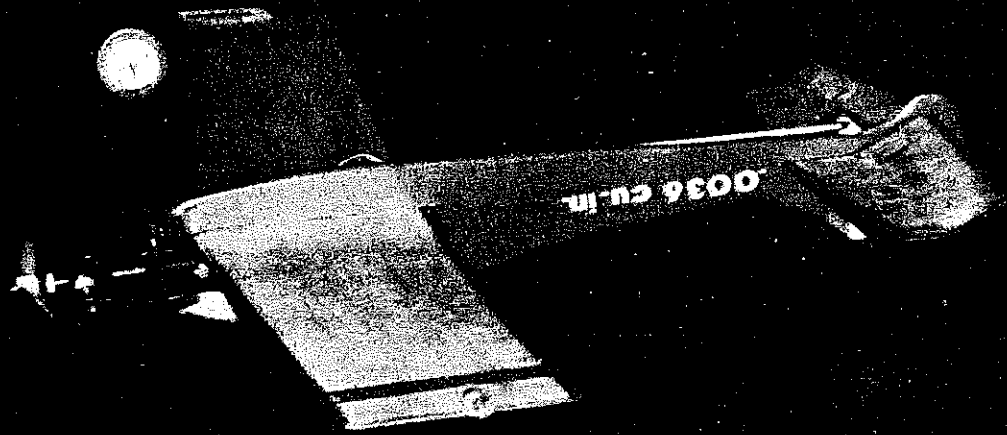
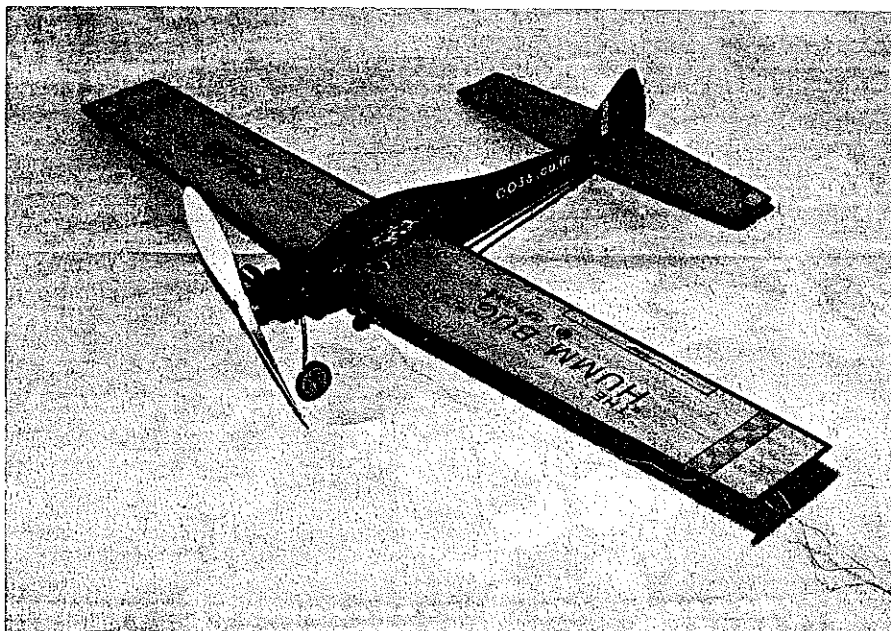


Humm Bug

It's a most unusual 'critter' for Control Line fun flying. Using a Telco CO-2 engine and 10- and 15-ft. lines, this big, featherweight model can perform many stunt maneuvers in any indoor site big enough for the lines. Try it for an interesting change of pace. ■ Doug Dahlke



