the type is the George Peters' Skybird (Illustration 28). Like all of his kites it is strongly built, designed to fly stably in a good range of winds and has a wonderfully rich colour scheme. The keel just shows in the photo; the tail is well displayed. There are commercial imitations.

The Ostend Bird came on the market in 2001 in a range of sizes. As Illustration 3 shows it is not wildly realistic (and sometimes makes me feel it is a Beijing swallow designed by committee) but it is a good flier with real 'sky presence' enhanced by the recently introduced range of colour variations.

Karl Longbottom's 'Kite' is an example of the use of Icarex and carbon fibre used to give a realistic bird shape which flies in the lightest of winds (Illustration 29). For me this is a classic.

Illustration 29 Red Kite kite by Karl Longbottom

4.3 Pearson Wing

I'm not at all sure that this wing type was developed by Alick Pearson, the famous flier at the Round Pond Kensington from 1925 into the 1980's. Certainly his wider fame stems from his Roller kite; nor was he the only Round Pond flier to build birds. However it is my tribute to a great kiter.

My Pearson bird kite (Illustration 30a) is not a great example, one of the last he made, but hopefully the bad photo still allows the rakish outline to be seen. The distinctive wing plan can be seen on Illustration 30b.

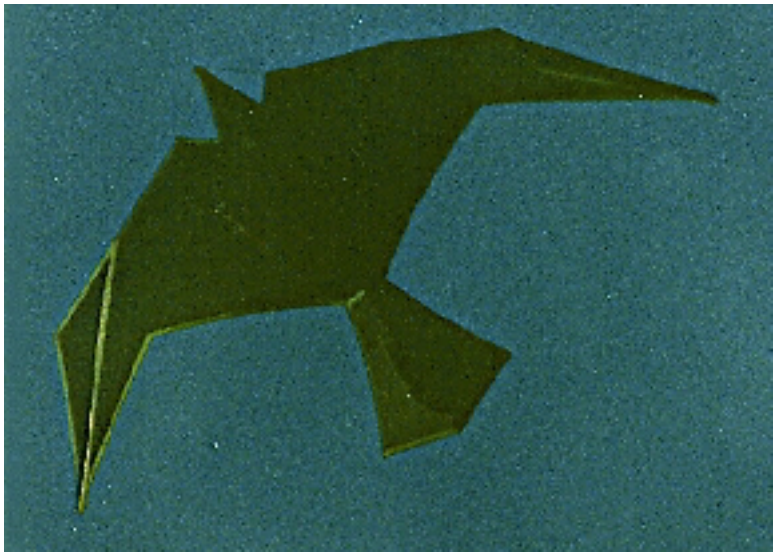

Illustration 30a: bird kite by Alec Pearson

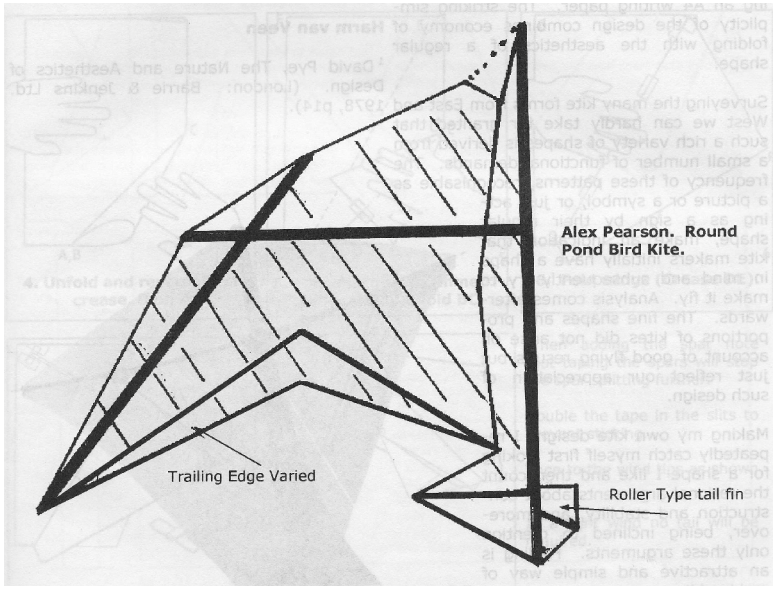

Illustration 30b: bird kite by Alec Pearson

Brick [8] has a development of the wing to be used in small plastic bird kites.

