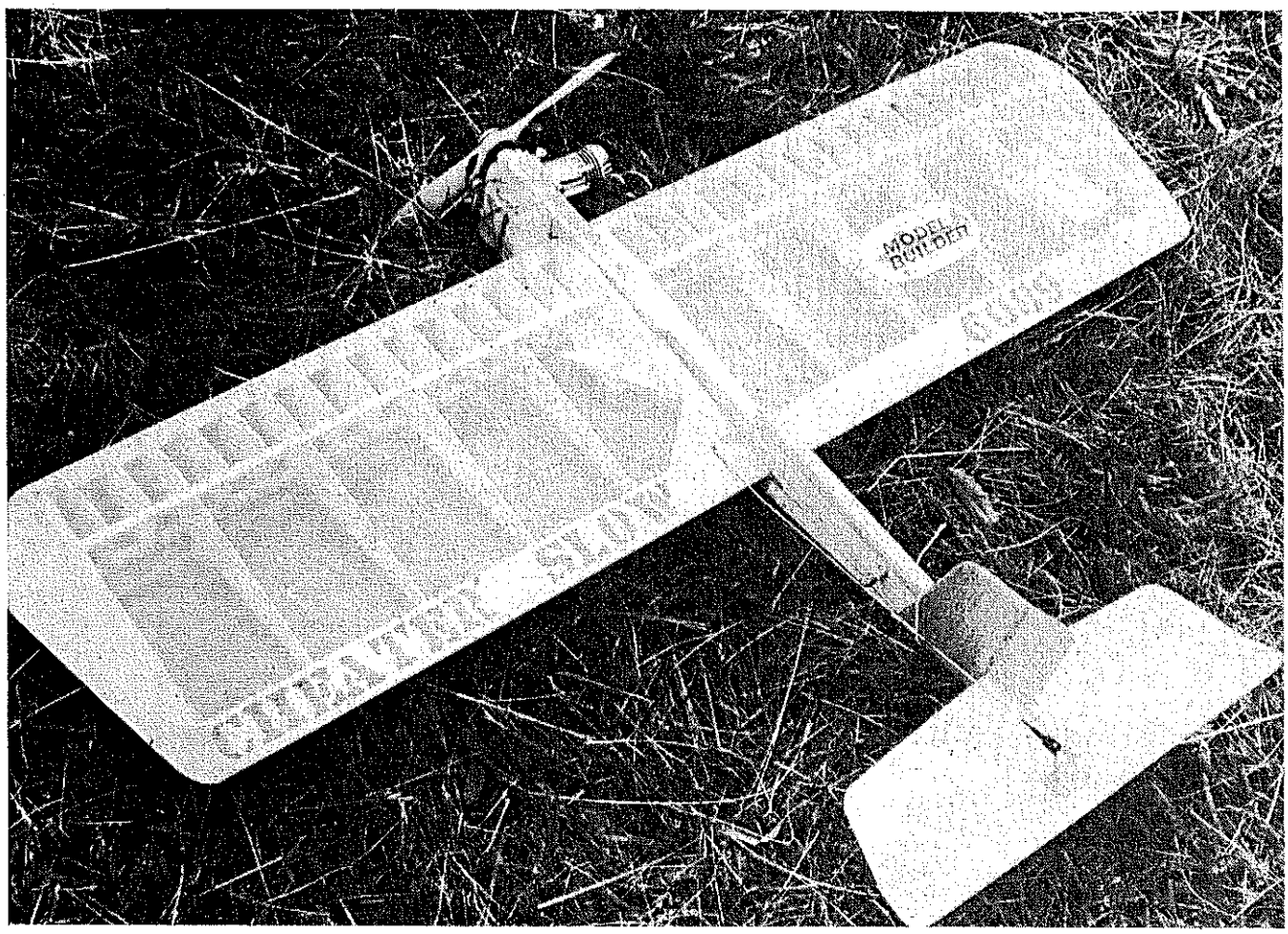
185



The Cheater Slow as used to win the Northwest Regional meet in 1976. The older model Fox was since replaced with Supertigre G-21 35 shown in other photos. Note inboard tank. With penchant for see-through covering, Dan used FasCal—other plastic films OK. Richard Lopez pic.

CHEATER SLOW

'Slow' is a good way to get started in Combat—and it's great fun in itself. A well-known flier/designer presents a thoroughly proved airplane. ■ Dan Rutherford

WHEN I STARTED showing up at Combat meets here in the N.W. with early versions of the Cheater Slow, more than a few assumed it could not be a legal Slow Combat plane, so superior was it to existing equipment. Close inspection by the nit-pickers verified that the plane is legal. But to keep them guessing, I thought it a good idea to hang the "cheater" label on the plane!

Ugly you say? The beauty comes through when an opponent can't follow you through maneuvers. Or when you are following and can turn with him without even having to use full control. I've won a lot of matches with this design. It long ago quit looking ugly to me.