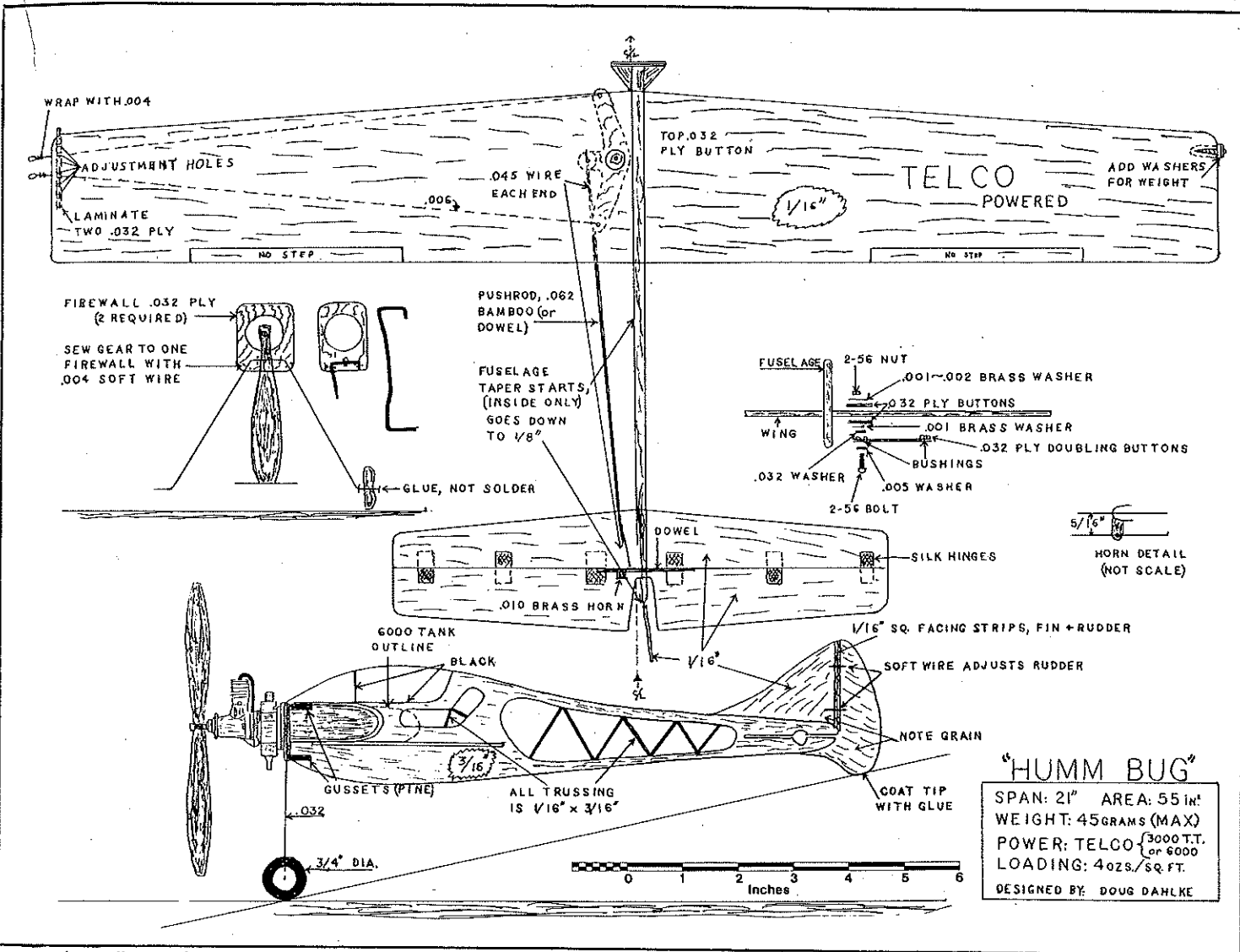
This isn't a trick photo. The Humm Bug really was caught while flying upside down—maybe even at the bottom of an Outside Loop, judging by the elevator deflection. Clean operation, no noise, and short lines allow this lightweight CL model to be flown in places you've never thought of.



CO-2 STUNT? Why not? No one will say you're a copycat! Although not exactly common, the August 1948 issue of *Flying Models* carried a CO-2 Free Flight model and suggested "movable controls might be fitted to fly C1. About two years later, Frank Ehling powered one of his early Stunters with a tiny CO-2 engine. The former Herkimer model engine company produced a large CO-2 engine at that time. Its wallet-crunching greed for fuel required the 1.2-oz. steel sparklet cartridge to be carried along. It gave one flight. The new .0036 cu. in. Telco 3000 offers CL and FF fans a clear advance. Invertible, it gives 40 grams of thrust at a medium power setting.

Why build the Humm Bug? 1) With no noise or crud, mind-jangling flying sites become available—like the meeting room in

Rub-on dry transfers from an art supply store can be used for attractive decorations (ordinary decals are too heavy!). Odd angle of the balsa pushrod is caused by the special bell-crank that is needed.



"HUMM BUG"
 SPAN: 21" AREA: 55 in.²
 WEIGHT: 45 GRAMS (MAX)
 POWER: TELCO {3000 T.T. or 6000
 LOADING: 4 ozs./sq. ft.
 DESIGNED BY: DOUG DAHLKE

you local library after the club adjourns. If there's room, here's the model. 2) You can learn much about really building lightweight that will, hopefully, carry over to your larger models. 3) This allows us blizzard-bound balsa builders to keep a hand in flying. You lose a lot of controlling ability over the winter by not flying at all. 4) Some Indoor modeling folks may have wanted to try Control Line without losing any indoor comfort. Here's their chance. 5) Sport fliers will find this a real change of pace. 6) It makes an unusually good trainer, as flights can be shortened to less than 10 seconds. 7) Mall-type hobby shows are great to attract young beginners by doing a few simple stunts like loops and inverted flight. It was after just such a display that I conceived the Humm Bug. 8) I suspect Indoor Combat could be flown with 1/4-in. tissue streamers. Wild!

