If your heart's still in Dogpatch, this 72-in.-span, 45-oz. Old-Timer can take you back. Yep, there's Pappy Yokum on your tail, trying to reclaim his Presarved Turnips—but you're too fast. ■ Alfred Lehmberg

Art Hale (Ventura, California) put his Fox .29-powered Feather Merchant on floats. Don't use downthrust here; its down-elevator-like effect on the big stab keeps the model at high speed on the water, making takeoffs difficult.

Feather Merchant 72

Old-Timer Flies Anew with RC Assist

YOU remember them (provided you're of a certain age) from the old Li'l Abner comic strips. The Feather Merchants, those funny little fellows with the long black coats and tall black hats, were the bane of Pappy Yokum's existence—always trying to steal his Presarved Turnips, which he secretly made in the woods beyond the view of Mammy Yokum. When they succeeded—as often happened—a personally affronted Pappy would chase them with his shootin' iron, without much result. The Snuffy Smith strip featured the same cameo. (Remember Snuffy chasing Revenoors confiscating his moonshine?)

How did I happen to name a model after Pappy Yokum's persecutors? In those early days of Gas model flying I belonged to the San Antonio Gas Model Airplane Association (SAGMAA). We did quite well in competition from 1938 to 1942 and attended meets together all over Texas. Arriving at an Austin meet one morning, we overheard someone quip, "Well, here are the Feather Merchants coming to steal our Presarved Turnips!" Before long I'd clapped the name onto a Bantam-powered original I'd had good results with during the 1940 and 1941 contest seasons.

I'd flown this model for both competition and fun and given it a new covering job the second year. During this period, I broke three props on the airplane.

One prop broke after a long flight during a funsie session at Kelly Field, our club flying site. The plane, escaping both Kelly's boundaries and the lift, glided over an area filled with mesquite trees, pear cactus, and rattlesnakes, and ended up in the middle of a clearing, where it struck a solitary mesquite tree just above ground level. Only the prop broke.

If there is truly justice in this world, why don't we fly over the pigeons sometimes?

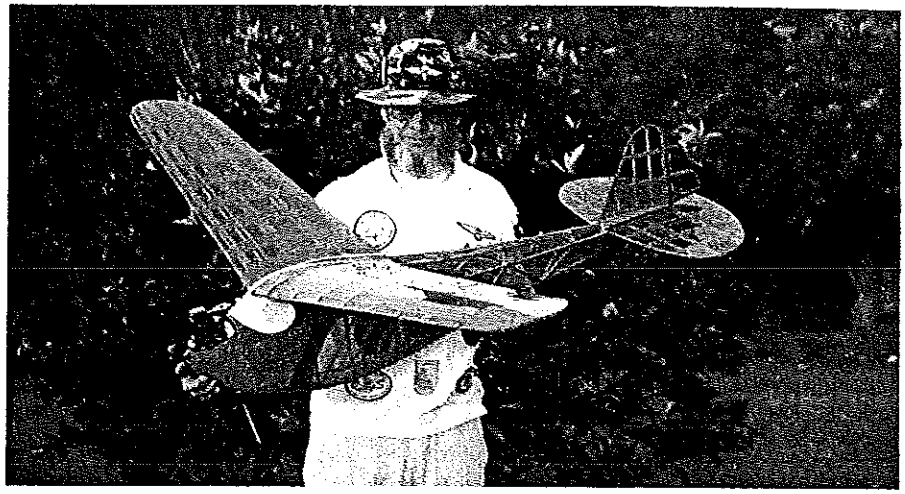
The model I came to call Feather Merchant traces its origins to a Cavalier built from a standard Berkeley kit in 1938. I'd put together enough pocket money to buy the kit, then powered the finished plane with a Brown B I'd gotten for Christmas.

The Cavalier didn't last long. Despite its generous downthrust, the model made a loop on takeoff and crashed. Except for the wing, it was *creamed.*

Next, I built a Lackey Zenith. It flew like a dream, but I wasn't winning anything. So I came up with my own design. The Goon had a 60% stabilizer, which was radical for its day. The model's rate of climb, however, was too low for the time-limited engine run events, dominated by the famous Goldberg Zipper.

