PLUTO

With more pulse rudder-only systems being sold today than ever before it is apparent that fun is the keyword of the Sunday flier. For year round flying at a minimum of expense, try this 32" span, .020 powered ship.

BY HOH FANG-CHIUN

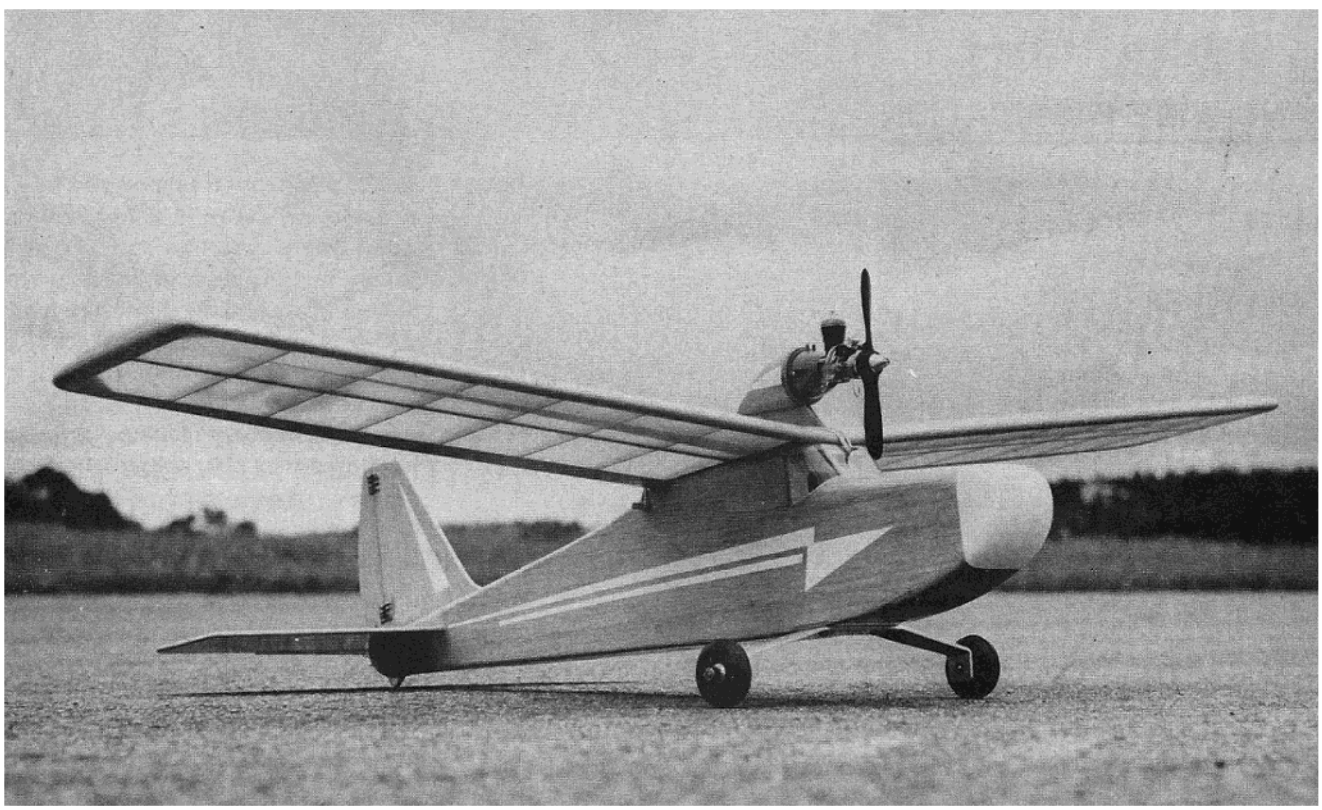
● Radio control models designed nowadays are almost entirely being directed towards the use of multi channel digital equipment. It is a pity that we seldom see new creations on rudder-only designs turning up, although there are some excellent single channel systems currently available on the market. After all, the majority of radio control enthusiasts are so-called "Sunday Flyers" and, for these people, **fun** still is the keyword of the sport. I think that no other type of radio control flying provides more fun per given amount of invested money than does single channel flying. In addition, we need variety, and in small single channel sportsters we find a different form of excitement with radio control flying.

Pluto is a pleasing ship, both in appearance and in performance. It has been designed specifically for rudder-only work. It is a small model with a wingspan of 32¼" and weighs under 12 ounces ready to fly. The model is powered by a Cox Tee Dee .020 engine and employs the lightweight Ace Pulse Commander single channel equipment. In spite of the small size of the model, it is a very stable flying machine and can be flown in most weather conditions.

