ET Electric Trainer

New beginners are often put off by a gas model's noise and speed. This simple-to-build and fun flying little model avoids all that so budding pilots only have to deal with mastering the controls while not becoming dizzy. ■John Hunton

PUTTING AN ELECTRIC MOTOR in a Control Line trainer is one of those timely ideas that make you wonder, "Why hasn't someone done this before?" ET is one of the easiest to fly Control Line trainers ever developed. It's user-friendly and it's fun. What's more, with the quiet electric propulsion system the model is *neighbor-friendly*, also.

Many youngsters have already learned how to operate and maintain electric motors and chargers from having owned one of the RC electric cars, and it's only natural that they will want to move into the added dimensions and challenges of flight. ET is a good way.

ET uses a standard 05 electric motor. Since most training flights should be of short duration, only a short charging period is required—so the action is almost nonstop. The tandem landing gear system limits the angle of attack at takeoff to prevent stalling, and it also restricts bounce-back at landing.

The model performs very well in the transition zone between flying and taxiing. Wind penetration is excellent. This docile trainer flies very smoothly, has good line tension, and has positive, predictable controls. In other words, ET is a cinch to fly, as any beginner's model should be. Let it help you learn to fly at your own pace. Begin with taxiing, then fly short hops on partial charges.

If the ET trainer didn't spring whole from my head like a moth from a cocoon, it came close. The model was conceived one Saturday, built and flown the following Sunday. I retested it, drew the plans, and photographed it the next week, then sat down to write this article. Once the idea for latching electric power and a Control Line model together in a trainer had taken hold of me, I was swept along in its current—and the ET may have set some kind of record for swiftness of execution from the moment of conception to the first flight. The model uses fairly straightforward construction techniques and is quickly built.

Top: Chuck Sharp launches ET for D.J. Campbell. ET accelerates slowly and may take as much as a lap to become airborne, but in the air there is comfortable power. Be certain that the entire circle is clear and that there are no wires overhead. Above: Author Hunton with his clean, quiet Electric trainer.

Wing. Cut two 1/16 x 4 x 36-in. sheets to 24 in. long. Select one sheet for the bottom. Lay out the rib spacing at 3-in. intervals, and mark with a pencil. Pin the bottom sheet to a flat work surface. Cut 3/16-in. doweling to a 24-in. length, and glue it to the front of the bottom sheet.

Cut the wing ribs from 1/8-in. sheeting, then install all but the center rib. Cut a 1/2 x 1/2-in. balsa spar to fit at the center of the wing, and glue it in place. Install both pieces of the center rib, then trim the spar to conform to the ribs. Sand all the ribs with a sanding block until they are even.

Taper the trailing edge of the bottom sheet. Glue the top sheet to the leading edge dowel, pin well, and let the glue joint dry. Wet the upper surface of the top sheet, then apply white glue to all the ribs and to the spar. Pull the top sheet down over the ribs,

Full-Size Plans Available . . . See Page 164

pinning it well at the trailing edge and wherever necessary.

Cut out the 1/8-in. plywood bellcrank mount and the wing tips. Drill holes in one wing tip through which the lines will exit. Allow the wing assembly to dry while you are building other parts.

The fuselage can be built next. Cut out the 1/8-in. plywood landing gear brackets. Bend the 3/32-in. music wire main landing gear to shape. Assemble the main landing gear wire to the plywood brackets, and clamp the assembly tightly.

Cut the 3/8 x 2 x 36-in. balsa sheet to an 18-in. length for the fuselage; cut the horizontal stabilizer slot. Cut 1/4-in. balsa strips for the motor guide to the proper length, and glue them onto the right side of the fuselage. The bottom 1/4-in. member should be 1/2 in. from the fuselage bottom.

Glue the main landing gear assembly into place. Cut a piece of sheeting measuring 1/2 in. by 1/2 in. by the width of the wing into a triangular shape, and glue it to the left side of the fuselage (see plans). Cut the balsa canopy from 1/8-in. sheeting, and lay it aside. Carve a radius into the left top front of the fuselage so that it will fair with the spinner.