Realize before you start this model that it is no Jr. Stiletto—nor is it the last word in the genre. It is offered as a starting point. Let's build a Humm Bug. It's a gas!

Construction. A full night of leisure work should produce this model. Balsa 4 to 6-lb. stock is used for the fuselage. Remember that 6-lb. stock is 50% heavier than 4-lb., and you are building to a 40-gram thrust level. If you lack a scale, *Model Aviation*

advertisers will sell you plans for making an accurate one for \$3.00. If you're short of

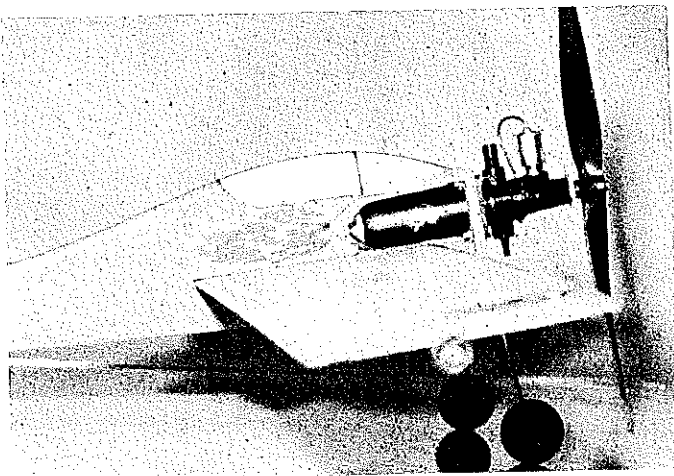


Model with the author gives a better feel for the model's size. At 21-in. span, it is as big as many 1/4A profiles. That gives it great maneuverability, but with the CO-2 engine providing only a fraction of the typical 1/4A's power, an extremely lightweight structure is a must.

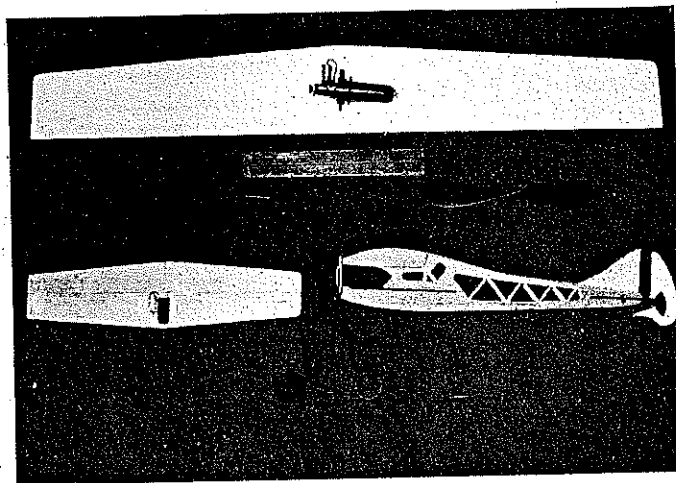
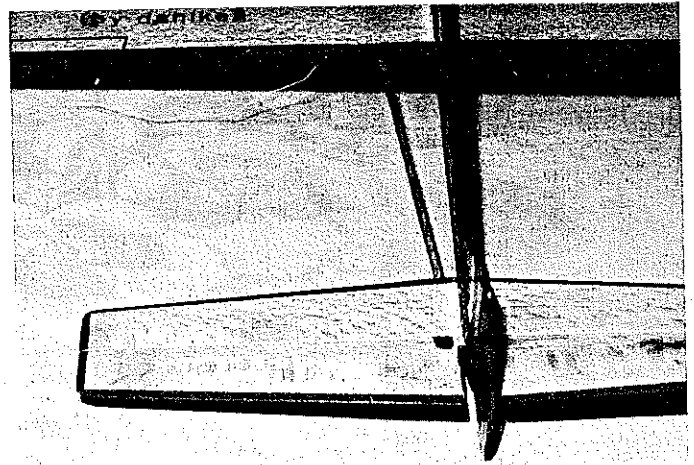
time to get a scale "right now," then remember this: *three standard Daisy steel BBs weigh one gram.* Put 81 of these BBs (27 grams) in the smallest plastic bag you have, trim off the excess, and tape it shut. A simple teeter-totter balance can be made using a common yardstick. The balsa must balance the BB's.

