build a "TIN GOOSE"!

Ford A.T.5 TRI-MOTOR

Here's DENNIS TAPSFIELD'S

59" SPAN VERSION—for

ELECTRIC POWER . . .

HAVE YOU EVER had that feeling of nostalgia—you know, the vision of that vintage type aircraft just breaking ground, and flying out straight and level at its hair-raising 100mph? Me too, and here is the result, a third-in-the-line of electric-powered multi-motored models.

Fifty years ago, in the July of 1926, in the Ford factory at Dearborn, Michigan, the first all-metal tri-motor was completed and the fact that there are some of these big (in their day) all-metal aircraft still flying is a glowing tribute to their designers and builders.

It was the first to fly a scheduled airline service, the first to carry two uniformed pilots and a flight steward. The model is finished in the red white and blue livery of one of the planes still flying at the time of writing.

It was decided in the interest of weight-saving not to attempt to simulate the corrugated skin of the full-size aircraft but only the well informed purist is likely to comment! Before you get too enthusiastic, let me say that if you only enjoy screaming round the sky with a 61 powered bomb, this model is not for you, since, like its full-size counterpart, it has to be flown with feeling and consideration. It is not very aerobatic; the odd loop and roll are about the limit—but do gain some speed by a shallow dive first! Anyway, who's heard of a vintage aerobatic airliner!

It will take off from a smooth surface and properly handled will fly in a sedate scale-like manner and evoke some oo's and ah's from appreciative spectators. The flight times are in the 5-6 minute bracket, using the series-parallel switching system for the motors. This makes use of the servo to operate a slider system with micro-switches which gives two power levels; the first position applies full voltage to the middle motor and connects the two outers in series; the second position connects the two outers in parallel, *e.g.* full power. The power output in the first position is enough to maintain altitude with a considerable saving in battery consumption. Landings can be made by cutting the power completely and, handled in the right way, very realistic,

smooth, soft arrivals are the rule. If you are still keen to build a "Tin Goose" this is the way: *keep it light*! Aim for a *maximum* bare airframe weight of 30oz.—this means complete, covered trimmed, with landing-gear and wheels! To this weight you must add, 3 motors, (about 16oz.), power pack, (about 24oz.), general wiring and switches, (say 4oz.), plus the radio, at around 14oz. A grand total of 88oz.!! Try very hard not to exceed this. The lighter it is, the better it will perform—so it's up to you.

CONSTRUCTION

Wing

Cut out all the ribs; do not make the spar cut-outs too tight a fit as this will cause distortion. Since the wing is flat on the top—*i.e.* no dihedral—it is made upside-down. Pin the joined spar in place on the plan, (you must have the complete wing drawing as it is in one piece). Pin the $\frac{1}{4}$ x $\frac{1}{2}$in. packing piece in place at each end; this supports the tail-end of each rib in the correct position. Glue the ribs in place upside-down, add the bottom spar and the leading edge and allow to dry. Cover the bottom of the leading edge and the trailing edge, being careful not to cause any warps. When set, remove it from the plan, and complete the structure; do not web the spars yet. Fit the aileron control system now. I used Bowden cable in nylon tube. Cut out the nacelle frames from $\frac{1}{8}$in. ply, slit the leading edge sheet to take them, and glue them to the $\frac{1}{8}$in. ribs. Thread the motor wires through the ribs, and pull them out by the nacelle frames. Make sure the wing is true before you add the spar webs. Make the ailerons, hinge on with film. Cap the ribs, and clean up the structure.

