the aerial eye

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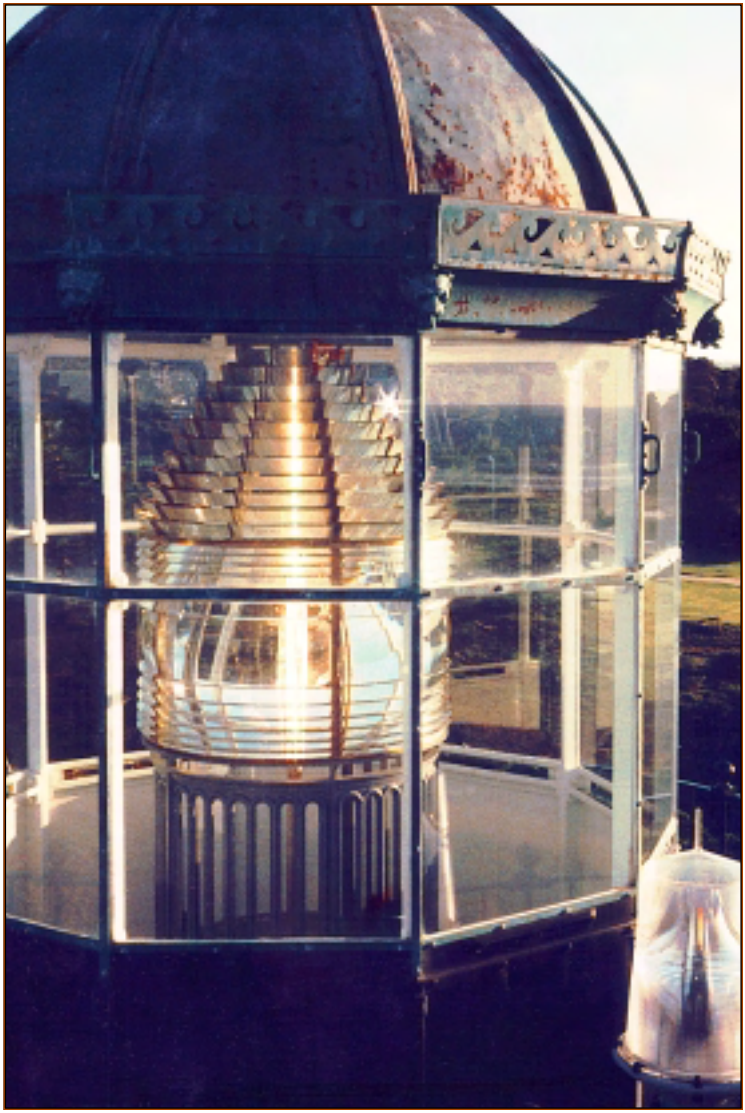

Fresnel Aglow
by
Brooks Leffler

HOW TO BUILD IT!

the aerial eye

This newsletter is produced by the Aerial Photography Committee of the American Kitefliers Association. It is our goal to publish quarterly, in August, November, February, and May.

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rebound

Two issues ago, we wondered how many of the 80 readers whose subscriptions were expiring would renew. Well, 50 of them did, and 31 more new ones have joined us, so we're back up to almost 260 readers again. Very gratifying.

You make it happen. Keep sending all those good articles and pictures!

Text via Email or on 3.5" (9cm) high-density disk (Mac or IBM in ASCII text format) is preferred, but typed text or handwritten letters are welcome too. Likewise, diagrams in PICT, GIF, or TIFF formats are best, but pen drawings, preferably on white paper, will work as well.

Photos may be sent as negatives, prints or slides, or by email attachments in JPEG, TIFF, or GIF formats. We can also read Kodak PhotoCD, or 3.5" high-density disks in the formats listed above. Please scan your pictures at 200 - 300 dpi. We'll keep the prints unless you direct otherwise, but return all negatives, disks, CDs, and slides—eventually.

Send everything to Brooks Leffler at the address below.

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safety first

by STEVE EISENHAUER

INCIDENT #1

It was an unseasonably-warm January day with unlimited visibility. The Delaware Bay beach was deserted.

In the light breeze I used my four delta-Conyne kites in train to lift the 250 lb [113kg] test kiteline. By walking backwards slowly I was just able to get my camera cradle airborne to about 200 ft [60m] of elevation. If I stopped walking the cradle slowly dropped, unless I cranked in line, then it would rise again.

Concentrating on the photographic flight process I almost didn't see the two ultralight planes approaching me. They were flying at less than 100 ft. [30m] elevation and periodically touching down on the beach for fun. In New Jersey no permits are required to fly powered ultralights and the only observed rule is trying to stay out of trouble.

I finished taking my photographs and, keeping an eye on the ultralights, I reeled in my cradle. By the time they reached me only my four highly-visible delta-Conynes were in the air at about 100 ft. elevation.

Both flyers smiled and waved as they passed about 50 ft. from my kites. The thought crossed my mind that if I had had a single kite up at 500 ft. [150m] and visibility had not been quite as good and the ultralights had approached me from behind rather than in front of me, then one of them might have caught a wing on my kiteline, crashed and died.

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about the cover

Fresnel Aglow by Brooks Leffler.

The Point Pinos Light Station in Pacific Grove, California, is the oldest in continuous use on the U.S. west coast, dating to 1853. It is at the southern entrance to Monterey Bay, set back from the sea about 300 meters. I live a mile away.

The city museum maintains the building as a historic landmark, and they have welcomed me as one of the family, so I can take pictures any time the lighthouse is open.

Very fragile, the 145-year-old Fresnel lens is off-limits to visitors, so my pictures provide the visitor with the only way to see this lovely piece of crystal sculpture—and the tiny lion's head downspouts above it.

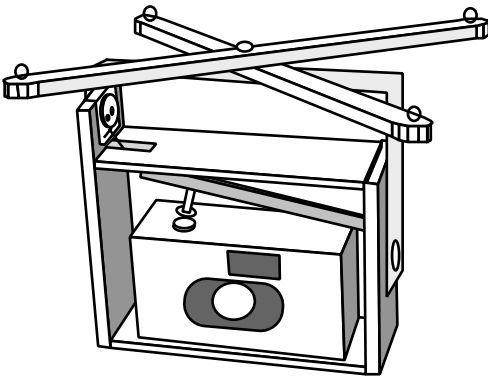
On this day in October 1997 I first tested the *horizon helper™* I described in the last issue, and all the images of this roll were nice and level, so I guess it works.

Wind was 10 - 15 mph, easily lifting my Monopost Epic rig with a FlowForm 16. I nearly always use Agfacolor 400 now because my local discount store sells it cheap!

•æ

brooxes basic brownie box

by BROOKS LEFFLER



*I created this simple rig for a workshop at the World Kite Museum in 1994. These plans were subsequently published in AKA's newsletter **Kiting**, but never here. With so many neophytes having joined us, we thought it would be useful to return to our roots.*

The KSB dethermalizing timer is still available from Joe Stanton at Stanton Hobby Shop, 4718 N. Milwaukee Avenue, Chicago, IL 60630; (773) 283-6446.

This aerial camera mount is designed to use a cardboard throwaway camera, triggering it with a model airplane dethermal timer. Other timers could be adapted. The rig is quite light—about 12 ounces ready to go—so it can be lofted in marginal conditions where a larger, fancier rig could not. And it uses the amazingly stable suspension system designed in 1912 by Pierre L. Picavet.

INGREDIENTS

Figure 1 is to scale, more or less, so I won't waste space telling you how to cut the pieces. Sides B & C are 1/2" plywood; top A, bottom D, and spacer E are 1/4" plywood. Shutter Arm G is made of 1/4" x 3/8" rectangular plastic tubing available from a hobby or crafts shop.

In addition you'll need:

2 small brass cuphooks
2 post office size rubber bands
a standard paper clip
four 4d finishing nails
1 aluminum strap 3/4" x 1/16" x 16.5"
two 1" machine screws
one 1-1/2" machine screw
3 lock washers
3 wing nuts
2 pieces of 1/2" x 3/4" wood 6" long
4 small screw-eyes
2 snap swivels
1 #6 nylon washer
36 feet of light polyester line
KSB dethermalizing timer
Kodak FunSaver™ camera w/o flash

ASSEMBLY INSTRUCTIONS

1. Drill holes for all nails & screws, including those projecting in Figure 1. Glue & nail top A, bottom D, and sides B and C together as shown. Before you do, screw a cuphook E inside each side about an inch up from the bottom.

2. Attach Timer F in the large notch at the top of side B. Be sure the timer wheel is towards the top and facing in, with switch at bottom.

3. Drill a 3/16" hole through the narrow side 1-3/8" from one end of plastic shutter arm G; drill 1/16" holes through the wide side 1/4" from each end.

4. Twist a nut about half way onto a 1-1/4" machine screw, and insert screw into the larger hole in Shutter Arm G. Twist another nut onto screw and tighten finger tight.

5. Unbend the large end of a paper clip into a right angle and insert this end through the hole in the end of the shutter arm closest to the screw just installed. Bend the wire up to secure it and snip off excess.

6. Insert opposite end of Shutter Arm G into the notch on Side C; insert a 4d nail through the hole in edge of Side C to provide a pivot for shutter arm. Tap nail into place enough to hold, but not so far that you can't pull it out with pliers.