Slow Combat is a very good starting point for anyone interested in getting into this kind of flying. Many novice fliers require complete building instructions from an article such as this. As a concession to custom, I describe the construction in what is really a rather illogical sequence. By that I mean you could be working on the fuselage while glue is drying on the wing, or assembling a tank, etc. If you were to follow the directions below to the letter as far as sequence is concerned, it would take several days to build one plane, whereas I can build two in three evenings or less. So, if you have built planes of this type before, feel free to skip around.

Construction

First cut out all wood parts. It's just as easy to cut out everything now, so you'll be simply assembling parts later on. The only piece not cut out now is the ⅛" lite-ply (available from Sig) used as a doubler on the inboard, forward side of the fuselage.

Wing: A hint for cutting the trailing edge pieces. I cut them out of 3-in. wide sheet and start by truing up one edge of the sheeting with a metal yardstick. Make this cut as close to the edge as possible. Now move the yardstick and cut the top TE piece. The piece left over will be more than enough for the bottom TE piece—exactly what we want. I build mostly with Hot Stuff; when gluing the TE pieces it is much easier to wick the glue into the joint if the bottom piece is protruding slightly. When the wing is completed, it is a simple matter to trim the bottom piece, using the top piece as a guide.

You can build on the plans. (Cover them with Saran Wrap first.) I simply draw a straight line on my building board (which is faced with Celotex, available at most lumber stores). This line is used to line up the TE pieces; vertical lines erected from this line are used to locate ribs.

Now, to frame the wing. The laminated center rib (3 ribs, each ½-in. thick) should have its spar slots cut out, also the slot for the ¼"-sq. spruce used as the aft bellcrank

mount.

Pin the bottom TE piece to the building board, being sure that the forward edge of this piece is lined up with the straight reference line on your board or the plans. I glue the three center ribs to each other with Hot Stuff. Five-minute epoxy is then applied to the two ¼-in. slots in this assembly and the bellcrank mount and bottom spar are slipped into these slots. Don't wait for the epoxy to set up! Immediately lay this rib/spar assembly on the board and glue to the bottom TE piece with Hot Stuff, once it is properly lined up. A weight placed on the center rib will hold it in position until the epoxy is set. Notice that the spar sits flat on the board, as does the entire rib from the spar back. I took this idea from several of Rich "von" Lopez's more recent designs, and it doesn't seem to hurt performance of the airfoil, while utilizing a flat board as a perfect (and simple) jig.

The ½-sq. LE piece is glued to the center ribs. Be sure the LE is aligned properly in all directions before gluing. Hot Stuff is perfect for this joint, assuming all of your parts are cut to fit accurately. (Since, as mentioned, I build mostly with Hot Stuff, I'll specify hereafter the glue used if it is not Hot Stuff.)

Starting at the center of either wing panel, place ribs and half-ribs in place and glue, working your way to the tip. With all ribs glued in, add the top TE piece. The top spar now is glued in—it is wise to use epoxy at the spar/center rib joint, especially if this joint is a loose fit.

Prepare the bellcrank assembly by attaching leadouts and cutting off the outboard end of the bellcrank as shown on the plans. (I use the middle hole for the pushrod.) If you want more movement of the bellcrank for the same amount of movement at the elevator, use the hole closest to the pivot point. It is easy to try both setups on the same plane. The "naked" construction may look strange, but it leaves the controls accessible.

Bend the crank end of the 1/16 pushrod (use .075 if you want), drill the platform for the mounting bolt and install the controls. With 5-minute epoxy, glue the platform to the ¼-sq. bottom spar and subspar.

Dan gives a mighty flip as Gary Stevens holds Cheater Slow. Dan's technique for fast starts is "back flip" rather than forward. Works best on cold or flooded engines. Lopez pic.

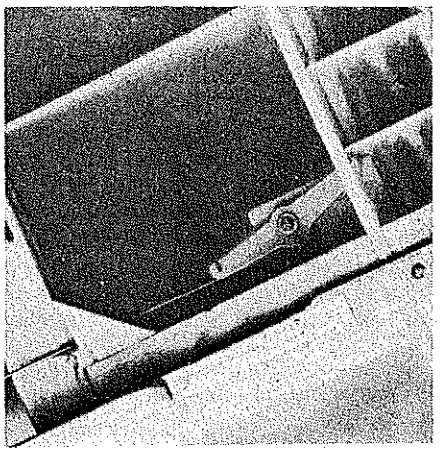
Mark each rib for the leadout location and use a hand-held paper punch to make the holes. Thread the leadouts through these holes and remove wing from building board. With the pushrod installed glue in the triangular piece of 3/32 balsa that acts as a guide for the pushrod. It also gives a bit of structure to attach covering.

