The Flightline

Volume 40, Issue 6 Newsletter of the Propstoppers RC Club AMA 1042 June 2010

President's Message

The June meeting will be at the field June 8th bring some new planes and copters to fly before and after the meeting.

Don't forget June 19th will be our first of three picnics. We could use some help and ideas for food. Can you come up with some new ideas or are the usual hot dogs and burgers sufficient?

The other picnics are Saturday July 17th and Aug 14th.

The field is in great shape and both of the roads in are good; no soft spots.

Maybe John Moloko or Mike Williams will give an update on the foamies they are building, maybe a demo

See you at the meeting and don't forget show & tell,

Dick Seiwell

Agenda for June 8th Meeting

At the Christian Academy Field;

Fly at 5 pm meeting at 6:30

1. Membership Report
2. Finance Report
3. Picnic Plans
4. Show and Tell and Fly

INSIDE THIS ISSUE

Minutes of the Propstoppers Model Airplane Club

May 11, 2010 at the Middletown library because of rain at the field.

Call to order by President Dick Seiwell took place at 6:40 PM
Roll call showed 13 members present
Minutes of the April meeting were approved as printed in the newsletter
Treasurer's report was presented by Pete Oetinger without questions

Old Business:

President Dick Seiwell found an area off the field behind the backstop where there are old bleachers. He plans to mow this area to create a shaded area for prep work. We will look this over and see if it is worthwhile.

New Business:

The Middletown Pride Day displays went well. Although it was quite windy, several flights were made. Most spectators were especially impressed by the helicopter flights.
Mike Lebrun from the Valley Forge Signal Seekers invited us to their fun fly on June 12.
Dave Harding talked about his plans for the next workshop at the gun club. He said he would bring parts to make several delta flying wings.

Show and Tell:

Dave Harding showed his Forester 99 gas ignition engine. He showed several other fuel engines and a pair of electric motors. That will fly his 14 foot wingspan Boehle's Giant old timer in the Euro SAM RC Champs to be held in the Czech Republic in June.

Adjournment took place at 8:45 PM

Richard Bartkowski, Secretary.

Calendar of Events

Club Meetings

Summer Monthly Meetings
Second Tuesday of the month.
Christian Academy Field
Fly at 5:00, meeting at 6:30 pm.

8th June

Tuesday Breakfast Meeting
Tom Jones Restaurant on Edgemont Avenue in Brookhaven.
9 till 10 am. Just show up.
Flying after at Chester Park 10 am.

Club Picnics

Saturday June 19th
Saturday July 17th
Saturday August 14th

Regular Club Flying

At Christian Academy; Electric Only
Monday through Friday after school till dusk
Saturday 10 am till dusk
Sunday, after Church; 12 pm till dusk

Special Club Flying

Saturday mornings 10 am
Thursday evenings in the Summer
Tuesday mornings 10 am weather permitting after breakfast at Chester Park.
Check our Yahoo Group for announcements;
http://groups.yahoo.com/group/propstoppers/

Beginners

Beginners using due caution and respecting club rules may fly GWS Slow Stick or similar models without instructors.
The club also provides the AMA Introductory Pilot Program for beginners without AMA insurance.

Propstoppers RC Club of
Delaware County, Pennsylvania.
Club Officers

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Propstoppers Web Site; www.propstoppers.org

Castor Oil Redux

We all know we are almost exclusively an electric club at this point, but your faithful editor and secretary have been competing in SAM competitions for some years and I have slid into the engine powered events. My initial foray was when I bought a full sized Lanzo Bomber (1260 sq inches) with an Irvine 40 diesel. This was the setup for the SAM Glow Texaco class. This wetted my appetite so I then bought an Ohlsson 60 pre-war ignition engine and proceeded to fly in the SAM Ignition Texaco event for some years. Then I bought an Ohlsson 60 Big Port post-war engine to compete in a different event too. Sound like a trend here?

Over the last few Euros I became captivated watching their big Texacos. I got to thinking the Giant would be ideal for this event if I could find a suitable engine; their rules are different. And find a way to get the Giant packed to take on the flights as luggage.

With some model modifications it now fits in this custom made box, but the engine solutions have so far defeated me. I bought a new MVVS 61 diesel like the Italians use but so far it has given me grief. My Australian friend lent me his MDS 61 diesel but it broke a crankshaft in testing. I was lucky to replace it with an EBay find but that is not working yet, so I went back to try the old "trusty" Irvine 40. But would it fly the ten pound Giant? Well it did, and in Chester Park yet (these big diesels running on very big props make very little noise! But I can't get it to run out a tank. Of course it could be the old fuel I am using……… Ugh, those oily hands.