7. Attach a rubber band to the paper clip end of the shutter arm with a lark's head knot.

8. Insert the free end of the paper clip through the

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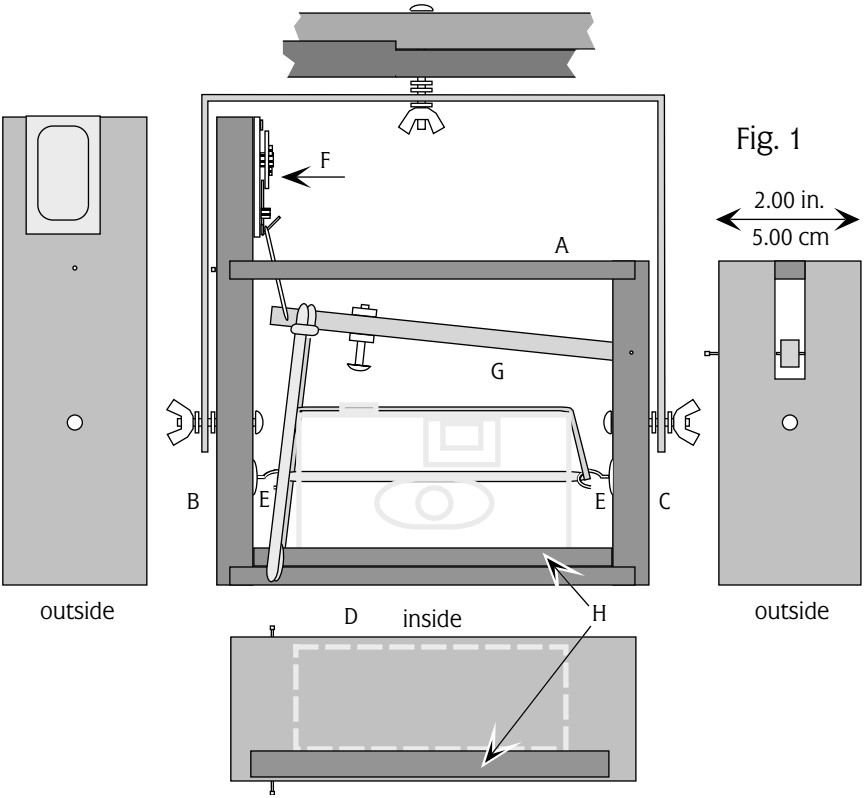

Fig. 1

your first r/c rig

by PETER BULTS, Holthees, The Netherlands

In my opinion one of the most important elements in building a KAP-rig is to keep the weight as low as possible. In other words use as few parts as possible. That also dictates simplicity.

As a camera rig is basically a mechanical construction you can look at other constructions. How did professionals design a train, a bridge, or bicycle?

But don't. Most of these things are not meant to fight gravity. Aircraft are a better source of inspiration, but keep in mind that these machines are made to carry people. Which means they are built much stronger than is really needed just to fly.

If you can, take a good look at racing cars. Colin Chapman, founder and designer of Lotus Cars, was famous for his lightweight constructions. Chapman gave many parts multiple functions. For example in the famous Lotus 49 F1 the engine not only powers the car, but is also part of the frame. The rear wheels are connected to the frame by means of the engine.

So, do trust small screws, bolts and nuts. They are strong enough. Even plastic nuts and screws are good enough.

Unless you have experience with building in wood I would say aluminium is the easiest material to start with. It is light and cheap, and available in a wide variety of shapes and sizes.

If you have an alu strip of 20 x 1.5 mm (3/4" x 1/16") try to get the feeling of how strong it is. Of course you will be able to bend a 1 metre (39") strip with your bare hands. But at a length of 15 cm (6") you would need more force than the weight of your camera.

Practice the technique of gluing aluminum. When it is done in the right way (see Peter van Erkel in **æ** 3.4) it is the best.

NOW BEGIN

I suppose you already have some alu strip, nuts and bolts, camera and a r/c set. If your r/c has only two channels you should now decide whether you want to control tilt or pan; the other channel is needed for shutter release. Personally I would go for the pan version.

If you are lucky enough to own a four-channel system go for pan, tilt, and shutter release; a HoVer-rig [which rotates the camera from landscape to portrait format] is far too complex to start with. If you need to buy an r/c system invest in a 4 channel. Eventually you will want all functions.

The first part you will need is a tripod-screw to fix the camera to whatever will be the rig. Cheapest tripod-screws are found in old camera cases. Often they are made out of plastic, which is good for weight reasons. [*This is the only world-wide universal machine screw size:*

1/4" x 20. A very short one will work fine. —ed.] Now attach this screw to the camera. Load the camera with film and batteries and (for SLR's) adjust the lens to infinity.

The big thing is to find the Centre of Gravity (CG) of the camera. This is important; turning the camera in any direction around its CG requires less power and allows for a lighter frame. Two triangular wooden blocks [*or a straightedge clamped in a vise —ed.*] will help to find the CG. Balance the camera on the two blocks in all three dimensions [front/back (X), left/right (Y) and top/bottom (Z)]. This should gave you an idea of the location of CG.

INNER FRAME

After you've identified the CG, look at the tripod-screw location. On most cameras you will find an important offset between tripod screw and CG. The strip that will be the inner frame should be right in the middle of the Y-axis. In some cases a rather wide strip will be needed to provide good support of the tripod-screw.

Now you can drill the hole for this screw, leaving enough strip left and right of the camera (about the height of the camera). If you'll use a servo for shutter-release make sure you have about 50 mm (2") extra on the side where the shutter button is.

Mark the strip left and right of the camera, plus 5mm each side, where it must be bent. Now bend it twice so that you get a nice U-shape.

Find something L-shaped to be fixed on the shutter servo's drive-plate. The L-shape should look like a little hammer

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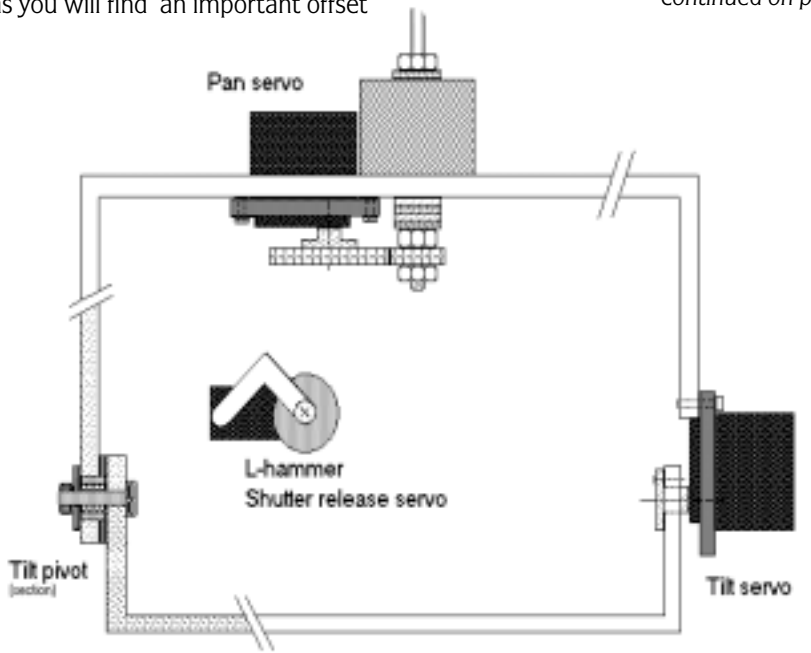

the flare kite

by ARTHUR COOMBS, Heidelberg, Victoria, Australia

The Flare kite was introduced to me by KAPWA in 1986 as a powerful lifter in moderate winds and extremely stable when flown with a drogue. Up-to-date it appears that no reference has been made to it in the **æ**.

This kite has been used by the author for over 10 years lifting rigs of about 1kg [2.2 lb] from which very satisfying KAP have been taken. It is replaced either by a large rokkaku or delta if the winds are too light.

Design details are given on p. 207 of David Pelham's *The Penguin Book of Kites [ISBN 014 00.41176; out of print, alas, but may be still available. —bgl].*

For my kite, the dimensions in cm are shown in Fig 1, opposite.

Ripstop nylon is used for the sail and keels. Nine millimeter diameter carbon-fibre rod is used for the two vertical longerons and the top spreader; 6mm diameter carbon is used for the lower spreader.

It is most important for the kitemaker to note the grain of the weave. The fabric is strongest along the straight part of the weave and weakest along the cross, i.e. diagonally. See Fig 2 and note weave orientation in each panel in Fig 3.

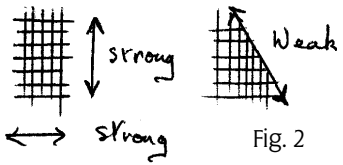

Fig. 2

When cutting ripstop nylon use a soldering iron against a steel ruler rather than scissors. Glass or Masonite™ can be used for the cutting table. (Use a well-ventilated area as fumes can cause irritation.)

Join the three sails and two keels together with straight stitching, as shown in Fig. 4. When sewing this material it tends to slip — use double-sided sticky tape to hold seams together. Silicon is a good lubricant for the sewing thread and will stop the "sticky" on the tape from balling up on the sewing machine needle.