The LE is carved to shape and the tips installed. Leadout guides at tip are simply short lengths of ⅛ brass tubing secured with micro-balloons and Hot Stuff (tack the guide in place with Hot Stuff, pile micro-balloons on tubing and add a couple drops of Hot Stuff). Sand the wing all over and it is ready to cover.

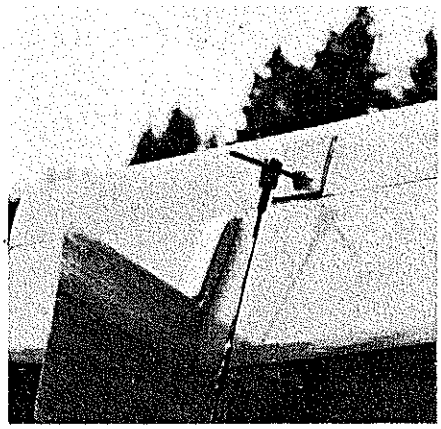
No, I didn't forget the tip weight, which is not required with the longer inboard panel. I cover with FasCal, but other plastic films are acceptable. FasCal is tough and relatively cheap. I cover from tip rib to tip rib and then cover the tips with Monokote. The color at the tips makes the plane a bit easier to see, if you have to look for it during a match.

Check the wing carefully for warps, by sighting it from the rear. The TE should appear centered. If not, there is a warp. This design is no more tolerant of warps than any other.

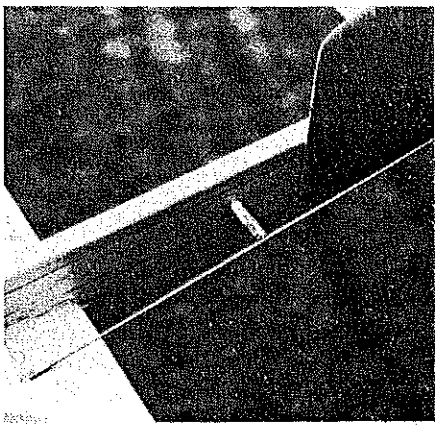
Fuselage: No need for extras on a Slow Combat plane, is there? Start by laying out a straight reference line 1 inch from the edge and parallel to it, on a piece of ½ × 3 balsa. With this reference line, outline the fuse and cut it out. At the nose section I lay in place the pre-cut motor mounts,



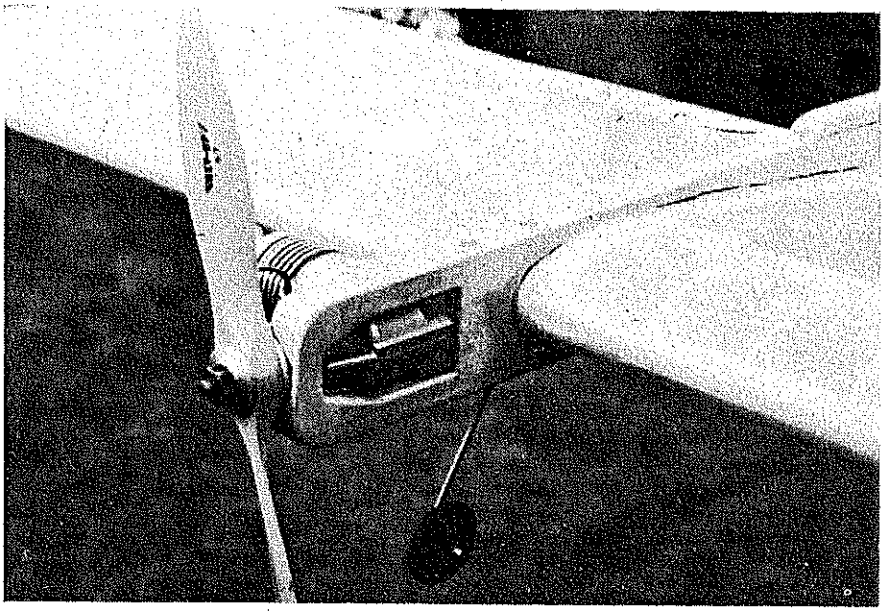
Dan allows that the bellcrank installation looks naked but says it sure increases accessibility.