Dave

Purpose-built box. 43 x 17 x 19 inches to Airline specs to ship the Boehle Giant to Europe

Giant Euro propulsion alternatives

Club Picnics

Saturday June 19th
Saturday July 17th
Saturday August 14th

Widener University SAE Aero Challenge Competition

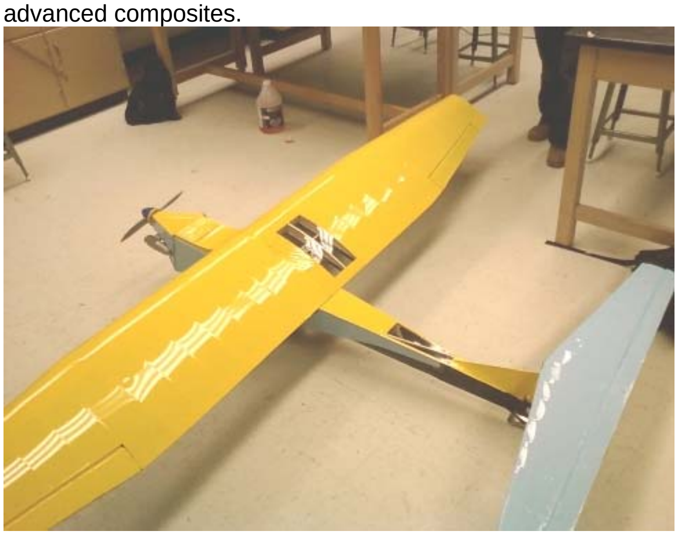
Our top club hero, Dave Bevan, has for years supported the Widener University senior engineering student team that competes in the Society of Automotive Engineers Aero Challenge Competition. Each year a new team of students elects to compete in this National event and it is quite a challenge for those who support these teams too. Widener does not teach aeronautics so the team members have to learn this from scratch as they design and build their airplanes. And each year SAE changes the rules a little so new teams cannot just start where the old team left off.

Each year Dave Bevan starts with some basic lessons in aeronautics and follows that with lessons on project management. This is really the heart of these competitions; giving students the opportunity to learn how to organize and manage teams to achieve new goals; technical, financial and schedule.

The contest specifies the rules of the year and the students must design, build and fly an RC airplane powered by an OS 61 to achieve certain goals, usually carrying the maximum weight under certain conditions. They must also write a report on the design and predict its performance. The report and the flight performance are scored.

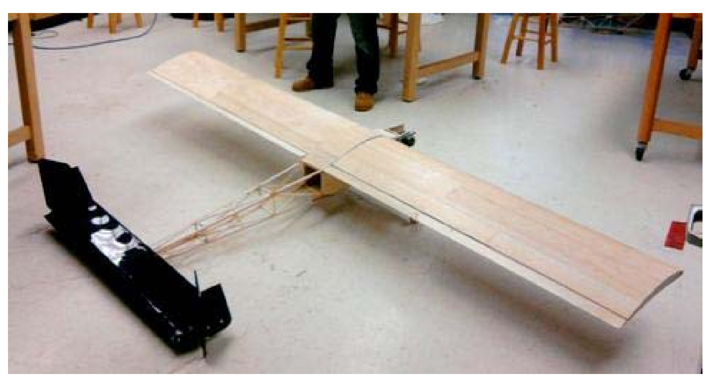
It occurs to me that Dave's experiences with this activity are not unlike the movie "Fifty First Dates". Every time the team is completely green and must learn from scratch.

This year's team aimed to produce an airplane as early as possible as they wanted to do testing to develop the final plane. Their design was fairly conventional and made from balsa. They are specifically prohibited from using advanced composites.



And this they did although some mistakes in taxi testing resulted in almost complete destruction of the model. Then faced with a much shortened schedule they redesigned the model to simplify its construction. Today's students may know little of model construction principles but they do know computational design and fabrication techniques. The state of this art is design in 3D "on the tube" with the attendant flow of digital information to automated machine tools. The Widener students took advantage of these methods to make a monocoque wing. First they programmed the wing geometry.

They had, with Dave's encouragement, selected the NACA 6409 airfoil and decided on a Hershey Bar rectangular planform. They cut a wing from a foam block on a digitally controlled hot wire machine, not that they wanted the wing core, but rather the "beds" that remained. This they used as the tooling to layup the wing structure.



The SAE emphasizes the analytical side of design by scoring not just the airplane's performance but also the student's analytical prediction of that performance. One impressive step taken by this year's Widener students was the recognition that propeller driven airplanes experience a change in thrust with forward speed. So they decided to test the OS 61 with various props statically and in a varying airstream in the wind tunnel.

With the new model build the team was way late in being ready to test and when they were ready their usual Boeing test pilot could not make it, so Dave asked me to help. We spent some time going over the model final preparation then performed a basic strength test before performing a simple flight test. There was no time to take it to Valley Forge so we made two very short flights in the Widener hockey field on artificial turf. Performance and handling seemed adequate so it was declared good to go, but not before the team made their presentation to the college staff as one of the many senior year projects. Their briefing was excellent and was topped by the final step of showing the flight video. They were declared the winners at Widener.

This year almost 50 teams entered and most of them took planes to Fort Worth, Tx to present their work and fly. A local club provides pilots for those teams who don't have one. He made one excellent test flight with the Widener plane and they began preparations for the actual competition flights. Unfortunately they suffered the usual knit picking problems that resulted in no scoring flights on the first day. They then spent all night ensuring they were ready for the last day but on arriving at the field found their work table had collapsed onto the model damaging is significantly. So in the end they did excellent work but were thwarted by gremlins that we all know so well.