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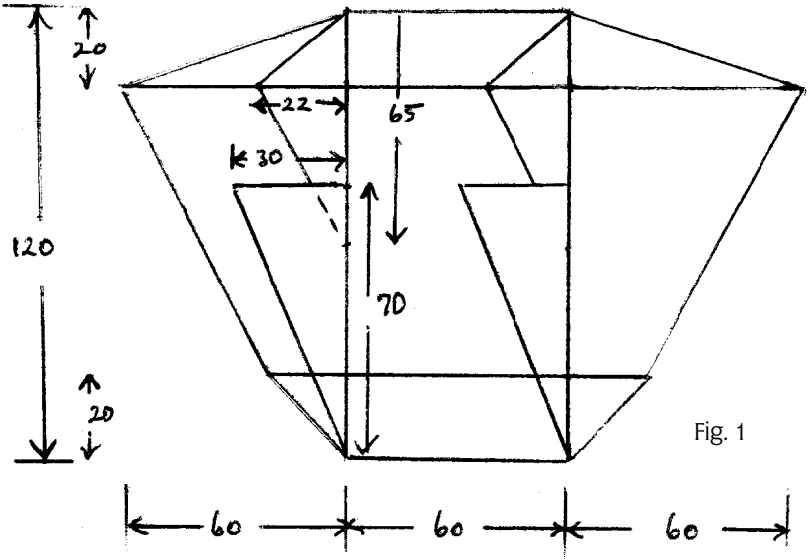
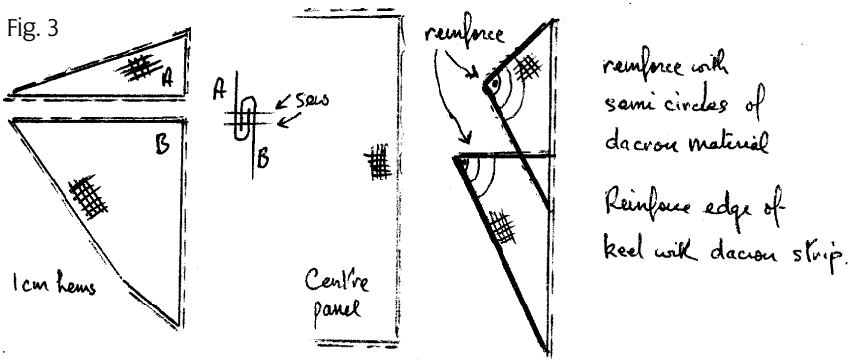


Fig. 1

Fig. 3



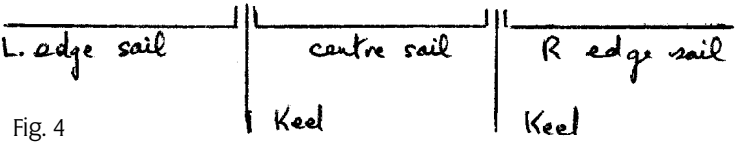
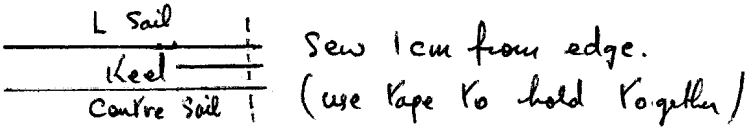


Fig. 4



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Make pockets as in Fig. 5 from Dacron® or similar material. Dimensions will depend on rod size. Four are needed for top and bottom of longerons. Pockets for the bottom spreader will be similar to the above. Pockets for the top spar will need rings for the bowstring to produce the dihedral angle. See Fig. 6..

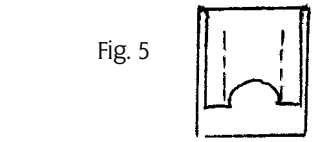
When a cord is placed between the left-hand and right-hand rings and tensioned, the kite will bow and produce a dihedral angle as in Fig. 7.

Loops will need to be sewn on each sail to keep the bowed spreaders in place. The spreaders must be behind the longeron and not between the sail and the longeron.

The bridle (Fig. 8) is attached to the tips of the four keels. Join the top points with one loop and the bottom with another. Attach two rings using the larks-head knot. Attach another string to these and use a third ring for final adjustment. This ring is approximately 250 cm from the attachment points.

The drogue (Fig. 9) is a small windsock, flown about 5 to 6 metres behind the kite and attached to a V-bridle at the base of the longerons. Diameter at the front is 25 cm; rear diameter is 5 cm; length is 65 cm. •æ

Fig. 5



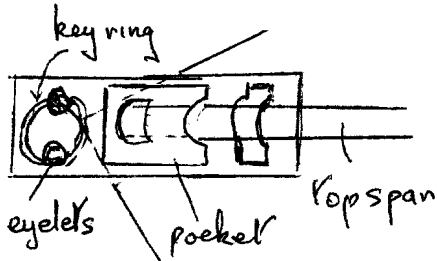
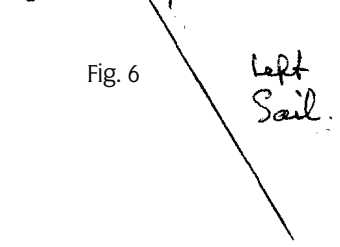


Fig. 6



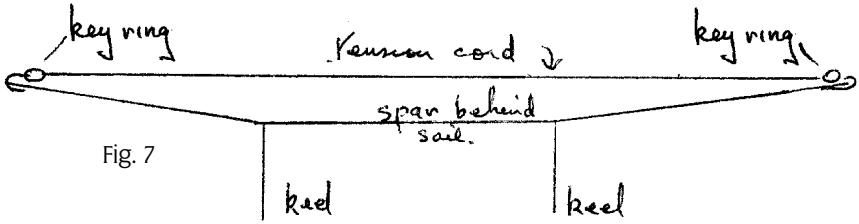


Fig. 7

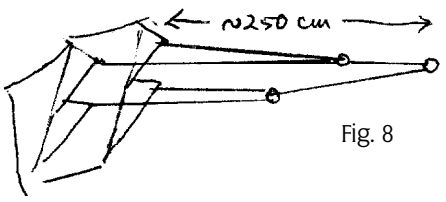


Fig. 8

Fig. 9

the aluminum cradle

by STEVE EISENHAUER

Aluminum is bendable, easily drilled, has a smooth finish that minimizes wind resistance, grips epoxy well if you roughen the aluminum surface and use the right epoxy, is lightweight and takes a beating.

I've had a few crashes with my camera cradles and have always been able to bend them back into shape. One of my cradles started out as a vertical-format system, then after bending the arms to make it a horizontal-format system, I bent it back into the vertical-format. It looks ugly but still works fine.

I use mostly 1/16-inch [2mm] aluminum but find my local hardware stores only sell it in 1/8-inch thickness, so I request a local metal machine shop to cut me some from sheets into 3/4-inch [19mm] and 1-inch [25mm] widths.

My fastening system (aluminum to aluminum, servos to aluminum, etc.) utilizes a mix of steel and plastic nuts and bolts, Velcro™ strips, epoxy, and tiny plastic wire ties. Sometimes I'll use two or more fasteners at once; for example, my servos are attached with steel bolts and nuts, epoxy, and plastic wire ties. My camera is bolted to the cradle with a plastic 1/4 inch bolt and further secured with Velcro hook-&-loop cloth on the camera bottom.

Velcro fastens three things on my cradles: my battery pack (along with a rubber band), my camera (along with a bolt), and the entire cradle assembly on the kiteline (along with a safety line).

Most Velcro has a strength rated at 10 lbs. per square inch if pulled at right angles to the sealed surfaces. So I wrap it around itself for the two strips that suspend the cradle system; this produces a strength rating of over 30 lbs.

Velcro also reduces vibration: my battery pack, camera and the entire system benefit, although I still use rubber donuts on the kiteline above and below the cradle to further reduce vibration.

On the next page are my three cradles, all of which are two-servo (pan and shutter) systems. Many KAPers now have several servos that control panning, "look down", shutter release and (occasionally) changing from vertical to horizontal format. My only plans are to make the following refinements to my two-servo system:

1. Make a prettier cradle. In the past I used a hammer and a table vise to bang aluminum strips into the desired shapes. In the future I'll still use a hammer but will cut a wood block as a form (template). Using big C-clamps I plan to hammer the aluminum into shape. The result should be a tighter, cleaner-looking system.

2. Reduce wind resistance. The less wind resistance the less vibration and "blow-away" (the tendency of the wind

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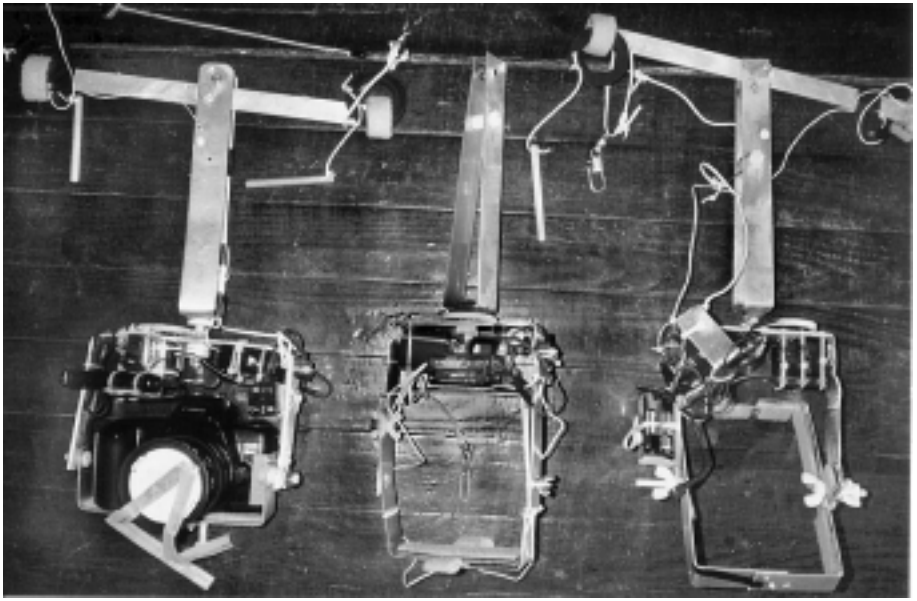

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to blow the cradle away from level). I plan to smooth out the hard aluminum edges with sandpaper, to shorten and shield all electrical wiring, and to make the cradle as compact as possible by reducing its width and height to the absolute minimum and stacking components together (e.g., a servo and battery pack) whenever possible.