In the meantime, I'd become one of the big boys—like Charley Adams, Richard Sherman, Fred Cordova, et al.—whom I'd so idolized just a few years before, and was achieving my successes with rubber designs. This, together with a ballooning interest in aerodynamics, got me to thinking about the Berkeley Cavalier.

Why was the model such a lemon? Why was all that downthrust without effect? My peers couldn't help, except that they, too, found



Ritchard Allen (Urunga NSW, Australia) uses an O.S. .26 Surpass in his FM 72. He says it flies well, though he lost most of his wing tip washout.

nothing nice to say about the model. In fact, Berkeley, apparently discouraged, soon stopped making the kit.

I decided to build a new model using the Cavalier wing. Money was scarce, and I needed to salvage whatever I could from any misadventure.

Model aeronautics is a game. You can't blame it all on Ozzie Reynolds's ideas about size or scale effect, although his theories play a significant role. Theories relating to full-scale aerodynamics must be modified using both modeling experience and hunches.

Around the time that I was designing a model for the Cavalier wing, I somehow managed to have reports on aerodynamics mailed to me from NACA (now NASA). Though I only partly understood what I read, correlating it with my modeling experience helped it to make more sense.

The Kutta-Joukowski theory of lift completely fascinated me. Remembering the Cavalier, with its short tail moment arm, nearly midfuselage wing, great downthrust, and nose-up instability, I could guess why the design hadn't worked. Maybe the trim was right for low speed, but increased airspeed generated a strong nose-up moment. Maybe the much-strengthened downwash from the wing struck the stabilizer mostly on its upper surface, decreasing the stab's angle of attack until it lifted down.

I looked for the answers with this latest design. The model had a narrow body, a belly with a low center-of-lateral area, a long tail moment, and a large stab set at positive incidence. I placed the wing on top of a cabin fuselage and set it at 2° more incidence than that of the stab (which I kept conventional). (Mr. Buckmaster and Mr. Tileson, please note that I refrained from using the word *decalage* for the sake of our friendly relations.)

While using generous dihedral and washout at the tips, I kept the Cardinal's excessive downthrust—for a reason. I had just discovered, in high school trigonometry, that the sine and tangent of angles less than 5° are virtually equal and close to zero. Therefore, downthrust imposes a downward force of nearly zero (making its name improper) and diverts the downwash from the wing in an upward direction only. I really made points with my teacher, Mrs. Wimberley, when I checked this out with her!

My theory was that on release, the model's airspeed is zero and the propwash strikes the large stab. Since the stab is at a positive angle of incidence—say, 1°—and the propwash is diverted upward at 5°, a good portion of the stab is effectively at a 6° angle of attack and hence provides lift. As airspeed increases, so do wing lift and downwash. The combination of this downflow and the upflow of the propwash decreases the angle of attack of the affected stab area, reducing the down-elevator-like effect. I felt sure of this because I recalled the way my rubber jobs and gliders lifted their tails when in strong lift—diving, then stalling, then diving again, yet still gaining altitude. Of course, sometimes the model would spiral, even all the way down, if the low tip remained in stall.

I was sure Kutta and Joukowski would have approved of my theory. Too, I had tried this idea on my Goon in late 1938. I could only hope I had the right amount of stab incidence and downthrust. Apparently, I did: The model flew very well.