4.4 Chinese Rigid Wings

(A note on types of Chinese Kites. Chinese books classify their kites into six to eight types. There is no agreed system and matters are complicated by problems of translation. The best book for this is by Ha & Ha [4]. A simple classification is:

- Rigid Wings (a.k.a. Hard Wings, Plank Wings)
- Flexible Wings (a.k.a. Soft Wings)
- Flat (the amazing range of shapes)
- Multiple Layered (a.k.a. Series Strung) e.g. Dragons

- Cubic (a.k.a. three dimensional) e.g. Chinese Lanterns and 'the first box kites?'
- Umbrella carrying (don't ask).

Rigid wing kites are designed to fly well in the stronger winds found in Northern China – basically north of the Yangstse. The classic design of the rigid wing swallow (Illustrations 31a and 31b) is said to have been developed in the 18th century by a famous author Cau Xugin. Up to six types of rigid wing swallow can be found including fat (adult male), slender (adult female), fledgling etc. An interesting variant is a twin bodied kite symbolising married harmony. Illustration 32 shows the sentiment interpreted in both rigid and flexible forms.

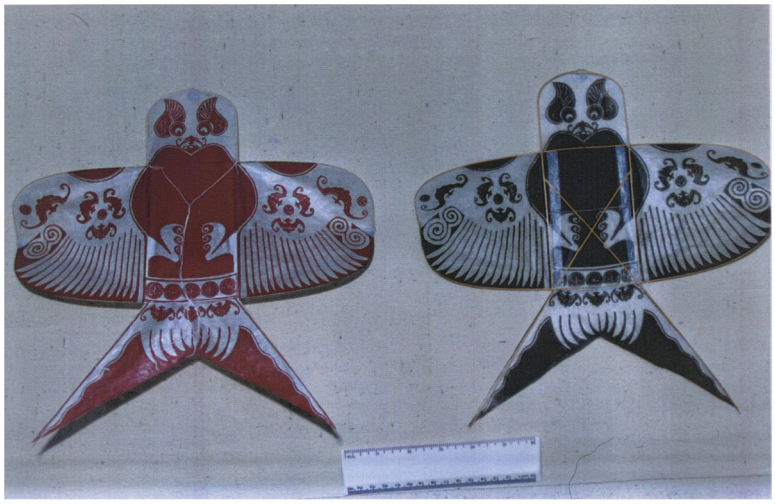

Illustration 31a: Chinese swallow kites

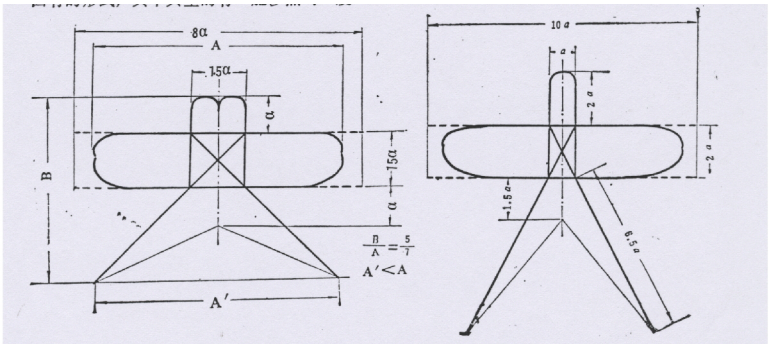

Illustration 31b: Chinese swallow kitesv

While the plans (Illustration 31b) and photos are helpful about the wing shape, two things are probably not clear. Firstly there is a tight line which runs along the face from wing tip to wing tip. Secondly this line and the sloping of the bamboo wing edges gives each wing at the tip both pronounced dihedral and a cup effect. Wings are said to be 'date stone' shaped. These two features mean such kites do not pack flat and are not usually broken down. So only small rigid wings seem to be

here in the U.K. where we commonly get neat little kites printed in tyvek or silk. But 2m. wide versions exist.

Do look at the Ha's book if you can — it includes notes on the aesthetics of rigid wing kites e.g. what are the preferred proportions. It also looks at the development of rigid wings to allow lucky or desirable symbols to be incorporated. Chinese kites often have decorations which are based on different words having the same sound. So "*lu*" means a deer and large salary — hence a reason for deer on a kite. More so for bats. However, I get lost when these creatures depicted on rigid wings (which anyway look very realistic to me) then change the profile of the kite (see smaller kite in Illustration 32).

Illustration 32: Chinese 'married harmony' swallow kites

4.5 Chinese Flexible Wings

Flexible wings are those where only the leading edge is supported. While there may be some sub-structure on eagle kites all the wings have loose trailing edges. They are seen as being more suitable for light winds. They produce a wide range of bird kites, many of which are extremely realistic.

The photos show:

Illustration 33 – a silk bluebird with a boat shaped body and papier mache head.