3. Redistribute weight, but don't reduce it. My cradle and camera rig is as light as I want it to be. The heavier the rig the less vibration and the less blow-away (a rig twice as heavy vibrates and blows away about half as much).

German KAPer Wolfgang Bieck uses a heavy 35mm SLR camera with an attached motor drive unit; his 4-1/2 lb. rig enables him to shoot during lower-light conditions, and to use slower shutter speeds and finer-grained films. I envy this capability but not his need to use bigger, harder-pulling kites to lift the added weight.

I'm comfortable flying my current combination of kites, and know under what conditions they can lift my rig. However, I would like to redistribute the weight so more of it is lower, preferably right around the camera itself. Again, this will help reduce vibration and minimize blow-away.

4. Tighten the tolerances on my pan servo pivot and gearing. All of my cradles rock a bit at this pivot point, and this is a vibration source.

A prettier, better-machined, more-streamlined, better-balanced cradle: that's my goal for the spring of 1998.

Continued on page 21

the TRAM-station

by RALF BEUTNAGEL, Braunschweig, Germany

Reading past articles about video-controlled rigs was somewhat discouraging. But the vision of seeing pictures on screen of what the airborne camera will take was stronger and so I decided to pursue it.

It was July 1997 as I looked for special KAP-qualified video-transmitters. Here in Germany I found three different systems which could be used. They all worked at 2.4 GHz which is legal in Germany without a special license [*USA too —ed.*].

The prices varied more than 100%—compare before buying! I decided on the VFÜ-2400 transmitter. It is the smallest, lightest and cheapest system I found, sold by different firms.

For the CCD-chip-camera I found 10 different types in b&w and about half the number in colour. So get enough information about the size & price! I bought a small b&w one (not the smallest) for a low price. The size is 40 x 40 x 27 mm (1.5 x 1.5 x 1 inches) and it has a 500 x 582 (291,000 pixel) image. A b&w-camera needs less power than a colour one.

I decided that my monitor should have an LCD-matrix screen rather than a picture tube. I found six small A-V-capable TV receivers, four monitors for use in trailers, trains or airplanes, and three external monitors for camcorders. I bought a small TV receiver because it was for me a cheap way to get a TFT-active-matrix.

Power supply should be by NiMH-accus [nickel-metal-hydride batteries] with 1200 mAh at mignon-size [*sorry, gang, I can't translate that one! —bgl*] for all components.

By the first of August I had all components together. I decided to make video a complement to my old hover-rig [**æ** 2.2]. The video transmitter, battery

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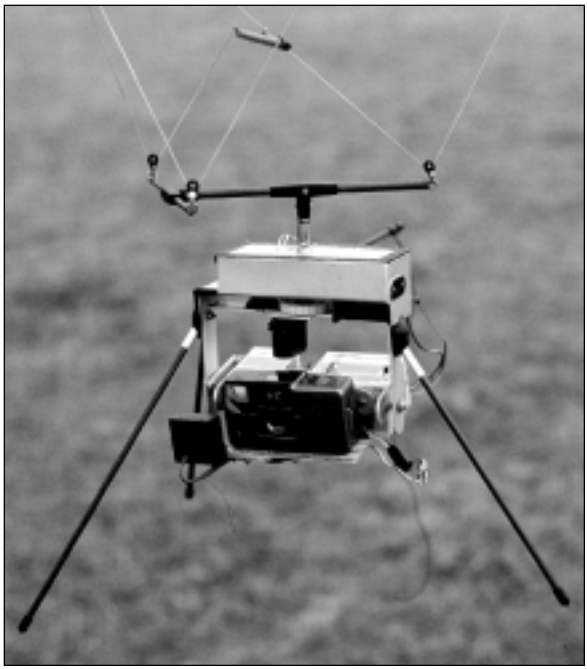
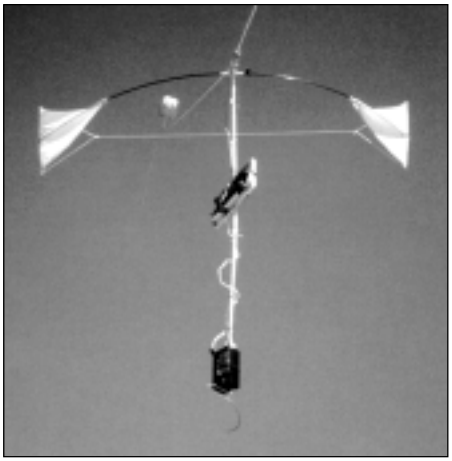


l'arc stabilisateur

by CHRISTIAN BECOT, Tourlaville, France

Christian visited me last summer and flew a pendulum rig that was (dare I say it) more stable than my Picavet suspension. In the last issue I baited him into telling us about his pendulum's dihedral stabilizer, and here is the result. I have left measurements in metric to keep things less cluttered; for inches, simply divide millimeters by 25. —bgl



HOW IT WORKS.

Rigs are always rotating from side to side along the flying line axis. This line is usually inclined at 40° to 60° from horizontal. To understand how the stabilizer works, cut a square paper to 5 x 5 cm (2 x 2 inches). Fold it once from corner to corner. Place the folded paper open-side-down on your desk. The diagonal fold represents the kite line. Each side of the paper is a sail. Now move it with the diagonal as axis of rotation. When rotating right, the right sail is exposed to the wind while the left one is not. So the wind will turn it back to the balance position.

DIMENSIONS

For rig with 350mm pendulum and 1.2kg weight [42 oz], I use the same bow and different sails depending on the wind:

Bow : 2 x 700 mm

Sails for strong winds : 200 x 350 mm

for light winds : 300 x 350 mm

MATERIALS

For the bow

A: GLASS-FIBER, 2 RODS 3MM D X 700MM L ["BOW RODS"]

B: ALUMINUM, 2 TUBES 4X0.5MM D X 30MM L

C: ALUMINUM, 2 TUBES 4X0.5MM D X 20MM L

D: ALUMINUM, 2 TUBES 6X1MM D X 10MM L

E: ALUMINUM, 2 TUBES 6X1MM D X 15MM L

F: VINYL TUBING, 2 PIECES 3MM ID X 10MM L

For the sails

G: RIPSTOP, 2 TRIANGLES WITH REINFORCEMENTS

H: CARBON ROD: 2MM D X 200 OR 300MM L ["YARDS"]

J: ALUMINUM, 4 TUBES 3X0.5MM D X 10MM L

K: 2 RUBBER RINGS

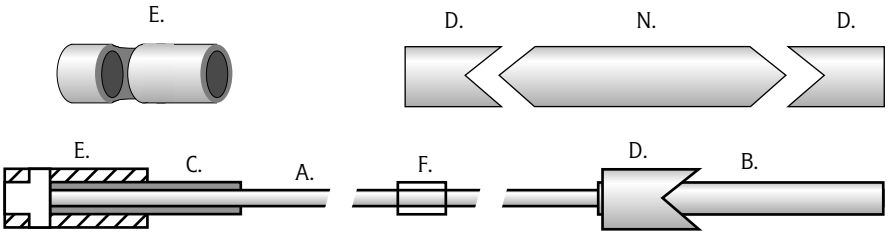
L: 2 ALUMINUM RINGS

M: STRINGS: 2 PIECES 400MM AND 1 PC 800MM L

For central connector

N: ALUMINUM, 1 TUBE 6X1MM D X 50MM L

EPOXY GLUE



HOW TO BUILD IT

The bow :

1. Slide part F on each rod.

2. Glue a part B at one end of each rod A and a part C at the other end of each rod.

3. Prepare each part D and also part N with matching nicks as shown above.

4. Prepare each part E with a slot: drill a 2mm hole and then file it open on one side; part H should insert freely in the slot.

5. Glue part D on part B on each of the bow rods.

6. Glue one part E on part C on one bow rod and using central connector #13, assemble the rods with nicks interlocked. Slide the other part E on the outer end of the other bow rod, check that slots of parts E have the same orientation, and glue the second part E in place.