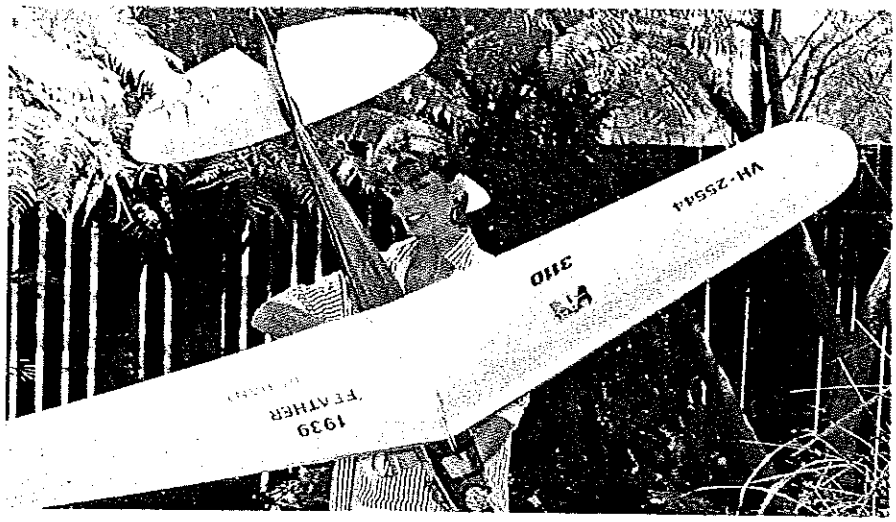
I wanted to try a couple of other ideas, but this required money. With a teenager's business acumen, I sold my new plane to a spectator for five bucks. Though I hadn't included the engine, Dad was disgusted with me. "What does he know?" I thought. "I just bought a Baby Cyclone C—less tank, coil, or condenser—for two bucks!"

With five bucks in my jeans, I was rich! I spent the last months of 1939 designing and testing a Hum-Dinger. It flew right off the drawing board. I made several flights in sheer ecstasy, drinking in the praise about the climb and glide.

Then the engine cut on takeoff, and the model stalled but made a nice recovery about three feet above the ground. Sharing that space on the other side of the Kelly runway was the headlight of a Model A. Both parties were demolished, but my empennage was untouched. The Model A owner was quite civil, even said he should have moved the car when we started flying our models in its direction. I was heart-broken, for my five-buck fortune was long gone. I'd even put a dollar Moore prop on the model instead of the reworked 25-cent Modelcraft one I used for fun-flying.

This model had been almost identical to the one I'd designed for the Cavalier wing. Because I didn't enjoy plotting the Eiffel 431 ribs, I had made the rib spacing fairly wide. To prevent the covering from sagging on the forward part of the upper camber, I'd used ⅛ x ¼-in. multispars with an upper and a lower strip where the main and rear spars would normally have been. To stiffen the spars I had used poster board as webbing between the ribs. This produced a very strong and lightweight wing.

Incidentally, I hadn't used the multispars to provide turbulators on the forward part of the upper airfoil; that method of improving airfoil performance had not yet been invented.



Merrilyn Borthwick (Chapel Hill, QLD, Australia), wife of *Airborne Magazine*'s famous columnist Colin Borthwick, with a Feather Merchant 80. The author says the plane's engine appears to be either an Orwick or an Anderson Spitfire.

The bottom longerons were cemented together from a point some distance behind the rectangular fuselage cross section, curving the fuselage downward. This automatically gave the stabilizer a little over a degree of positive incidence. Again, I had provided excessive washout at the tips and used generous dihedral. The model climbed to engine cutoff in a fairly tight and quite steep left spiral, then made a nice glide transition as the wing leveled and the right glide circle started.

This airplane's life was so short that I never called it anything except "my Brown job."

After talking my parents into a Bantam .19 for Christmas 1940, I scaled down "the Brown job" to a 46-inch span (Well, it was *almost* scale). I also widened the chord a bit and decreased the aspect ratio. This is the Class A model that I dubbed Feather Merchant. Today it has SAM (Society of Antique Modelers) Old-Timer approval as Feather Merchant 46, as does the original version, Feather Merchant 72, featured in this article.

In 1980 I scaled up the 46-incher to 80 inches for SAM RC Assist. This version will handle any .60 ignition engine. It has since been scaled down to several sizes, all with SAM approval:

- *Feather Merchant 72* for FF and RC Assist; 653-sq.-in. wing area; maximum glow engine .29; weight 45 oz.
- *Feather Merchant 46* for FF and RC Assist; wing area 288 sq. in.; maximum glow engine .12; weight 20 oz.
- *Feather Merchant 80* for RC Assist; wing area 864 sq. in.; maximum glow engine .38 (the Fox .36 is the engine with displacement closest to .38); weight 60 oz.
- *Feather Merchant* 56 for RC Assist (scaled especially for the Ohlsson .23 event); wing area 429 sq. in.; maximum glow engine .19; weight 30 oz.