Cut the fuselage to shape, and core out at least the amount shown—more if you're brave. Make the Warren-trussing strips from the material just removed, as it is identical in density to the wood remaining in the fuselage. This helps to reduce warps. Glue the trussing in place with a cyanoacrylate (CyA), and notch out for the tank clearance, leaving 1/16 in. around the edge. Cut out the wing and tail slots. Allow an extra 3/8 in. at the trailing edge to shift the wing aft for balance purposes. Cut out both 1/32 ply firewalls, and bend a .032 wire gear for a single-wheel landing gear or .025-.028 for a two-wheel setup). The larger firewall shown is the trainer version; the smaller one is for the single-wheel gear. Sew the gear to one firewall with thread after notching for clearance. Glue the firewalls together.

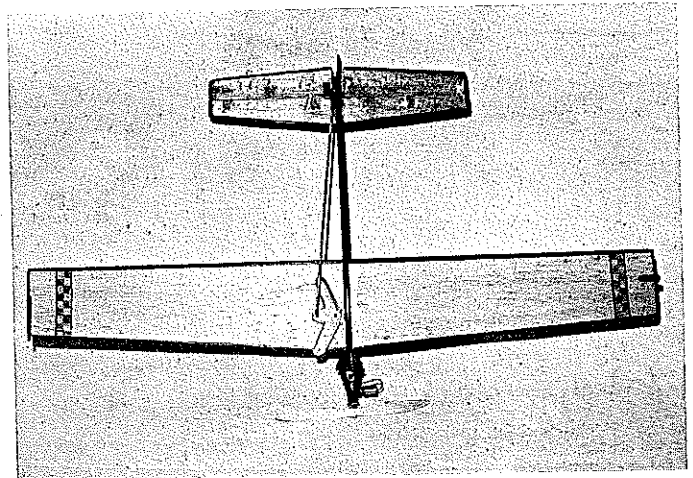
While the glue dries, pull all but 28 BBs from your neat little plastic bag, and with your teeter-totter balance find a piece of 1/16 x 3 x 36 balsa that does not weigh more



Left: Humm Bug has a sleek profile reminiscent of early 1950s CL planes, especially the Jim Walker A-J models. Upright engine and two-wheel gear are best for the trainer version. Right: Silk hinges used by the author are barely visible. Dark spot on inboard elevator is top of the control horn.



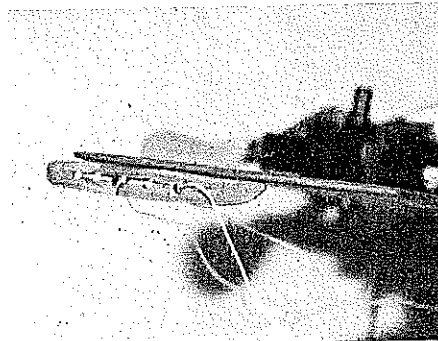
Left: All of the pieces before covering the fuselage and assembly. Note Warren-trussing of the fuselage for strength while saving weight. Right: Special bellcrank seen in bottom view is to get the pivot point close to the plane's center line. Tip-weight box makes use of washers.



than nine grams. My sheet was 7.9 grams, giving a 4.9 lb./cu. ft. density. Cut out the wing and tail surfaces from this wood. Round the edges, but don't try to "airfoil" these flat-plate surfaces, as this will only cause a warp. A cotton swab stick is glued in place to connect the elevators. Install the soft wire rudder hinges and tip weight box. Epoxy on the firewall with the tiniest dabs possible. Glue in the firewall gussets; when dry, drill the engine mount holes.

The bellcrank is 1/32 in. doubling buttons on the top side to provide support for the bushings. The odd bellcrank gets the pivot point as close to the aircraft center line as possible without putting a hole in the fuselage. My first pushrod was 3/32-in. bamboo. Overbuilding, again. The next one was a 1/16-in. hard balsa "dowel" with wire ends for trimming. Result: 50% weight reduction. Bind short music wire tips on the pushrod with thread or .004 copper wire, then glue. Use white glue for the silk "Z" hinges and the horn. You should have at least 35° of up and down elevator. Cover the fuselage with bamboo paper in your choice of color, shiny side out. You can substitute Ply Span. Reason: very little dope is needed to seal it. Old Timer Models in California sells both, and Sig Mfg. Co. sells Ply Span.

Permanently borrow those lightweight



Close-up of adjustable lead-out system. To change line sweep, just unplug eyelets and move backward or forward as needed, then reinsert.