The sails :

7. Cut ripstop to dimensions with allowance for hems and yard sleeve; prepare reinforcements

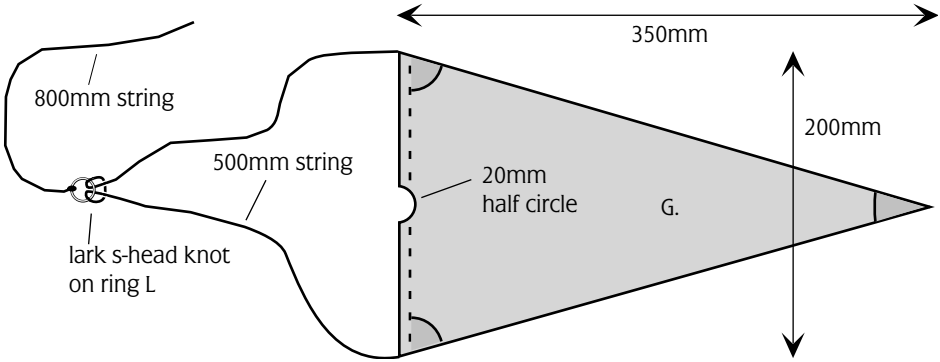
8. Sew hem reinforcements and sleeve

9. Prepare 2 yards: glue parts J at each end of part H ; then drill 2mm holes at 5mm from end

10. Slide the yards in each sleeve and tie sail corners to the holes at each yard end.

11. Prepare the bowstring: tie 500mm strings to the yard ends on each sail; put

Continued on page 21



[above left] ***Wisconsin Fields***

[above] ***Gig Harbor Contempora***

[right] ***Presqu'Isle Provincia***
by Carl Bigra

[lower right] ***Frank Lloyd Wr***
by Craig Wilso

[below] ***Aqueducts Park, Roma***,
by Claudio Del Greco

[left] ***Pier Skaters***, *New Jersey,*
by Steve Eisenhauer

aerial gallery

by Andy Kraushaar

***ry** by Marvin Nauman*

***al Park, Ontario**,*
s

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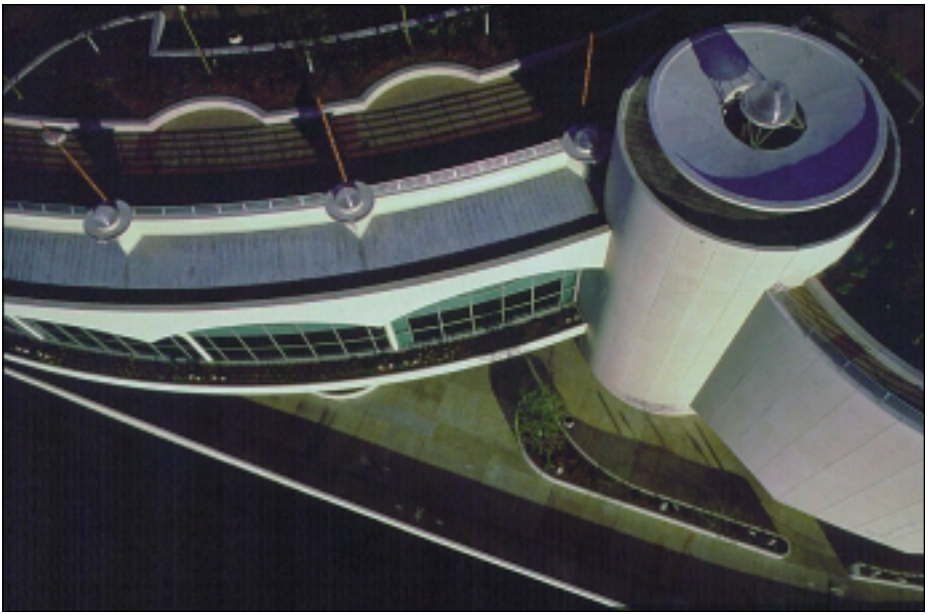


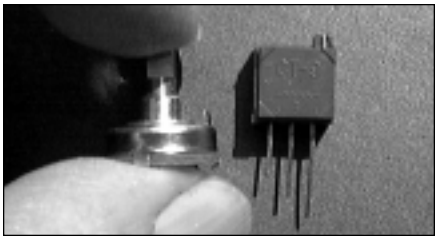
360 easy degrees

by BROOKS LEFFLER

One of the most-asked questions in KAP is how to pan the camera 360 degrees. After years of doing it by 4:1 gearing which simply amplifies the servo's travel (and speed) in both directions, I have recently been using a modified standard servo to operate endlessly both directions, gearing down (1:4) the final drive for more precise control.

We've had several articles in the past which discuss this topic, but I've never seen instructions here or elsewhere with enough detail to lead the beginner through the process. Now that I've actually done it 8 or 10 times, I'd like to pass on what I've learned.

All we're going to do is replace the servo's internal potentiometer (pot), on the left below, with a trimmer (right), and remove the stops on the gears. Half an hour, max, even for a newbie.



NO ZAP

Opening a servo for the first time is likely to be intimidating, but fear not. You won't hurt yourself, and you don't need to understand much about how it works—especially, you don't need to understand electronics at all. And don't worry about irreparably damaging something or voiding the warranty—though you will do the latter. But at the very worst, a standard servo costs less than $15 by mail-order, and the learning experience is worth every penny.

I have done this conversion on brand new and very old Futaba standard servos, and on Tower Hobbies System 2000 and System 3000 standard servos, with and without ball bearings. I haven't seen inside most of the other brands, but these directions should apply to them too.

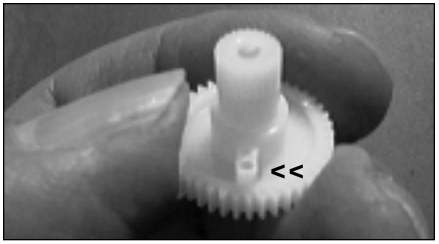
I have not found a microservo that can be modified this way, so you're stuck with the size and weight of a standard servo.

You will need a 3/8" square (or 9mm) Cermet trimmer, 5 kilohm, multi-turn (12 - 25 turns), with the adjusting screw on the side. Tools: jeweler's Phillips screwdriver, small diagonal cutters and/or knife, soldering iron and resin-core solder, 3/16" drill or cyanoacrylate glue as needed, depending on servo modified.

HERE GOES

1. Unplug the servo. Unscrew and remove the servo drive plate or arm, and the four Phillips screws on the bottom of the case.

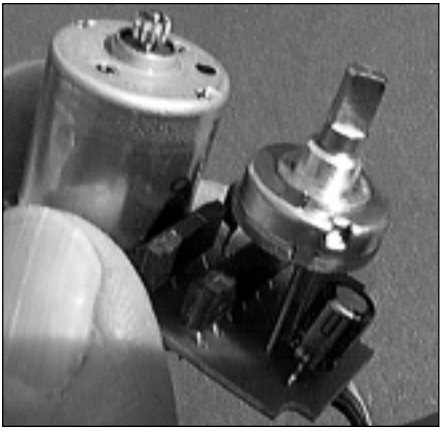
2. Remove the top of the case to reveal the gears. Inside the lid you will



note one or two stops to keep the final drive gear from rotating all the way, and/or a similar projection on the gear itself [above]. Using a knife or small diagonal cutters, or a small motor-driven grinder, remove enough of these stops so that the final drive gear will rotate all the way.

3. If it has not come off already, pull the final drive gear off the main housing. On the newer Futabas, it is seated on a small bearing surrounding the pot shaft [below left]; on the Tower 3000 it fits similarly over a shoulder cast in the plastic case. In the older servos the final drive gear is often supported *only* by the shaft of the internal pot [below right].

4. Remove the bottom plate of the servo case and gently pry the circuit board out of the case with a tiny screwdriver. NOTE: On the Futaba, you may have to remove two tiny screws under the gears in the top section before the circuit board will come out. Simply pull



the gears straight up to get at these screws.

5a. On the new Futaba and Tower 3000 servos, where the final drive does not need the pot shaft for positioning, the pot will come out with the board, standing on stiff leads [above]. This pot will be replaced with a trimmer inside the case.

5b. On the earlier servos, the pot is attached to the case with a locknut around the shaft [below], and connected to the board with flexible wire. Most of these servos will require the pot to stay in place so the shaft may serve as an axle, and the trimmer will have to be placed outside the servo case.

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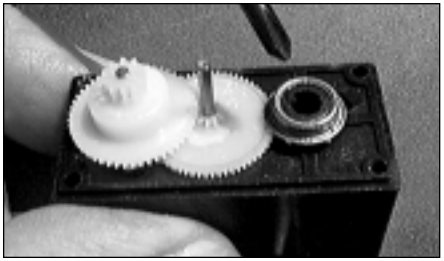
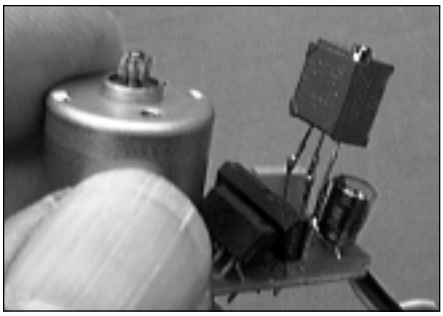




Continued from page 19

The locknut holding the pot in place is accessible from the top compartment. Remove it and take the pot out of the case.

6. If the pot stands on stiff leads on the circuit board, cut the three leads close to the pot and discard it. In its place, solder the Cermet trimmer [above]. Then bend the leads as necessary so it will fit in the space available, and so the adjustment screw points to a side of the servo case. It may also be necessary to clean out any plastic webs inside the case which braced the old pot.

Drill a 3/16" hole in the servo case opposite the adjustment screw on the trimmer so a tiny screwdriver will be able to turn the screw with the case closed.