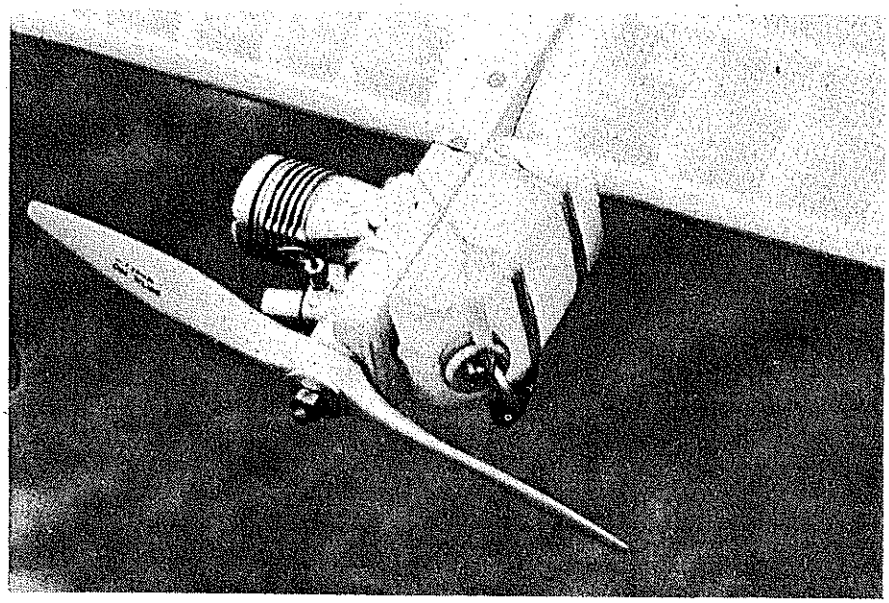


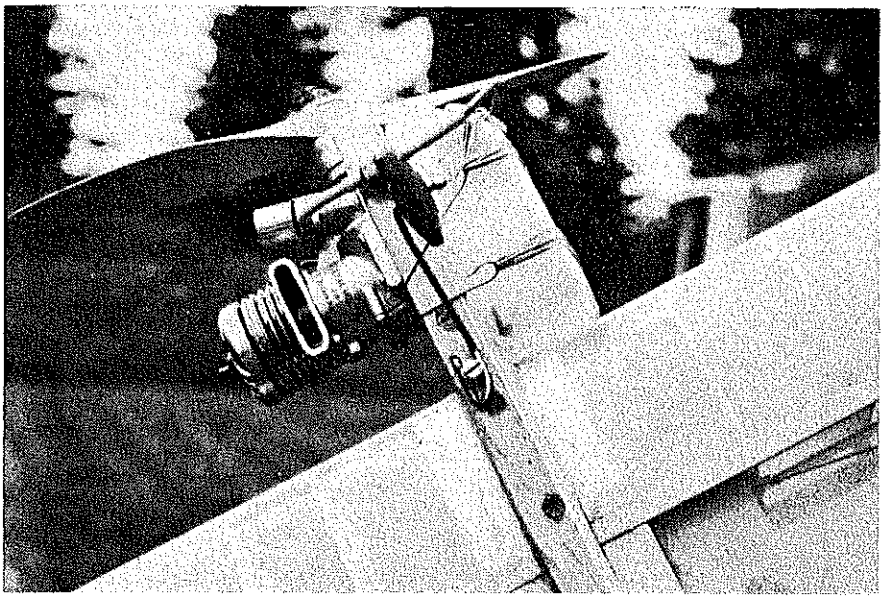
The dial-a-turn linkage consists of Rocket City clevis, DuBro threaded rod. Permits precise adjustment.



The pushrod fairlead is dowel inserted into fuselage with U-shaped wire wrapped in place, then epoxied.







Top: Tank removed to show how profile is holed to accept the case of the engine. Virtue of the inboard tank is that it permits engine to be mounted closer to wing, decreasing usual tendency to nose-heavy condition. Middle: The 4-oz. Pylon SS-4 clunk tank normally is used for RC. Above: Underneath view shows gear mounting, how tank is rubberbanded in place, and fuel feed line.

mark their outlines on the fuse and then cut it out to accept the mounts. For now ignore the wing cutout. The mounts are glued in place with 5-minute epoxy. Get them glued straight and square to each other.

The ⅛ lite-ply spacer (doubler) is glued to the inboard side of the fuse. Best way to do this is to cut a piece to length, but oversize the rest of the way around. Lay the fuse on this spacer and glue. Lay a scrap piece of ½ balsa in place at the nose of the fuse and against the spacer. Glue this in place and then cut off both the excess ply and ½ balsa. If you want, the ply spacer may be extended at the rear to act as a doubler at the joint between the balsa fuse and the maple motor mount. This does help to keep the fuse in one piece when installing the wing.

A trial-fit of your engine should show that the bottom of its case hits the lite-ply spacer. Cut out the spacer to clear, using the plans, pictures and your engine as a guide. Don't worry about losing strength by cutting the center out of the spacer. The front end, as shown, is strong enough without doublers—the one shown is simply used as a spacer to keep the engine's case from riding directly on the tank.

