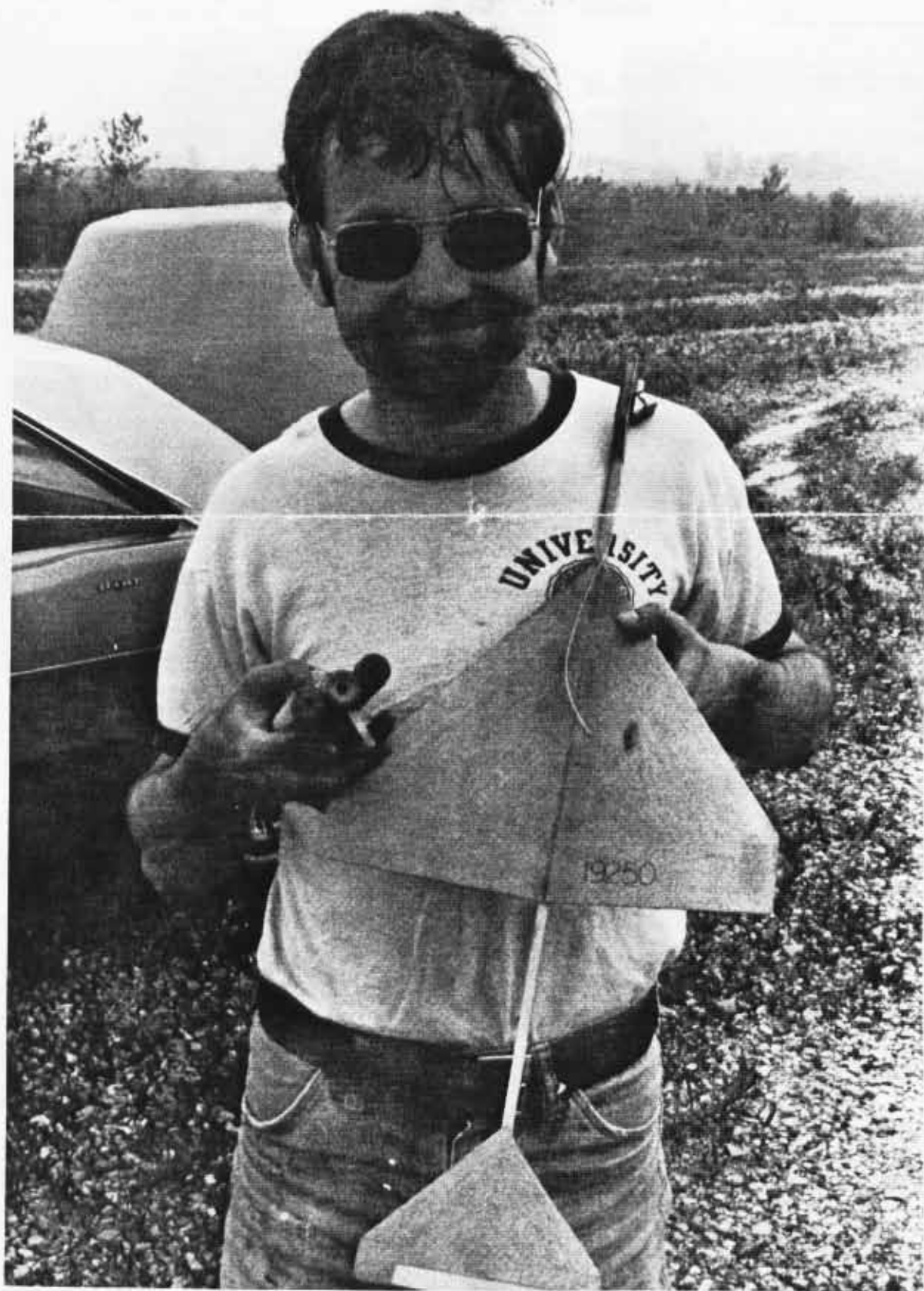


THE LEADING EDGE

VOL.6 NO.2 MAR-APR 83
WINNER OF THE 1982 LAC NEWSLETTER AWARD



T MINUS 1

WISCON-4 Mar. 26-27
LaCrosse, WI

A model Rocket convention sure to be fun for all. Sponsored by WVAR. Convention features workshops, movies, contests and world famous auction. Contact Ric or Bunny.

MONTHLY NIRA MEETING April 1
Glen Ellyn Civic Center 7:30 PM
Planning begins for our 1983 flying schedule. T-Shirt money is due.

NIRA WORKSHOP Mar. 13
Bob Kaplow's house 2 PM
(see map elsewhere)

Bunny, Ric and Henry are giving workshop tips. Bring something to build, and see Bob's computer!

MIDCON-1 April 2-May 1
Warren, MI (near Detroit)
Discussion groups, manufacturers' displays, movies and four contests. Contact:

Vince Bonkowski
38490 Littlefield
Sterling Heights, MI 48077
313-264-3755

CONTEST CALENDAR

NOMID-83 May 7-8, 1983
Events: Sp. Scale, D EL Dur., DR, $\frac{1}{2}$ A PD, A HD, A RG, B RG, $\frac{1}{2}$ A RG, $\frac{1}{2}$ A ISD

Contact: Mike Zienkiewicz
28811 Sutherland
Warren, MI 48096

MWRC-83 May 28-29, 1983
Events: Sp. Sys., B RG, D RG, $\frac{1}{2}$ A RG, $\frac{1}{2}$ A HD, C SR Alt., B Alt.

Contact: Mark Bundick
1925 N. Hudson
Chicago, IL 60614
(312) 642-9028

ETR-83 July 2-3, 1983
Events: to be announced
Contact: Mark Bundick

MALL DISPLAYS

Tony Lentini is working on finding NIRA a shopping mall for our next model rocket display. NIRA members are asked to contact Tony if they know of an interested mall in the area. Volunteers for setting up the display and manning the information booth should also give Tony a call at 455-7756.