7. If the original pot was separate from the circuit board, cut the flexible wires, noting which one was wired to the center of the pot. Without shortening the wires, solder them to the trimmer in the same sequence as they were connected to the original pot, with the center wire to the center post of the trimmer. You may wish to insulate these connections with heat-shrink tubing or tape since the trimmer will be outside the case.

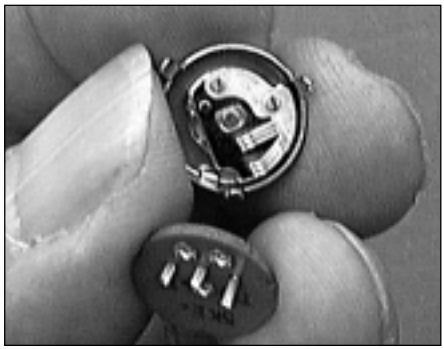
With the knife and/or diagonal cutters, cut a slot about 1/16" x 1/4" (1.5 x 6 mm) in the side of the servo case so the wires can pass through to the outside with the case closed.

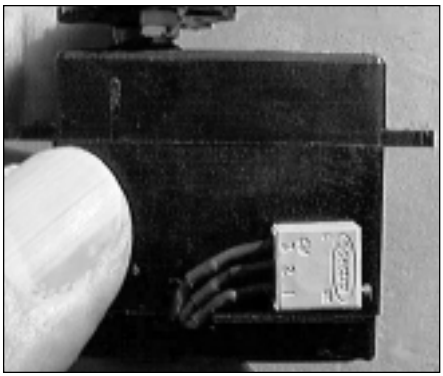
8. If the final drive gear requires the pot shaft as an axle, the pot will have to be gutted and reinstalled. Open the back of the pot by prying up the small metal tabs that retain the back plate [below]. Using cutters or a small rotary grinder, remove the detent in the pot case which prohibits the rotor from turning 360°, and remove everything from the rotor which is not necessary for the shaft to turn freely. No need to reinstall the back plate.

9. Replace gears and screw the case back together. If the trimmer is outside, attach it to the side of the case with a drop of CA glue [right].

10. On your transmitter, place the trim slider of the control that will operate this servo in the center of its travel, and tape over it so it will not move.

11. Plug in the modified servo and turn on the system. The servo will prob-





ably spin one direction or the other. With a small screwdriver, adjust the screw on the new servo trimmer until the servo stops turning.

Operate the joystick; the servo should now move endlessly in both directions depending on the position of the joystick.

TOO QUICK?

I have found that if this modification is used to pan the camera via direct drive, it runs too fast for precise control unless you operate it with a very gentle hand on the joystick. I have reduced the speed of my pan servo by 1:4 gearing. More about that in another issue.

SOURCES

SERIES 3000 TS-53 STANDARD SERVO
Tower Hobbies
(800) 637-6050 or (217) 398-3636
www.towerhobbies.com

CERMET TRIMMER PART # 3299W-502-ND
Digi-Key Corporation
(800) 344-4539 or (218) 681-6674
www.digikey.com

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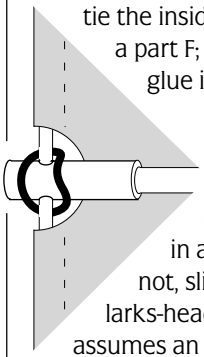
Continued from page 15

an aluminum ring in the center of each with a larks-head knot; tie the 800mm string on each ring.

INSTALLATION AND ADJUSTMENT

The central connector can be fixed permanently to the carrier bar of the pendulum.

Insert each yard in the slots of the bow and fix it with a small rubber ring; tie the inside corner of each sail to a part F; then slide F inwards and glue it when the sail is taut.



Install the bow on the carrier bar. When the bar is inclined to 40°-60°, the bow should be in an horizontal plane. If not, slide the rings and the larks-head knots until the bow assumes an horizontal position.

Note that you don't need to tie or tape anything when installing the assembly. It is fast to install and remove. Even in the strongest winds, the bow will never bend so much that the bowstring becomes free!

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Continued from page 12

Now I just have to find time to build it. I love to fly kites and take aerial photographs but dread the cradle-constructing process.

Like people, no two cradles are built alike. When I look at my cradles I see the flaws in myself. Changing my habits and flaws is often difficult, but I'm afraid it's time to refine my cradle and myself. Wish me luck.

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Continued from page 5

notch in Top A and over the timer's trigger hook. Cock the timer and turn switch off. The shutter arm should now be held up by the timer's trigger.

9. Insert a 4d nail through the center hole below timer on Side B, through the loop of the paper clip, and into the wood of the top. Tap into place enough to hold, but not so far that you can't pull it out with pliers.

10. Drive a nail in the hole at left front edge of Bottom D, and in corresponding hole on right rear edge. Leave 1/4" of each nail sticking out.

11. Slide camera into place between cuphooks E-E. You may have to lift shutter arm slightly to clear camera. Align camera so screw head on shutter arm will contact shutter button and place Spacer H flush with front of camera. Mark it, remove camera and nail spacer in place.

12. Drill centered 3/16" holes in the center and 1/2" from each end of the aluminum strap; then bend it 90° five inches from each end, forming a U.

13. Attach the U to the camera box using 1" machine screws, lock washers, and wing nuts as shown.

14. Hook a rubber band between cuphooks E-E. Slide camera into place from the front, and seat it against Spacer H and between cuphooks. Slip the front leg of the rubber band over the top of the camera, clearing shutter and frame counter. Back leg of rubber band goes across the back of camera. Check to be sure that camera is seated securely.

15. Hook loose end of the shutter bar's rubber band to front nail installed in step 11, and across to back nail, so that the rubber band describes a triangle from front edge nail to shutter bar to back edge nail. By evening tensions of the legs of the rubber band, a small amount of adjustment may be had regarding alignment of shutter bar.

16. Waste a picture and test the timer and shutter release. The rubber band tension should be enough to trip the shutter, but not so snappy that it jars the camera. Then lift shutter arm. If you can advance the film, it worked.

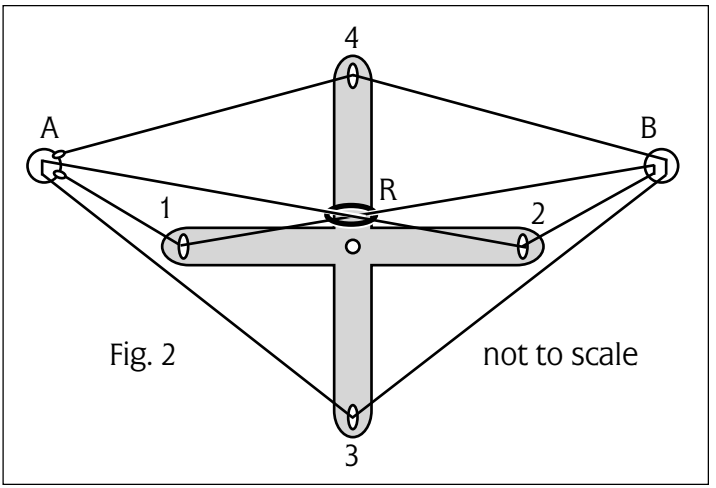

Fig. 2 not to scale

17. Refer to Figure 2. Find centers of two wood strips and drill hole big enough for machine screw. Notch one of the strips so they will fit snugly and firmly together in an X. Screw a screw-eye into the top of each end of the X. Fasten the X to the center hole of the aluminum strap as shown, screw-eyes up.

18. Attach a snap swivel to one end of the light line; this is point A in Figure 2. Put the other swivel at B and the nylon washer at R. Lace the line through the screw-eyes and snap swivels as follows: A, 1, R, B, 2, R, A, 3, B, 4, A. Secure the loose end to swivel A. Even out the lines and be certain that there are no snags and tangles so the line runs freely.

TAKING PICTURES

With lark's head knots, attach two small rings three feet apart on your flying line at least 100 feet below a steady-flying kite. To attach camera rig, simply attach swivel A to the upper ring and swivel B to the lower. Set the cross level, adjust your camera angle and secure all wing nuts, be sure the film is advanced, set the timer, and let 'er go!

A de-thermal timer will run for six minutes, but I've found that 1-1/2 to 2 minutes is plenty to achieve moderate altitude. Check your watch when you start the timer so you know about when the shutter will snap. With low to moderate altitude, you may be able to hear it go, or feel it in the line. When it does, walk the camera down if there's room. Reset the shutter arm and timer, *then* advance the film, start timer, and relaunch.

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Continued from page 3

I've already experienced an osprey (a large fish hawk) hitting my kiteline with its wingtip and being temporarily knocked off course. It doesn't take much of a leap to envision a human with less adequate eyesight doing something similar when airborne.

INCIDENT #2

I was flying my single 14 ft. [4.2m] delta-Conyne on a crystal-clear autumn day at the Cape Cod National Seashore in Massachusetts. Taking a few rolls of film from an elevation of 400 ft. [120m], with the kite at 500 ft., I felt the urge to fly high and use some of that 1500 ft. [450m] of line I keep on my reel for special occasions.

Since it was Monday morning and the recreational small aircraft flyers were all probably working and the day was clear, I sent the kite up 1000 ft. [300m] and felt quite righteous. After getting a roll of photographs I brought the kite down—and then heard the drone of a small aircraft.

Not a quarter mile away it was coming in for a landing. To my dismay I discovered there was a small recreational and commuter airport just over the sand dunes from where I stood.