Illustration 35 – a heron with 3D body, neck and head. Realistic 2D legs. You may spot the sequins stuck on the wings by the seller to 'flash it up' for the Malaysian market!

Illustration 36 – an owl with a paper mache body

Illustration 37 – three sand swallows. For me this is the most graceful Chinese design. The one on the right has a hinged tail. The others have 3D bodies. All are designed to fly in pairs at each end of a flexible bamboo strip which is bridled in the middle.

It would seem that some Beijing kite makers now make both rigid and flexible wing kites.

Chinese eagle kites could be seen as a separate group because of the partial support given to the wing feathers (see Illustration 37 and also Illustration 36). Some big eagles (1.5m. span) are made using thick section bamboo well able to withstand a wingtip landing. They are sometimes flown in the U.K. but I haven't seen them flown with the big quick recovery reels which allow the flier to pull the kite overhead, then let it turn and run downwind before checking it and bringing it up overhead again.

Illustration 33: Chinese silk bluebird kite

Illustration 34: Chinese heron kite

Illustration 35: Chinese owl kite

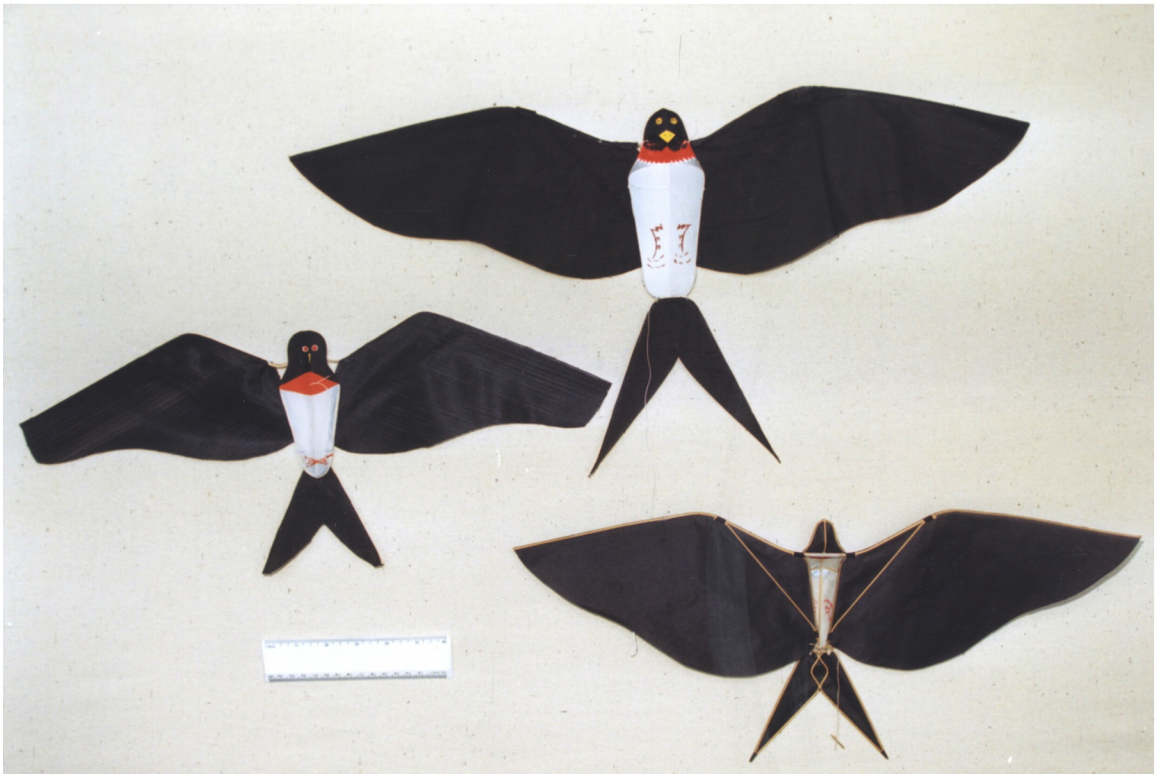

Illustration 36: Chinese sand swallow kites

Illustration 37: Chinese eagle kite

4.6 Japanese Wings

I have rarely seen a live Japanese bird kite. They do not seem to be a popular design; Streeter shows just one in fifty illustrations in his 1974 book. Hosking illustrates over 340 kite types of which 7 are bird kites. Apart from those heavily influenced by China, Japanese bird kites use a wing more familiar to us from the Yakko

kite or a class variant. The hawk (Illustration 38) has a 3D body with a single bridle point. The bird (Illustration 39) has a flat body and wings which are 'pointed Yakkos'.