The model is very easy to trim. If properly built, in accordance with the plans, very little or no adjustments will be required to make the craft perform successfully. The prototype needed only a slight down adjustment on the elevator trim tab to fly properly. Also, once correctly trimmed, it is almost impossible to sustain extensive damage due to its light weight and relatively robust structure.

Because of the small size of the model, weight is of major importance to ensure good flying performance. Since the Ace Pulse Commander single channel system probably is the lightest radio control equipment commercially available at present, this outfit is recommended. The magnetic rudder actuator used in the Ace pulsing system is obtainable in several sizes and power output. My original model uses the "Twin Baby" actuator which is recommended primarily because of its low weight. The more powerful "Standard" actuator can also be used. If the "Standard" actuator is employed, the added weight of this unit will somewhat reduce the flight duration of the model. To compensate for this, it is suggested that you use a larger external fuel tank in order to obtain a longer engine run. The external tank can be placed in the engine nacelle pod. Normally, an engine run lasts about 85 seconds and the glide that then follows usually lasts another 3-4 minutes without a thermal. Under thermal conditions the glide flight of course, lasts much longer.

The construction is completely straightforward, but care should be taken to ensure that the balsa wood used is of medium to soft density if the design weight is not to be exceeded. This is important because you will note that the sizes specified for most parts are on the generous side, as using relatively large section softer



wood gives a stronger structure, as well as being easier to work, than if harder wood of a smaller section is used.

CONSTRUCTION

Wing: The wing can be built in one piece, or each half may be built separately, then joined at the proper dihedral angle when ready for the balsa sheet center covering. If the former method is preferred, join two plane boards, blocking up the ends to obtain the specified dihedral angle. The latter was chosen in constructing the original wing, so this building method will be described.

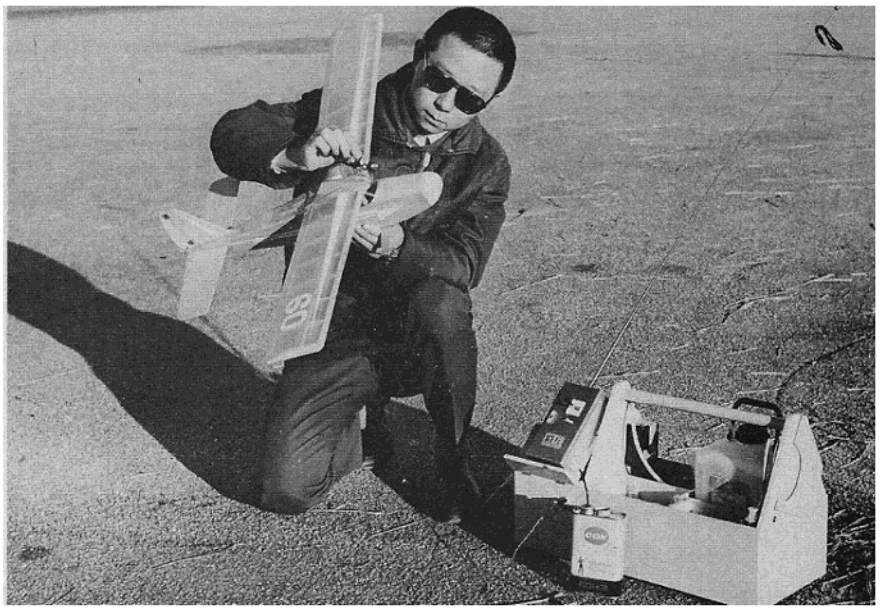
Prepare all components before starting the assembly. Pin down the leading edge, bottom spar, and trailing edge on the plan, protecting the latter with wax paper. Be sure that the notches are already cut in the trailing edge. Incidentally, when cutting these notches, make them a little undersize for a tight fit to the ribs. Cement all ribs in place except the center rib W1. Note that rib W2 is shallow by 1,5mm on both top and bottom to allow for sheeting, so place scraps of 1,5mm pieces beneath it for proper elevation. Add the top spar while the panel still is on the board. Allow sufficient time (preferably overnight) for cement to thoroughly dry before removing from the work board.