¼-in. hollow plastic wheels from your old Sleek Streak rubber model. The whole plane can be bought new for 79¢ or so. Serious builders will disdain such things and build a hollow, spoked wheel from mushy balsa, with bitsy 1/64 ply side buttons for the axle to ride on. The one I built weighed only ⅓rds of what a Streak wheel weighs. CyA-glue the wing in place after moving the body 3/16 in. outboard, giving unequal panels. The tip weight "box" is a tiny lumpkin of pine placed sideways to partially balance the lead-out drag and provide a tip skid for the single-wheel gear operation. The .048 i.d. by .098 eyelets are standard Perfect Parts

items; they are easily lost beneath your fingernails if you are careless. Temporary lead-outs were .006 wire wrapped with .004 copper wire. Once the sweep adjustment was found, they were discarded, and the lines were tied directly to the bellcrank.

Here are component weights for users of accurate scales:

Telco 3000 T.T. with prop (40g thrust @ 4,000 rpm), 22.0 grams.

Telco 6000 T.T. with prop (45g thrust @ 4,500 rpm), 26.0 grams.

Wing, sanded but bare, 4.7 grams.

Wing, painted but minus controls, 5.4 grams.

Trainer fuselage (papered) with firewalls, two-wheel gear, fin, and paint, 7.95 grams.

Fuselage (as above) but with single-wheel gear and lightweight nose, 4.95 grams.

Tip weight box, complete with screw, .3 gram.

Sleek Streak hollow plastic wheels, each, .45 gram.

Hardwood rubber model wheels, 1-in. diameter, each, 2.3 grams (a definite no-no).

The properly built model needs neither nose nor tail weight. If you can carve a good propeller, you can probably reduce the prop weight by 1½ grams. The lighter the model, the more the duration of flight and the less power needed. Depending on the grade of wing wood used, you may notice some wing

Fly a Lazy Bird

The Glider with a Difference

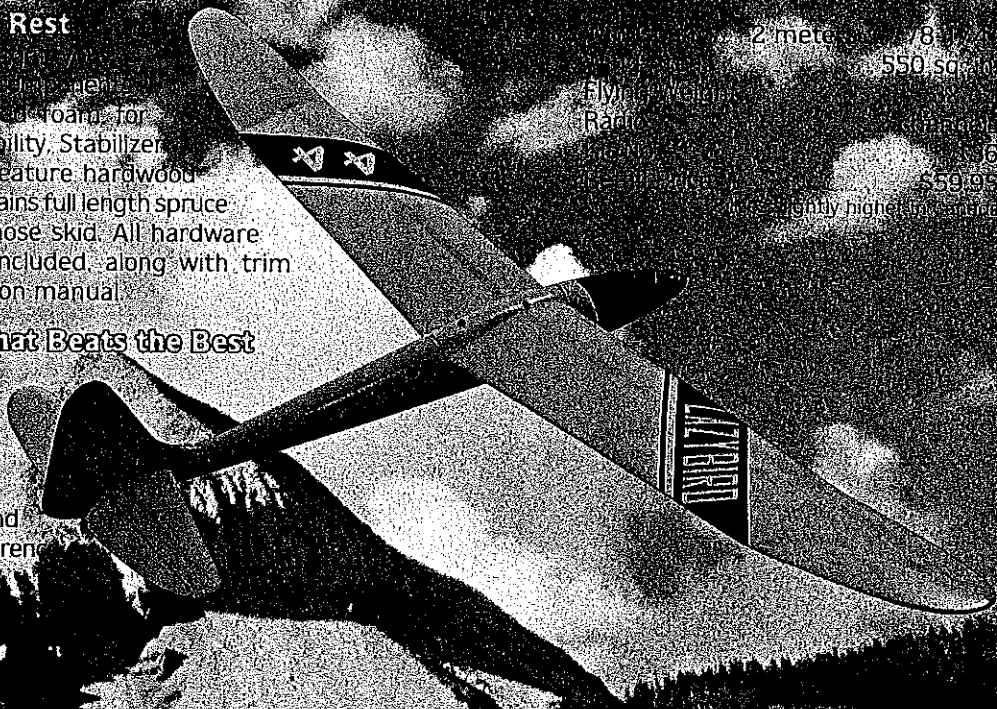
Assembly - Faster than the Rest

The Lazy Bird is built into soaring form. The wings are injection-molded foam for strength and durability. Stabilizer and bolt-on wing feature hardwood spars. Fuselage contains full length spruce stringers and ply nose skid. All hardware and linkages are included, along with trim sheet and instruction manual.

Performance That Beats the Best

The Lazy Bird performs as well as many conventional wooden gliders. Fly a Lazy Bird and experience the difference.