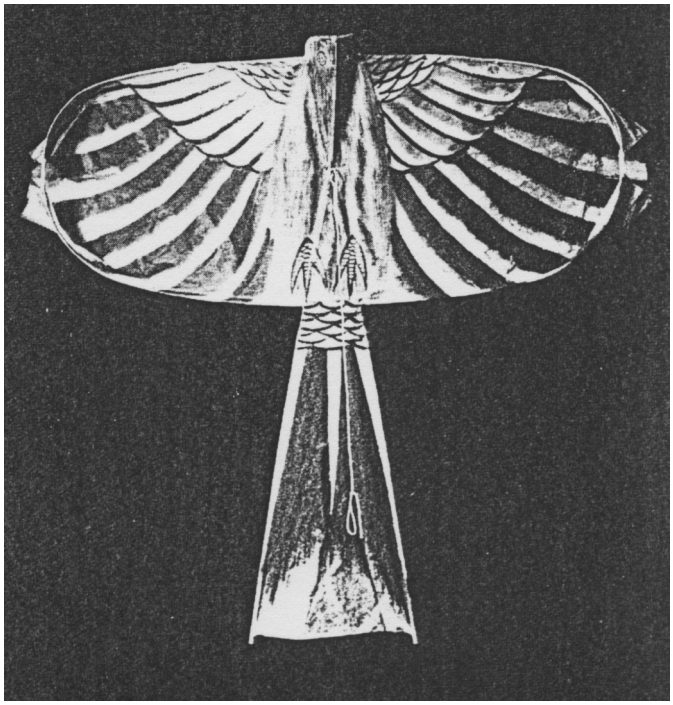

Illustration 38: Japanese hawk kite

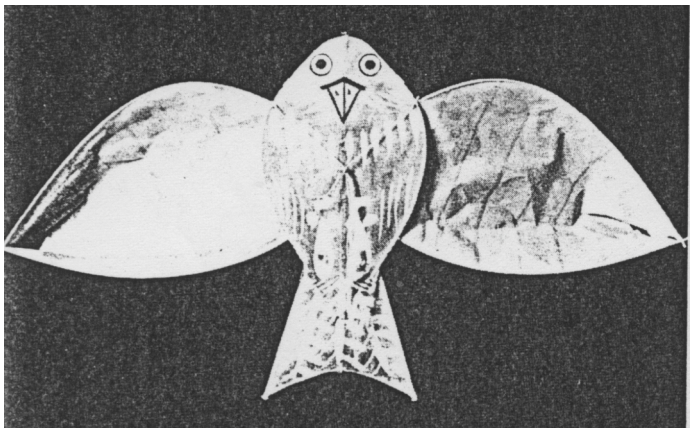

Illustration 39: Japanese bird kite

To describe a yakko wing if you haven't held one is almost beyond me but Illustration 40 tries to do this. I have also included a plan from the Ohashi (entirely in Japanese so no reference given) book (Illustrations 41a and 41b) as this shows in 41a the material for one wing of 41b and thus the depth of the pocket to 'spill' air at the wing tip at A.