ESTES CATAL

1983 is a special year for Estes Industries. It is their 25th Anniversary. To celebrate the occasion, Estes is having a sweepstakes in which you can win your weight in rocket products. There are also 127 other prizes, including 2/3, or 1/3 you weight in Estes products, Astrocam 110's and \$10 gift certificates. To enter, all you have to do is fill in the entry form in the new catalog and send it in.

Estes also introduced twenty new kits in the '83 catalog. Some of the more unusual are the Mini Shuttle, Mini Tri Pak, Airborne Surveillance Missile, Scrambler 2 and other neat looking, futuristic models.

The Mini Shuttle is a Sport Scale version of the Space Shuttle Orbiter. It's a little shorter than the Columbia kit Estes offers, but is the same diameter. It appears that the body is only a BT-60, and not in the shape of the actual Shuttle. Also, unlike the name suggests, the Mini Shuttle uses regular engines, not mini

The Mini Tri Pak contains three mini kits. Not surprised are you? The Star Seeker is an interstellar speeder with wierd looking fins and break-apart recovery. A two stage mini-engine model, the Sting Ray, can reach altitudes over 2,500 feet, according to Estes. Finally, the S.C.R.A.M. has military styling to look like a surface-to-air missile, and features break-apart recovery.

The Airborne Surveillance Missile, at first glance, looks like a mini-engined version of Tom Pastrick's "Pregnant Whale". The Estes model has an extended neck and two sets of forward fins. The Scrambler: 2 is a D powered egglofter. Other large payloads will fit as well.

Price-wise, things stayed about the same as the August '82 price change. D12's remain at \$4.95, standard A's and B's are \$3, and C's are \$3.25. Mini $\frac{1}{2}$ A's are \$3, and A's are \$3.15. The catalog is \$1 from Estes, Penrose, Colorado, 81240.

Happy Silver Anniversary, Estes, and many more to come in the future!

Larry London

NIRA T-SHIRTS

Want to show your interest in model rocketry and NIRA? Then you're probably interested in the NIRA T-Shirt! These will be high quality light blue t-shirts with the NIRA club patch and the words "The Leading Edge of Model Rocketry" silkscreened on in black. If you want a shirt, you must sign up at the April meeting or call "Jedi" George Liebesahl at 973-7850 (ask for room 1409). Cost is \$5.50 each with S, M, L and XL sizes available.



≈ 2" DIA

NIRA

THE LEADING EDGE OF MODEL ROCKETRY

MODEL OF THE MONTH WINNERS



The Model of the Month Winner for January is Tim Marcy and his Estes Mercury Redstone. Congratulations, Tim!



The Model of the Month Winner for February is Tony Lentini and his Estes Satellite Interceptor. Congratulations, Tony!

THE LEADING EDGE

is published bimonthly by and for members of the Northern Illinois Rocketry Association (NIRA), NAR Section #117, and is dedicated to the idea that Model Rocketry is FUN! Membership dues are \$3.00 per year and include a one year subscription to the Leading Edge. Non-member subscriptions are available for \$2.00 per year. All membership and subscription fees should be sent to Bob Kaplow, 1628 Waterford Lane, Palatine, IL 60067. Articles, plans, other newsletters and news items of interest should be sent to:

Ric Gaff, Editor
331 Third Street
Northfield, IL 60093

Any material in the Leading Edge may be reprinted if proper credit is given.

COVER PHOTO: Bunry at ETR-12 with an "Apertyx", a flightless bird with frizzy wings.

CONTRIBUTORS

MARK BUNDICK
RIC GAFF
TOM PASTRICK
LARRY LONDON
BOB KAPLOW

LEADING EDGE STAFF

Editor	- Ric Gaff
Half-tones	- Tom Pastrick
Mailing List Keeper	- Bob Kaplow
Typist	- Mark Bundick

CONDOR

TEN YEARS OF ETR TERROR

"Condor", or F powered, HG and RG have been a tradition at ETR regionals for 10 years. They have played no small part in giving ETR a "wild and crazy" reputation. ETR-2 was my first experience with Condor. I wasn't flying the event, but it was hair-raising anyway! After that, all the ETR's and crazy Condor flights seems to merge into a lump, like one big contest. I'm sorry if I get confused about exactly which ETR the following flights occurred. The main purpose of the article is to examine the serious, hilarious and memorable aspects of Condor HG flying. If I start to sound like Howard Kuhn, please stop me!

John and Mike Kalb made the biggest impression on me at ETR-2. Each one had an interesting flight. John flew a large swept wing "Thunderbird" like model. The bottoms of the wings were covered with a layer of fiberglass. John had flown this model dozens of times with four C6's. At ETR-2, he decided he needed more power. He stepped up to the Enerject F67, the most powerful motor available at the time. For that additional edge over the competition, he used a piston! The model flew great for about ten feet before it disintegrated into Balsa bits (a new breakfast cereal?). No one realized then that a long and Balsa-stained history had begun.

Mike's Condor, while more unusual than his dad's, shared the same fate. Green Giant frozen foods were giving away large styrofoam gliders for a promotional gimmick. A good thought, but they'd never met Mike. The glider was a "natural" Condor conversion. Mike flew it with an Estes D12 staged to



Mike Kalb and his Jolly Green Prang! A familiar sight with Condor; ETR-4.

and PSI F7. The D boosted it really nice. The model was a shoo-in to win until the F7 fired.

The PSI F7 is a fascinating motor. No other can compare with its long nine second burn and its meager thrust levels. When the F7 second stage fired, the "model" promptly started looping around. Shades of Bernie Biales! Fortunately, the glider never reached the ground while looping. It did circle a small private plane before crashing.