All weights are based on a wing loading of 10 oz./sq. ft.

Muriel Oglesby, of Mountain View, California, learned to fly with her O.S. .25-powered Feather Merchant 72. Muriel's husband, Richard, built it.

The first three Feather Merchants were kitted in small runs in the U.S. In Germany, Michael Volz Modellbau manufactured Feather Merchant 72 and distributed it as a kit. The model has been built and flown all over the world, and it's been most pleasing to get letters from some of the builders. The accompanying photographs show their work. Bill Forrey, Contributing Editor of *Model Builder*, won the 1984 10th annual Astro Champs with an electric-powered Feather Merchant 72 and published a kit review in the April issue of *Model Builder*.

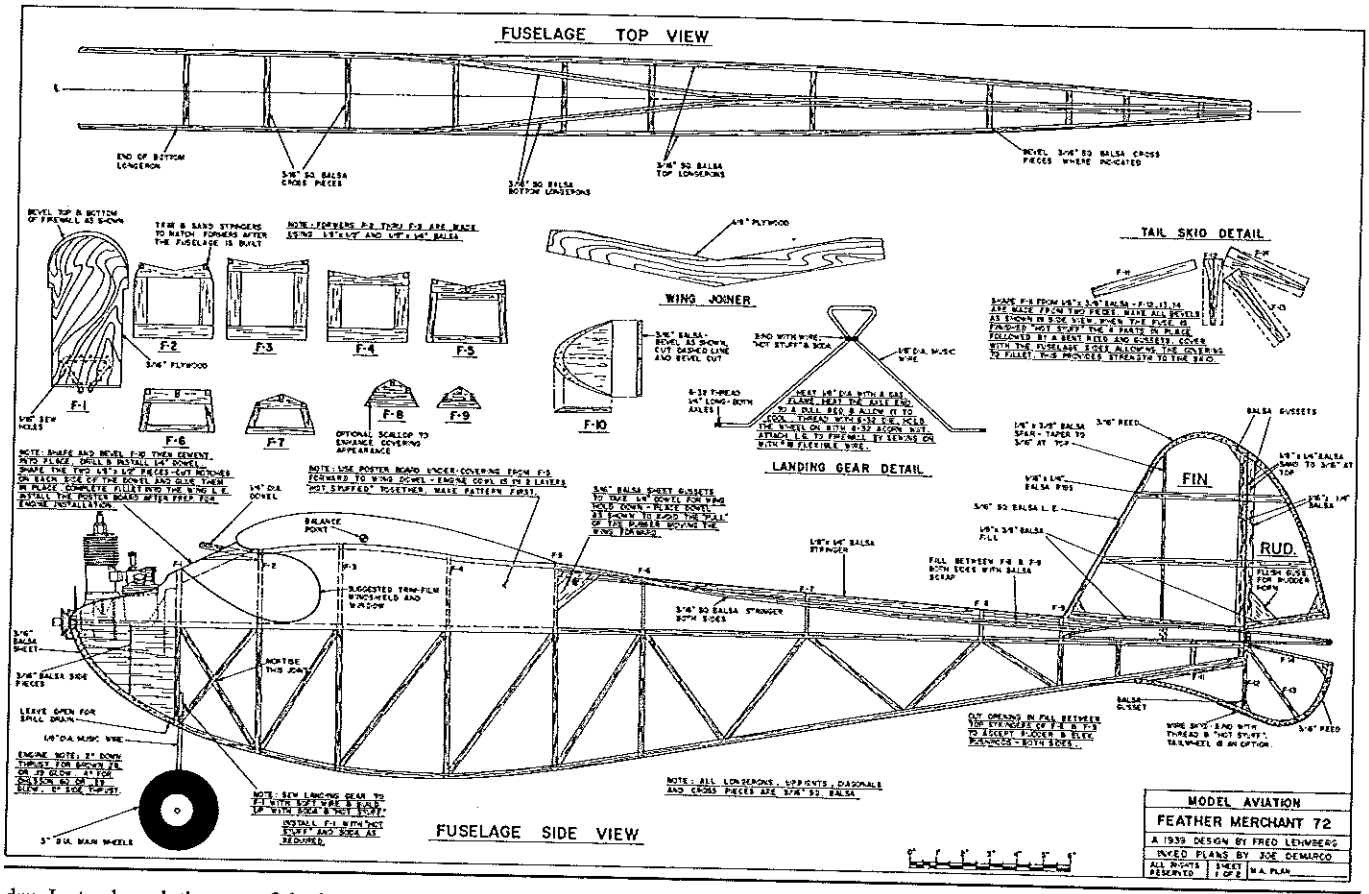
If you have experience assembling built-from-sticks models, you can build a Feather Merchant. The construction notes below point out possible trouble areas and suggest ways of making the job easier. Incidentally, I use CyA (cyanoacrylate) glues almost exclusively.