What if I had been flying a little further down the beach? Would the pilot have seen my kite above him and been able to guess the location of my kiteline? A big kite and 250 lb. test [110 kg] kiteline would give quite a pull on a wingtip upon contact.

Continued on page 29

mju-modification, or I've got it—II!

by ULRICH MONSEES, Stade, Germany

After buying an Olympus mju II [Stylus Epic in the U.S.] a year ago I disassembled it the next day to check it for KAP electronical use—converting the shutter to electric triggering.

An adhesive tape on the capacitor prevented an easy dismantling. I didn't take enough care when I put it together again, so I distorted and stripped the trigger sheet metal with the trigger pin inside the camera. You have to hold it upside down and move the back part very carefully watching that nothing gets jammed.

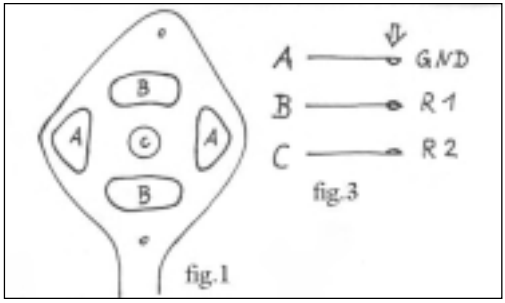


fig.1

fig.3

Before you can solder three wires to the trigger plate (see fig. 1) you have to remove the sheet metal over it anyway. So it was no loss for me.

You should use very thin wires (0.7 mm; 22 AWG). I got mine from Olympus, Hamburg. They helped me quite a lot with my questions.

I drilled three holes on the left side of the viewfinder. There's enough space to push back the wire into the camera after soldering the jack (see fig. 2). Allow 2 cm of wire to look out of the (camera) case for easy soldering. Disconnect the soldering iron from power before you get in touch with any of the camera's electrical parts!

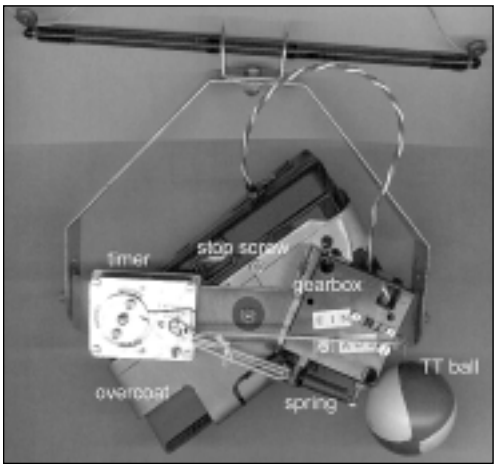
I had put a piece of double-sided adhesive tape onto the camera before I soldered the jack. Then I glued the jack with a two-component adhesive (UHU Plus) onto the tape. This was upon the advice of Peter van Erkel. It allows you to take it off easily if necessary. You should cover the electrical connections with tape, too.

If you want to use the mju as a "normal" camera you've got to build a two-step switch and put it into the socket or connect it parallel and glue it some-

fig. 2

where onto the case. You have to connect A and B for autofocus and exposure memory and then add C for the shutter release (see fig. 3).

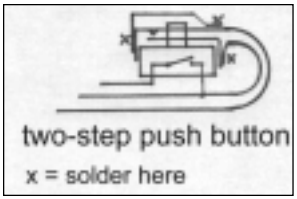
Good luck with this job! The only difficulty really is to put the camera together again—except for that moment when you decide to take off the trigger sheet metal and kill the mju for a moment!



THE SLIM RIG

This is a rig to start with or for use if you run out of batteries. I take it for holidays, too. You can preset the direction and trigger it with a self timer or a Graupner/KSB thermik timer.

I use the circuit board and the gearbox of a simple RC-car as a switch. The gearbox slows down the movement of a spring and moves a sheet contact over the circuit to switch it on and off again. It's a simple switch but it works, though I'm looking for a better (smaller) one (see **æ** 4/1). An extra switch in the box cuts off the cable to the camera when you tension the spring.



The rig itself is made out of 1 x 20 mm aluminium sheet metal. With a mju II it will weigh just over 300 g.

First - bend an "overcoat" or carrier for the camera. This "overcoat" should extend higher than the vertical frame to allow a screw at the right position to act as a stop between horizontal and vertical orientation of the camera.

Put a rounded screw through the center of gravity behind the camera and fix it (later) with a safety nut. All the other parts should be joined by safety nuts, too.

Second—bend the vertical frame.

Third—bend the horizontal frame.

Fourth—bend an U-shape for the mono-Picavet and put all things together. I've used a short carbon-fibre-rod for the mono-suspension.

The vertical frame carries the timer and the gearbox or another switch that is to be activated by a spring. A table tennis ball—hanging on the timer—shows us the moment of triggering. That's the time when we pull down the kiteline again.

The drawing shows the necessary circuit for a two-step-switch. You can modify the given one in the gear box or make your own.

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Continued from page 13

and some electronics are mounted in a box which can be installed in one second to my rig, with only two wires to connect. The CCD-chip-camera is mounted parallel to my view-finder camera with a wing-screw. For an SLR-camera I would prefer to mount it in a tandem-way to look through the lens.

A good idea was to install an r/c-switch to turn off/on the video-camera and transmitter. They both together need 220mA/12v when working; the switch itself needs only 3 mA/4.8v. I can work with the video system continously for almost 4.5 hours before changing the separate accu-pack [batteries] on the rig.

In November the KAPers Wolfgang Bieck and Otto Böhnke visited me. I showed them my video-system. Both immediately ordered the video-system too.

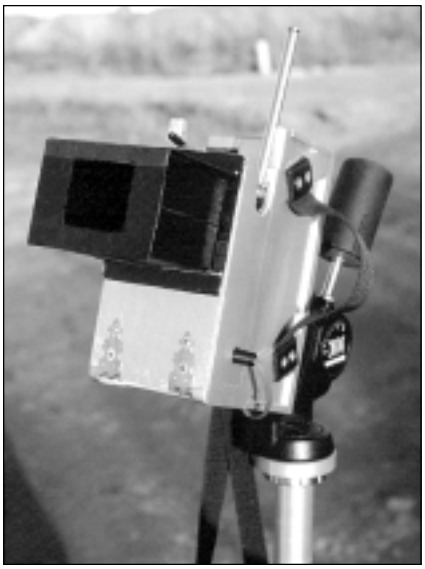
In the first week of December my video-eye was airborne twice carried by my Maxi-Dopero [**æ** 3.3] without any problems in a gentle wind. My groundstation was not ready at this time and the components were fitted together by tape, but I got my first experiences.

I had been asked to take aerial pictures of dredged foundations of a new house. At the end I had 15 pictures left on the film and I photographed the same subject without video-control under the same conditions. Back from the photo-lab I could compare: none of the pictures taken without video-control taken pictures was as exact as the ones with video-control. I was relieved.

Some more weeks were necessary to build the ground-station. The video-components I installed in a special box, which is like a cross between CamCorder and Hasselblad. You can hold the box in your hand or mount it on a tripod to use it. The monitor is fitted with a focusing hood which can be folded back for transport.

I can use the ground-station three hours continuously as absolute maximum, but a main-switch allows me to turn on the monitor (6v/450mA) and the video-receiver (12v/300mA) only when I need them to reduce power consumption.

I was done with building on Christmas day and had a nice present. On the 27th



of December I visited with Wolfgang and Otto again, and we tried out our different components. For example, I use an LCD-monitor with TFT-matrix, and Wolfgang and Otto both use the Citizen External CamCorder Monitor. We could see a significant difference to a normal LCD-monitor in contrast and sharpness.

We tried out different lenses on our chip-camera. Which focal length will be the best for a through-the-lens (TTL) view on an SLR? If you mount the chip-camera parallel to the camera is it better to see a little bit more on the screen than the camera will take, or should it be the same size? If you use a TTL-viewer, how about a zoom-function by r/c?

And how about integrating the r/c transmitter into my ground-station in a Peter-Bults-style [**æ** 3.1]?

New ideas were born. We were fascinated by a very small platine [*circuit?* *component?*]: this was a converter specially developed for r/c user! The normal voltage of 4.8v out of the r/c receiver-battery can be stepped up to 12v for the video-system.

This means that with an addition of less than 100 g/3.5 oz. (CCD-camera 20 g, video-transmitter 20 g, RC-switch and mounting-material etc.) everybody can convert his r/c rig to video-control!

The last thing I had to do before my video-system was really ready was to give it a name. The name ViCoRi (Video-ControlledRig) was introduced by Wolfgang Bieck [**æ** 3.2]. For my system I decided on the acronym "TRAM-Station" (TransmitterReceiverAccuMonitor Station).

At the New Year Fly-In 1998 of the Drachengruppe Braunschweig I presented my TRAM-Station to the different kiters officially—after 6 months of work.

Everybody asked me whether the "kick" of KAP is now gone away because I know what I have taken. Today I have back two more films from the photo-lab. Again I had used the TRAM-Station and thought I knew what I would get. But the reality: I get a really big kick: the light, shadows, details, the colours and the atmosphere—I hadn't seen anything like this on the video screen.

Although I am using the TRAM-station the kick of KAP is not gone with the wind. Maybe it has grown because with video-controlling there are more good subjects per film—and each one gives you more adrenalin.