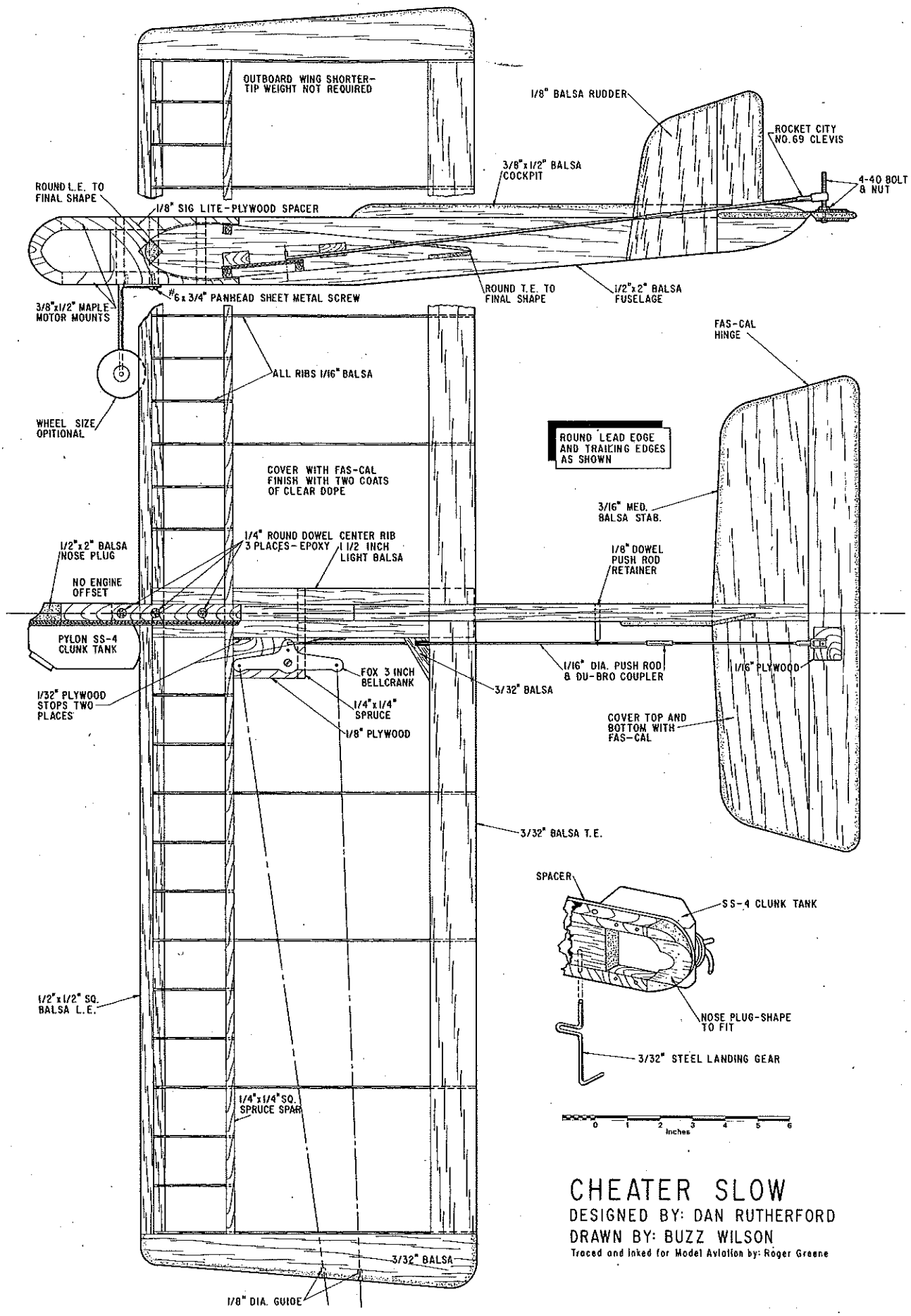
Make the wing cutout as accurately as possible. Too tight a fit will cause problems when fitting the wing—tight fit may cause the fuse to split apart. Too loose a fit makes it difficult to glue wing parallel to the reference line, and adds unnecessary weight when you slop in epoxy.

Remove the covering from the center rib (three ½-in. ribs). Slip the fuse on the wing and glue in place with 5-minute epoxy. Double-check to be sure fuse is straight from all angles. When the glue is dry, drill three ¼-in. holes at the location shown on the plans through both motor mounts and the fuse/wing. Cut three pieces of ¼-in. dowel to length, dab plenty of 5-minute epoxy into the holes and as quickly as possible insert the dowels.

Tail Surfaces: The stab and elevator are cut out of 3/16 balsa, the outline sanded, and then the LE of the stab and the TE of the elevator are rounded. A little trick probably not very common in Combat circles: Look at the plans and you'll see that the TE of the stab and the LE of the elevator are beveled from bottom to top. Make these bevels fairly sharp at the hinge line, to avoid binding.