Construction

Fuselage: Build the sides first, crafting both at the same time and then splitting them apart with a razor blade. Cover the plan with the clear plastic backing from used rolls of MonoKote if you're using CyA glues.

Do *not* try to bend the bottom longerons

Author Lehmberg with three of his four Feather Merchant versions (left to right), the 72, 46, and 80. Good fliers with a wide stall tolerance, all the Feather Merchants have SAM (Society of Antique Modelers) Old-Timer approval.



dry. Instead, soak the part of the longerons you'll be bending, using either water, water-and-ammonia, or glass cleaner. The last two methods will be quicker. When the longerons are in place, dry them with alcohol and a hair dryer. Add the planking as shown on the plan. At this point you should have two fuselage sides with their top longerons flapping about.

Block up the sides (with one side flat on the table), and install all the crosspieces that are of the same length. Constantly check with a square to ensure that the top side is precisely above the one that is flat on the table. Lay this assembly aside.

Make the turtledeck formers. The Feather Merchant 46 and Feather Merchant 80 use sheet formers; the other versions use built-up formers. I prefer to build up the formers, since this eliminates cutting holes for control rods and produces a lighter result.

Cut the crosspieces that bridge the sides beneath the formers. Also, cut the few crosspieces that remain to be fitted into the bottom.

Finish joining the two sides: Bring them together at the rear, and wrap them with a rubberband. Beginning on the bottom, install the first crosspiece; estimate and cut the bevels required, and cement the piece in place. Continue until all the top and bottom crosspieces have been installed. Keep checking alignment as you go, for any error will be permanent and create built-in turn—generally, because of the pigeon effect, in the direction you *don't* want.

Pinch the bottom longerons together with clothespins, and cement them in place. Sand away the vee in the bottom of the longerons using a sanding block. Glue in the formers, followed by the flapping longerons and the stringers.

Complete the nose as shown on the plan. Make the landing gear, then lace it to the firewall with wire. Load the assembly with baking soda, and saturate it with CyA.

I prefer to use commercial engine mounts bolted to the firewall rather than wooden engine bearers, since this makes it a lot easier to change engines, if necessary. Install the poster board as shown on the plan. I prefer to cover the nose and window areas with poster board, using white, silver, or light gray Monotrim to simulate the windows. Don't forget the wing hold-down dowels and their gussets.

Bob Nolan (Dunedin, Florida) pulls his free flight version with an Ohlsson Gold Seal. Model is red silk with black trim.

Lescher Dowling built this FM 46, flown in 1/2A Texaco. That sure looks like the Seguin, Texas, site in the background.

Building the stabilizer is basically conventional. If your working plan includes a reed, that piece doesn't have to be wet for bending. Because of its opposite curvature, it will *not* bend in when the covering tightens.