Wingspan: 2 meters / 78 in.
Wing Area: 550 sq. in.
Flyin' Weight: 39.6 grams
Radio: 2 channels
Price: \$59.99
Flyin' Time: Slightly higher than standard



Midwest Products Co., Inc. • 400 S. Indiana St. • P.O. Box 564 • Hobart, IN 46342 • (219) 942-1134

flex in flight. I doubt if this affects the flight, but if it bothers you, add .004 copper flying wires on the top and bottom—or V-braces of 1/32 mushy balsa.

You may have no idea how badly most of us tend to overbuild. My calculator pointed out interesting things to me, like the fact that for a given length, .045 wire has twice the volume, hence twice the weight, of .032 wire. My Ohaus scale told me that the four stock Telco mounting screws weigh a total of one gram. My toolbox produced four replacements of the same length, but thinner; they weighed .42 gram, a 58% reduction. Of course, a single-wheel gear is half the weight of a standard one for two wheels. During one point in my testing, a friend suggested I try nose weight. Reassemble if needed, but add no weight!

At the current 39.6 grams, I have vertical takeoff capability with a medium power setting. For those who, despite all warnings, have managed to produce an embarrassingly heavy model, I suggest you fit in a Cox .01. At least you will have something to fly for your efforts, although the previously-mentioned advantages will be lost. Without braces, the .01 engine may shear the wing.

Finish. Brush three separate coats of 50/50 clear nitrate dope/thinner on the fuselage, sanding lightly between coats. Next, spray on three coats of 30/70 nitrate clear/thinner over the whole model, sanding if needed with 600 grit paper. Yep, 30/70 is correct; you need to keep the weight down. One coat

of Aerogloss Bonanza Blue was sprayed on for color. Cockpit lines are India ink applied with a Rapidograph technical pen. The fin flash reflects the Anglo-Saxon heritage of the Telco.

Flying. Do read Telco's instructions. Operating this engine isn't hard, just a bit different from what you may be used to. It shouldn't take over 60 seconds for the liquid CO-2 to run down through the tiny inside diameter of the needle into the tank via the also tiny tank inlet. *Do not* lay the cylinder over level or point it downward when you are first puncturing the cartridge; liquid CO-2 may freeze things open, and the charge will be lost. The prop I received with the engine had the hole off-center; check yours. It is a sturdy prop of low pitch, and it should be able to withstand very high rpm safely. Using ready-made props, my best results were achieved with the prop from a "no-name" CO-2 sold by mail a few years ago. It has a diameter of 5 1/2 in. Of course, a balsa prop would be best of all, and I doubt that you would break one very often.

One-pound-test line will more than withstand a 10-g load safely—that is if your model weighs 45 grams or less. The 'ancients'—who actually used to build models rather than import or cast them—have been known to "build" their flying lines as well. Cloth lines can be stretched out and doped, sanding between coats with 600-grit. Two thin coats of dope is all you need. This reduces line stretch in flight (which is not the

problem here), and it also cuts line drag (which never hurts).

I didn't bother with this. My "natural" lines approximately .010 to .015 diameter (ever try to measure cloth lines?) were tried in both 10 and 15-ft. lengths. The 10-ft. lines were better.

Be prepared to assist the model just as PAMPA folks do with their big Precision Aerobatics models by occasional whipping during maneuvers. I have gotten seven Inside Loops in one flight before the lines started getting sticky. Inside Square Loops were recognizable, and so was my Triangle. A Lazy Eight and Inverted Flight have also been done. Clearly, other maneuvers are possible. Short lines are the functional equivalent of extra gram-power, and 40 grams is what you have to work with.

Warning! My girlfriend, apparently cowed by the bark and snarl of the throbbing Telco, failed to snap the prop completely over. Only bumping it against compression resulted in a nice engine run—backwards! Upon release, the Humm Bug responded normally to negative thrust, backing away at a fair pace. Despite this being my first canard clockwise taxi effort, I realized what was wrong and kept full-down elevator. I'm glad this happened in private!

A couple of times while flying inverted, I ran out of charge, and I landed inverted atop the copper motor feeder tube. At such low flying speeds and low weight, no dam-

Continued on page 164

FULL * SIZE * PLANS

- No. 409 **Fokker Spin III** \$8.25
 FF Scale. Early Fokker monoplane trainer for .049 power. 3 shts. + doc.
- No. 410 **Pober Pixie** \$13.00
 RC Multi-Scale for .40 power, 4-channels. Can be built as sport flier or Precision Scale, depending on detail added. 2 shts. + doc.
- No. 411 **Humm Bug** \$1.75
 CL CO-2-powered profile mite for sport, Stunt.

