

Flat Kites by George Webster

1 Introduction

Definition: 'A single plane surface which may have built-in dihedral, may deflect to give dihedral in flight or may be bowed by means of a line. It may, or may not, have a keel. Keels are usually at right angles from the face of the kite and form a bridle attachment point, but may protrude from the back.'

This definition includes, I would estimate, over 95% of the world's kites. Trying to give reasonable treatment to flat kites in one article is possible because:

- Kites will be dealt with in less detail than some other articles e.g. sled kites.
- Some flat kites have been dealt with in other articles.
- Some types will have a sketchy treatment (e.g. Indonesian kites), as much as a result of limitations in my knowledge rather than lack of space.

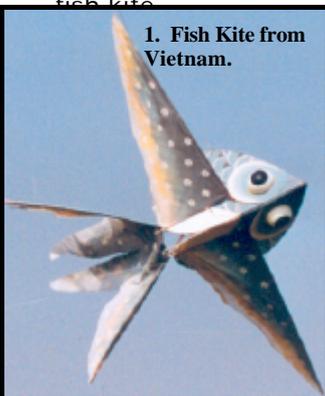
But the aims of the article remain the same, i.e. to inform about the types of kite that might be seen in the air and to explain their background.

Picking up point B above we have:

<u>BEGIN</u>	All Flat Kites
<u>LESS</u>	Deltas – covered previously
	Sleds – covered previously
	Eddys – in the Golden Age of Kites
	Some kites in a history article to come.
<u>RESULT</u>	Flat kites dealt with in this article.

Picking up point C, since all the world's indigenous kites are flat and written knowledge in English of some countries is sparse, I feel I have to single out for special mention as absentees:

- Indonesia. An enormous country with several major cultures. There is a brief mention of the fighter kite but the magnificent Janggan is missing.
- Cambodia. Nothing on the wonderful Kleng Ek Kite.
- Sri Lanka. Only the Bird or Crow kite (in the bird kite article).
- Vietnam. A western version of the 'children's kite' as shown in photo 11. Photo 1 shows a (low flying) fish kite.



1. Fish Kite from Vietnam.

I have divided Flat Kites into three main types:

- Flat Kites with a single spine (e.g. Indian Fighter) in section 2
- Flat Kites with multiple centre crossing spars (e.g. Hexagon) in section 3
- Flat Kites with a grid of spars (e.g. Edo) in section 3.

This classification will not work perfectly, so we have to have:

- Snake Kites in section 5
- Oriental Winged Creature in section 6
- Play Sails in section 7

Notes: As usual capital letters mean that the book is in the bibliography. There are 24 diagrams – the 'specials' are mine. The photo credits are; David of Holwick 1-4, 7, 9, 10, 12, 25, 26, 28, 40, 41, 47, 48, 49, 52; Malcolm Goodman 4, 31 – 36, 45, 46, 50, 51, 53, 54; Unknown 44; Websters the rest.

My thanks to Jon and Gill particularly Jon for reading my writing and following my drawings. Next up could be a brief history of kites in England or Exceptional Kites.

2 Flat Kites with a Single Spar

In my view the world's first kite was a single leaf used to lift a fishing line (see an article on 'Origin of Kites' to come and several recent items in the Drachen Foundation Magazine). Leaf kites are still found today in various parts of Indonesia, still used for fishing, but leaf kites are found elsewhere, e.g. Martinique. Japan has an interesting two leaf design (HOSKING p60) made from Japanese white bark magnolia.

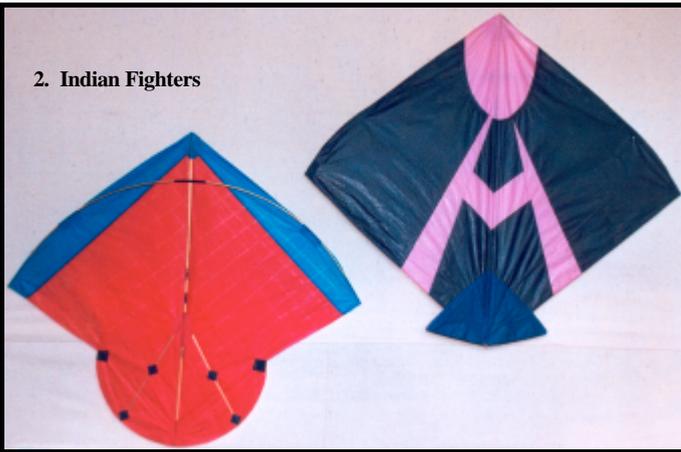
This section is divided into; Indian Fighters, Japanese, Malaysian, Others with a bamboo bow, European descendants of the Malay, Diamond, Eddy.