Empennage. Cut the horizontal stabilizer, elevator, and fin from 1/8-in.-sheet balsa. Round off the front of the horizontal stabilizer and fin with fine sandpaper. Install the horizontal stabilizer into the slot in the fuselage, checking that it is square. Install a 1/8-in.-sheet plug at the rear of the elevator slot. Attach the fin to the top of the fuselage, noting the offset shown on the plan top view.

Final assembly. Smooth up the fuselage with a light sanding using fine sandpaper. Sand the wing assembly to a smooth con-

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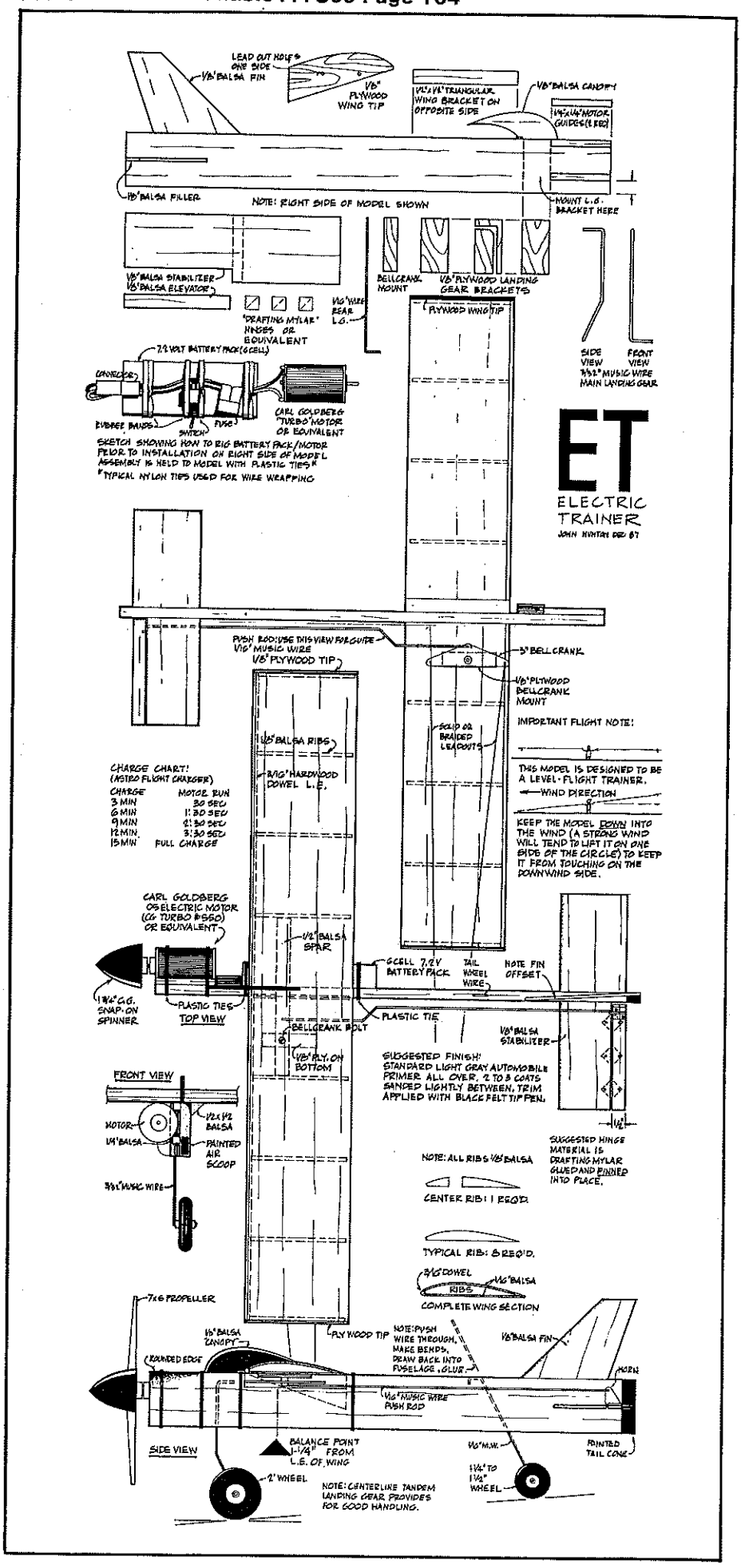
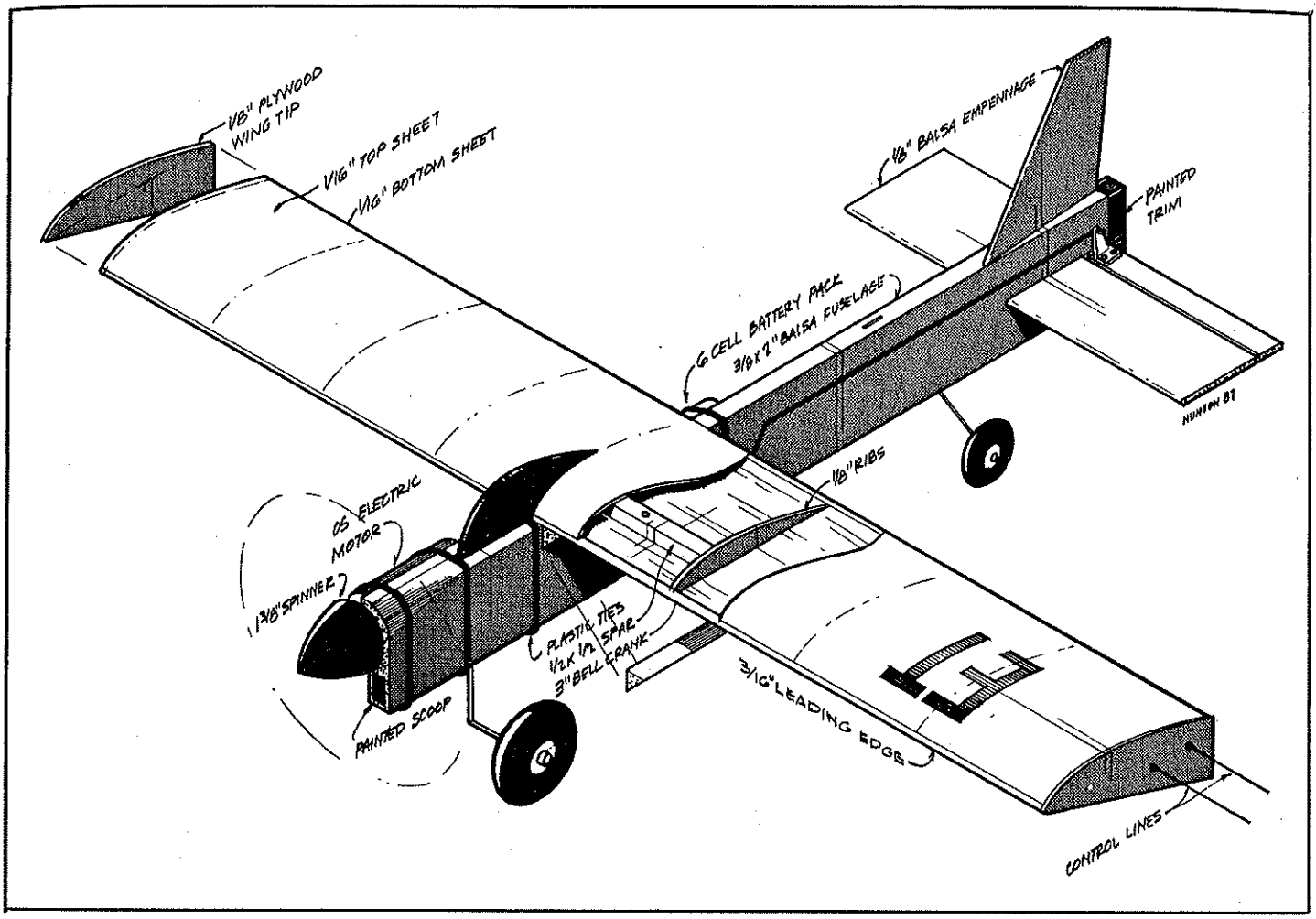
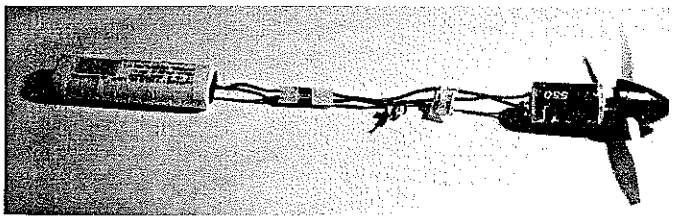
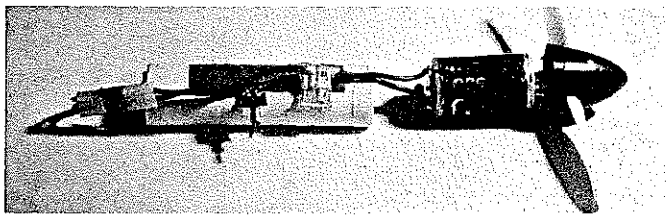
Materials List:

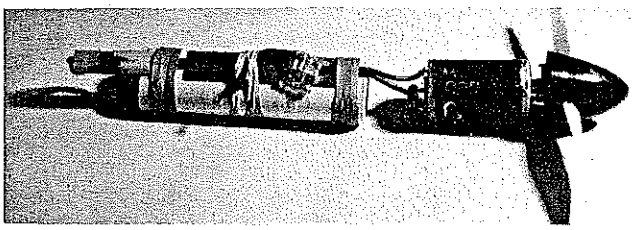
Two sheets 1/16 x 4 x 36-in. balsa
One sheet 1/8 x 4 x 36-in. balsa
One sheet 3/8 x 2 x 36-in. balsa (enough for two models)
One sheet 1/8 x 4 x 6-in. plywood
One stick 1/2 x 1/2 x 12-in. balsa
One stick 1/4 x 1/4 x 6-in. balsa
One 3/16 x 36-in. hardwood dowel
1/16 x 36-in. music wire
3/32 x 36-in. music wire
Three-inch bellcrank
Lead-outs
One 2-in. wheel
One 1 1/4-to-1 1/2-in. wheel
7 x 6 propeller
One 1 3/8-in. spinner
Elevator horn
One Carl Goldberg Turbo electric motor with switch, fuse, and propeller adapter
One six-cell battery pack
One charger
Control lines, .015 x 35 x 52.5 ft.
Control handle
Cyanoacrylate (CyA) or aliphatic (white) glue
Gray automotive primer



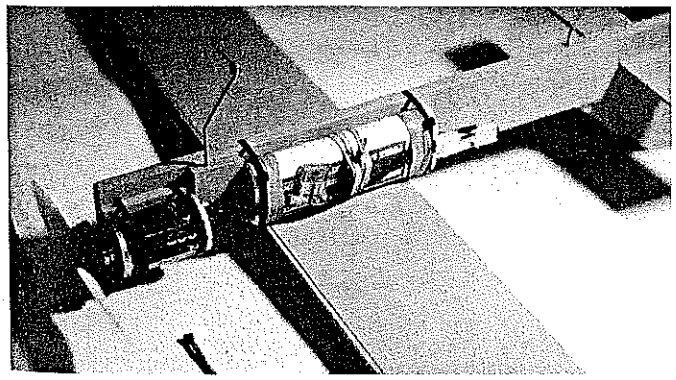








Top Left: To assemble the stock Goldberg motor and battery unit (which includes switch and fuse), first lay out the assembly in a line. Above: Next, fold the battery under the wire bundle. Left: Finally, use three rubberbands to wrap the assembly together. The middle band holds the switch firmly in place but still allows it to operate.



Left: Once assembled, the motor and battery pack are strapped to the fuselage with plastic electrical ties. Right: With the charger clipped to the car battery, ET is given a 5- or 6-min. charge for a good flight time. Caution beginners to never leave a charging battery pack unattended.

shelf components available now.