The model made an encore appearance two years later, somewhat refurbished. This time it flew with clustered D12's, but that didn't help. The model thrashed around a bit before it crashed, thankfully for the last time. In a fit of divine justice, it nearly creamed its Frankenstein-like creator!

The main architect for shaping (or warping) ETR's direction was Highland Park's latter day hippie, Steve Berhends. Interested in counter-cultures and radical causes, Steve kept Condon on ETR's schedule for its prang possibilities. (He also introduced the "Saturday Nite Live" activities. It was no accident that ETR was held on the Fourth of July weekend.) A universally known wildman, and sometime thorn-in-the-side of some folk, Steve's four consecutive National Championships left his building and flying skills unquestioned.

Steve's first memorable Condor was the "Eiger". Steve flew HG's named "Eiger" in several sizes. His Condor version was small, about 12"

wingspan, flown with an F7. A first flight DQ, Stevie elect to fly it tail-first, just to watch it corkscrew into the air and add another statistic into the ETR prang records. After the predictable result, Steve set the remains on fire.

His "Beaver" was a bit more interesting. It was the first "internal parasite" flown at ETR. Plans can be found in the May 1976 issue of the Rocketeer. (Ed. Note: I'll xerox these for anyone who's interested; just let me know. - RG) The glider is a very high aspect ratio swing-wing with a single pivot. The single pivot allows the wings to lay on top of one another, and the whole mess fits into a BT-60 breakaway booster.

A crude, night-before effort, the Beaver was designed so as to just have an entry. A two-staged D12/E5 flight yielded a two minute flight and a first place at ETR 6.

Dave Cook made his mark at ETR 8. His weapon of choice was a rear-engined delta-winged model. With the ever present F7, it was unstable from the moment it left the rod. Somersaulting about the launch site, the bird hit the ground behind the launch table, scattering people everywhere. After crawling along the ground for several feet, the model flew back into the air, ran out of steam and died behind the launch tent. In its nine second life, Dave's little wonder had made three straffing passes at yours truly who was steadily recording the event on film and making his life insurance agent think twice about renewing the policy.

The prang lover's paradise (and if you've made it this far, you qualify!) had to be ETR 7. We thought ETR 7 was really going to be the last one. Honest! So we decided to go out in style by flying both Condor HG and RG! Of the twenty or so folk who entered, nearly all flew both events! While we had winners in HG, no one even managed a qualified flight in RG. Swing wings and slide wings shreaded, pranged and failed to swing or slide. When the weekend was over, the field was littered with the remains, and prang fans had stories to tell for years.



John Kalb's Condor in its' last moments; ETR-2



Steve Behrends and his "Beaver" at ETR-6

There were successful Condors at ETR, and I don't mean the obvious flukes. No one seems smart enough to try these ideas again, so you may want to look closely at these models before you tackle this year's event.

Gret "Fat Albert" Stewart and Tom Hoelle both had excellent Condors at early at ETR 4. They flew large (6" root chord) "Teen Angels", a design of Greg's that he scaled up and down for various events. Power came from two D12's and a mini. Both models boosted fine and glided well. Greg once lost his stab on Flight #1, only to replace it with a slab of $\frac{1}{4}$ " balsa for Flight #2. Tom wowed the crowd at ETR 6 with a straight boost, good transition and great glide. It was the best Condor ever at ETR at the time. Would have been a first if only the DT had worked and Tom returned the model.

John Boren came to his first ever contest, ETR 9, with "Dee Dee IV". This triple D12 powered flopwing featured sheeted wings. After a mediocre first flight, John retrimmed and got performance more like an RC sailplane than a H. He took a B Division first with over three minutes total time.

Jedi George showed up at ETR 10 with a modified B H, a Flanigan Flyer. It was strapped to a large black BT-70 booster containing three D12's. A first flight DT recovery insured the win from a second flight flyaway.

Finally, an internal parasite with a bit more care in construction came out of Tom Pastrick's workshop. The "Tapeworm" went aloft in a BT-101 booster with an F100. See the plans in this issue.

Few consistent approaches to this event exist. You've gotten a look at the history of Condor in the Midwest via this article. I've always enjoyed Condor, whether it worked or not, and I suggest you give it a try sometime. It's an event where you can still make a mark as a designer. Whenever you fly Condor, let me know in advance. I'll be there with my camera, just in case (heaven forbid!) it should prang.

Ric Gaff



Mike Kalb and his infamous "Ho-Ho-Bo" Jolly Green Giant Condor with "shotgun" D12's at ETR-4



Keith Vineyard and an early Groundhog swingwing; ETR-4.



Greg "Fat Albert" Stewart makes a hasty repair on his giant Teen Angel; ETR-4



John and Mike Kalb prepare to fly Mike's Jolly Green Giant Condor



Tom Hoelle prepares to fly his giant Teen Angel off a 6' C-rail; ETR-4.



John Boren and his triple D12 flopwing. Wings flopped; glider didn't. ETR-9



Jedi with an external parasite: Flanigan Flyer and triple D12's.