2.1 Indian Fighters

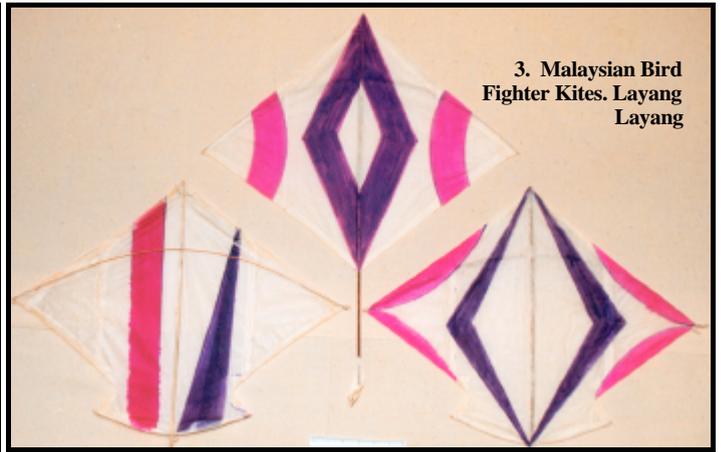
Perhaps the nearest kite to a single leaf in structure and, apparently, a very simple kite is the Indian Fighter. A 'classic' Indian Fighter is shown on the right of Photo 2 – see also Diagrams 1 & 2. It has a bamboo spine, a tapered bamboo bow as a cross spar and a paper cover. The term Indian Fighter is often used to describe kites which differ slightly in shape and may come from – the Indian Subcontinent (including India, Pakistan, Bangladesh, Nepal and Afghanistan); Malaysia (Photo 3 shows the Layang-Layang [birds] flown by children); China—The book by HA & HA calls it the Rhombus Kite; In Hong Kong kite fighting is popular; Singapore (Both adults and children fly the Indian Fighters); Indonesia (Probably the worlds third largest producer of Indian Fighter kites – where 5 million a year are made by one manufacturer).

Diagram 1 mentions some of the variations; what all these kites have in common is the use of bamboo and either paper or plastic sheet. The widespread nature of the design suggests that it is an old one. The use of paper shows that the age is limited to about 500 AD. There is no natural substitute for bamboo, which has limited the copying of the design in the West until thin fibreglass and carbon fibre became available in the last 20 years.

The essential feature of the Indian Fighter design is that it is steerable. How is the kite controlled. Under line pressure the wings of the kite flex upwards and backwards; the resultant shape is stable flying in a straight line in any direction. If the line pressure is reduced there comes a point when the kite, being flat, spins in the wind with no directional stability. So all (!) you have to do is wait until in one of the spins the kite



2. Indian Fighters



3. Malaysian Bird Fighter Kites. Layang Layang

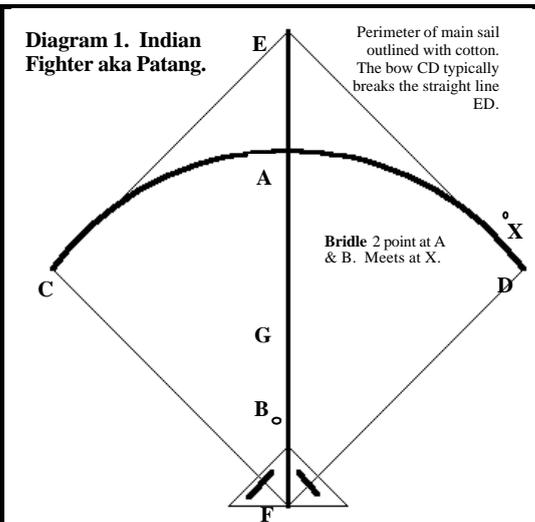


Diagram 1. Indian Fighter aka Patang.

Perimeter of main sail outlined with cotton. The bow CD typically breaks the straight line ED.

Bridle 2 point at A & B. Meets at X.

Bow arrangements. Kites with fibre glass bows don't break the line ED. Kites with fibre glass bows and ripstop covers often have a straight pocket for 50% of ED.

Tail Arrangements. No tail, i.e. CFD unadorned. Paper tassel at F (sometimes also at C & D). Larger unreinforced tail - a triangle apex G found on small Pakistani versions. Semi-circular—see Photo 2.

Bamboo sometimes has dark marks where it has been straightened.

Paper sometimes has shiny parallel lines where it has been rubbed to increase strength.

Ripstop pockets allow the kite to be rolled up.

Afghan Kites—often larger with elliptical flaps attached to CD and DF.

Japanese Hata—larger, double paper, no tail and tassels at wing tips.

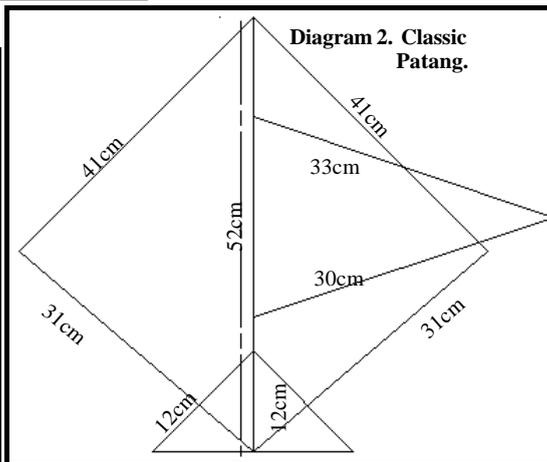


Diagram 2. Classic Patang.



6. Janneke Groen Sode.

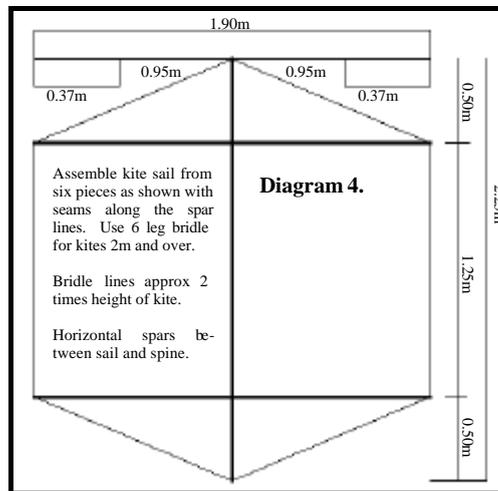


Diagram 4.

Assemble kite sail from six pieces as shown with seams along the spar lines. Use 6 leg bridle for kites 2m and over.

Bridle lines approx 2 times height of kite.

Horizontal spars between sail and spine.