Tony Matthews' (Ontario, Canada) elegant Wakefield represents one of the better examples of the trend, bearing in mind, please, that he is the *designer/flier* of this particular sample, so no fun-poking is intended. All but the model's tail feathers, prop blades, and finish were "supplied," even though Tony did a tremendous amount of development work in arriving at his formula, including airfoils, prop design, and the like.

More to the point, the wing came from J.H. Maxwell in Scotland machined to specs from solid balsa; the motor tube was an import from Japan; the tail boom was a ready-made carbon fiber item; the front end was a machined unit; and so on.

Should we knock it? I do not think so. If a computer-controlled balsa milling tool can make a better wing than I can, so be it. Certainly the hardware involved now requires ultraclose tolerances and machining well beyond the capabilities of my tin snips and soldering iron. The aforementioned Maxwell shop in Scotland can also provide Wakefield *prop blades* which are nearly-ARF as well. Why not use a bulletproof carbon-fiber motor tube lovingly crafted by an enthusiast on another shore? The pros and cons are just now coming to the surface, but they probably need to simmer a bit longer. Joining in, however, may become just a matter of economics.

Next, there is Bob Piserchio's Wakefield front-end unit. It is another mini work of art and is an item which has become almost universal among the F1B fraternity. These utterly trouble-free and durable necessities are made up to order on a combination milling machine/lathe and are set with double ball bearings, positive prop stop, and adjustable-pitch blade hangers. Included in the full package are front and rear motor tube inserts, the front being available machined to desired thrust offsets as called out by the buyer. They're very slick, very dustproof, and very smooth. A mere $66.50 buys one from Bob Piserchio, 5257 Stone Ct., San Diego, CA 92115. He also has data on the availability of motor tubes and other Wakefield gear.

Shanghai speaks: By the time this is published, we may very well be powering up our Rubber Free Flight with rubber strip from the Fan How factory in Shanghai, P.R.C. According to George Schroedter of Champion Model Products, the latest batches of U.S.A.-made rubber have been totally unsatisfactory for our purposes—so much so that he has taken the bold step of trying to import the commodity from the P.R.C.

What will arrive first will be 1mm x 2mm stuff from the supply used by the Chinese fliers at the last FF World Champs. This rubber has been tested by Fred Pearce and others under controlled conditions and found to be very close to the '81 Pirelli specs. So it is anxiously awaited. Further downstream, George may have other sizes available, lest you tire of spooling up those 108-strand gumbands for your Wake! For more info, write Champion Model Products, 880 Carmen Ct., La-Verne, CA 91750.

Low tech: The new Pee Wee-30 event can bring a lot of relief from the nerve-busting FAI wars. It is also a lot cheaper. More fun is also a possibility. The little 100-grammers really do pack much enjoyment.

Now SCAMPS (Southern California Antique Model Plane Society) has instituted an OT and Nostalgia Pee Wee-30 category on its schedule for '88, should anyone wish to get on the bandwagon with some classic crates. And Charlie Yost, PW-30 founder, has come up with a *Triathlon* version that combines P-30 Rubber, PW-30 Gas, and Towline-30. The kicker is that the flier has to use the *same airplane* for all three divisions, with only the forward two inches of the fuselage allowed to be interchangeable! Are we ready to rumble? Write for details.

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ET/Hunton

Continued from page 64

tour. Install the plywood wing tips, making sure you put the one with the line exit holes on the left wing panel (left and right are as they would be to the pilot). Glue the wing to the fuselage, checking alignment with the stabilizer.

Glue the canopy in place, and do the same with the ⅛-in. plywood bellcrank mount. Install the rear landing gear wire. Leave the top end unbent until the wire has been pushed through the fuselage; then bend it, pull it into place, and secure with glue.

The model need not be fuel-proofed, but it should be finished in order to reduce drag and produce a cleanable surface. The finish may be any of the fast-drying variety, in either clear or color. The prototype was painted to be representative of Navy jets—three coats of automotive primer with a light sanding between each coat. Black trim can be added with felt-tipped markers. Wheels can be installed after finishing.