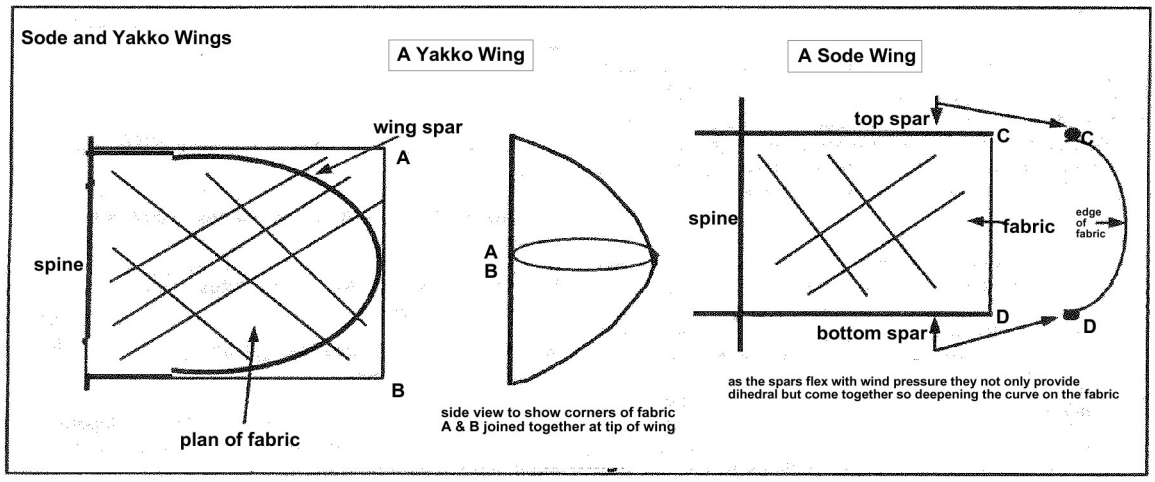

Illustration 40: Yakko and Sode wings

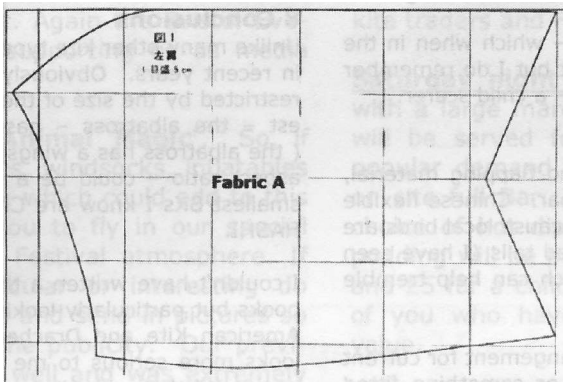

Illustration 41a:

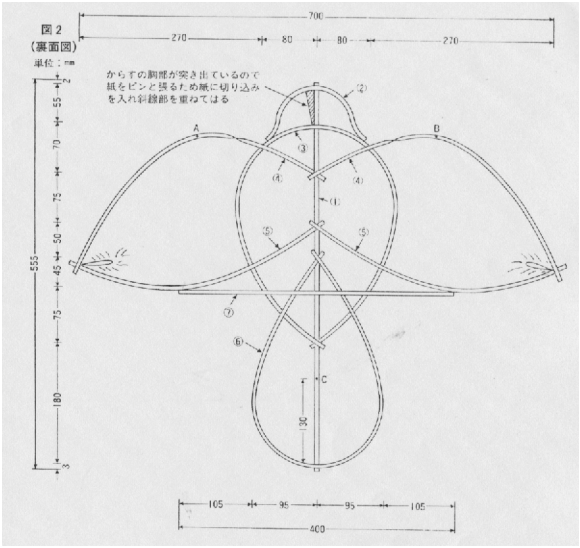

Illustration 41b:

Perhaps the wingform will be clearer in the two photos of Western versions of Japanese insect kites (Illustrations 42 and 43.)