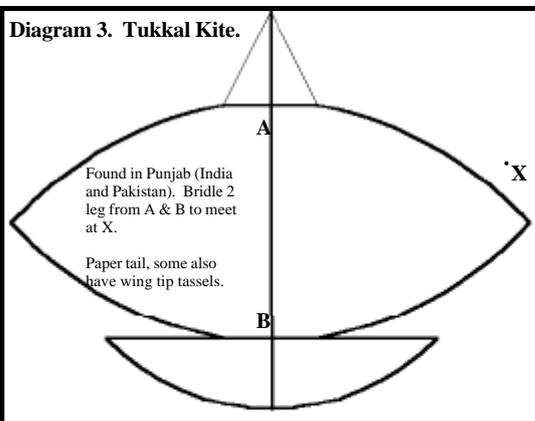


Diagram 3. Tukkal Kite.

Found in Punjab (India and Pakistan). Bridle 2 leg from A & B to meet at X.

Paper tail, some also have wing tip tassels.

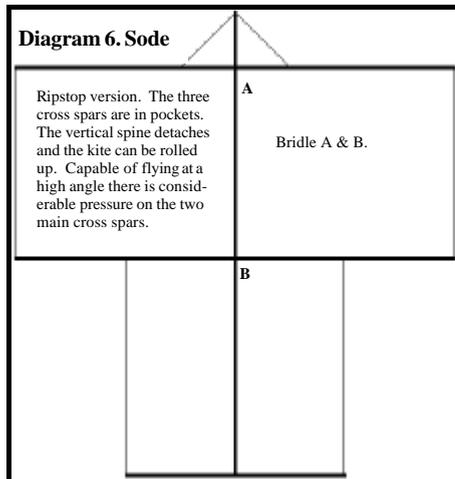


Diagram 6. Sode

Ripstop version. The three cross spars are in pockets. The vertical spine detaches and the kite can be rolled up. Capable of flying at a high angle there is considerable pressure on the two main cross spars.

Bridle A & B.

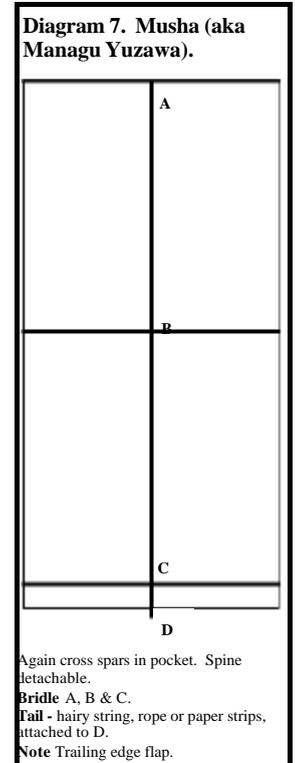


Diagram 7. Musha (aka Managu Yuzawa).

Again cross spars in pocket. Spine detachable.

Bridle A, B & C.

Tail - hairy string, rope or paper strips, attached to D.

Note Trailing edge flap.

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4. Japanese Hata

is facing the direction you want it to go, pull on the line, the wings go back and the kite tracks following its nose. It is a real skill which almost anyone can master – if they start off with enough kites.

shape; some western fighters use a second short piece of material to reinforce the centre of the bow. The Petang is not the only type of kite fought in India; in the Punjab (which straddle India and Pakistan) they also use the Tukkal (Diagram 3).

Indian Fighters have been well written up in general books and in BOITRELLE & PETIT, CRUMPLIN and GALLOT. While several books give detailed instructions for making one, imported kites can be found. If it is your first time try to get one with the gold paper reinforcements at nose and wing tip and get the seller to bridle it for you. You might even get a lesson. Or you might look out for one of the complex patterned, multi-coloured kites – all done with pieced together tissue paper – which are best left on the wall.

As their name implies these kites are widely used for fighting. - I am told that in some Indian languages the word for flying a kite is the same as fighting a kite – either at one of the great festivals where perhaps a million city fliers go onto flat roofs and engage in a general melee or in some cities where there are club contests between expert fliers at above 1500ft. Kite lines are cut by the use of 'sharp' line (called 'manja') where the standard cotton line has a coating of ground glass.

In all the countries mentioned children re-cycle vanquished kites and fly simplified versions of the fighter.

Indian fighters were slow to appear in the sky in England. I don't remember one until early 1980s although there are legendary stories of early Blackheath festivals in London where Asian fliers appeared, cut every fighter out of the sky and withdrew – playing no further part in the meeting.

In the USA western versions of the kite came on the market in the late 1970s – the Vic Fighter Kite and the later, larger and more elaborate Grandmaster. Those kites used Mylar as the cover, man made material bows and spines of spruce or cedar. More recently kites with thin carbon fibre spars and with lightweight ripstop covers have appeared. Such kites have a price much higher than the 5p, which would get you a serviceable kite in Asia.

As a child we used to play the game 'conkers' in the autumn where we threaded a horse chestnut on some string and used it to hit another similar conker until one smashed. You would go to school with a dozen and not expect to come home with more than one. While Western versions of Indian Fighters may be much better at dealing with wet conditions, and are easier to transport, their cost means that inevitably the 'freedom to play' in the Asian festival sense is lost. Skilled contests at 1500ft – 5000ft are seldom seen due to height restrictions and failing eyesight!

The bow of the Indian Fighter, or Patang in India, is usually of square section tapered to each end to ensure balance, even flexing and the precise curve required.