Dave Bevan and Dave Harding

BROOKHAVEN BOROUGH

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May 24, 2010

Prop Stoppers
c/o Mr. Dave Harding
4948 Jefferson Drive
Brookhaven, PA 19015

Dear Prop Stoppers:

Thank you very much for the beautiful plane and flying lesson you gave me. I have done some practicing with the plane in the gym and am looking forward to enjoying lots of flight time with my new plane.

Sincerely,

Harry Swayngim, Jr.
Rental Coordinator

The Model Helicopter

By Roy L Clough Jr.
Air Trails, Oct 1953

Roy's continued research in to the whirlybirds has produced some fine models incl iding the first truly successful stable co-axial type. Th s is fascinating stuff, folks.

■ In our previous series of articles, ("What's the Score on Helicopters?") the writer tried to present a simple basic understanding of the major forces involved in a rotary wing flying machine.

We saw that the problem of flight stability largely resolves into integrating the natural gyroscopic forces of a rotating system with its aerodynamic characteristics in such fashion that a reaction by either tends to maintain the positional integrity of the system with respect to the rotor mast.

This, in the practical application, requires a certain amount of independence between mast and rotor in order to prevent immediate displacements from setting up a chain reaction of self-aggravated wobbling, and a certain amount of interdependence in order that control may be effected, or imposed upon the rotor, and that the mast shall serve as a reference point, ruling the plane of rotation of the rotor.

Thus it becomes quite simple to design a vertical-lofting or hovering model, by simply arranging the rotor to feather along its longitudinal, or spanwise axis and by hanging the hub in a gimbal which permits a see-sawing action, and positioning the blades by means of a flyweight or paddle bar so they will not roll over or develop flutter in a chord-wise plane. A rotor such as this is said to be *independent*, for if all bearings are free it will rotate in its own optimum plane regardless of the position of the fuselage, or mast.

This is fine for an indoor model where gusts are not a factor, and when it is not desired to obtain forward flight. However, the *completely* independent rotor is not desirable, even for model work, because it has no reference point from which control can be effected. (In the practical sense it is well to point out that a completely independent rotor does not exist; there is always some friction in the pivots and gimbals which tends to position the blades at 90 degrees to the mast, but this residual friction is seldom much in a model). Therefore, we must build in a small amount of friction, either by making the gimbal fittings a bit stiff to begin with, or by providing a drag of some sort which can be adjusted. When this is done the model will fly forward by simply changing the C.G. slightly, since the reaction of the rotor, in seeking to justify its position with respect to the angle of the mast and aerodynamic pressures, will result in cycling pitch.

This is the simple way of doing it and it works quite well for models. By judicious use of a small weight arranged to slide fore and aft, the model will climb vertically or fly forward at a fast clip in satisfactory fashion. By reference to the previous articles, note that sidewise flight can be obtained by raising or lowering the torque prop axis, or alternatively the weight can be attached to a wheel strut. Keep this trick in mind; later, when building gas models, you may wish to position the gas tank in such fashion that the attitude of the model changes in flight; as for example, take-off directly into forward flight with the speed decreasing as fuel is consumed and with let-down in autorotation vertical.

Cyclic control of the rotor is a bit more complicated, but not greatly so, and undoubtedly it will eventually replace C.G. shift control except in the simplest models. This is particularly true when we consider the advantages of such a system in contest flying.

A cyclic control system means having a control which can be moved to secure flight in any desired direction, without changing ballast, by altering the pitch of the rotor blades for a segment of their sweep around the circumference of the "disc."

The type of cyclic control we are interested in for model work is the so-called "indirect" or reactive control, in which the linkage is not directly attached to the rotor, but to an intermediary point from which the rotor is controlled. If we tried to attach the cyclic mechanism directly to the blade roots, and connected the other end of it to the fuselage, we would find that this would freeze the system, resulting in a stiff rotor and destroying the stability we gained by freeing the rotor from the mast in the first place.