Covering and hinging of the stab are done in one operation. I use Monokote, but any plastic film is fine and the previously mentioned FasCal also works well. Lay the stab and elevator flat (right side up) on the bench and butt them up to one another. Cover the entire stab/elevator with one piece of film. Flip this assembly over, fold the partially hinged elevator over onto the top of the stab, and cover the bottom, again using one piece of film. With the covering done, lay the assembly flat again and you'll be done with it—in-

Continued on page 94



CHEATER SLOW

DESIGNED BY: DAN RUTHERFORD

DRAWN BY: BUZZ WILSON

Traced and inked for Model Aviation by: Roger Greene

FULL-SIZE PLANS AVAILABLE .... SEE PAGE 104

think of it it's always in tall corn.

Picture a thermal as a rising bubble of air that resembles an invisible hot air balloon. As this thermal breaks from the ground its direction or movement of flight is at the whims of the wind—exactly as is the track of a hot-air balloon. Now visualize your plane circling within that thermal and staying confined within that bubble. As the thermal rises it also drifts downwind at the speed of the wind—in this case at 10 mph. As you are lazily winding your way upward—and downward—there comes a point where a decision has to be made as to when to head back—and heading back is now into the wind. Now if both the KA-6 and the floater were enjoying the same thermal, and both fliers were of equal skill, both planes would be at the same altitude but the KA-6 would be flying at three times the airspeed.

It is rather obvious which has the advantage in getting back to the launch site but let's run through some figures. It is also obvious that if the floater flies at 10 mph in order to achieve a L/D of 10:1 then by flying faster—that is decreasing the angle of attack—the airspeed will increase but the glide ratio will decrease. The rate of sink will also increase. Let's say the glide ratio drops to 7:1 and the L/D is now 7:1 at 13 mph.

Now back to the thermal. Let's further say that both planes had launches to a normal height, hooked into the same thermal and are now five minutes into the flight. Altitude is now 700 feet after five minutes of launch release and with the 10-mph wind, both planes are 4500 ft. downwind. The KA-6 with its higher L/D should make it back to the launch point still 550 feet above the ground. Meanwhile the floater, in hopes to get back, has to increase its speed. Its original flying speed of 10 mph is matched by the wind and therefore will make zero mph over the ground. If the before mentioned increase in speed to 13 mph is the best the plane can combine at the L/D of 7:1, then the plane's speed over the ground is 19 ft./sec. minus the wind's 15 ft./sec. or 4 ft./sec. This would take the floater over 18 minutes to get back to the field—if it didn't run out of airspace. But alas, with the above figures the floater does run out after covering approximately 2800 ft. and it's the tall corn for a landing.

Next month we'll discuss ballasting and how to improve the performance of some usually lighter wing-loaded planes.

Dan Pruss, Rt. 2, Box 490, Plainfield, IL 60544.

Cheater Slow/Rutherford

continued from page 26

cluding hinging with no air gap between the surfaces. This type of hinge is strong, free in action, and easy to do.

Remove the covering where the stab glues to the fuse and glue the stab/elevator assembly in place. Be certain this assembly is located squarely. The hinge line on both sides should be equi-distant from the TE of the wing, and the stab should be parallel to the wing, when sighted from the rear.

The 3/8 × 1/2 piece now is glued to the top of the fuse. It is notched at the rear to clear the stab and rounded at the front to simulate a canopy, which seems to satisfy those that think such a silly thing as a phony canopy adds anything to the Slow Combat event. In any case, this piece is rather handy as it makes the mounting of the stab much stronger than simply gluing it to the top of the fuse, and also acts as reinforcement for the fuse itself.

The two rudder pieces are cut out, one being sanded to provide the offset shown when glued together. The 3/8 × 1/2 top piece is notched to clear the rudder offset and the rudder assembly is just glued onto the side of the fuse and into the notch on the top piece. The rudder is ugly, but it works. Don't leave it off.

Before final installation of the linkage, tank, engine, etc., put a couple coats of dope on any exposed wood. Not much required, just enough to fuel-proof everything. Use clear dope, if you expect good performance; colored dope is just too heavy.

Linkage: If you want, use the normal control-horn set-up, but I have found that the linkage shown is much superior in that adjustment of elevator travel can be precisely dialed-in, where it is hit and miss with a control horn. I call the linkage shown the "Dial-A-Turn." Give it a try, you'll like it. Here's how to do it.

First pick up a package of Rocket City Aileron Swivel Links (stock No. 69), DuBro threaded pushrod and split coupling sleeve, and a long 4-40 bolt. Make two doublers of 1/32 ply (the plans show 1/16, but I generally use 1/32) and glue them in place. Drill a 3/32 hole through doublers and stab. Screw a 4-40 bolt into this hole, snug it up with a nut and washer and epoxy it top and bottom. Although the plans show the bolt straight, I try to angle it a bit forward so that the point of attachment between it and the pushrod is over the hinge line.