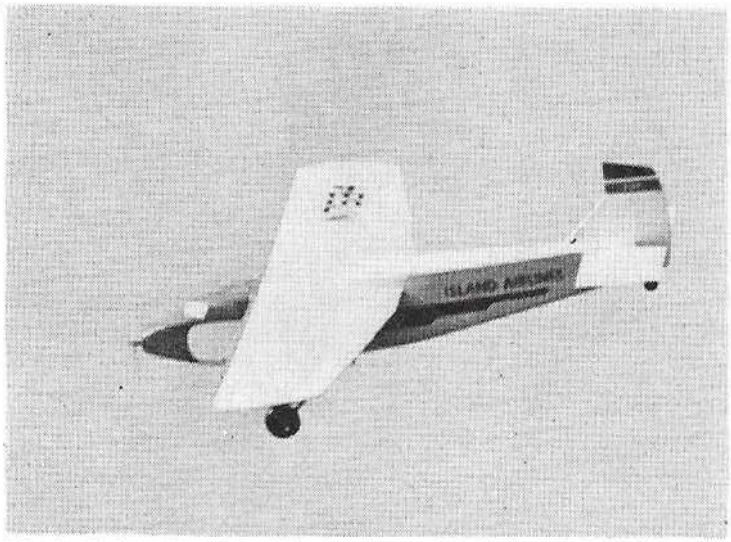
Tail unit

This is very simple, all made of $\frac{1}{8}$in. sheet. Choose the wood carefully to keep it light.

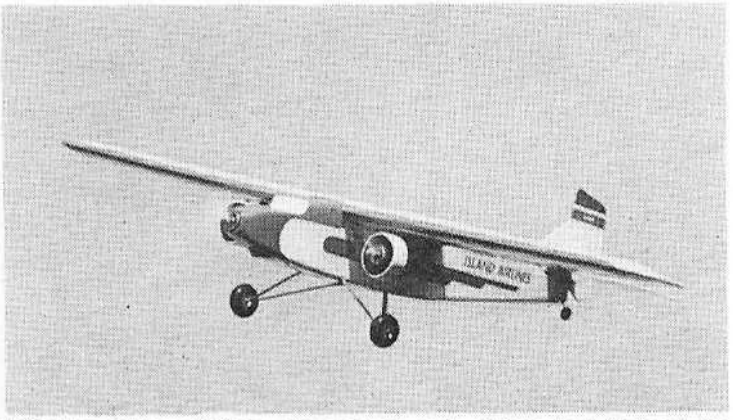
Fuselage

A simple box; cut out the sides from matching $\frac{3}{32}$in. balsa, and use $\frac{1}{4}$ x $\frac{1}{4}$in. cut from the same sheet if possible, so that the sides pull in evenly. (It will be necessary to slit the longerons forward of F2 to allow the sides to pull in at the nose without strain). Glue in F2 and 3 and allow to dry; pull the sides together at the tail and glue, when dry pull the nose together, add F1 and glue a piece of $\frac{3}{32}$in. sheet top and bottom to hold the spacing at the extreme nose. Make the three $\frac{1}{16}$in. sheet balsa tubes by wrapping it around the motors, and wrap the outside with fine glass cloth for strength; use white PVA glue throughout.

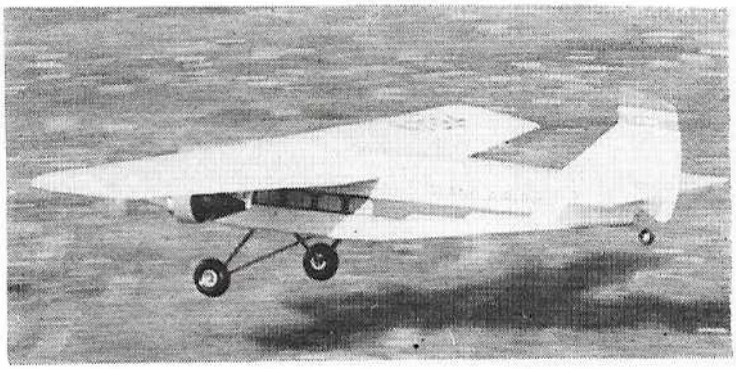
When dry, glue one into the nose of the fuselage, fill in the corners with block. Fit the landing gear by binding and epoxying it to the two hardwood crosspieces; you can now fit F3B. Make provision for the radio battery in a polystyrene block behind F1, sheet the top and bottom, add the cabin fronts and the $\frac{3}{8}$in. sheet top. Dowel the wing in place, fit the two wing-bolt fixings in the fuselage, see that the wing fits the