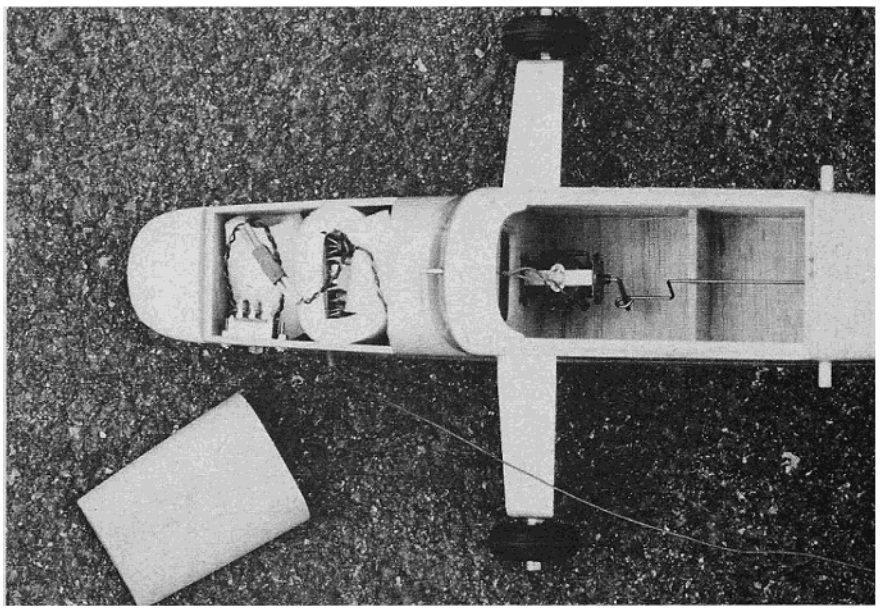
Follow the same procedure for the other half. To incorporate dihedral, bevel sand the butt ends of each panel so they meet at the correct angle. Use hard balsa dihedral braces to check the alignment. When tight joints have been obtained, glue the braces in position. Add the two center ribs W1 and be sure to leave a 4mm gap between the ribs for the plywood engine pylon. Cover the center section with pieces of 1,5mm balsa and complete the wing as shown.

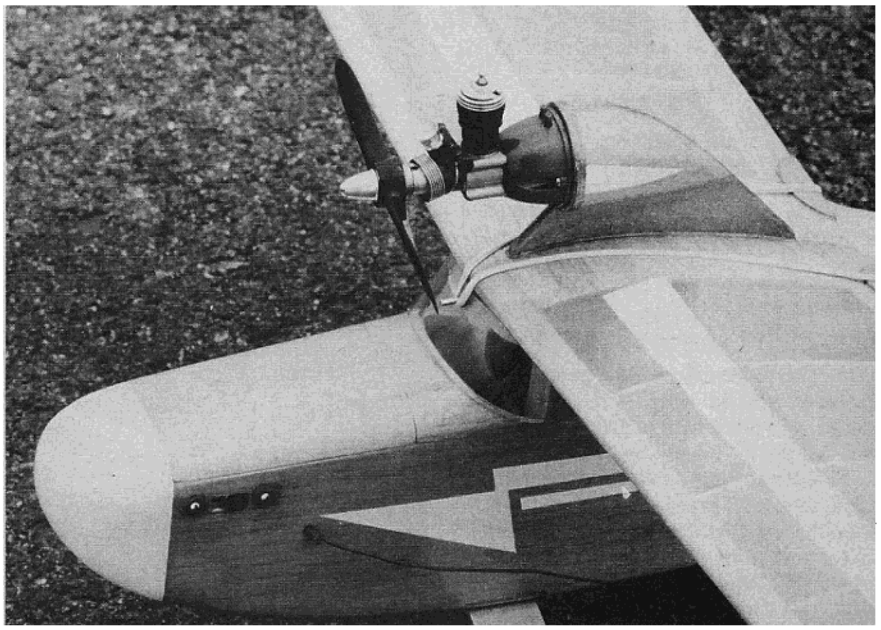
Engine Pod: Cut the engine pylon from 4mm plywood. If an external fuel tank is to be installed, cut an opening in the pylon as required. The firewall should be tilted to obtain 4 degrees right thrust. Check this alignment with a properly angled template when installing the firewall. Cement soft balsa blocks behind the firewall to form the nacelle and sand to shape. Finally, slip and cement the engine pod into the wing slot as shown.

Fuselage: Cut the fuselage sides from matched balsa sheets and locate the doublers as per plan side view. Note that the doublers should have the grain running diagonally to obtain true flat surfaces. Glue 3mm square balsa longerons to the sides aft of the cabin.

Prior to the assembly of the fuselage, mount the actuator to the proper plywood bulkhead. Note that former F4 will not be required if the "Twin Baby" actuator is installed since this unit is mounted on F3 as shown on the photograph. To assemble the fuselage, first cement formers F3 and F6 to the sides and allow to dry. Check that the joints are at right angles before the glue sets. To lock the fuselage, draw the sides together at the rear and cement to the tail post. Check the sides for equal bend by







referring to the top view of the plan. Pull in the sides at the nose with two pieces of hardwood and rubber bands. Add the remaining formers and complete the structure as shown. Note that the actuator torque rod must be installed inside the fuselage before the bottom sheet is added. Shape and sand the entire body, round off all corners liberally.