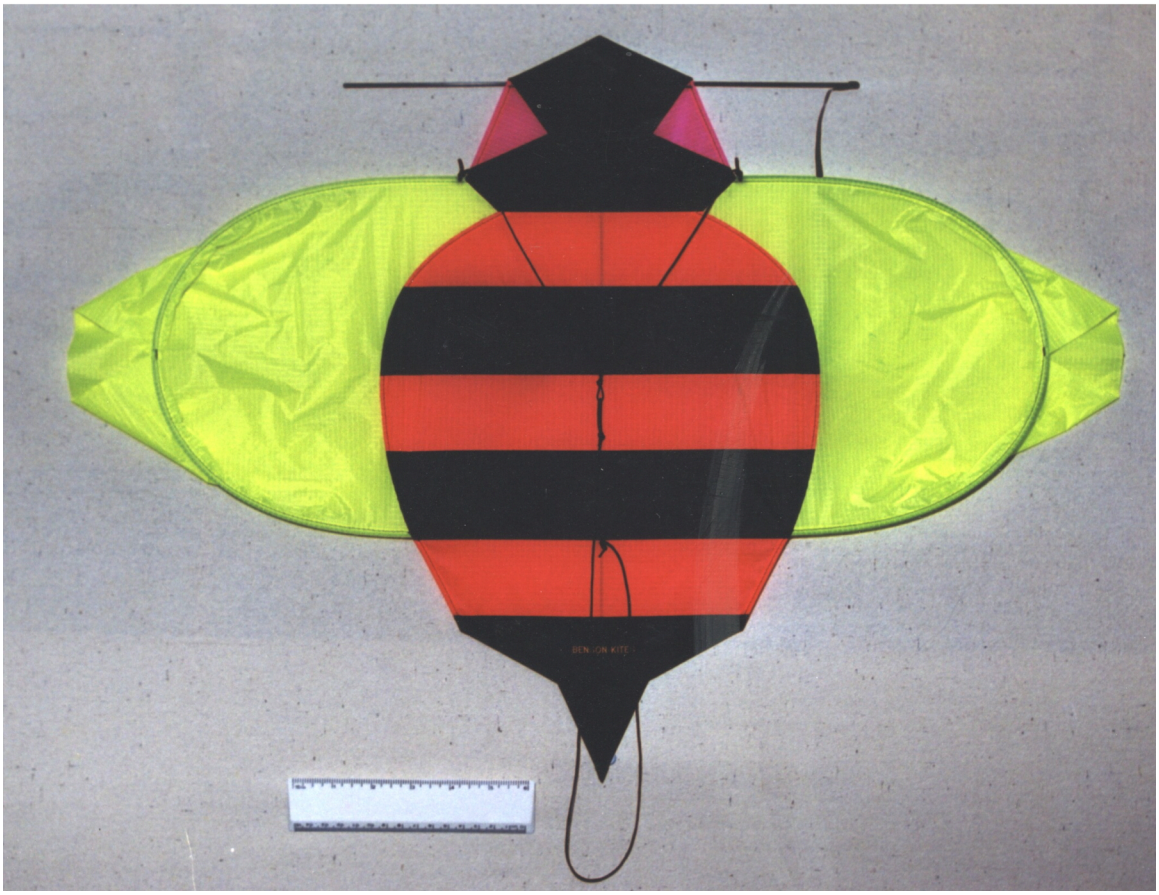

Illustration 42: a Japanese insect kite

Illustration 43: another Japanese insect kite

Two points on these Japanese wings. Firstly they are unlike any other wing forms known to me, with the nearest the Chinese Rigid Wing. Secondly remember that Japanese kites are made from paper which means that the pockets are much stiffer than western ripstop yakko wings.

A puzzle is that I have seen several 19th century Japanese prints which show a bird kite – but its wings are more like a high aspect ratio Sode flown with considerable dihedral.

I have a Japanese bird about which I really know very little. It is made of paper but parts are constructed in a way which reminds me of model aircraft. For a reference to a Japanese website and plans for making a Japanese bird see Ashby's article in *Kiteflier* 101 (October 2004).

5 Bodies, Heads, Tails and Feet

5.1 Bodies.

Whereas papagaios usually have 2D bodies, deltas, coming from a design using a central keel, naturally have some 3D, or may use a tunnel keel.

Without doubt the Chinese are the greatest exponents of realistic (and 3D) bird bodies. Traditionally many of the bodies are covered with paper or silk. Some of the bigger 'craftsmen made' birds have bodies accurate in all dimensions but even the widely produced Tientsin bird kite, which folds into a box, shows how bamboo can be split, shaped and formed to fit together into joints, holes and slits all without nails or adhesive (see Illustrations 31 to 36). I have yet to see a western equivalent.

Javanese kites are well known for their spectacular furry bodies – even though birds have feathers.

5.2 Heads

Obviously the limitations here are the usual physical ones (weight, lift and drag) *vs.* realism. Some kites just use a point, some have a design to suggest a head (Dan Leigh), some illustrate a head in 2D (J. Scholz.) Heads may be 3D and stuffed (papagaio) or inflated (Martin Lester's designs).

Heads are sometimes designed to move — which when in the air affects the flight. I've never seen that but I do remember the big eagle (Illustration 20) had a snapping beak — a child scarer.

5.3 Tails

While papagaios may just have cords and flapping material, earlier bird kites tended to use a light cross spar. Chinese flexible wings may have flowing tails, probably because local birds are so equipped. Several designs have hinged tails (I have seen one translation 'the tail rangs down, which can help tremble the flying').

However, by far the most popular tail arrangement for current western bird kites is the length of fibreglass or something fitted under tension in a curve between two pockets (see Buzzard, Condor, Ostend Bird, etc).

5.4 Feet

If feet are shown at all it is usually simply on the surface. But non-western hawks etc. often have extremely realistic 3D talons. And cranes and flamingos have featured legs (e.g. Martin Lester's Flamingo).

6 Exceptions

I can think of three important exceptions to the wing classification scheme.