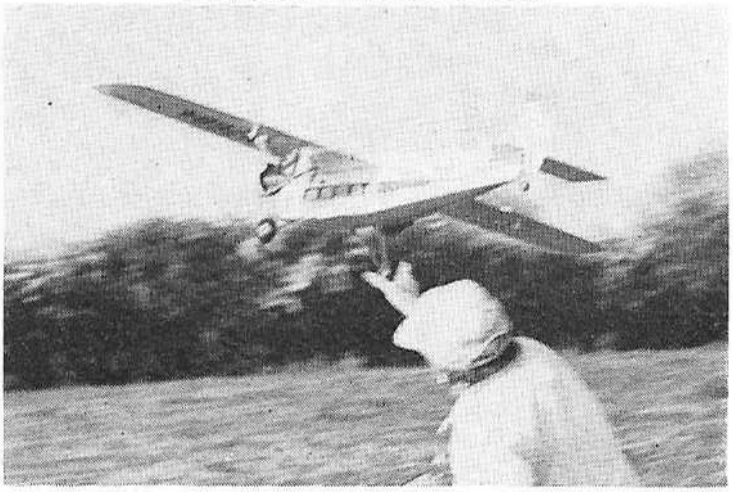


The in-flight shots here show the model doing control-line type circles round the pilot. (Nose cowl omitted for trimming—see text).



Whether taking off from the ground or hand-launched (below) the *Tri-Motor* gets away in a lively manner. (No—Dennis is *not* actually holding it by a wheel in this shot!).





fuselage profile properly, then build up the fuselage parts that are glued to the wing. When complete, clean up the entire model, and cut the slit for the fin.

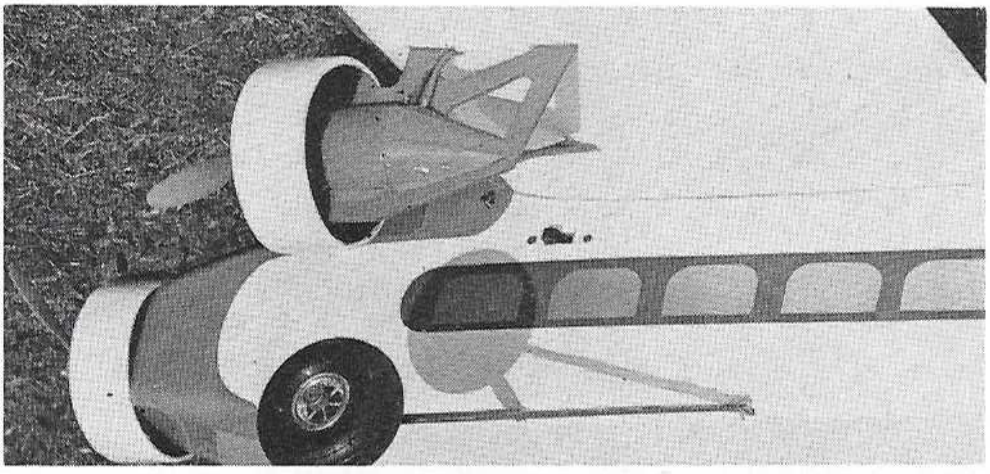
Covering

The original model is covered with iron-on film. Cover the wing before fitting the $\frac{1}{8}$in. dowel struts on the nacelles, make sure the wires are in place, hinge the ailerons with film. The tailplane, elevator, fin and rudder, are covered separately, leaving bare the areas for gluing. Ensure that everything is square when assembling the tail unit.