Tom Pastrick (R) and "Kilometers" Rohloff pose with Tom's huge swingwing Condor; ETR-9 →

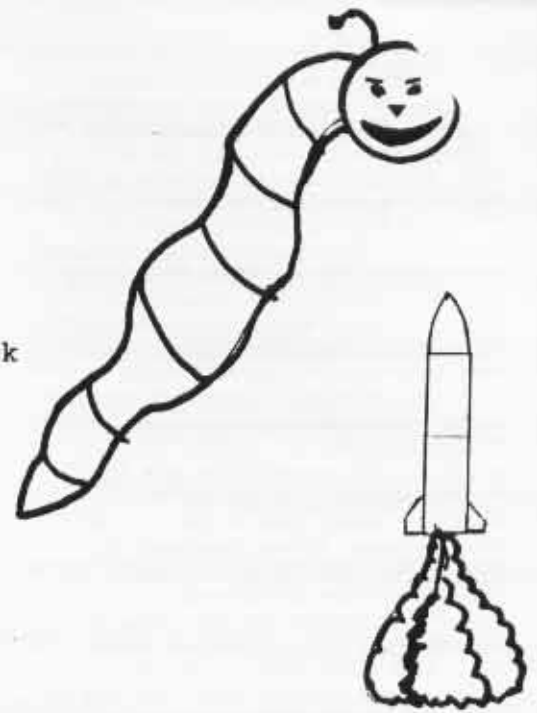


← Dave Cook's delta wing P7 Condor had one of the most unstable and frightening flights ever; ETR-8.

BUILD THE

TAPEWORM

designed, built and flown by Tom Pastrick



balsa disc/NOMEX
"sandwiches"

balsa
spacers/
supports

3 1/4"
BT-20

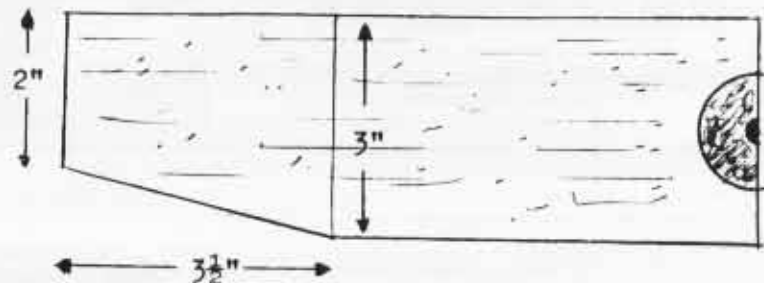
2 3/4"
BT-70



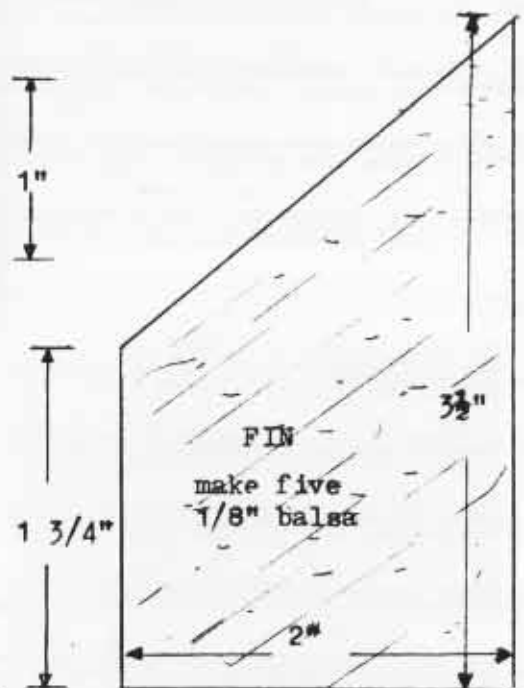
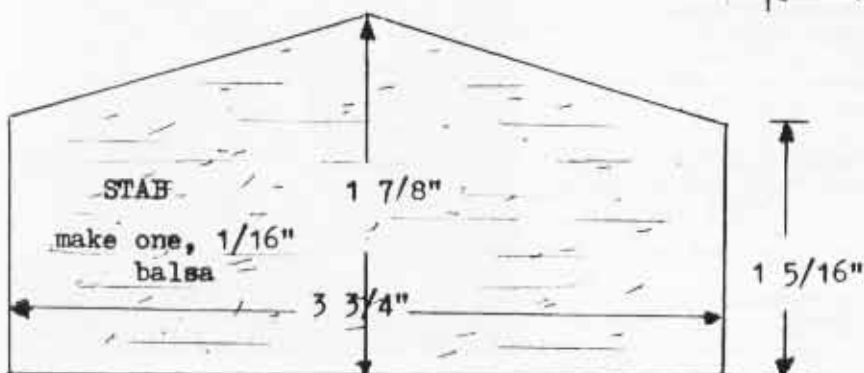
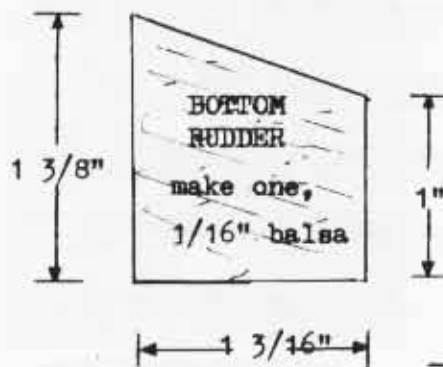
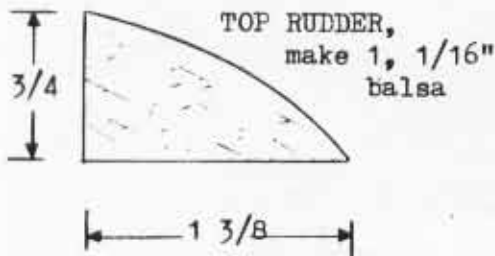
PISTON DETAILS

Parts list is on page 12

WING PATTERN (not full sized!)



FULL SIZED "TAPEWORM" PATTERNS



The "Tapeworm" was originally signed and built on short notice or an ETR. The RC is an "internal parasite"; that is, it is totally enclosed in a BT-101 tube. This technique allows the model to boost at high speed with no structural stress on it at all. Unlike other F RC's with fixed wings and high wing loadings, the "Tapeworm" uses a highly efficient polyhedral wing with a wider wingspan. Other design features include a powered ejection piston, scissor wing pivot and five main fins.