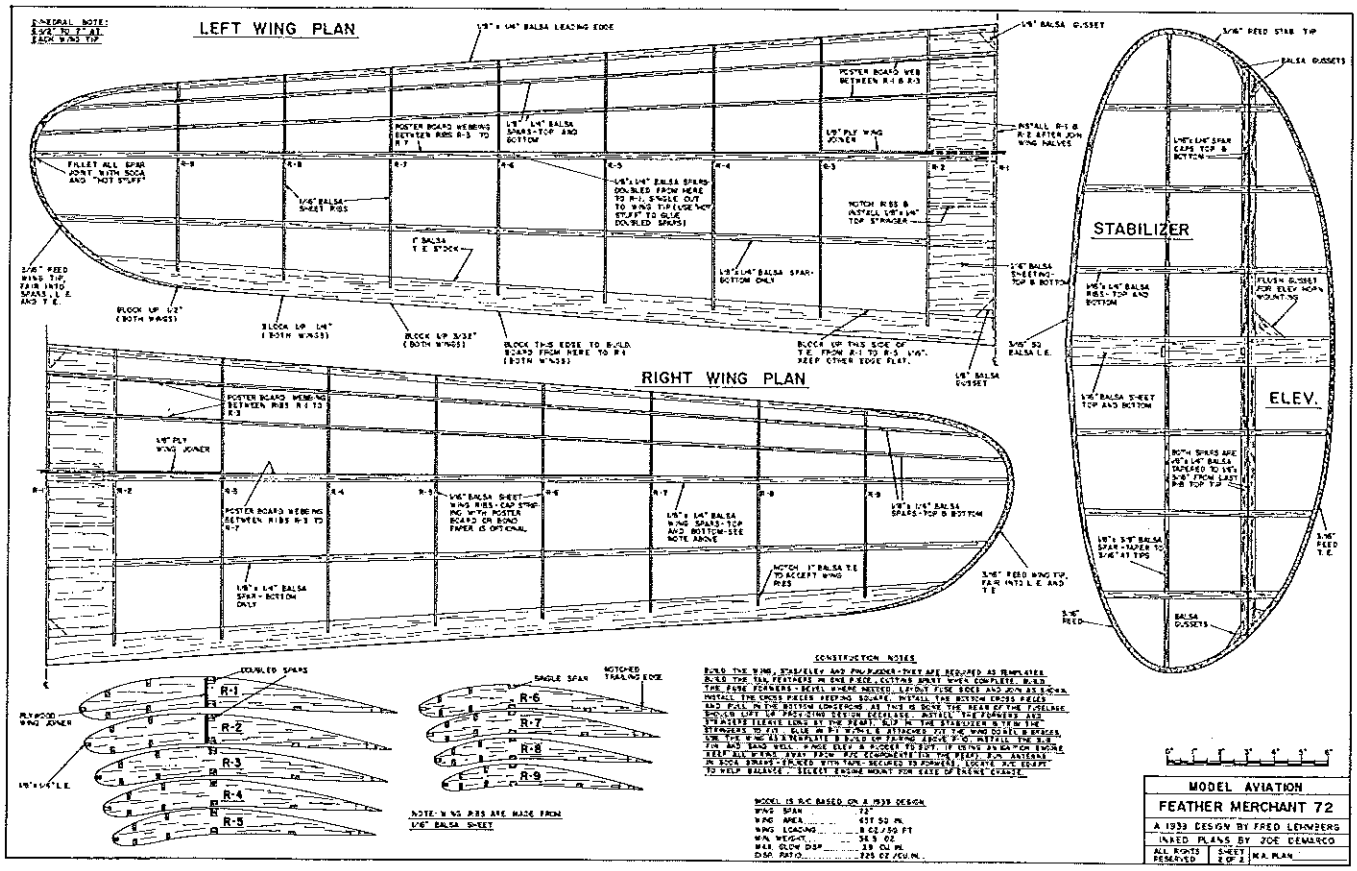
Install the leading edges, trailing edges, and tips. Add the rib bottoms, spars, and rib tops. Build the stabilizer and elevator as one piece, cutting the unit apart only after all sanding has been completed. Cap only the adjoining rib/elevator spars, top and bottom, between the ribs.

The procedure for the fin and rudder is much the same, except that, since there is no flat bottom, the ribs are attached with the structure off the work surface. (Builders call this "in the air.")