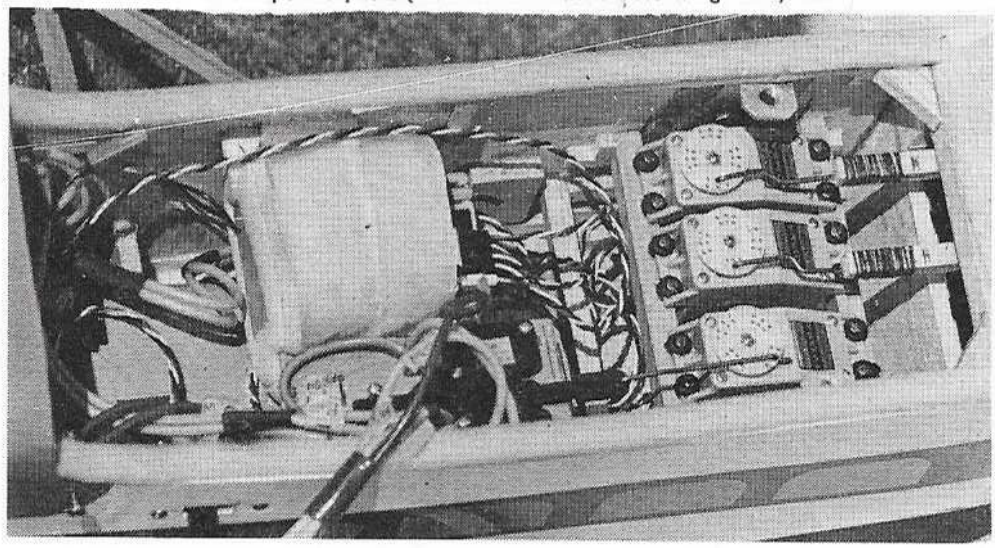
General

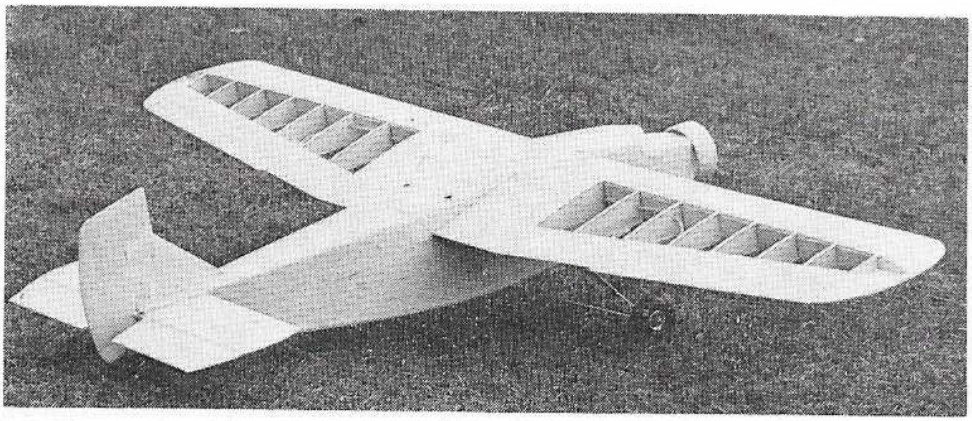
Glue the motor tubes into the nacelles, fit the $\frac{1}{8}$in. dowel struts, make paper cones to fair the rear ends, and fit the cowl rings, but do not fit the nose ring until you have trimmed the model, as a nose over can damage it. (No scale engines are fitted as this would impede the airflow, and it is not evident when in flight). Make the electro motors a good snug fit in the tubes; wrap with tape if necessary.