The horizontal and vertical fins are simply cut from soft 3mm sheet balsa. To obtain proper alignment while gluing the former on to the fuselage, reference should be made with the wing. Temporarily hold the wing in place with rubber bands during this procedure. Finally, install the fin.

Finishing: Apply two coats of thinned clear dope to all exposed wood, then lightly sand the last coat. For all-round protection cover the entire model with lightweight tissue. My original model has lightweight

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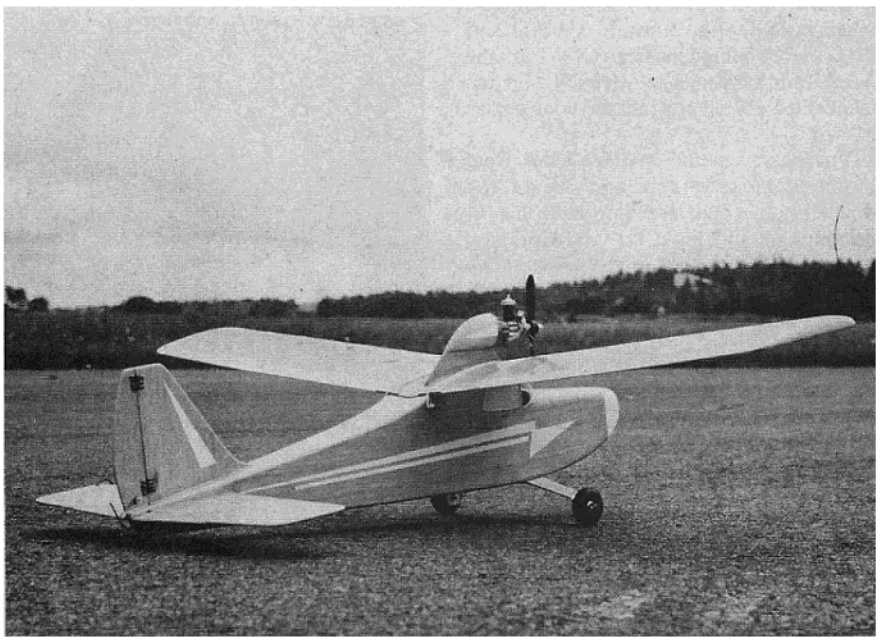
Designed By: Hoh Fang-Chiun

TYPE AIRCRAFT
Sport (rudder only)
WINGSPAN
32¼ Inches
WING CHORD
5⅛ Inches
TOTAL WING AREA
165 Square Inches
WING LOCATION
High Wing
AIRFOIL
Flat Bottom
WING PLANFORM
Constant Chord With
Slight Swept T.E.
DIHEDRAL, EACH TIP
1½ Inches
O.A. FUSELAGE LENGTH
22¼ Inches
RADIO COMPARTMENT AREA
(L) 8½" X (W) 2" X (H) 2½"
STABILIZER SPAN
13¾ Inches
STABILIZER CHORD (incl. elev.)
3¼ Inches (average)
STABILIZER AREA
44½ Square Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Mid-Fuselage
VERTICAL FIN HEIGHT
4¼ Inches
VERTICAL FIN WIDTH (incl. rudder)
3¾ Inches (average)
REC. ENGINE SIZE
.020 Cubic Inch
FUEL TANK SIZE
On Engine or Aux. 1 Oz.
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
Pulse Rudder Only
CONTROL FUNCTIONS
Rudder

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa and Ply
Wing	Balsa and Ply
Empennage	Balsa
Weight Ready-To-Fly	12 Ounces
Wing Loading	11 Oz./Sq. Ft.



silk on the wing for maximum strength, but Silkspan will also do. To save weight, use colored material only and limit the use of color dope for trimming purposes. Now give the entire model several coats of clear dope until a slight shining surface has been reached. To obtain a smooth finish, wet sand between the final coats.

The procedure described above was used in finishing the prototype. With the ever expanding use of the polyester type covering materials such as MonoKote, Solarfilm, etc., these materials can very well be used to speed up the finishing process of the model. To cover the cockpit, cut the windscreen pattern from sheet celluloid as shown. Trim as required for fit. When satisfied, glue the windscreen in place, using epoxy cement for best results. Hold the celluloid sheet in place with masking tape while the glue sets. Finally, epoxy the wing front wire dowel in position.

Radio Installation: The installation of the Ace Pulse Commander system is clearly shown in the photographs. To repeat: the battery is located behind Former F1 with the receiver placed next to the battery. Stuff as much sponge as possible around the units to protect them from being damaged in case of

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