Shim up the trailing edge the amount indicated, pin and weigh it down, then build

For Three View – See Page 96

Full-Size Plans Available – See Page 176



Bill Forrey, *Model Builder's* sailplane columnist, won the 10th annual Astro Champs with this Feather Merchant 72 Electric.

RC Feather Merchant 72

Type: Sport

Wingspan: 72 inches

Recommended engine size and type: .29 cu. in. (or smaller) glow ignition

Number of RC channels recommended: Three

Expected flying weight: 45 ounces

Type of construction: Built-up

Type of covering/finish recommended: Iron-on films or silk-and-dope

in the wing tip washout as shown on the plan. Don't try to omit the washout or reduce the dihedral. They're there for good reason, and you'd be unhappy without them.

Don't forget the spar webbing on the multispar versions. Either conventional sparring or multispar construction works satisfactorily; the 46- and 72-inch versions used both types. I like the better covering appearance that conventional sparring permits, and I don't think the possible turbulator effect of multispars is particularly effective. On the other hand, multispars are easy, quick, and light. Either type provides good covering contact on the bottom to preserve undercamber.

The Feather Merchants are easy to fly. Keep in mind, however, that they don't like high speed in level flight. If you're using radio control, don't expect to lose altitude on a landing approach by giving *down* elevator; the airplane's low drag and high lift prevent that. On releasing the stick, you'll find yourself at nearly the

Continued on page 127

Charles St. For info. & directions call: Dr. Sandy Frank 817-599-7131 Sponsor: WEATHERFORD AERO MODELING SOCIETY

FL

APR. 3—Fort Myers, FL (E) 2nd Annual Swap Shop & Auction 9:00 a.m. -4:00 p.m. 8:00 a.m. for Sellers, Corkscrew Woodlands Exit 19 W off 75 Corkscrew Rd., ¼ M. from 75, Larger Hall, Tables $10. Advance Reservations Definitely Recommended Admission $2. Paul Bartos 1002 Washington Ave., Lehigh, FL 33936 PH: 813-368-0214 Sponsor: S.W. FLORIDA AERO CLUB

LISTING and AD INFORMATION

NORMAL LISTING

When an AMA sanction is issued for an event, the event will be listed automatically in the "Contest Calendar" section. The listing will give the date, place, and name of the event—plus competition events, flying site, and Contest Director name and address. Use of Supplementary (paid) Ad space is suggested for the description of unusual or special events, deviations from AMA rules, or significant aspects of a meet. Paid ads may be helpful in promoting fun-fly-type meets or to give directions to the flying site.

SUPPLEMENTARY ADS

Larger ads can be inserted in the "Contest Calendar" section by paying a fee. These ads are accepted for AMA-sanctioned events only.

FEE: Fees are based on ad size and whether or not the sponsor is an AMA-chartered club.

AD POLICY:

SIZE: 1⅛-in. wide and either, ¾, 1½, or 2¼-in. high. This is the full size of the ad as it appears in the "Contest Calendar" section.

PRICING: ¾—$8; 1½—$16; 2¼—$24 for each time the ad is run (payable in advance). **AMA-chartered clubs pay only half that rate.**

AD PREPARATION: The advertiser must prepare the Supplementary Ad. Ads must be full size (see above). Ads which are not made up in dark black on a white background will not reproduce well. It is recommended that the ad be made on heavy paper or lightweight cardboard. PLEASE DO NOT USE PHOTOGRAPHS ON ADS.

SUBMITTAL DEADLINE: Every effort will be made to include Supplementary Ads received by the 14th of the month in the issue reaching readers approximately the fourth week of the following month. However, this cannot be guaranteed, as ads are published on a space-available basis only! There is normally a two-month lead time required for inserting a Supplementary Ad. The same deadline will apply to sanctioned events listings.

Questions about either Supplementary Ads or regular Sanctioned Events listings should be directed to Debbie Brown in AMA's Competition Department.

Send ads to AMA HQ, Attention: Competition Dept.