The Rocket City clevis is screwed onto the DuBro threaded rod (not too far, we want some adjustment here). The clevis attach button is screwed onto the 4-40 bolt and the clevis is hooked up to the button. With the bellcrank in and the stab in neutral position, cut to length the pushrod from the wing. Using good solder, plenty of heat and the DuBro split coupling sleeve, join the two pushrods.

With your very own Dial-A-Turn hooked up, try the controls to see how much up and down you have. A total movement of

¾ in. is about right for starters (⅜ up, ⅜ down). This will probably be too much or too little, but the control system allows full adjustment to suit your tastes.

A pushrod guide is an absolute necessity. I drill a ⅛ hole through the fuse, glue in a piece of ⅛ dowel and then make a U-shaped piece of 1/32 wire. This wire is wrapped onto the dowel with wrapping wire, which is epoxied. Not pretty, but it works.

Engine, Fuel System: The placement of the tank on the inboard side of the fuse isn't all that unusual. Many people are using it because it allows moving the engine back a bit towards the wing, which helps get rid of the nose heavy condition seen in most Slow Combat designs. The tank is a Pylon SS-4 clunk normally used in RC planes. This tank works better than any I have tried. It is cheap, easy to make and mount, vibration doesn't bother it as there are no solder joints to break or leak. With the 4-oz. capacity it gives engine runs of over 5 minutes—super engine runs if the needle is set properly. More on this later. Look at the pics. The single vent goes to the top, forward and inboard-most corner of the tank. When assembling the tank, be sure this vent is not closed off, due to being jammed against the tank. There is no need for having the vent go up above the tank. I cut this vent off short, leaving a straight piece about ¼ in. long protruding from the plug in the tank.

The feed line is per tank instructions. Just be sure the clunk weight will reach both the top and bottom corners of the tank. The external, brass feed line is bent so that it goes straight to the needle valve and is not in the way of the prop. Use a fuel filter.

Wire clips are bent from 1/32 wire. These go on the fuse behind the engine; rubberbands attached to them hold the tank in position.

I regard blind nuts as too much trouble to install. They would interfere with the tank anyway. I use sheet metal screws. They work fine. Obtain #6 × ¾ panhead sheet-metal screws. A pilot hole is required —3/32 in. works fine. Punch the holes in and install your engine. The screws will go in hard the first time but will work easier afterwards. Use of these screws will mean drilling out the mounting bolt holes in your engine. You should be using #6 screws anyway, even if you use blind nuts.

Miscellaneous: Install the engine. Double-check for warps. Be sure the prop clears the tank and its assorted lines. So far, the engine I prefer for Slow Combat is the newest version Supertigre G-21 35. It has adequate power, starts easily and draws fuel very well, important in an event limited to suction feed.

For props, you have choices. The Rev-Up 9 × 7 is fine, although quite hard to find in any decent quantities. However, the very best prop I have found for Slow Combat is the Taipan 9 × 6. It really pulls through maneuvers and just generally works great. The only modification necessary is to remove the flashing from the LE and TE of the prop so you won't get cut while flipping it.

As a rule, we here in the N.W. go conservative on nitro in Slow Combat, yet we seem to fly as fast as anybody else. Speed is not the most important thing in Combat, especially Slow Combat. Much more important are easy starts (the one-flip kind), needle settings that are easy to get, and consistent runs from maneuver to maneuver, match to match. So we rarely use fuel with a nitro content of more than 20%. I use either Nitrotane 20% or Aldrich's Magnum 10%. Both fuels are excellent with the Magnum giving longer runs on the same amount of fuel. This is not a problem with the 4 oz. tank on the Cheater Slow; it'll give 5-minute-plus runs on most any fuel, but is something to consider if you use smaller tanks.

Flying: I'm hoping that you have followed my recommendations as to motor, tank, etc. because this plane was designed with only one combination in mind. For instance, use of a lighter motor will find you out at the field with a tail-heavy plane. Might be quite exciting for the first minute before the crash, but is definitely a situation to be avoided! *(more)*

Fill the tank through the feed line. This means removing the tubing from the needle, but that's OK since this tank will not require refueling during the course of a match. With the tank full, put the tubing back on the needle and pinch the tubing off with a clothes pin, etc. This style of tank likes to siphon, which will quickly flood the engine.

With a helper holding the plane, remove the clip on the line and start the motor. Now comes the strange part. With this style of tank the needle must be set very lean on the ground. Not so lean that the engine sags, but almost. Just lean it out until your fingers say "Stop," then lean it out a bit more and you'll be close.

When the plane is launched, go level for a few laps. If the engine goes a bit rich, it's probably OK as far as setting is concerned. With the plane in level flight, check to be sure it is flying with the wings level. If not, you've got a warp. It's up to you whether or not you try any maneuvers with a warped wing. It is best to wait until the warp is removed.