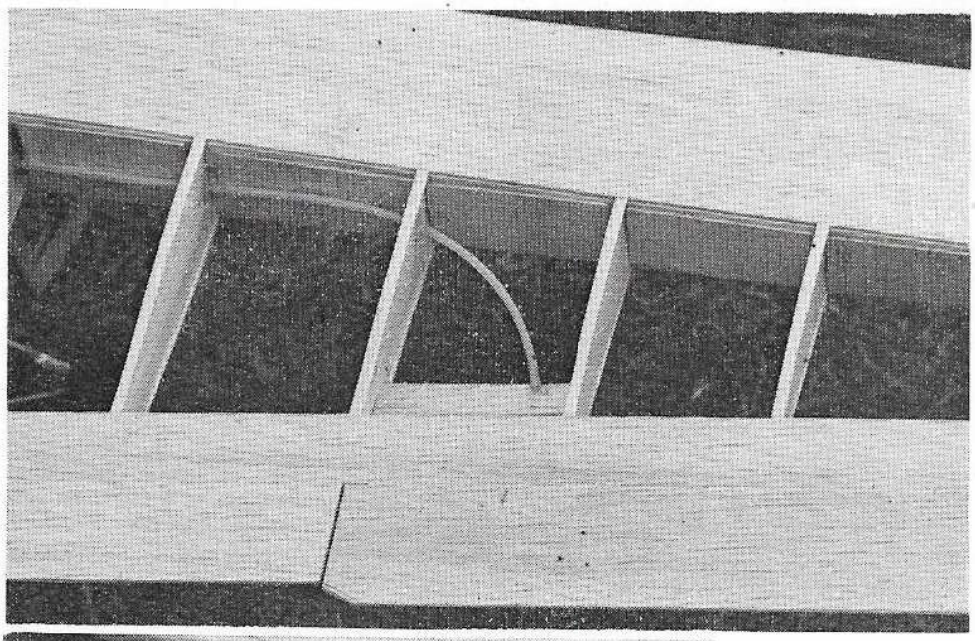
Install your favourite elevator and rudder controls, fit three servos abreast in front of F3, the receiver sits on top of the power pack, wrapped in foam, the power pack lays on top of the hardwood cross-pieces, and is blocked in place when

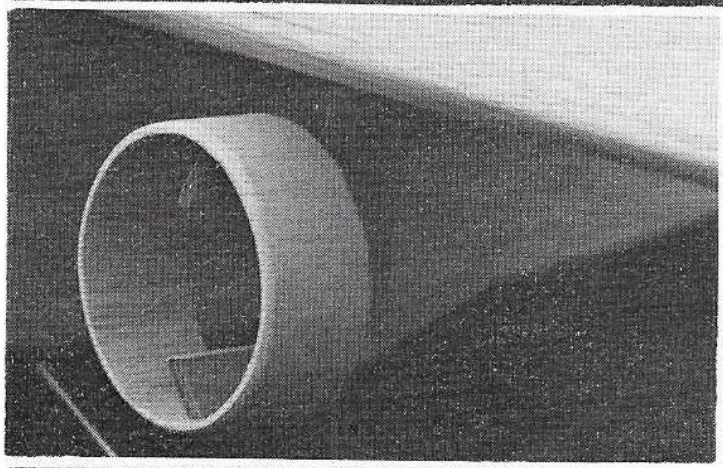


Side view above shows the outboard motor nacelle attachment, while below is shown the designer's very neat radio installation, with three servos abreast and receiver sitting on top of the power pack. (Note metal brackets for wing bolts).

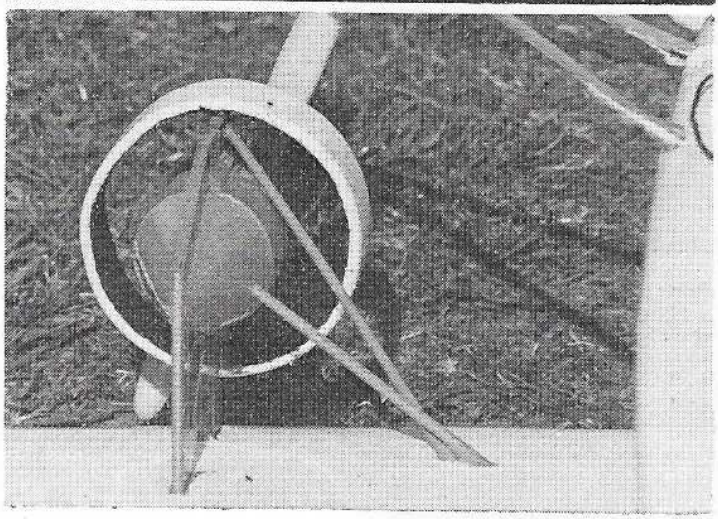








Snake or nylo-rod type flexible linkage is used for the ailerons, as shown above. Note also webbing, and slightly wider chord aileron. At left is shown the basic ply motor mount, with laminated balsa cowl ring and, below, the finished installation, with motor and struts fitted. At right: designer photographed with his model at the 1977 RM Electric Fly-In at St. Albans.



the balance point is correct. Set the control surface movements as specified.