Renew for '93

Built and Flew/Lehman

Continued from page 20

tempera paints. (I later covered the engine area with clear dope.) I should also mention that the tops and bottoms of the fuselages and the midwing sheeted areas were covered with classroom tablet backings. As the project neared completion, I put in several hours covering the wings and installing the hardware, radio, and engine.

"The maiden flight of the Pan Am took place the evening of April 16. Uncertain of the outcome, I made arrangements for only one student to be present.

"Joshua Smucker, a young man who is likely to become a pilot, accompanied me. Even with full throttle, the airliner was sluggish in the fresh spring grass, but it did take off and fly nicely. Unfortunately, the covering on the wing began to loosen after two laps and we had to bring her down. I remarked how handy it was to have throttle control for cases like that. It was too dark for repairs and a second flight.

"Joshua and I went out again three evenings later. This time all went extremely well. With Joshua outside the circle at the throttle, we did takeoffs, touch-and-goes, and slow approaches. Communication was by hand signal.

"A week later, on April 23, the students who built the Pan Am took turns being copilot and enjoyed it immensely. After a safety lesson, each person took his turn at the throttle control for about five laps before handing the transmitter to the next pilot.

"Later, I transferred the engine and radio to the Swissair, and the second class had its session. Both classes preferred high-speed flight. Even after deliberating on the beauty of slow, planned approaches and gentle flybys, they persisted in flying at full tilt. Throughout our sessions, however, no matter what the kids did with the throttle, the planes handled well.

"All in all, this was an enriching and enjoyable venture. The kids made sure I knew that it was a highlight of their school year."

It's too bad that we'll probably never know what effect this experience had on the futures of these youngsters. Wouldn't it be neat if at least *one* of them came across this article 20 or 30 years from now and wrote a letter to the editor? ✈

Feather/Lehmberg

Continued from page 27

same altitude—though a lot closer! A little *up* stick will drop the tail and increase sink, and releasing the stick will give you a nice touchdown.

Like all Feather Merchants, the 72-inch version has a wide stall tolerance. Even when stalled, it still mushes along instead of pitching down. You can exploit this in tight turns on the glide by using some *up* elevator and strong rudder. Oh, yes—I almost forgot. Don't even *think* "ailerons" for *any* Feather Merchant!

I want everyone who builds the Feather Merchant to have a ball! I would like a picture—maybe? If you have any questions, problems, or the like, drop me a line at 21337 Oak Park Lane, Anderson, CA 96007. An SASE would be appreciated.

I remember reading somewhere a closing that seems appropriate: "See ya in the Chicken House, y'hear?" ✈

How to Trim/deBolt

Continued from page 30

I'm going to break off the discussion at this point, as the remainder is fairly lengthy. Save this portion for continuity and reference when you study the concluding part.

Part Two will cover the process of developing force arrangements for your model and how to get the ultimate flight performance from them. I'll also talk about trimming methods. *(To be continued.)* ✈

RC Electrics/Kopski

Continued from page 76

a fancy wiring harness incorporating a double-pole, double-throw, center-off (DPDTCO or DP on-off-on) switch and associated wiring. It also requires a battery made up of two half-packs, each having the same cell count and cell type.

The idea behind this scheme is to use the two packs connected in series for high power, and the same two packs connected in parallel for cruise power. This connection is accomplished with the servo-driven switch described above. Thus, in-flight switching between the two available voltage levels—and to *off* as well—is readily accomplished. And—just so there's no misunderstanding—all the cells in this arrangement are charged in series. Ni-Cds are *never* charged in parallel.

The wiring diagram gives the details. In actual use, the plane, motor, and prop are configured to cruise or climb slightly on the voltage available from the paralleled half-packs ("half voltage"). Then the higher voltage associated with all the cells in series results in relatively aggressive climb capability when needed. The center-off switch option allows charge conservation during thermaling.

Since much of the total flight time is likely to occur with cruise power levels, battery efficiency during these periods is of considerable interest. It is argued that parallel-connected half-packs afford increased efficiency since each half is nominally operating at half the total motor current. Cells tend to display somewhat higher capacity at lower drain rates and, conversely, somewhat lower capacity at higher currents.