1. BT-101 PREPARATION

In order for the ejection piston to work, you must join the two BT-101's externally. To do this, cut two discs from posterboard about 3 15/16" in diameter. They must fit snugly into the BT-101. Put a disc in each tube about 1" from the end. **DO NOT GLUE THEM IN!** They are only there to support the tubes while you join them externally. Put the BT-101's together and run a bead of epoxy around the joint. (ed. note - You may find it easier to use a strip of gauze or a split piece of BT-101 to join these tubes on the outside. This would also reinforce a key joint.-RC) Any epoxy inside the tube will cause the piston to hang up!

Now build the engine mount. For the F100 version, you need a 10 1/2" engine tube; for composites, 8 1/2". Make the centering rings from 1/16" hard balsa; I made four rings with a hole in them the same size as the engine tube I was using. Glue two rings together with their grain running 90° to one another. This balsa "plywood" is very strong. Make a homemade engine hook out of 1/16" music wire, epoxy it onto the engine tube, then attach the centering rings to the tube. Let dry. Install the engine mount securely.

Cut out five fins. Attach them to the rear of the BT-101 and fillet. I used epoxy for strength. Remember, it's an F100!



The "Tapeworm", an internal parasite Condor RC

TAPEWORM

AN INTERNAL PARASITE CONDOR

The model is flown from a 3/16" launch rod. Aluminum tubing launch lugs were made. One is 5" from the rear of the tube; the other, 21".

To prepare the nose cone, drill or cut a 1/8" dia. hole, smooth the edges and attach 32" of 1/8" elastic cord through this hole. Attach a 12" chute to the other end. Cover the hole in the base of the nose cone with some strapping tape; this will keep the nose of the glider from jamming into the nose cone.

2. EJECTION PISTON CONSTRUCTION

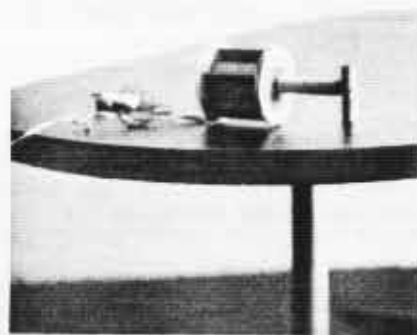
The "Tapeworm" uses an 18mm engine in a movable piston to positively force the glider out of the model. If the piston isn't precisely made, it will jam in the tube and fail to eject both the chutes and the glider. Be careful while building!

Cut four 1/16" balsa discs 1/16" smaller in diameter than the BT-101. Cut two squares of Nomex wadding, 4 1/8" on a side. Now make a sandwich using the balsa discs as "bread" and the Nomex as "meat". Use epoxy to join everything. Make sure no epoxy oozes out.

This design insures the discs are small enough to move freely, and the Nomex provides a good gas seal.

Trim the excess Nomex to within 1/16" of the disc. Cut a piece of BT-70 2 3/4" long; cut six strips of hard balsa 2 3/4" x 9/16". Epoxy the BT-70 to the piston discs using the balsa strips to help center and support the BT-70. Cut a BT-20 3 1/2" long. Punch two 1/4" holes in the front of the BT-20 to let ejection gases escape. Add an engine hook. Now glue the BT-20 to the BT-70/ring assembly so that the BT-20 fits into your engine holder tube and the BT-70/ring assembly is centered in the BT-101. **DO NOT GLUE THE PISTON INTO THE BT-101 ACCIDENTALLY!!!**

Epoxy a 36" length of 3/16" shock cord to the top of the piston.



Rocket powered piston: heart of the "Tapeworm"

Epoxy the other end to the outside of the BT-101. Attach a 16" parachute to the shock cord about 4" from the piston. Your carrier rocket is now ready for finishing. Keep it light, because the "Tapeworm" is close to the weight limit when fully loaded.

3. GLIDER CONSTRUCTION

Begin by cutting out all parts. The stab and rudders should be made of 1/16" hard balsa. Round off all edges. The boom is 18 1/2" of 3/16" x 3/8" spruce. The nose of the boom should be rounded in front and left square in the rear. The wings come from an 18" piece of 3/16" x 3" balsa. Contest balsa is best. A 1/16" x 1/8" x 18" spruce piece can be attached to the leading edge for protection. See the plan for the wing shape.

Cut two discs from 1/64" plywood, one 1 1/2" in diameter, and another 1 7/8". Epoxy the smaller disc on the top of the wing, and the larger on the bottom. Both discs must be centered on the wing. When dry, airfoil the wing. Bore a 1/4" diameter hole through the discs and set the wing aside.

Cut a piece of 1/32" plywood, 2 1/2" x 1 1/2". Bore a 1/4" hole in the center. Epoxy this to the boom,

Continued on Page Nine

DESIGNING CONDORS

Let's face it. Craming 40+ Nt.-sec. into a model that's then supposed to glide back down isn't easy. Even with careful preparation, design and building, you may still wind up with a pile of scraps and a DQ in results. However, the joy of watching a model gracefully gliding high above after leaving the earth in a mighty roar is worth the pain. If you read on, perhaps you can be the next ETR Condor winner, bowing to the applause of fellow contestants instead of hearing the chuckle of Ric's prang seeking camera.

1. POWERPLANTS

The spring season will be the first time we'll see those new Aerotech E6 and F10 composite motors. These may be the answer to the search for a good Condor powerplant; light, reliable and one motor only. They won't be cheap, however. I've always tended toward clustered black powder motors. I've never had a problem with bad ignition, and you can tailor the motors to get a time thrust curve to your liking.

Clustered D12 will work for flexies and parasites. Standard gliders won't make it through the thrust spike, but I wonder if a larger swing-wing might not be the ticket. Terry Lee likes triple E5's; I prefer to use two of them with a D12. The increase in average thrust gets things going in the right direction to start with.



John Boren shows his Condor's power pod. Makes you shudder, don't it?