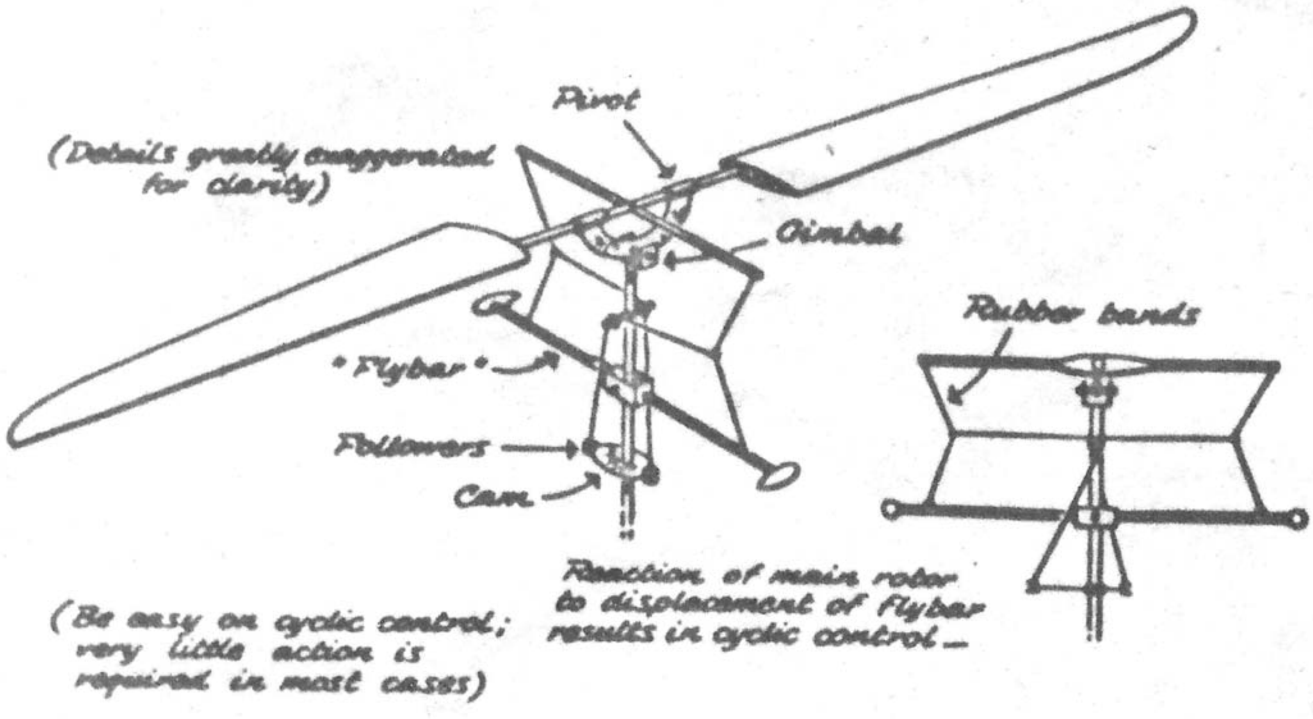
Therefore we must control the rotor from some point not rigidly attached to the fuselage. With the Bell system, this is the Young fly-bar control (see sketch). To work this connect the fly-bar to the longitudinal pivot with a jointed lever which can be cyclicly pulled inward at the joint, thus changing the angle between the fly-bar and the blades, for a segment of each revolution. The reaction of the blades to this deflection gives cyclic control.

The Hiller Paddle system (see "Rotor-matic" sketch) uses two short wings set upon a cross-arm which is attached to the central pivot. The angle of these wings or paddles may be changed through a simple scissors type linkage which is attached to a swash plate. When the swash plate is tilted the angles of the paddles change in rhythmic cyclic fashion with each revolution, and the rotor blades' reaction to this produces a longitudinal rolling of the rotor which results as cyclic pitch. This system is very simple, as is the Bell, but in both cases avoid any considerable play in the linkages since this may result in excessive wobbling and erratic control. However, for most small models this may not be critical because of the strong damping effect (scale effect) present in models.

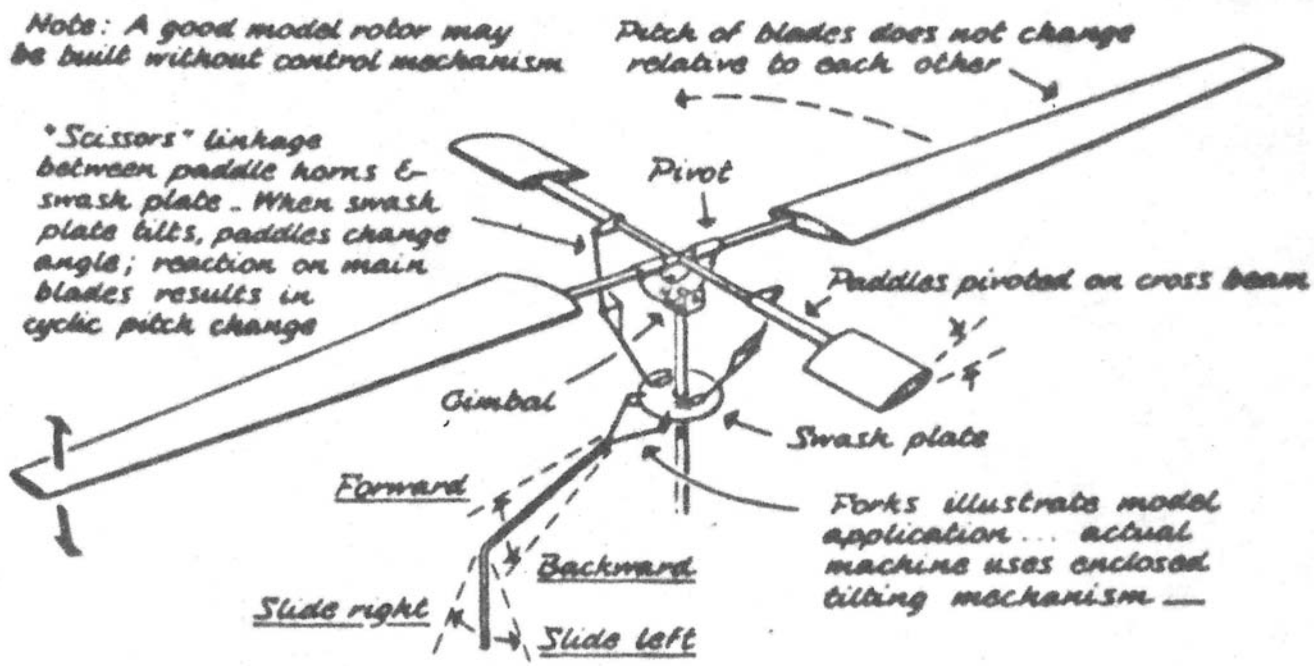
As a footnote to these two systems we can add that it isn't strictly necessary to duplicate the control systems of the originals in order to get satisfactory performance. Here is a simple dodge, which judiciously applied works most effectively. Build the rotor, with its paddle beam or fly-bar in the simplest fashion and simply stick a wire up from the fuselage in such a way that the cross-arm bumps it gently at the same point every revolution. Presto! The reaction gives you cyclic control.