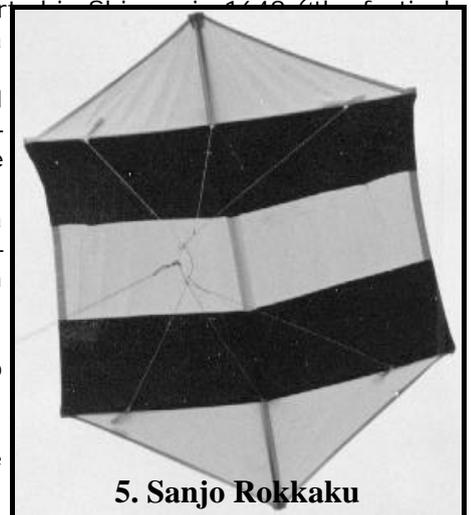
Of those adapting the original idea to Western needs, Tony Slater has for many years been a source of great designs. His butterfly is a classic.

2.2 Japanese Kites

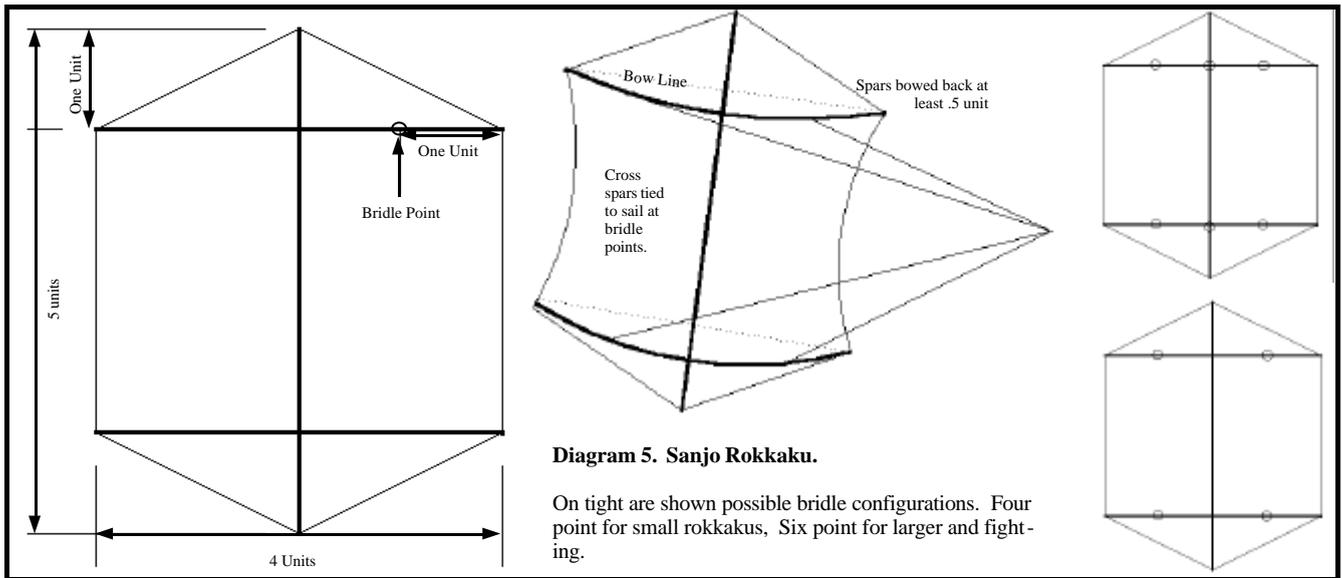
Compared to the Indian sub-continent Japan has a very wide range of single spine kite types – we will concentrate on those seen in the U.K.

Japan has several fighting kites, one of which is the Nagasaki Hata (Photo 4) resembles a heavily built Indian Fighter. It uses two thickness' of paper, has no tail but has tassels at each wingtip. The kite is unlike any other Japanese design and is made using different coloured paper joined together (as if the Indian Fighter – while Japanese kites are usually painted). These colours are red, white and blue – the colours of the Dutch flag. Nagasaki was the only permitted access point for Western ships in the mid 16th century. Dutch ships would have had Indian and Malay crew members.

There are other designs of fighter kite in Japan, some of them use sharp blades on the kite or on the line rather than manja. However, the most famous Japanese fighting kite (and I suspect the most common Japanese design in Europe) is the Sanjo Rokakku of Shirone – colloquially called a 'Rok' in England (Photo 5). Rok fights start was originally a kite fight between local children and children of government officers. The festival has evolved into a friendly kite fighting competition between local towns' HOSKING). Nowadays up to 1000 kites can be involved. The use of western made roks to fight came from the American