If the plane is straight, go ahead and wring it out. Make mental notes of how it flies. If it turns OK on insides but is kind of wide on outsides, remember to adjust the linkage to suit. If this plane is straight, it will hang out on the lines very well, even if you have way too much control. So adjust the linkage to give more and more travel until the plane bogs down slightly in the turns and then back off a little to give the tightest, fastest turns possible.

This plane works very well in the "wiggly" maneuvers now gaining in popularity here on the West Coast. So try flying it in a rather jerky fashion, doing lots of reversals of direction in quick succession. In practice flying, I try to force myself never to do a complete half loop, let alone a full loop, both of which are easy maneuvers for someone to follow through. And *never* do a lazy 8—this maneuver is extremely easy to follow, unless you can do them with the bottoms a foot or so off the ground without watching your plane. In this case, lazy 8's are a great way to suck your opposition into the ground.

On this first flight, also keep track of how your engine runs. If it cuts rich on outside loops, it is too rich. If the tank still has fuel in it (1 or 2 oz.) when the engine quits, your engine is not completely broken in. With a well broken-in engine, the previously suggested props, a tank made per the plans and pictures, 10% to 20% fuel, and the right needle setting, you can expect super runs. The engine will run at a constant speed through any maneuver you can dream up and the setting will not go lean at the end of the tank.

CL Speed/Snyder

continued from page 29

market. The new K&B 29 and the Supertigre 29X are both super engines, but they have rear exhausts. If you don't use a minipipe how can one get the exhaust out of the airplane? It's imperative that this rule proposal be modified to include minipipes; otherwise, these newly-designed engines (the only ones appropriate for the event) will not be able to be used. The author finds this suggested rule change (#64) of minimal value, other than the weight restriction for safety purposes (comments invited).

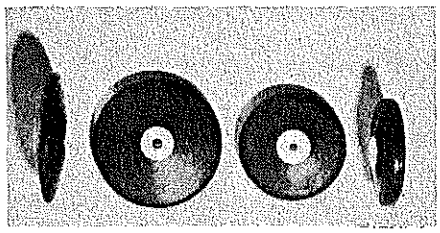
I sincerely hope that all concerned fliers have notified their respective district reps, presenting their objections and suggestions. It's too late when the rule is passed. In addition, it might not be a bad idea to have a 24-month moratorium on rule changes applicable to control-line speed in order to obtain a status quo to allow us to evaluate our current position.

It would be appreciated if the following information would be provided by the readers in order to assist this column in presenting pertinent facts:

1) Name, address, phone number, of all editors that are currently producing articles and circulars on UC speed information.

2) Photographs of special designs, propellers and handy hints to be incorporated in this column.

productreviewproductreviewproductreviewproductreview



Streamlined Wheels: Made of low density, tough, resilient polymer material, will stand shock and abuse of high-speed landings. These wheels are ideal for competitive racing events. In two sizes—1¼ and 1½ in. diameter—the fuel proof material is molded onto precision machined aluminum hubs. Weight of the low-drag wheel is 1/5 oz. The smaller size ideal for RC, CL, especially Goodyear. The larger wheels good for such events as Rat Race, Big Goodyear and Slow Rat—also meets rules for ¼ Midget RC Pylon. (Product brochure available for 13c.) Wheels may be purchased by mail at $1.95 per pair postpaid. **Kustom Kraftmanship, P. O. Box 2699, Laguna Hills, CA 92653.**

productreviewproductreviewproductreviewproductreview

3) Sources for obtaining Monoline equipment, speed pans, fuel switches, tuned pipes, and fiberglass propellers.

4) Engine specialists interested in obtaining engine rework, as well as a list of their customers who have been winners in the Nationals in the last two years using their engines.

Last, but not least, my daughter Rebekah (Jr. age 12) has been demanding equal time on the '76 Nationals report. She won first in C-Speed with a record flight of 164.77 mph, and first in B-Proto with a record flight of 132.35 mph. I promise we won't ever bring this up again.

Flash! Just received from my old friend Joe Klause (Kustom Kraftsmanship, P. O. Box 2699, Laguna Hills, CA 92653) four pairs of his new racing wheels. They are patterned after the old Don's racing wheels which have become impossible to find. They are light and magnificently put together.

Sam Snyder, 1041 E. Pico, Fresno, CA 93704.

CL Aerobatics/Paul

continued from page 30

Specialties with Tom Lay offering to rework the O.S. Max 35 stunt engine. He states, "I will modify piston, head, venturi, needle valve, hand lap piston and sleeve, and precision assemble your engine. One-flip starts and smooth, steady power will result. I'll have old style O.S. mufflers available soon." Prices are $10.00 for rework to a new engine plus postage. Used engines reworked for $10.00 plus parts and postage. Address is: T&L Model Specialties, PO Box 6052, Torrance, CA 90504. Incidentally, Tom built the .010 stunter