Remember, however, that this is control by unstabling—the bumper wire should be quite flexible or the fuselage may sway excessively, and, while it sounds very simple, and it is, it can get out of hand by displacing the rotor too far if the jolts are too heavy.

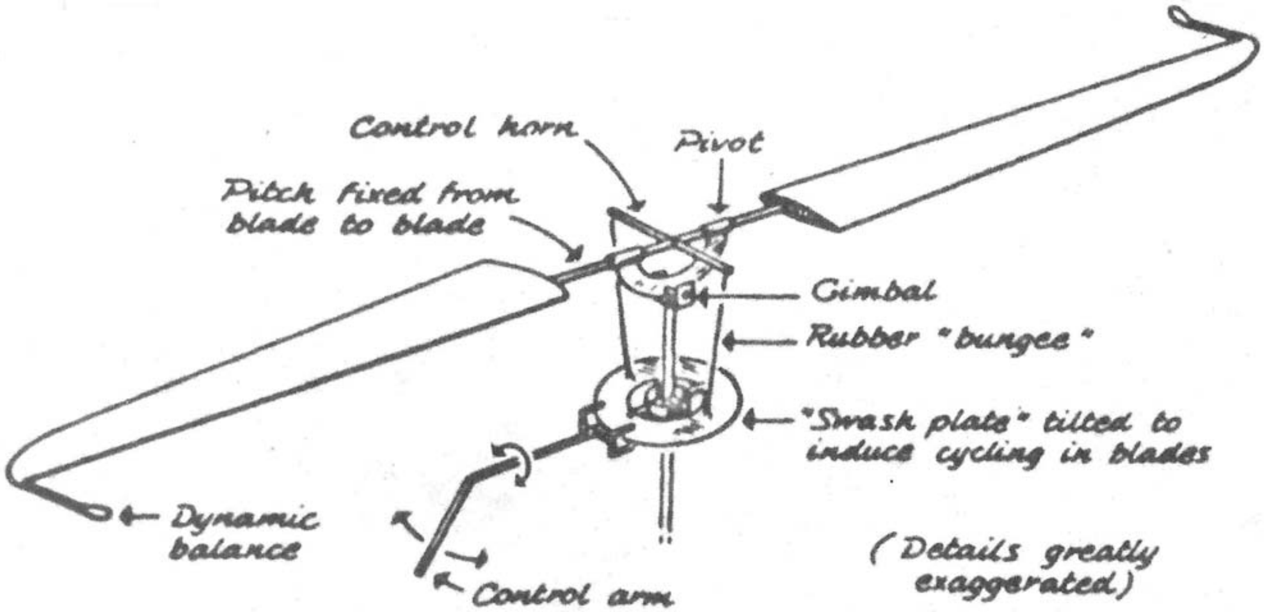
In an effort to develop a system which would lend particular emphasis to the qualities desirable in model helicopter work, we have designed a two-part series of rotors which we term the "bungee-dynamic series."