5. Sanjo Rokakku



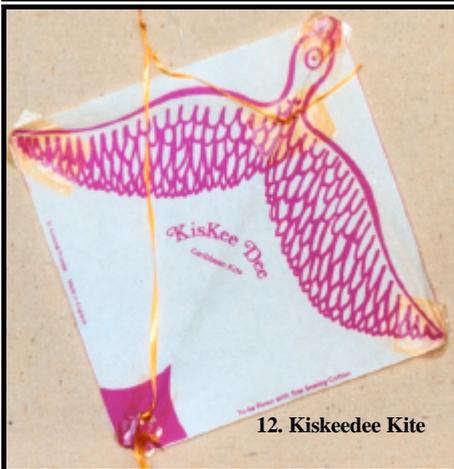
7. Malaysian Wau Bulan



8. Malaysian Wau Barat (Western Kite).



9. Malaysian Wau Ikan



12. Kiskeedee Kite



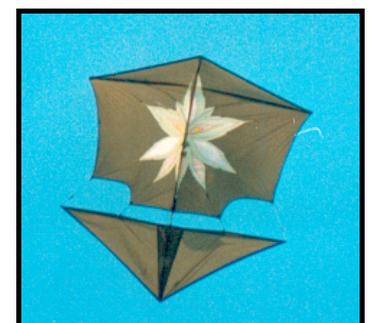
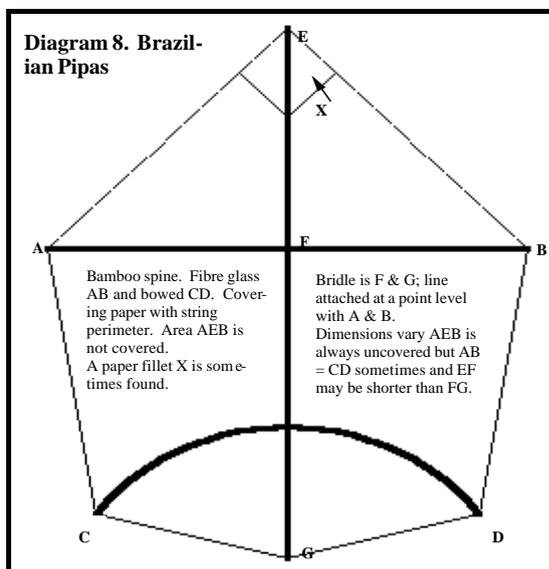
10. Malaysian Layang Layang from Melaka



Photo 11. Vietnam Children's Kite



13. Split Malay.



14. Split Malay by Earnest Barton with Tunnel Rear Keel.

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tion who made the kites from dowels and ripstop and started team fighting in 1983. This attracted considerable interest. The UK rules were drawn up and popularised here by Martin Lester and Gill and Jon Bloom, resulting in a team and an individual competition running through the season from 1987. Contemporary plans are given in Diagrams 4 and 5.

Unlike Indian Fighters ordinary line is used as the greater line tension from the larger kite (most are now 2metres) allows the line or bridle to be cut by friction. All the entrants fight at the same time; a kite has lost once it has been cut free or touched the ground. Spectators like the contests, which usually have a clear winner – although this can take some time. But for fliers the interest has waned – festivals such as Bristol and Sunderland could have over 40 kites in 1993 – now 10 kites is a large field. Perhaps 'large field' is part of the problem in another sense. Kites cut can be lost, especially from a small flying field and fliers (who almost always have made their kite) do not want to lose it.

But, independently of fighting, Roks live on as serviceable fliers, which can be trimmed to make stable lifting platforms, and which provide a good surface for imaginative decoration.

Another Japanese single spare kite, which however is not dirigible and not used for fighting – is the Sode (Diagram 6). Photo 6 shows a western version made by Janneke Groen. The Sode has the shape of a Japanese Happi or jacket and is said to have originated from a successful fisherman flying his Happi from his boat. It uses the curvature caused by wind pressure between the front and rear cross spars to give lift and stability (see Bird Kite Article).

There is a single spine kite rarely seen – my son made one 20 years ago in ripstop – called the Musha (Diagram 7). It needed a long ribbon tail but was a good flier.

For other Japanese single spine kites see:

- PELHAM; good for plans
- SKINNER & FUJINO; good recent survey
- HOSKING; comprehensive list and illustrations
- STREETER; the classic book for culture and the designs.

2.3 Malaysian Kites

Wau. While Malaysia has a wide range of kite designs, we will concentrate on Wau of which the Wau Bulan (or moon kite) is the best known. The new moon has a religious significance in Islam. Photo 7 is a fairly simple example.

Malays have a long history of kite making, they claim that they invented the kite, certainly they were fighting kites in the 15th century. Perhaps the long history accounts for there being at least four explanations for the word Wau:

- It is the noise made by the hummer fitted to most

- It comes from the Dutch word 'wouw' which means a large bird of prey and a crow.
- The wings are a similar shape to the Arabic letter, which is pronounced wau.
- According to Pierre Fabre (Kitelines Winter 1997) it goes back to the 17th century Thai word for a kite. Surely this settles it?

There are various types of Wau distinguished by different tail shapes. One of the commonest is the Wau Kuching or 'cat wau'. The tail is shaped like a D on its back and looks like a cat's head upside down – I am not convinced but Malays do love cats and even have a town named after them.

The distinctive curved wing is found in several Indonesian kites, the Tikkal Kite (see 2.2 above) is similar, as are some Chinese designs. But for performance the high point is, I think, the Wau wing.

Waus are not fought but the highly decorated ones, which are those usually seen, are made for competitions. These competitions, which have become more widespread in recent years, judge the kites on, in decreasing order of importance:

- Angle of flight.
- Beauty of decoration.
- Ability to stay flying and not crash.
- Noise made by the hummer.

The kites are made from a special bamboo and the curved shapes are achieved without using heat to bend the bamboo (as in China) and using bracing lines and tying (no glue). For the thickness of the bamboo they can be quite large structures. The basic cover is a glazed tissue paper which is glued behind the frame: at this point the kite is test flown for symmetry, balance, etc. The best fliers will have the distinctive cut paper patterns in 2 or 3 colours glued to the front covering the frame – producing one of the very few kites where the frame is covered front and back.

Other frames are made up into 'Wau Cantik' (beautiful Kite) with very elaborate paper decoration – up to seven layers – which are entered into a 'beauty' competition. These, not intended to fly, take longest to make and attract the highest price. They are quite different from the cloth-covered kites sold to tourists. The cut paper patterns are traditionally always symmetrical on each wing and front and back symmetrical on the front wings. Since Islam forbids representation of a living animal, traditionally complex arrangements of plants, vines and flowers are used – but the Wau Kuching breaks the rules. Waus have paper tassels attached to the wing tips and stylised bird heads tops some.