Install the elevator hinges. After gluing,

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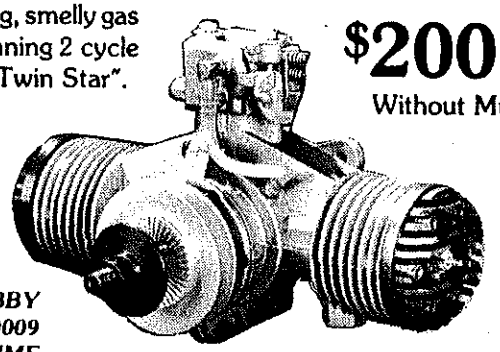

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push straight pins through all the hinges, and clip them off to make certain that they can't pull out. Install the elevator horn. Bend the pushrod to shape. Note the "joggle" near the bellcrank for fine adjustments. Assemble the bellcrank and pushrod, then mount the bellcrank to the model. Install the lead-outs. Check the controls and make final adjustments so that when the bellcrank is neutral the elevator is as well.

If you're using one of the Goldberg Turbo motors (available from Carl Goldberg Models, 4738 W. Chicago Ave., Chicago, IL 60651), begin motor assembly by folding over the wire harness assembly (with switch and fuselage) and strapping it to the battery with rubberbands as shown in the sketch. Anchor the battery assembly and motor to the fuselage with nylon ties. Use strong cord if nylon ties are not available. Install a 7 x 6 propeller and a 1⅜-in. spinner.

The model is now ready to fly. It is suggested, however, that you become familiar with the motor operation by giving it a charge and running it a few times. Be extremely careful of the propeller. Read the manufacturer's comments on safe motor operation thoroughly, and be cautious not to overheat the battery.

Here, for your convenience, is a chart of approximate motor run lengths as determined by the length of battery charge:

- Charge three minutes for a 30-second run.
- Charge six minutes for a one-minute 30-second run.
- Charge nine minutes for a two-minute 30-second run.
- Charge 12 minutes for a three-minute 30-second run.
- Charge 15 minutes for full charge.

Flying ET—a unique experience: The first thing to do before flying any Control Line model is to mark the control handle to identify which end is *up* (that is, when you pull the top of the handle back and the elevator moves to *up*).

Pick a relatively calm day for the first flights. Use a paved area if possible (a grassed one will have to be mowed very short). Mark the center of the circle well (so you do not wander out of it during flight), then walk the model around the circumference to make sure it clears everything. The launch point should be on the downwind side of the circle so that any wind will help keep the lines tight at launch. Check once again that *up* is up.

Charge the battery for three minutes maximum for first flights. Have your helper launch the model pointing slightly outward. Leave the controls in neutral at launch and during the entire takeoff run. The model will take off by itself if it has been aligned accurately.

For the first few times, it may be advisable to keep some *down* on the trainer to keep it on the ground while you get used to operations. ET taxis very well. Adjust the time of charge to suit how long you wish it to run. Your tolerance to dizziness will build up after a few flying sessions. Try concentrating on the model and not the background to help overcome the dizziness.

Longer charges will provide slightly more power, but output of Ni-Cd batteries is relatively level over the period of a charge. One good feature of Electric flight is that the power of the motor drops off slowly when the charge is spent. The model will gently land itself when the motor quits. back onto the ground, and after taxiing a lap or so let the lines go slack so that a wing tip can contact the ground and stop the model. At that point, switch off the motor.

When power is reduced, don't try to hold the model in the air. Instead, let it settle

Flying the model in windy conditions will very likely present the only problems for the beginner. While this design performs better in the wind than any model I've ever flown, a gale force will still tend to raise the model on the upwind side and bring it down on the downwind side. The best way to counteract this characteristic is not by pulling *up* control on the downwind side, but by using *down* control into the wind. In other words, do not allow the model to climb coming into the wind. That way, everything will be right when you are going downwind.

ET is no Stunt model, but a straight-and-level basic trainer. It is, however, in my opinion, the finest and easiest to fly basic

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Continued from page 66

used as a landing gear strut cover, as was the example, provision must be made so that the cover can be placed over the working landing gear strut. In the case of the Mosquito's landing gear, the main struts were made of stainless steel tubing that would accept ¼-in. solid stainless rod (spring loaded) which formed the basis of the shock-absorbing landing gear.