Model Interpretation of
YOUNG "FLYBAR" CONTROL

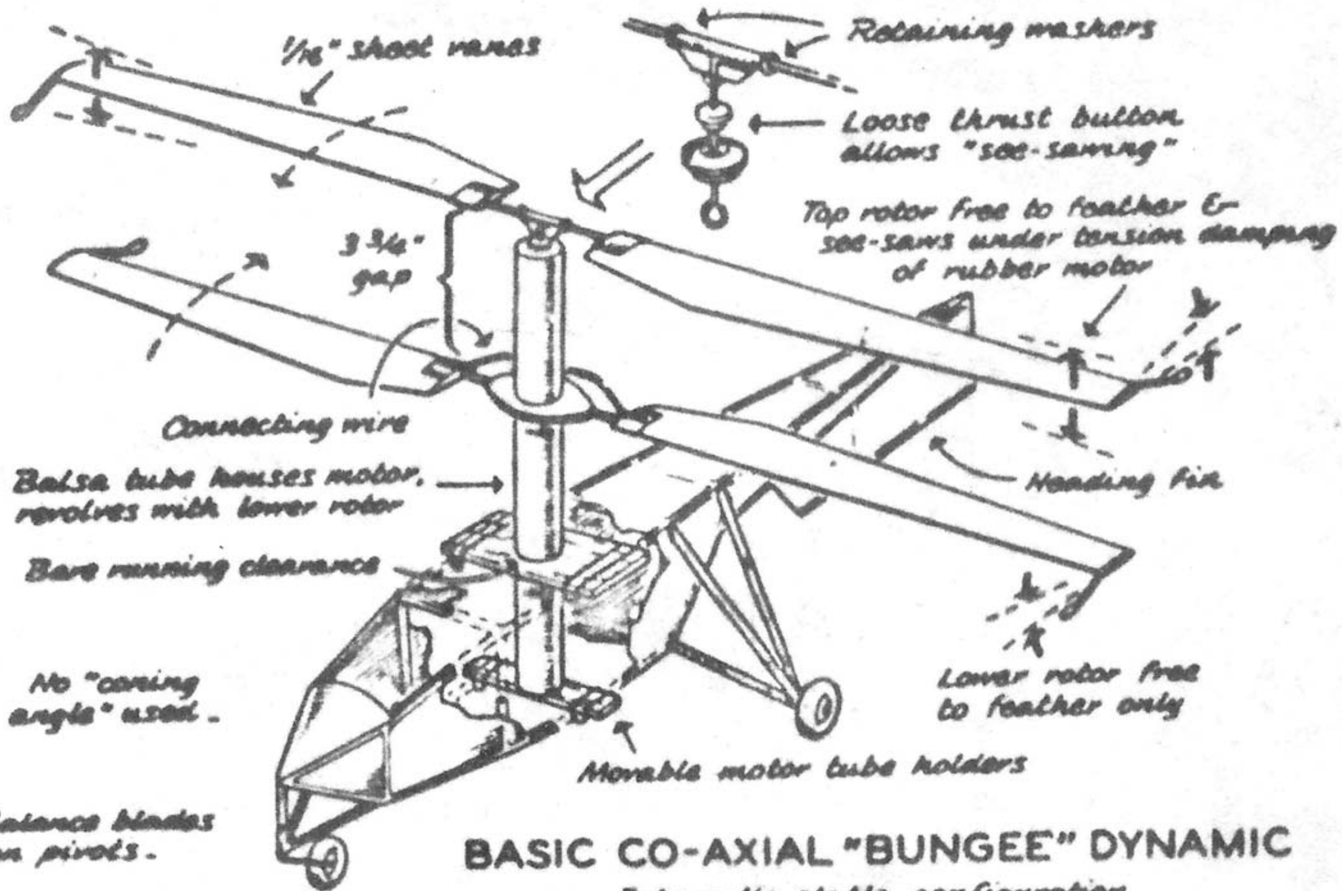


HILLER "ROTOR-MATIC" CYCLIC CONTROL



BASIC ROTOR DESIGN – CYCLIC CONTROL

Bungee – Dynamic Series



BASIC CO-AXIAL "BUNGEE" DYNAMIC

Inherently stable configuration

These rotors cover a wide field of application and include power delivered at the hub and power applied at the tip, which means the series covers rubber, internal combustion, rocket, pressure jet and ducted fan configurations. In the middle of the series is our special pride and joy—a system which we believe to be the first truly successful, inherently stable, co-axial rotor arrangement, which positively controls the ancient problem of rotor clash.

The basic rotor and its derivations are shown in the drawings accompanying this article. We start with a two-bladed rotor (see sketch "Basic Rotor Design—Cyclic Control") which is see-saw mounted in gimbals and free to pivot, within limits in a spanwise fashion. This rotor is of the first part of the series, which we term "locked."

By this is meant that the pitch of the rotor blades relative to each other is fixed at all times (as in the Hiller) except as subject to collective pitch control. The blades are stabilized by means of dynamic weights which protrude tangentially, about one chord length ahead of the blades' leading edge. There is no fly-bar or paddle-beam; instead, we have a double horn to which are affixed two snubbers, or "bungees" which run to a swash plate which may be tilted to secure cyclic control. These elastic connectors replace the inertial damping forces of the fly-bar, or the aerodynamic damping of the paddle beam, and are simpler to work with than either of these.

Because of the concentration of mass in the rotor tips we can use much lighter blades successfully—meaning balsa instead of birch or pine, and the corrective force is balanced at all times, exerting a positive, yet gentle steering action upon the system. This is the cyclic control version.

And if we desire extreme simplicity we just move the bungee connections 90 degrees, that is, affix them to the spanwise pivot to exert a continuous corrective force upon the see-saw axis, and the machine becomes controllable through C.G shift.

From this point of departure we proceed to multi-blade applications—we may build a four bladed rotor simply by doubling up what has just been described, except that of course only one mast attachment, or swash plate will be required.

In order to build a stable co-axial machine, using rubber power as an example, we merely construct the lower rotor attachment with spanwise pivots and attach it rigidly, that is, without see-saw gimbal to the drive tube with a bent wire "lead-around" interconnecting the blades. The upper rotor must be free to see-saw about ten degrees up and down, which allows plenty of leeway against clashing with moderate gap, and this may be accomplished, in a rubber model, by simply rounding the edges of the thrust button—the tension of the rubber motor being sufficient "bungee" action.