Waus (Bulan, Kuching, etc) traditionally come from the Northern states of peninsular Malaysia but have been adopted as a major cultural symbol for the whole country, for example on the back of a coin, Malaysian Airline Services has an adapted Wau Kuching as its' logo.

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The kites were probably originally developed by farmers for bird scaring and indicating wind changes at night. They do this as Wau Bulans (unlike the one in the photo) have a bow fitted to the rear before the main wings. The bow is at least the same width as the wings being a piece of bamboo with a thin strip of bark or ribbon in tension. Even in a constant wind the noise fluctuates as these kites have a very unique flying pattern:- they settle to a high angle and move in a horizontal figure of eight back across and up the wind.

The popularity of Wau kite festivals in recent years has led to the kites becoming smaller (about 4 – 5 ft high) and thus easier to transport. They are not demountable. Seen in England they are invariably flown by Malaysians. Hard to fly anyway, they do not travel well and seem unusually susceptible to warping in UK conditions, perhaps because they are under tension unlike the heat bent bamboo of most other kites. While I have seen plans for Waus – most recently in HOSKING (Color The Sky) – I have never known anyone try and make one.

Other Kites

There are kites using the elliptical wing but not having any body shape etc. Of the Waus above – one is the Wau Barat (Photo 8). These have 9 – 15 ft wingspan. Flown for performance, the name means Western Kite – a recognition that the kite originated in Thailand which is referred to as being west of Northern Malaysia (it is actually North West but no matter). I don't know of such a kite currently in Thailand.

There are kites without the elliptical wings called Wau, e.g. Wau Ikan or Fish Kite (Photo 9), also the Wau Ular (Snake Kite) in Section 5 below.

Other kites are referred to as Layang-Layang (birds) in Malaysia. They vary from quite sophisticated models (Photo 10 is a kite from Melaka) to versions very similar to Indian Fighters.

Perhaps the most important Malaysian kite has been the simple Malay (square flown on a corner with a bowed bamboo cross spar) which was the ancestor of our Diamond and Eddy (see Golden Age of Kites and a history of kites to come). While it is claimed that the Malay archtop still exists I have never seen one live or in a photo.

2.5. Other Kites using a Bamboo Bow

Three types of kite are included here.

Variations on the Indian Fighter design

The books by GALLOT, BOITRELLER and PETIT between them give a good range of kites similar to an Indian Fighter which are fought in Chile, in other Asian countries and Western variations. The Vietnamese children's kite is only known to me from Margaret Gregers writing. Photo 11 shows a ristop version. Photo 12 shows a Kiskeedee, requiring a tail it is a West Indian

years in the UK as the cheapest kite at a festival and often the most fun to fly. Viv Comma made them to dance and not to fight. I think he is the only kiteflier to have a street named after him (Kiteflier January 1999).

Brazilian Pipas

Until 10 years ago European fliers believed that the Brazilian Fighter Kite was the cloth and wood Papagaio (See Bird Kite article) – and that might have been true 20 years ago. From various sources, including contact at the Dieppe Festival, it is clear that although an Indian Fighter similar kite is used the main fighter is the distinctive Pipas or 'Top' kite (Diagram 8).

Various Designs

Many small kite designs from all over the world use a curved bamboo (or sometimes reed) spar.