6.1 There is a large (4m.) multi-bridled soft seagull made by Peter Rieleit in about 1995 (Illustration 44).

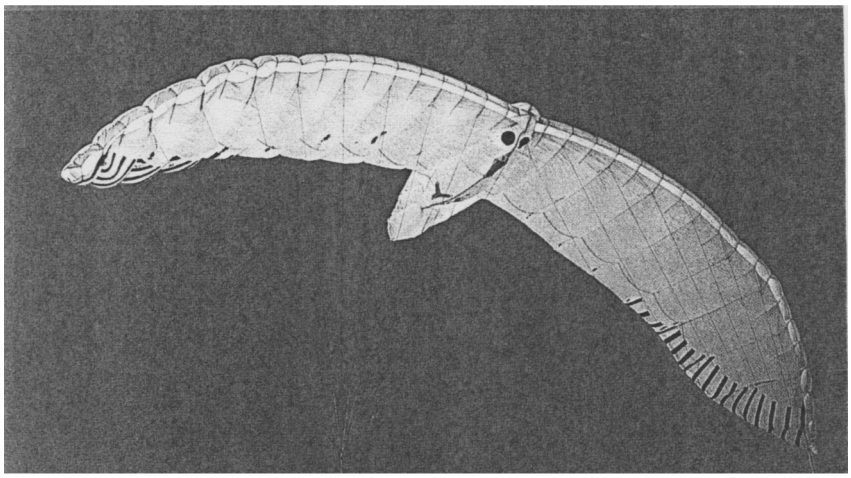

Illustration 42: Seagull kite by Peter Rietlet

6.2 Martin Lester made a range of semi-inflatable bird kites following on from his 1993 shark. Of these the best all round flier was probably the Canada Goose. The photo (Illustration 45) is not a good one and the wing spars should be hidden in the kite. Martin's breakthrough was to realise that quite a small air intake aperture would inflate a relatively large and complex design. Life sized and naturally coloured the goose shows off the advantages of having 3D wings and looks good.

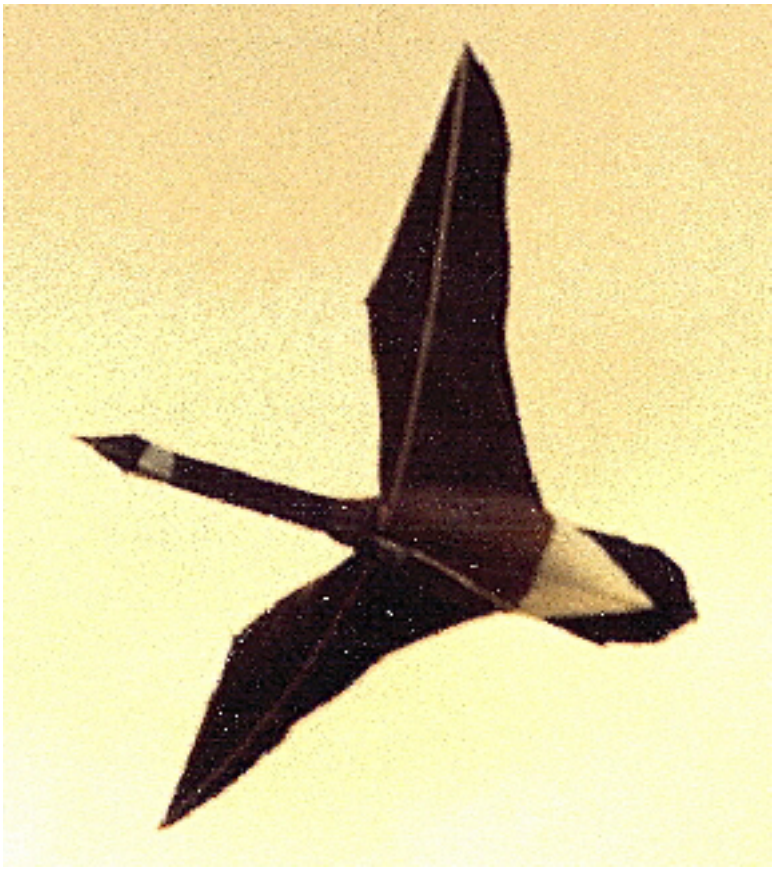

Illustration 45: Canada Goose by Martin Lester

6.3 The third exception is Stan Swanson's Condor (Illustration 46). He has designed other kites since but for me nothing compares to this massive full sized bird. Feathers give a final touch to its natural look in the sky. One photo shows it in flight, the other displays the unique construction method which relies on his ability to drill massive but light plastic fittings. I hadn't flown it for some time before the photo and had forgotten what an excellent flying machine it is.