The F7 can work in Condor, but keep it light, and fly when the wind is low. If your model is too heavy, the F7 is sure to start arcing. The heavier the model, the sooner the arcing. Same thing for wind; higher winds equals more arcing. You'll need some luck here, too.

Finally, don't think you have to use all 80 Nt.-sec. allowed by the event. A successful flight with 41 Nt.-sec. is far better than a shread with 80 Nt.-sec. Adjust your total power down if you have shreading problems until you get something that works.

2. MATERIALS

Nothing but the highest quality goods should go into your Condor. If there's a weakness in them, the boost will point them out graphically. High stress areas should be reinforced with plywood, etc.

For booms and pylons, stick to spruce. The wood you want has tightly spaced grain running along its length in straight lines. Spruce with wavy, widely spaced lines is not good.

I like to increase my balsa wood weights in Condor. While I'll search for and pay more for 4 lb./ft³ wood in Sparrow HG, I'd rather get 8 lb./ft³ for Condor. Too many Condors are built too light. Save the weight-saving stuff for later, after you understand what forces are working on your balsa.

C grained wood will always resist warping. Warped surfaces on a Condor are a no-no, so use C grain if you have it.

Hardware sizes should be increased, too. Larger launch lugs, bigger music wire fittings and sturdier recovery systems on pods are all a must.

3. CONSTRUCTION

You can buy good wood and good engines, but building skills aren't for sale. If you've been saving up building energy, better release it for Condor.

Build it straight. Use a ruler to be sure things are lined up like you want them to be. Don't trust your eyesight alone. Use tape, rubber bands, blocks of wood or



Al Mienast with Jim Zingler's internal parasite Condor.

whatever to jig parts in place and keep them there while the glue dries.

Forget the Hot Stuff. I don't care what anyone says; the security of good Titebond joints or epoxy fillets pays off in Condor.

Cover it up. Tissue, and silksan are my favorites, but I suppose Monokote is better than nothing.

4. DESIGNS

Parasites are cheap and have a good historical success rate. Any good B or C HG is a candidate for conversion to a parasite. The trick is to get a reliable mounting technique, one that keeps the glider from wobbling around during boost but allows easy pop off when the time comes. Attach your recovery system to the rear of the model so the shock of the opening can shake loose the glider.

Simple front engine models like enlarged Falcons or the old "Thunderbird" can work. Use a minimum power configuration and strengthen the wings. The big design problem here is how to recover all those ejected engines legally.

Variable Geometry seems to make life very difficult in high powered glider events. Al Mienast has both won and lost using large swing wings. Take your pick.

Scaled up models have done well. The "Teen Angel" by Fat Albert is a particular favorite here in the midwest. I'll send a copy of the plans to anyone interested for a SASE. If you want to try something new, try enlarging the "Flanigan Flyer". With any enlarged design, pay attention to the pod attachment.

Flexies? Bah! Parachutes!

If you can afford it, RC seems to eliminate many Condor problems. The additional weight of the RC gear slows things down to the point where wings stay on. Exception to that is made if you chose to do aerobatics during boost. For now, these designs have a distinct edge over any other,

5. TRIMMING

Start with a neutral point calculation, then pick a CG position ahead of it to give you some reasonable stability margin. Keep adding incidence until you get a decent glide from shoulder tosses. Then take a test flight. If you try to hand-launch these monsters, you'll end up with a sore shoulder! For parasites and flexies, Condor trimming should be the same as your Sparrow trimming.

6. MISCELLANEOUS

Use a DT. I know there a pain to prep, but if it does work, you want it back, don't you? Put your name and address on the bird, too. It's cheap, costless insurance.

Take the time to draw up the plans. It doesn't have to be fancy, but if you don't have a DT, and no one calls to tell you they found your rocket, you'll still have some place to start from for the next version.

Talk to other RC flyers, before and after the flight. They may have seen something you didn't. If you ahead or prang, pick up the pieces and do some analysis. You can usually determine what went wrong, and be better prepared for the next Condor outing.

Remember, real rocketeers fly Condor RC!

Bunny



"Jedi"-George and his P7 powered R/C Condor at ETR-12

12" from the rear of the boom, with the long dimension running to the boom. Next, epoxy a 3/8" piece of 1/4" dowel into the hole, making sure the dowel is perfectly vertical.

Cut the wing apart at the polyhedral breaks. Sand the edges to a bevel, and give each tip 7/8" of dihedral. Let dry.

Cut a 3/4" diameter disc of 1/16" plywood. Drill a hole just slightly less than 1/4" diameter in the center. Now put the wing on the dowel. Fit the 1/16" ply disc down on the dowel. It should have a snug fit. The wing should now rotate freely with no wobble. When satisfied with the fit, epoxy the disc in place. Make sure no epoxy runs or drips down on the wing.

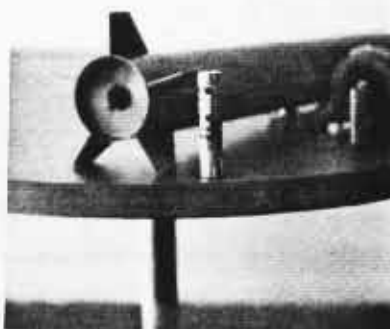
After this is dry, rotate the wing to a perfect 90° position. Hold in place with tape. Mark the spot where the bottom disc and the 1/32" plywood plate meet. Drill a 1/8" hole in each and epoxy a 3/8" piece of 1/8" dowel in the wing.

Bend a 1/16" music wire hook for the activation rubber band. Epoxy it 1 5/8" in front of the 1/8" dowel in the wing. This distance is measured when the wing is in the open position. A 3/4" Sig rubber band opens the wing smartly when looped over the hook and dowel. Those of you who built the Estes "Orbital Transport" will recognize this completed activation mechanism immediately.