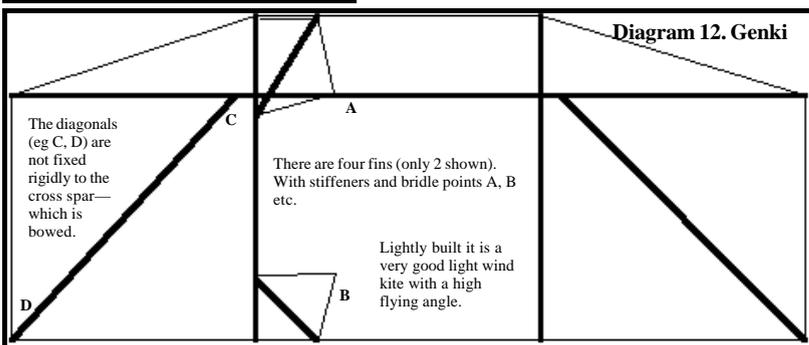
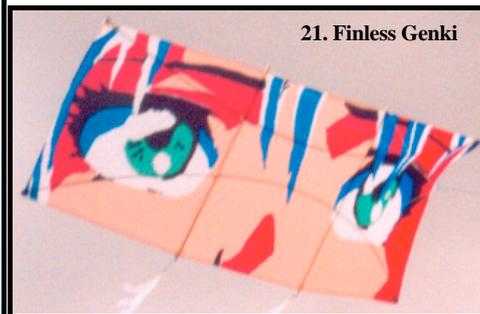
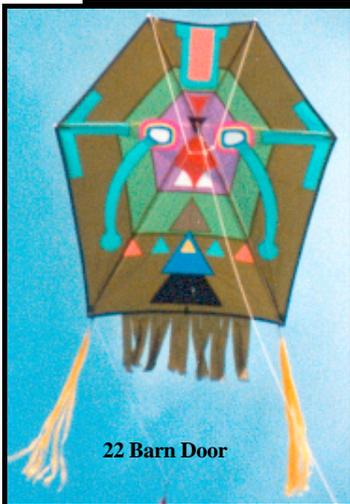
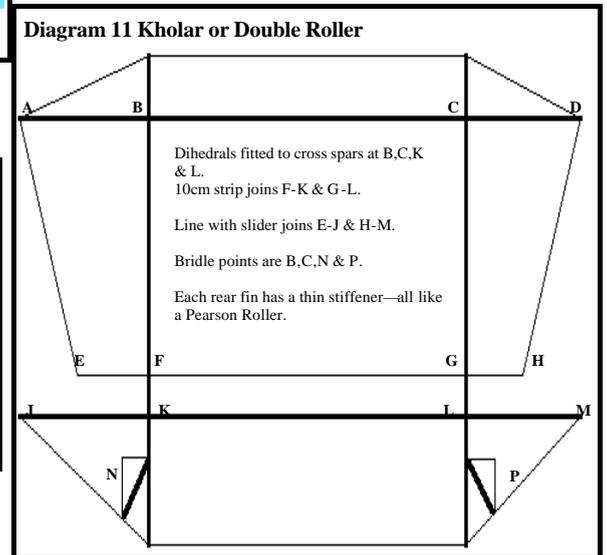
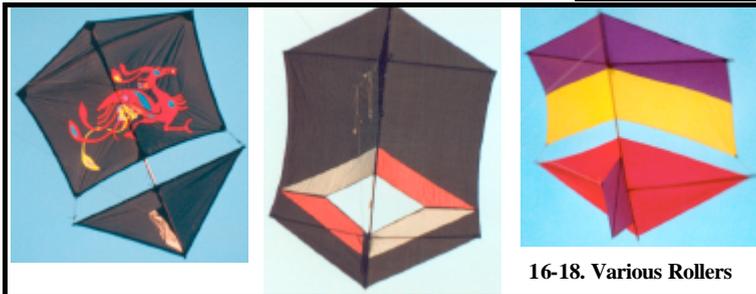
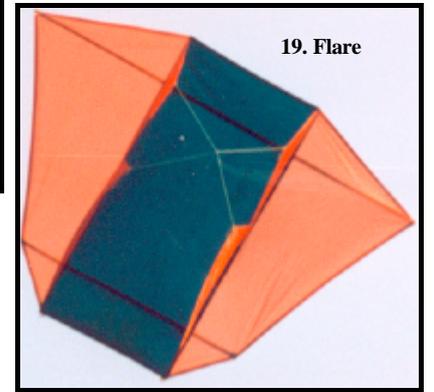
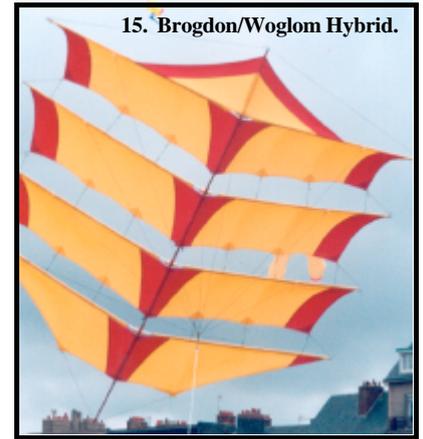
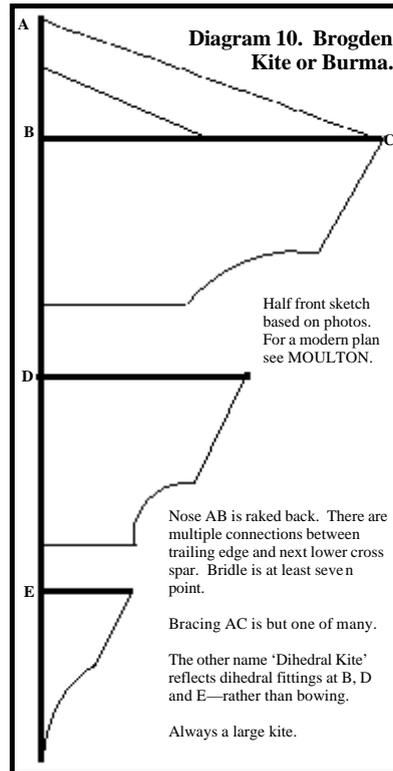
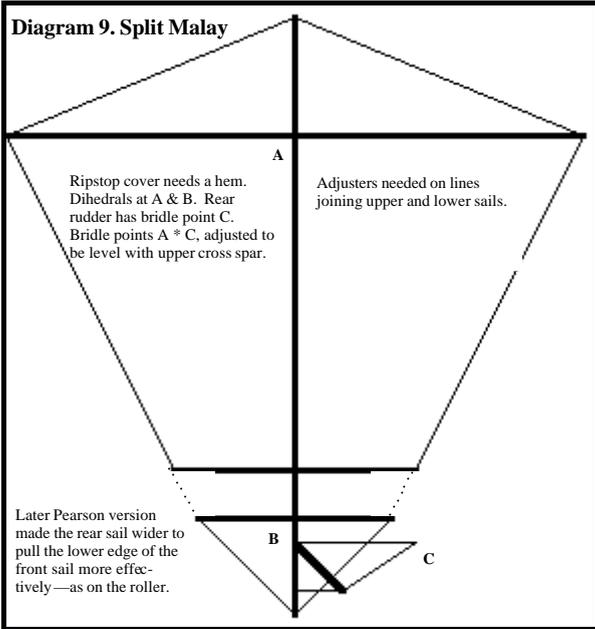
2.6 Western Single (and sometimes double) spine kites

As already indicated, other articles deal with the relationship between Malays, Diamonds, Woglom and Eddy up to the start of the 20th century. What of these kites today? Many are still sold for children's toys – often in plastic printed with exciting images or advertising logos. They all use tails to sort out imperfections. The Brookite Company was set up in 1906, always producing a superior product and from the start made the famous Cutter Kite – a fabric covered diamond with a keel.