Illustration 46a: Condor kite by Stan Swanson

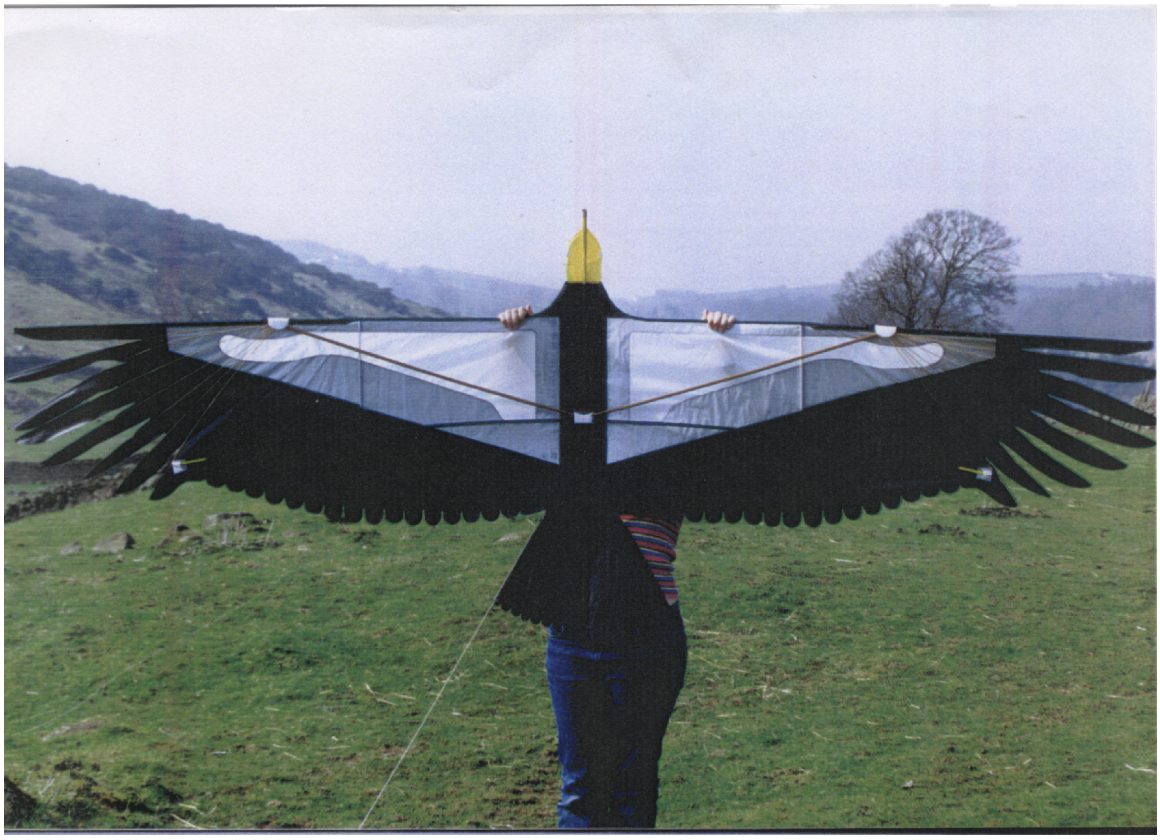

Illustration 46b: Condor kite by Stan Swanson

7 Omissions

Here are brief notes on some kites which have been excluded on grounds of time/ space and lack of details.

7.1 Small kites which are largely designed for children but which are interesting bird kites. The little Windy Kite where a printed, detailed bird has its wings spread via fibreglass on a curve. The Jackite – brilliant little tyvek and fibreglass cardinals and blue birds. It was their dove which was used in the opening ceremony for the 1996 Atlanta Olympics. Various books (and the *Kiteflier*) have paper outlines to cut out and spar lightly with drinking straws.

7.2 Various American builders of eagles, particularly the Bald Eagle (lucky you! try the idea of flying a heraldic lion).

8 Conclusions

Unlike many other kite types, bird kites haven't got generally larger in recent years. Obviously kites designed to be realistic are restricted by the size of the real birds. Interestingly the largest –the albatross– seems only to exist inthe very large birds with high aspect ratio wings to be seen at the last few Dieppe festivals. The smallest bird kites I know are Charlie Sotichs' plans in Kurahashi [9].

I hope that you have found something of interest — perhaps a new kite to look out for or a design to build. I have provided a few detailed plans but, as before, my focus has been on being informative and perhaps inspiring the experienced builder to try something new.

9 Bibliography

[1] Thiebault, A. (1982) *Kites and Other Wind Machines.*

[2] Yolen, W. (1976*) The Complete Book of Kites.* Good also on compound birds.

[3] Hunt, L. L. (1971*) 25 Kites that Fly.*

[4] Ha, K. and Ha, Y. (1990*) Chinese Artistic Kites.* The best book on Chinese kites — but really only the Ha family kites.

[5] Streeter, T. (1974*) The Art of the Japanese Kite.* The classic book on the subject

[6] Hosking, W. (2000*) Kites of Japan.* Comprehensive range of types, including seven bird kites.

[7] Bondestam, M. (1982*) Lennä, lennä leijani* .

[8] Brick, W. J. (1997*) On Bats, Birds and Planes.* A small book of interesting small kites.

[9] Kurahashi, D. (2000*) Japanese Kites — Concepts and Construction.* Interesting plans —including Charlie Sotichs' hummingbird with bamboo thick as a hair.