To finish the glider, attach the stab to the rear of the boom. Sand or carve in 1/16" of incidence before gluing the stab into place. Attach the top and bottom rudders, and your glider is done.

4. PREPARATION AND FLYING

Give the glider some shoulder tosses to get an approximate trim. Handlaunching this model doesn't work with the wing pivot mechanism. Launching in the booster is the only way to get that perfect trim.



Bottom view of "Tapeworm" with a Project F.

TAPE WORM

To prep the "Tapeworm", install an A8-3 in the piston's BT-20. Install an F100-4 in the engine mount. Lower the piston into the model, making sure the A8-3 is down in the engine mount tube. It should have a Sure-Shot or PSI wick in its nozzle to insure ignition. Attach the rubberband to the glider, pivot the wing, and put the glider in on top of the piston. Pack the parachutes and place them so they face the bottom of the wing. If they face the top, they will tangle in the glider. Put on the nose cone, put in an igniter and fly!

The "Tapeworm" needs some care in building, but works well in Condor. Stick to delays less than 6 seconds, and never use a booster engine!

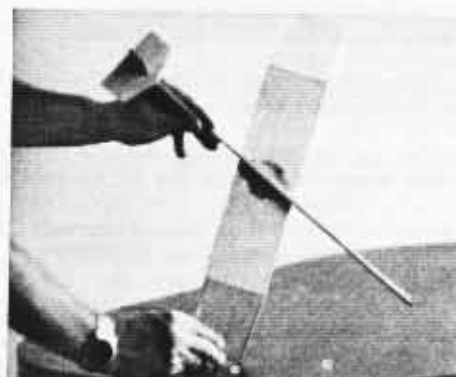
Tom Pastrick



The main reason for "Tapeworm" existence: a scissor-wing glider that fits inside. Top view shown.



View of "Tapeworm"'s cruciform tail



Bottom view of glider

WORKSHOP TIME

NIRA's never-ending quest for knowledge comes in the form of a workshop at Bob Kaplow's on March 13, Sunday, at 2 PM. A map is provided below. The following ~~xxxxxx~~ people have volunteered to give demonstrations: Henry Veldenz - Helicopter Duration; Ric Gaff - Launch Control Systems; Bunny- Scale. All NIRA members are encouraged to come and bring a friend!

You are ready to start building a scale model, but it needs more than one diameter of tube. Since there are numerous body tube sizes from numerous manufacturers, how do you know which two tubes will give you the best fit with your scale factor? My "Body Tube Scale Selection" table will tell you.

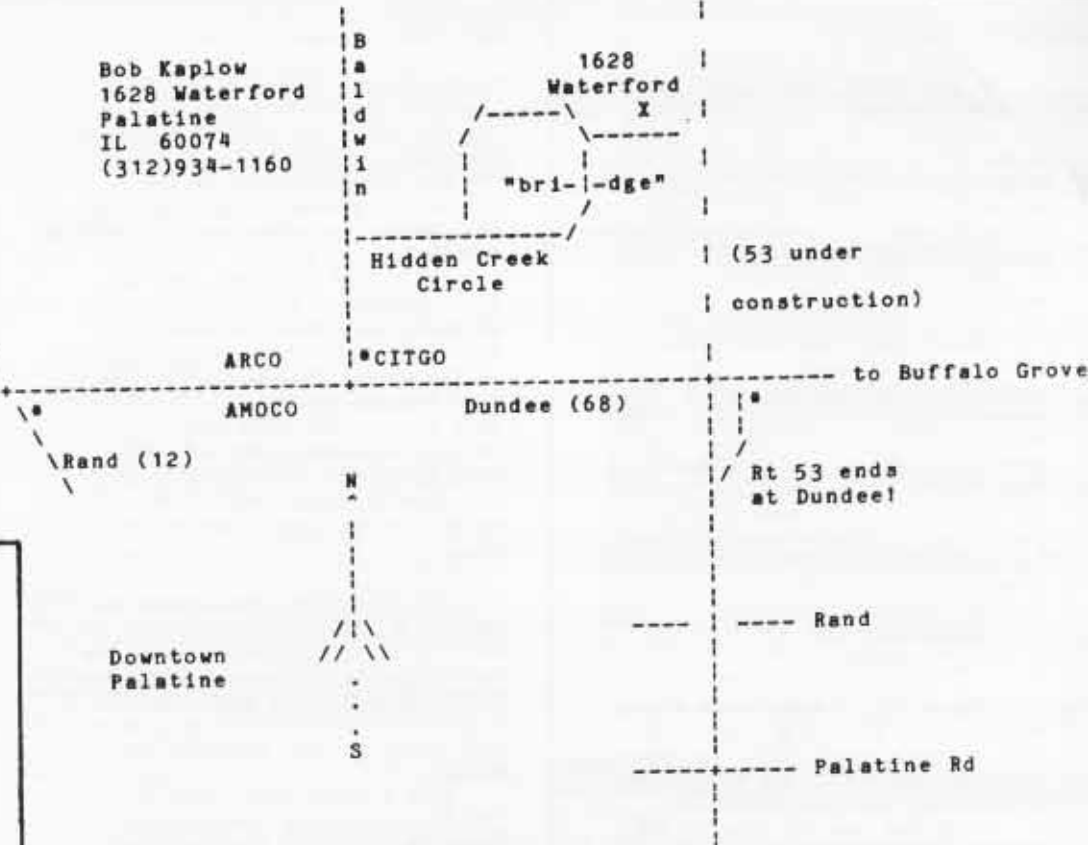
The full table is a cross-reference list for all pairs of body tubes currently available to model rocketeers. To use the table, compute the ratio of diameters on the real rocket. For example, the Aerobee 350, a favorite with Pat Peterson, has an upper stage diameter of 22.0" and a lower stage diameter of 16.5". The ratio is $22/16.5$ or 1.333. Now search through the table diagonally, from upper left to lower right. We find that the Crown 1" tube and the Canaroc 100 tube give a ratio of 1.33! But you say you don't have any Canaroc tubes? Never fear; one step back shows that HT-50 and HT-20 is almost as good at 1.326. A layer of tissue or an extra heavy coat of paint can be used to fudge the tubes to an even closer match.