Amongst kite designers development started quickly after Eddy became known in the 1890's. Taking on board that here was a tailless kite designers realised that increased stability could be gained by building in dihedral to the cross spar and that more lift would be got by subdividing the sail horizontally. Possibly the first development was the split Malay (Photo 13, Diagram 9 and photo 14, the latter is an Earnest Barton design with a tunnel rear keel). In 1903 a prestigious height competition in Sussex was won by Charles Brogden's Burma Kite (Diagram 10 and Photo 15 which shows a kite cross between the Burma and the Woglom). There is a good picture in PELHAM but MOULTON also has a plan. He points out the names Burma and Malay hint at the former's ancestry.

The Burma was a large kite (19ft bng), sometimes called the Dihedral Kite because of the built in angle of the wings (rather than using bracing lines) and had a swept back or 'turned up' nose section. Although undoubtedly a great light wind flier, its complexity means that Brogdens are rarely seen today. But a descendant is.

The German toy company Margareta Steiff (better known in the UK for teddy bears with a button) designed the 'Roloplan' in time for the 1909 Christmas market. They simplified the Burma by having 3 or 2 (the latter being the only one I have seen) lines of sails, each tier of the same span, connected by 8 links



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tion finished in the 1960's although very large home built versions were produced by East German fliers after that. I have a ripstop version which needs a fair blow but then flies well – however sorting out the 7 point bridle and the bracing lines is a nightmare. Part of the construction problem is that Roloplans get close to jibbed kites in the way that they behave with airflow between the wings.

One of the most famous British kites of the 20th century is the Pearson Roller. Several kitefliers made copies of the Roloplan in the inter-war period; one of them John Shaw flew at the Round Pond in Kensington where he met Alick Pearson. Pearson took the design forward and by the early 1970s had developed his simplified version which he produced for sale. The 'Round Pond Group' (see article by Dan Leigh in 'Kites' no 2 April 1996) were also well known for their bird kites and their split Malays. The cramped and wet site meant that kites had to be reliable at flying from hand to a high angle.

The Pearson Roller had a two piece bridle with only a rear rudder and one connector between the two sails on each side. EDEN has a plan. The roller shown in PELHAM is not the Pearson design which is square overall and has a lower cross spar. He made them 46" square to economise on the use of materials – he was the first to use ripstop nylon. Photos 16-18 show a range of rollers. The vented roller (17) can be a problem as the rear edge of the vent may lift (flap) – avoiding this may lead to the kite being bridled so square to the wind that you are flying a rok with a hole and a useless fin.

Rollers were popularised by appearing in PELHAM and by the availability of Pearsons followed by Jilly Pelham versions in the late 1970s and early 1980s.

They then gradually fell out of favour, partly, I suspect, because of the domination of the easy to make delta as the favourite light wind kite and partly because of the development of the Genki (see below). Ten years ago they were a rare sight at a UK kite festival but they have made a come back perhaps capped by the matched set flown by Team Volundra in 2002.

One unusual variation on the roller is the double spined Kohler or double roller (diagram 11), I have only seen a photo but it does look good. I know that we are basically looking at single spine kites but they a so few exceptions.

Our other double spine kite is the Flare (Photo 19). Designed by Pelham it features in the book as does the even rarer multi-flare. In the article on sled kites I jokingly suggested that the flare might have been derived from a winged sled with an oversize cross spar. Equally it could have been a double roller with oversize fins and no slot in the cover. Flares are rarely seen now being replaced by the higher performing Genki (Diagram 12 and Photo 20).

thuisen in about 1983. They are essentially flares with a higher aspect ratio made possible by a diagonal spar to the bottom corner of each wing. There was a single spine version (not seen) which basically would have the effect of a no-slot roller – and Genkis do use roller type small fins. Since Genki is meaningless in English they were called extended wing flares at one time and were christened in the newsletter of the Northern Flying group as the 'Windbreak kite'.

Carl Crowell's Wolf Genki could, at one time, be found on the internet. If you replace the fins and the centre section by a 2-cell Conyne triangular section you apparently have a kite called a Tiski-Tiski. Last year I saw a new Dutch Genki variation about 4 metres wide with no fins but relying on curved carbon fibre and clever bridling to provide dihedral (Photo 21).

That is all I want to say in this article about Western single-spine kites. Any experienced kiteflier will immediately recall interesting kites which have been omitted. I hope that they are not too important – except the Marconi? – and in another article 'The History of Western Kites' there is a section on kite artists which include the show kites of George Peters, Steve Brockett, Pierre Fabre, etc.

3 Kites with Crossing Spars

In this, the 3rd section of flat kites we consider kites where the defining character of their shape is given by the crossing of spars rather than a central spine. In some ways this is fundamentally a more difficult category of kite to be stable on flight as a well balanced single spine will produce dihedral from each wing which reduces the need for a tail. Most kites in this section need a tail – the Korean and some Japanese designs excepted.

The very simplest kite of this type, i.e. two crossed spars, is known as the Della Porta and appears in the article on 'History of European Kites'.

This section is broken down into:

- 3.1 The American Barn Door and Three Stick
- 3.2 Hexagonals and similar
- 3.3 The Bermuda Head Stick
- 3.4 Circular Kites
- 3.5 Korean Fighters and a Japanese Fish

3.1 The American Barn Door and Three Stick Kites

The American Barn Door (Diagram 13 and Photo 22) is literally referred to in books as the traditional kite of America. I have never seen an account of how this happened and it is interesting given that to the end of the 19th century the USA population was dominated by European immigrants who had a tradition of Arch Tops and Malay types. Where did the Barn Doors come from?

They were used from 1885 by Alexander McAdie for lifting equipment at the Blue Hill Observatory. However,