Flying

Make sure that the model balances at the point shown on the plan, and that all controls are neutral; it is best to set the ailerons up about $\frac{1}{16}$ in. as this gives the effect of washout, and can help to delay tip stall. Sight the model from the tail to check for warps. Charge the power pack.

If you have a good smooth surface, it is best to allow the model to take off: alternatively, you can have a *reliable* helper to hand launch it for you. Choose a calm day for your first flights and, since the battery pack will not be at its best for the first few flights, do not attempt to climb initially, but concentrate on straight and level flight. As the battery improves, you will begin to be familiar with the capabilities of your model. A word of warning: if at some time you choose to fly this model in windy conditions, do not turn it sharply out of the wind as it is possible that due to intertia, it will lose flying speed, an incipient spin will develop, and you will take it home in a plastic bag! Treat it sensibly, and you will be rewarded with some really stately flying . . . just like the real thing!

CHARGING NOTES

Any commercially available battery pack should be charged according to the maker's and/or distributor's instructions. The following information is intended for those who will buy their cells separately and make up their own pack.

If the cells have no tags to solder to, do use a large 65 Watt (or more) soldering iron, and do not keep the iron on the cell for more than a second, or you could damage the cell. Ideally it is better to have the battery pack completely discharged before

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charging, so that you are sure how much charge it can take: this is important since, although these cells can be charged in as little time as 15 minutes, particular attention should be paid to time and current measurement. In fact, to take account of possible ammeter error, only 90% of the cell capacity should be used in the calculation of charge times.

Example

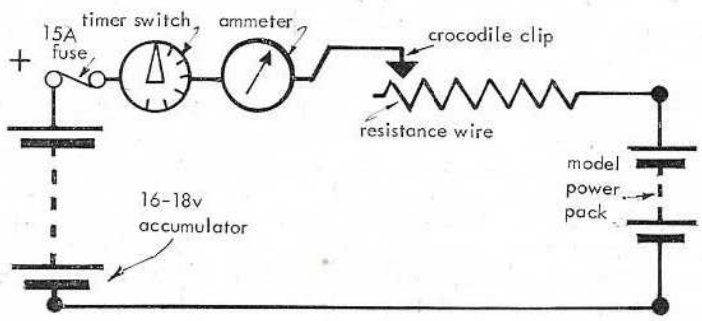
Suppose we want to charge a 2.0Ah cell in 30 minutes . . . 90% of 2.0Ah = $2.0 \times \frac{90}{100} = 1.8$Ah.

Current needed = 1.8Ah × 2 = 3.6 Amps for 30 minutes.

Special 'cycling' equipment now availabe is a great help in the proper care of nicads. However, if you take the necessary care, then you can charge the way I do and, charged carefully in the proper way, the cells will last for a long time, and could see out several models!

To charge the 9 cell 2.0Ah pack in 30 minutes will require a minimum of 16 to 18 volts. It is essential to have a good ammeter in the circuit that will read correctly to 0.1 amps, i.e. 100 milliamps with a full scale of 5 amps or more. I make all my connections with small crocodile clips, and use a short piece of electric fire element as a resistance to control the current to the required amount. I usually charge at 4 amps for 25 minutes, which seems to work O.K. Whatever you do, use the time/current calculations!

Dont't forget it's on charge: while watching your pal's new model bombing round the sky you could ruin a good set of nicads!



The designer's own circuit for charging flight-pack nicads from a car battery has been found to work well.