No. 131	Gee Bee Model Y: 40-powered RC stand-off scale of one of the great old-time racers	\$5.00
No. 193	Sillette: CL Stunt model (McDonald) winner 1976, 1980, 1982 FAI World Champs	\$3.75
No. 225	Ole Reliable: RC 79" version of '38 old-timer, REM controls, 19-25	\$4.25
No. 239	Blue Birds: RC Ken Willard's formation plane, 4-ch., 10	\$3.75
No. 262	Crashmaster: CL Crash-proof trainer, 2 sizes—15-30 and 35-40	\$1.25
No. 282	Gee Bee: RC Granger Williams' magnificent Model Z for .40 engine	\$7.50
No. 291	Cap 20: 40-powered scale RC of French aerobatic plane. Low wing tail dragger, 2 sheets	\$7.50
No. 299	Gee Bee Sr. Sportster: RC 1/4-scale by Halkke for .91 power. Prototype span 30 in. 2 1/2 sheets	\$11.75
No. 302	Mini F-16: RC Sarpolus' .049 ducted fan sport flier for 2-ch. Balsa wings, tail, fuse structure	\$2.75
No. 307	Pegasus: RC Watson's giant super sailplane features flaps, spoilers, T-tail, 166 in. wingspan	\$6.75
No. 310	1930 Fleet Biplane: RC Sport Scale for .35-40 4-ch. Wingspan 56 in. 1/6 scale. Two sheets	\$6.25
No. 314	Drake II: RC Ken Willard's flying boat for 3-ch., 15-power. Fly from land with removable gear	\$3.75
No. 326	Taylor Cub: RC Don Strull's Schoolyard-Scale for .049s. 2-3 Ch. Spans 50 in.	\$3.50
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No. 343	Waep VI: FF Mike Stoy's Nats-winning Outdoor HLG	\$1.00
No. 348	Onestep: RC Trainer has very forgiving flying qualities 3-ch., 10-25 power	\$4.25
No. 354	Merlyn: RC Giant. 155-in. span Sailplane uses 3 RC channels	\$7.50
No. 356	Maule Lunar Rocket: RC 1/4-Scale spans 92.5 in.; 5-ch. (flaps); 1.2 cu. in. engine	\$12.00
No. 358	Pieces: FF Indoor Easy B Rubber-power contest-winner by W. Van Gorder	\$1.00
No. 362	Supercat: RC Half-A Pylon Racer/sport flier. Aileron, elevator control. Foam wing	\$2.00
No. 365	Seamaster: RC Willard's .40-size flying boat for 4-ch. Strap-on gear for a landplane! 2 shts.	\$11.00
No. 368	Space Shuttle II: RC Larger, improved version of Hux' glider for 3-ch.	\$5.50
No. 370	CAP-21: RC Giant-Scale of French aerobatic craft spans 7 1/4 ft., Quadra power, 2 sheets + doc.	\$14.00
No. 371	Strato-Streak: RC Old-Timer version of Garami's famous '41 FF design for 1/2A power, 2-ch.	\$5.00
No. 372	Nelghvion: RC Low-wing, 1/4-gear sportster for 1/2A power, 4-ch.	\$5.00
No. 374	Marissa: FF Rubber-powered sportster in the Golden Age tradition	\$3.00
No. 375	Snapshop Twin: RC Workhorse utility/sport ship for twin .35-.40, 4-5 ch. Foam wings, lifts 12 lbs., 2 shts	\$11.00
No. 376	Aurora: RC Sport/Aerobatic flier for .049-10 -power uses 2 or 3 ch.	\$3.50
No. 377	Wingmaster: CL Sport Stunter for 1/2A Profile fuselage, sheet wings w/flaps	\$2.00
No. 378	Mr. Spook III: RC Fly Sport Pylon, Nov./Sportsman Pattern, or sheet sport. Uses 4-ch., 25-.40 pwr	\$5.00
No. 379	Monoboom 1/2A: CL 1/2A Combat ship is large, light, super performer	\$3.75
No. 380	Witch Hawk 500: FF Hot Class A/B Gas competition ship for .15-.23 power. A Nats-winning design.	\$3.75
No. 382	Navy Flier: FF Rubber-power sports flier captures the Golden Age flavor. Spans 26 in.	\$3.00
No. 383	Callisto '62: RC Fly this sleek, Nats-winning Sailplane in AMA Mod. Std. or Unlimited classes	\$7.50
No. 385	Similar .61P: RC Evans' famous design returns as a .60-sz. Pattern plane. Retracts, foam wing	\$5.50
No. 386	Laser 200: RC Sport Scale replica of championship Aerobatic flier. Uses .40 power, 4-5 ch. 2 shts	\$10.75
No. 388	Czech Mate: FF Cute, low-wing sportster for CO-2 powers spans 25 1/2 in.	\$2.25
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No. 395	Sky Baby: CL 1/2A Racer for Mouse or Scale. Plans show Cox Black Widow. Spans 18 3/4 in., V-tail	\$1.75
No. 396	Lee-Richards: FF Electric-powered (020) Scale of ring-wing oldie	\$3.50
No. 397	Bell YFN-1 Alracuda: CL Sport Scale profile twin for pusher, reed-valve .049s	\$3.25
No. 398	Gee Bee R-1: RC Halkke's latest 1/4-scale spans 75 in., weighs 15 lb., flies on .80 or larger. Four shts. (no. doc.)	\$22.25
No. 399	Zephyr 1100: RC AMA Class B Sailplane for 3-channel RC gear	\$6.75
No. 400	Mid-Slow: CL Rat-Race-style Stunt trainer for .20-power. Profile	\$5.00
No. 401	Royal Lancer: FF Basic competition model for AMA Class A uses standard-performance .15 engines	\$5.50
No. 402	Ape: FF Jumbo Rubber Scale of Armstrong-Whitworth research biplane from the mid-Twenties	\$4.75
No. 403	Cub Floatplane: RC Sport Scale for .049-10 size engines, 4-ch. RC. The J-3 on floats is a classic	\$6.50
No. 404	Focke-Wulf 190: CL Profile Scale for 1/2A power features unique engine mount for more realism	\$3.00
No. 405	Regent: Queen of the Skies: RC Fun-type biplane for .40-.60 power, 4-channels (2 sheets)	\$13.50
No. 406	Piper Comanche: CL Sport Scale uses twin .25s, throttle control (2 sheets)	\$8.25
No. 407	Boeing XF5B-1: RC Sport Scale for 1/2A power, 2-3 channels	\$4.25
No. 408	Re-Volt-Er: RC electric-power sport flier for 2-channel, .05 motor	\$6.50