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Continued from page 7

that will push the button of the camera. Before you can bolt the servo to the inner frame you must find out the exact path of the hammer. At the end of travel of the transmitter's joystick the servo should release the shutter. Having a visual image of the servo/hammer, fix the assembly to the inner frame. I can't give more detail on this part of the project since it is different with each camera, but I believe it is the most difficult part of building a KAP-rig. I turned to electronic shutter release quite soon.

With all elements of the inner frame in place balance the whole assembly again to find the new Y and Z axis and mark their crossing point on both sides of the frame. This is where the tilt axis will be.

TILT AXIS

The tilt servo is going to be on the opposite side of the inner frame from where the shutter release is. Drill a hole so that the stem of the servo drive-plate can pass, leaving the plate itself at the inside (fig. 1). In this way the servo carries the weight, not the screws. Only one small parker-screw is needed to assure the turning of the inner frame. And it saves weight. Put the servo in its position with the shaft end at the bottom.

At the other end you need a pivot. There is no need for a ball-bearing here since the load and the speed of rotation are low. Simply drill a 3mm (1/8") hole in the inner frame and put a bolt through it. Find two tiny pieces of tube of a different diametre so that one fits loosely over the other. Any plastic tube material is good as long it isn't soft. One metal tube and a plastic one is also good, but don't use two metal tubes—they tend to grip. The bigger tube should be slightly shorter than the inner one.

OUTER FRAME

Things to consider in designing the outer frame are the pan-axle and servo, the battery pack(s), the receiver and the CG of the completed inner frame.

If you have that CG more or less right in the middle it might be a good idea to separate the battery pack into two blocks of two penlights each. Position these blocks left and right of the pan-axis.

The easiest way to pan the rig is by means of a 4:1 gearing. Be careful: the big gear will be on the servo, the little one fixed to the pan axle.

To assure the good functioning of the gears, the pan-axle should be supported at least at two points by the outer frame. So you must construct something that keeps the axle in a 90-degree position to the frame. A small bridge or double-deck solution might be a good thing. But a small wooden block of 20x20x20 mm [3/4" cube] firmly fixed to the alu strip will do as well. The pan-shaft itself is made of a 3 or 4 mm threaded steel rod. The diameter is determined by the hole in the smaller gear.

Bend a piece of alu-strip to an upside down U-shape so that it is just wide enough to fit nicely to the tilt-servo and the tilt-pivot at the other end of the inner frame. Join the two frames together and use rubber-bands to hold the battery-pack(s) [and other components] in

place. Balance the construction on the top of a finger to find the X-axis. That is where pan-shaft is going to be.

GEARS

Whether two gears fit together well (or not) is controlled by something that technicians know as "module" of a gear-wheel. Two gears that have the same module will fit together. The number of the module is calculated: module = diametre / number of teeth. Diametre in this case is measured halfway up the teeth. Useful plastic gear-wheels that you can buy in a hobby-shop have a module of 1. They are rather coarse but allow for some small mistakes. If you use finer-toothed wheels (module 0.5 or 0.75) you must have ability and the tools to work very accurately.

The module-number helps you to calcute the exact distance between pan-axle and servo-axle. Calculate the average number of teeth of the two wheels and multiply the result by the module-number. This gives the exact distance between the two axles.

[*"Module" of gears must be a metric thing; the term doesn't seem to be used in the USA, and I've had no success adapting Peter's formulas. I suggest that yanks use 24 to 32 pitch gears, and measure the distance between axes. —bgl*]

FINISHING THE RIG

Since the gears define the position of the pan-servo, find a way to fix it to the frame. The pan-shaft can be put into place. The bearing can be made of a simple combination of metallic and nylon washers. The radio-receiver and the antenna-mast are used to fine-balance the whole system. Move them around until the rig hangs level, then attach them.

An important finishing touch is to secure all nuts and bolts. A tiny drop of good glue between nut and bolt can prevent a lot trouble. What is left is connecting servos and batteries to the receiver. And make a SUMIPI (sub-miniature Picavet; see **æ** 1.4).

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Continued from page 23

I've been a passenger many times in small aircraft and believe most pilots would easily see and be able to avoid the kite and line, but what about those few pilots who might not see as well? What if the pilot was inexperienced and concentrating solely on landing the plane?

These types of incidents have made me rethink my own safety precautions. Perhaps all KAPers should.

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in the summer issue:

CARRYING KAP GEAR

How do you store and move all that stuff around?

R/C Tx & Rx

Any new ideas in transmitters & receivers?

AD & COPY DEADLINE: May 10, 1998

aerialetters

DETHERMALIZE

My father and I are starting to build a very simple system to fly from a kayak. Just a kite, a single use camera, a timer and some string. I am having trouble finding a dethermalizing timer. Issue 3.3 page 12 shows a KSB unit. Issue 4.1 page 29, mentions Grauppner Thermik and KSB. Where can I get one of these? I have visited five local hobby stores and they all tell me that no one makes them anymore. I called a few far away places, and they all start talking about a remote control system with servos. I was thinking more along the lines of a thick rubber band, a chunk of wood, and a timer. Can you help?

Andrew Otewalt
San Jose, California

I suspect that the KSB and Grauppner timers are the same thing with different names. You can still get the KSB at Stanton Hobby Shop, 4718 N. Milwaukee Avenue, Chicago, IL 60630; (773) 283-6446. Last I heard they run about $28.00. —bgl

PERHAPS™

I am very happy to report getting and thoroughly enjoying my **æ** 4/1! I am going to do some experimenting with a "high-start" and/or the no-wind system (line and pulley, Japanese contributor) outlined in one of those great early issues [Masami Nakajima, **æ** 2.3].

The Kodak digital DC20's are now $150 around here. They have mediocre resolution, but an ISO of 800 and very fast shutter speeds! I picked one up. Maybe a way to get some instant gratification.

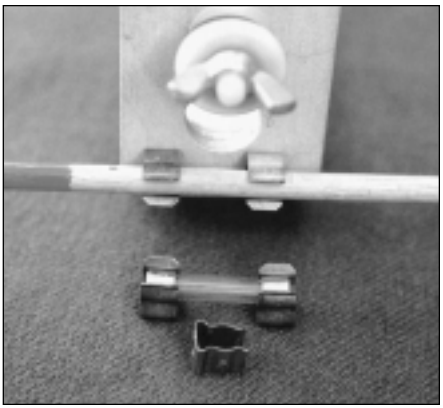
But — Say™, don't think you you Spent-a-Bit™ too much space discussing the Trade-Mark™ issue?

Best-Regards™
Bruce™ Baskett <grin>
Austin, Texas

EASY DIRECTION INDICATOR

Since I haven't see this method for attaching a pointing stick to the camera cradle in past issues of **the aerial eye** I thought I would submit it. A simple method [of attachment] is to use two fuse holder clips [*see below*]. The pointing stick is simply pushed into the clips and removed when done. Two separate clips are used, as shown, or one fuse holder strip with two clips also would do.

Don Dvorak
Santa Clara, CA



A BRIEF FROM SOUTH AFRICA

Being the only kite aerial photographer in SA for the last two years has been a rather singular pursuit. I have however had considerable encouragement with the arrival of my first **aerial eye**....

I am at present using a conventional rig design with a 4-channel Hi-Tec radio and Olympus mju (Stylus in the USA) with a mixture of deltas and roks for lifting platforms. I have however managed to acquire a sub-miniature video transmitter and camera which in conjunction with a small TV tuner gives me considerable accuracy. I found however it can be particularly heart-stopping to look up from the monitor to discover kite and rig in a power dive.

This brings me to the question of design and looking for the definitive platform for lifting a rig in various conditions. ...I would like to see a regular article on this subject as I feel this is the very backbone of KAP. We have a particularly powerful wind in my part of the country and I am very keen to develop a design to fly comfortably in wind speeds in excess of 60 kph [37mph].

In closing I would like to extend my thanks to Brooks Leffler, Charles Benton, Craig Wilson, Wolfgang Bieck and the many others who have unselfishly imparted their experience and knowledge in the pursuit of aerial photography. Without their help it would have been a much more intensive and longer period of development.

Glen Thomas
Cape Town, South Africa

WANTED:
æ editor

Brooks Leffler has decided that he needs more time to pursue other projects, such as the consolidation of **æ**'s first four years into a book. He has told the committee that he would like to step down from regular editorial duties after **æ** 4.4 is published around September 1.

He intends to continue to contribute articles, pictures, and drawings, and has agreed to continue to handle subscriptions, mailing, and the annual directory.

So we need someone who can prepare the journal for publication. This involves word-processing, editing text, photo preparation, and page layout. In short, we need someone who enjoys desktop publishing as much as KAP.

The time commitment is 30 to 40 hours per issue, four times a year. While there is no compensation for time spent, all out-of-pocket expenses such as postage, telephone, and supplies are reimbursible by AKA. Capital equipment and travel costs are not reimbursible.

For further information, contact Brooks at (408) 647-8363 or kyteman@aol.com

do you know me?

On February 23, 1998, at midnight, the lovely sailboat at left, titled simply "yacht.jpg," arrived in my email box, presumably along with a message. Sometimes I don't have a chance to look at attached pictures immediately, and when I finally did see this one, any accompanying message had gone the way of the day's junk mail, and with it the name of the photographer.

The picture is outstanding, and if you took it, my humblest apologies for such casual treatment. We'd like to give you credit for it in the next issue if you would but raise your hand.

Brooks Leffler
kyteman@aol.com

[below] ***Cover.*** *Restaurant umbrellas, South Africa, by Glen Thomas*