Building for Scale Altitude and want a smaller model? Moving back toward the upper left shows a 1.319 ratio from the CMR RB74 and RB50. That's perfect for small powered Scale Altitude. What about that monster Sport Scale bird? Moving toward the lower right, we find 1.354, close enough for Sport Scale, from the BT-70 and BT-60.

Once you get the hang of it, the chart is very easy to use. Moving along a diagonal line gives similar ratios with small models in the upper left, and big birds in the lower right. If you're building a model with three or more diameters, pick two major sizes, use the chart and write down your selection. Now recompute your tube ratio using one of the diameters from before and a new one. See if you get a good match in the table when you use the same body tube size from the first time around. You probably won't,

Continued on Page Eleven:

Bob Kaplow
1628 Waterford
Palatine
IL 60074
(312)934-1160



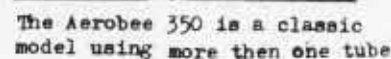
SCALE BODY TUBE SELECTION GUIDE

Commercial Body tube sizes

Diameter		Manufacturer(s)	Designation
(in)	(cm)		
0.175	0.444	Estes	LUG
0.375	0.952	Estes	BT3
0.541	1.374	Celestial, Estes, Centuri	BT5
0.558	1.417	CMR	RB50
0.584	1.483	CMR	RB52
0.736	1.870	Celestial, CMR, Centuri, Estes	BT20, RB74
0.752	1.910	Canaroc	100
0.766	1.946	CMR	RB77
0.890	2.261	CMR	RB90
0.920	2.337	FSI, CMR	RB92
0.950	2.413	CMR	RB95
0.976	2.479	Canaroc, Celestial, Centuri, CMR, Estes	BT50, RB98
1.000	2.540	ACE, Crown	INCH
1.170	2.972	Celestial, FSI, CMR	RB120
1.210	3.073	ACE, CMR, Crown	RB125
1.325	3.365	Celestial, Centuri, Estes	BT55
1.340	3.404	Crown, FSI	
1.637	4.158	Celestial, Estes, Centuri, FSI, Crown	BT60
1.870	4.750	ACE (egg diameter)	
2.040	5.182	Celestial, Centuri, Crown, FSI	ST20
2.217	5.631	Celestial, Centuri, Estes	BT70
2.420	6.147	ACE	
2.600	6.604	Centuri, Estes	BT80
3.938	10.003	Ace, Centuri, Estes	BT101

Route 53 continues
South to the end of
the universe (and
Glen Ellyn)

Bob Kaplow



The UFO Verdict: Examining the
Evidence

by: Robert Sheaffer

Is Earth in the midst of an invasion from space? Are UFO's aliens, space vehicles, angels, demons or something even stranger? Since 1947, when Kenneth Arnold saw a string of strange flying objects, America has had a fascination with UFO's. Many people claim to have seen incredible objects in the sky, objects that move with supersonic speed making no sound, making sharp turns, and stop in defiance of the laws of inertia. Some even claim to have been abducted by aliens!

In his book, Mr. Sheaffer examines the claims of UFO proponents and finds a field rife with poor research, overblown conclusions and sheer nonsense masquerading as science. Classic UFO cases like the Betty Hill "abduction", Jimmy Carter's UFO, Exeter, Pascagoula, etc. are researched and found lacking any shred of credibility. Close encounters of all three types do not survive a close encounter with Mr. Sheaffer's careful research.

The photographic evidence in particular is shown to be less than worthless. With thousands of pictures snapped each year, why has no one ever

taken a decent picture of any UFO? Mr. Sheaffer has an answer, one that will not appeal to UFO believers.

"It is indeed possible to suggest an hypothesis about UFO's that suffers from none of the observational objections that can be raised against the various 'nuts and bolts' hypotheses, or the philosophical objections that compel us to disregard the so-called psychic explanations of UFO's. It is the familiar null hypothesis, the cornerstone of statistical analysis; UFO's, as a phenomenon distinct from all others, simply do not exist."

If, after reading this book, you feel that Mr. Sheaffer is hopelessly misguided, ignorant or a dupe of government agencies' UFO cover ups, write to me. I have a bridge I'd like to sell you. Cash only, and small bills, please?

Ric Gaff

Hi THERE! I'm A, WELL I'm SORT OF A, AA
Kind of A, TO BE HONEST I'm
NOT SURE WHAT I AM, I
LOST MY ID CARD, BUT I CAN
TELL YOU ABOUT A GREAT HOBBY STORE
THE GLEN ELLYN TOY AND CARD SHOP 476 MAIN ST

PARTS LIST FOR THE TAPE WORM

two BT-101 body tubes
one JNC-101 nose cone
one BT-70, 2 3/4" long
one BT-20, 3 1/4" long
one body tube for engine mount
(varies depending on the
engine you select)
1/4" dowel
1/8" dowel
1/64" plywood
1/32" plywood
1/16" x 1/8" x 18 spruce
3/16" x 3/8" x 18 spruce
3/16" x 3" x 18" contest balsa
1/16" x 3" x 18" hard balsa
two 4 1/8" squares of Nomex
1/2" dia. aluminum tube
engine hook
1/16" dia. music wire
1/8" elastic cord
3/16" elastic cord
posterboard
strapping tape

RIC GAFF
331 THIRD ST.
NORTHFIELD IL
60093