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379	380	382	383	385	386	388	389	390	392
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"anything" and not self-destruct. The engine features a chrome liner with an aluminum piston and a special ring. Everything has a proper fit, so the engine doesn't tear itself apart. How well it continues to run after a few ground-poundings we'll soon find out, because a limited number of these engines should be out by the Memorial Day meets. As the message on Howard Rush's fuel says, "10% more nitro than your fuel," the same can be said about this motor. In tests, it is faster on any number of props than anything else—but then the real world is a harsh place for Combat equipment.

Charlie Johnson, 3716 Ingraham St., San Diego, CA 92109.

CL Navy Carrier/Perry

Continued from page 87

problem, Ron installed an Acme battery holder for a C-size alkaline cell under the canopy of his Class I Guardian. A single cell would provide enough power for three official flights, even without a switch to open the circuit during high speed. It could even be used for starting! The Acme battery holders are available from Sig.

The photo this month is Glen Magree's .15-sized Wildcat. The model won the Rocky Mountain Aeromodelers' .15-class Carrier competition last fall with a high speed of 65 mph and a slow speed of 24.8 mph. The event has been under development since last summer, and Glen reports that there are 10 to 12 models under way for this year's flying season. The rules for this event were described in the February issue.

Richard L. Perry, 7578 Vogels Way, Springfield, VA 22135.

Humm Bug/Dahlke

Continued from page 93

age was done, although I would avoid doing this repeatedly on cement. If this happens, your helper can easily catch the model by simply cocking both arms up at the elbow so they are level with the floor and letting the model coast into his or her tummy.

The model decelerates quickly when power fades, which is typical of lightly-loaded aircraft. Lightly loaded, low-powered models may stall easily, but they also recover readily. If more line tension is needed, bend in more rudder, add a .010 to .020 shim behind the engine to give out-board thrust, or alter the line sweep. The crankshaft is the throttle, and it is controlled by turning the flat hex nut just behind the prop. Do not raise or lower the dot more than 15° from factory setting.

"Sprint" performance, as the factory calls it, will give you 78 grams of thrust—but for a shorter period of time. It would, however, generate the power for more complex vertical maneuvers. Rotating the cylinder 90° outward into sidewinder configuration slightly reduces the required tip weight, and the extra drag of the cylinder is correctly placed. I am not certain that it runs as well in this position, though, and I seemed to have more irregularities in the runs. This may have been due to other causes, and further testing is needed.

Have fun with your Humm Bug.

Full-size Plan List Available. A complete listing of all plans previously published in this magazine, through No. 381, may be obtained free of charge by writing (enclose stamped pre-addressed envelope) Model Aviation, 1810 Samuel Morse Dr., Reston, VA 22090.