After the exact size and shape of the cover was determined, a wooden pattern was carved from a block of hardwood that had been predrilled for the size of the landing gear strut. The hole, in addition to accepting the working landing gear strut, would also be used for suspending the pattern during the mold-making process detailed below. Please note that the prototype compression leg covers were made of steel stampings and that they were joined together with a series of rivets, front and rear of the cover. Also note that the pattern and casting includes this detail which was created by gluing wood strips to the pattern and applying drops of epoxy glue to form the rivet heads.

The next step was to make the rubber mold. The finished compression leg cover pattern was placed on a piece of snugly fitting dowel stick, then fitted into a cardboard container that would allow for about ½ to ¾ in. of clearance on all sides and ends of the pattern (see sketch). If the item to be molded were to be of a shape that did not lend itself to suspension in the same manner as the example, two or three well-placed straight pins pushed through the cardboard and lightly into the pattern would do.

The Silastic G-RTV molding compound used was made by Dow-Corning Corporation. It is a two-part, two-color, room-temperature-curing silicone rubber. The rubber compound is white, while the curing agent is red, which permits the obtaining of a thorough and even mix of the parts. The two parts were mixed very slowly so that air bubbles were not generated in the compound. When properly mixed the compound was a light pink in color.

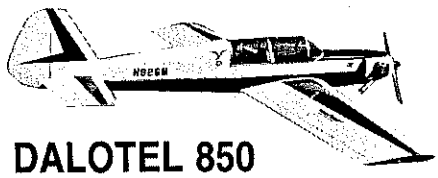
After mixing, the compound was poured slowly into the box and allowed to form around the object, again watching for air bubbles. The mold was allowed to cure for at least 24 hours. When the mold had cured, the cardboard box was removed. The mold was then cut in two so that the pattern could be released. The mold in the photo was cut, using a single-edge razor blade, lengthwise down the side of the pattern (see photo). Care was taken to obtain a good, even cut of the mold without damaging the pattern. (It should also be noted that the mold separation point was chosen so that it was away from major mold details.) We now had two mold halves as shown in the photo. The dowel stick was then removed from the pattern.

Before the mold was used for casting, small holes were cut into the top of the mold (see arrows in Photo B) to permit the pouring of fiberglass casting resin into the mold. One hole allowed for the pour while the second hole acted as an air vent.

To make the casting, the dowel stick was placed between the mold halves which were held together with very light rubberbands. (It was necessary to use light rubberbands so as not to distort the mold.) Polyester glass resin was mixed (ac-

Continued on page 156

experience the Great Performance of this Quartet



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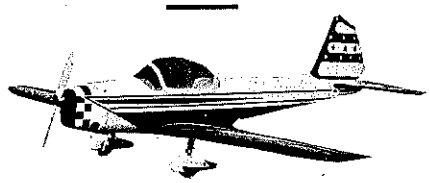

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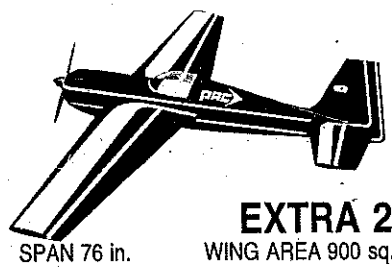
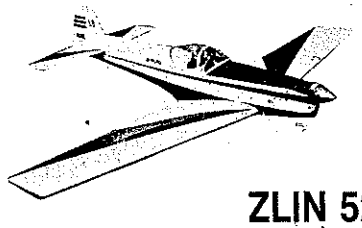


EXTRA 230
SPAN 76 in. WING AREA 900 sq. ins.



ZLIN 526
SPAN 72 ins. WING AREA 900 sq. ins.

A series of Sport Scale, All Balsa, ARF Airplanes for 120 - 4 cycle or equivalent motors.

coming soon: SU-26M and Ultimate Bipe

available direct or from select hobby shops.

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