If we build a gas model, with shafting, then of course the upper rotor must be mounted in a gimbal and snubbed with rubber bands, permitting damped motion between stops. Now with such an arrangement as this we secure forward flight by trimming slightly nose-heavy. No other cyclic control is required. For heading control a simple fin, as shown, corrects for the downwash which may tend to rotate the fuselage the same way as the lower rotor. The sketch ("Basic Co-axial 'Bungee' Dynamic"), incidentally, is all the plan needed by any reasonably able builder to turn out his own machine in short order.

One note on adjustment: The downwash's tendency to rotate the fuselage is corrected by bending the fin. However, after doing so the machine may show a tendency to drift sidewise. This is due to the reaction of the air against the fin, so just move the rotor mast a trifle off-center to correct it, countering the side thrust with a bit of off-center lift.

The second part of the series includes the unlocked rotors. These rotors may be built in any number of blades, from one, with counterweight, through two, three, four, five, or as many as desired. In the unlocked blade series (final sketch) we run into "dynamic pitch." By this is meant that the blades have no particular fixed pitch relative to each other or the mast, but seek pitch angles individually according to the speed of rotation. This is accomplished by positioning the dynamic balances well below and ahead of the leading edge of the blades, which causes them to ride up under the action of centrifugal force until a balance is reached between the force exerted by the upthrust of the counterweights and the aerodynamic pressure on the blades.

It is important with this system to locate the hinge line knowingly to obtain high efficiency, but in the practical application we find it works well even with rough approximation of position. The hub attachment of this system to the mast may be quite varied, from a simple rubber disc which functions as a universal joint, to separate snubbers for each blade pivot. This system gives us a built-in and fully automatic cyclic and collective control. Auto-rotational let-down is fully automatic (with a simple ride-out dog release on the mast) which solves a mechanical problem that can be knotty, and cyclic control is merely a matter of shifting the C.G.

There is just one precaution to be observed with this system in securing forward flight by C.G. shift. It is better to have the snubbers a bit too limp than a bit too tight, and don't overdo the nose-heaviness. The reason for this is that a condition of "over-cycling" will occur if the snubbers are too tight, that is, the blade pitch will adjust itself too rapidly, accelerating the cyclic action, meaning the model will nose down and dive into the ground.

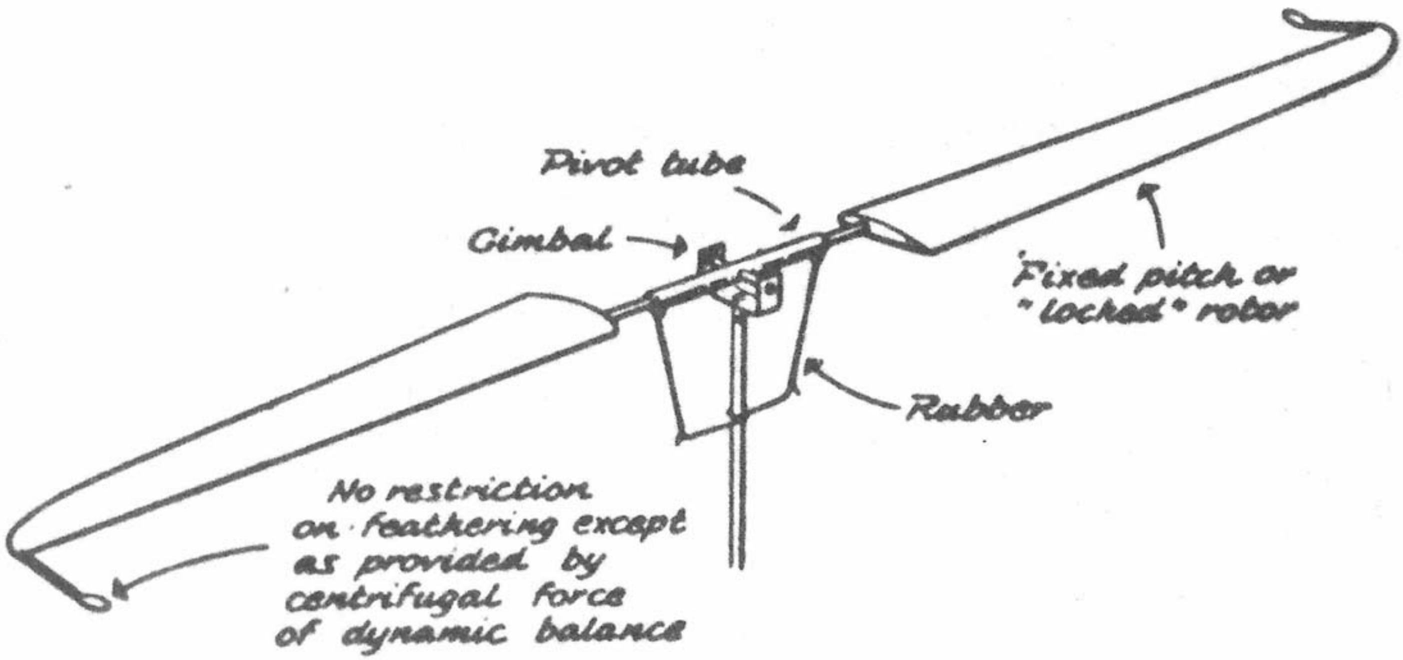
If the snubbers are too limp the worst that will happen is that the rotor will tilt backward and forward flight will proceed at a snail's pace. This adjustment is by no means highly critical—the admonition just given is of the same order as instructing a builder of conventional planes not to tilt up the leading edge of the stabilizer too far if he doesn't want the model to dive in.

Whatever system you elect to use, try to make your selection knowingly, based on what you want to do with it, compared with its characteristics. For example, the unlocked bungee-dynamic rotor is perfect for jet power, quite good for gas engine, and a complete bust for rubber —because it wastes too many revolutions in getting started.

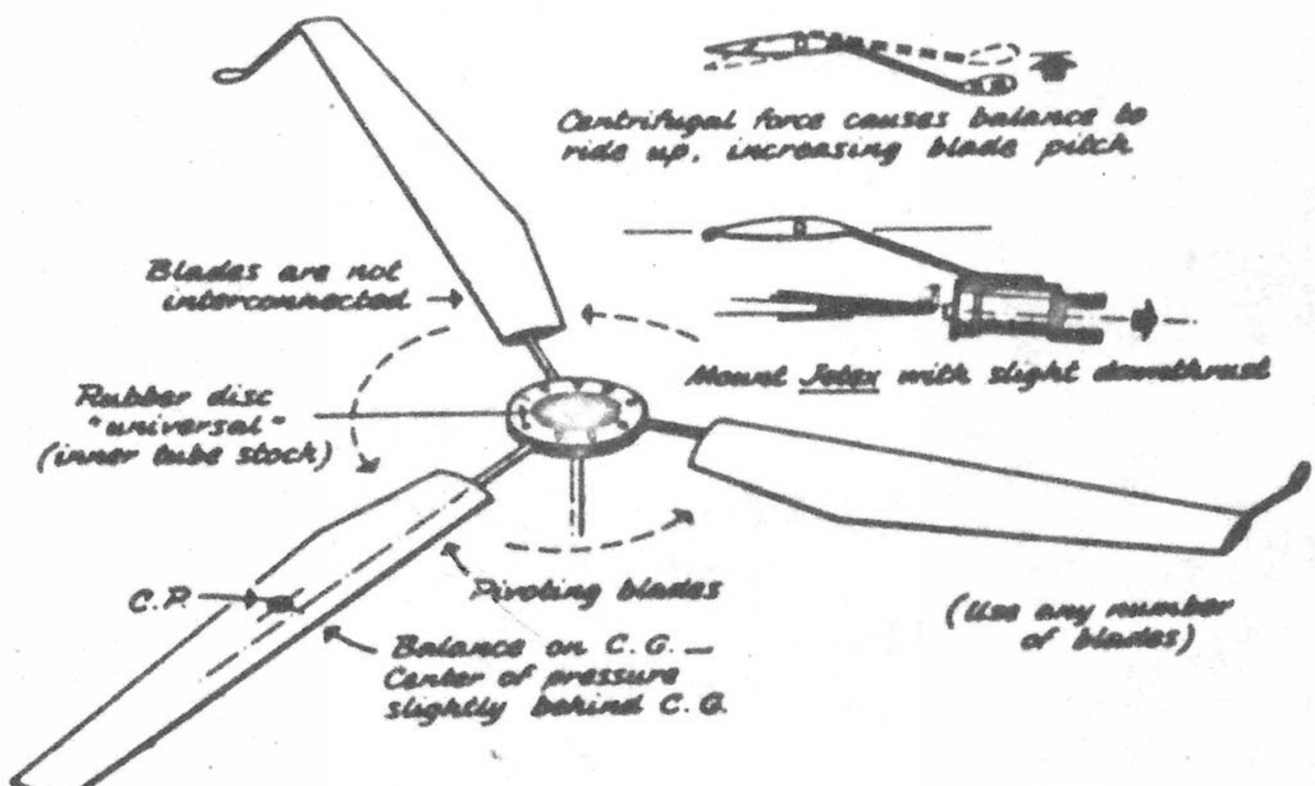
For rubber models the best bet is to skip autorotation and bring the model down under residual power, or if you are the ambitious type, fly with a locked rotor which unlocks and de-pitches itself when the power is exhausted.

Once again, we strongly recommend that the first model should be rubber power—it will give you a wonderful opportunity to get the "feel" of rotor wing flying, without introducing a lot of distracting complications.

(To be continued)



C. G. RIG CONTROL
Bungee-Dynamic Series



"UNLOCKED" BUNGEE DYNAMIC SYSTEM
Pitch is function of rotational speed

✓ Best for jet – Good for gas – Poor for rubber... Cyclic & collective pitch, fully automatic

Dave Harding – Editor
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Propstoppers R.C. M.A.C

Widener University SAE Aero Design Team at the flyoffs in Fort Worth Texas

Lehigh University Students Aero Class Project; These mechanical engineering students were given a challenge by Professor Grenestedt; design and build an electric powered model to the FAI endurance rules. This is their third attempt. It successfully flew last week proving the basic design is sound. It however was damaged in landing in gusty conditions. Great job team.