

PITTS SPECIAL

BY NORMAN MCFARLAND

The history of the full-size Pitts Special is probably better known to the reader than to the writer, so there is no need to repeat all the thousands of words of praise which have already been bestowed. The invaluable assistance of Curtis H. Pitts and Mary T. Gaffaney in providing information, without which this model would have never left the drawing board, is gratefully acknowledged.

The model was conceived as a subject for the 1971 British Nationals, after studying photographs taken at the World Aerobatic Championships at Hullavington, (1970) and the brochure from Curtis Pitts. Three models have been built, each embodying modifications, all of the best of which are incorporated in this plan.

The original (N5J) had foam wings, weighed 9½ lbs. fully laden with Merco .61, MRC radio and 10 oz. fuel, and flew well without the cowl and pants but brick-like when fully dressed. Subsequent lightening by using built-up wings was cancelled-out by liberal application of fiberglass to the nose to hold the bits together after discovering that dry joints on the switch can render any radio U/S! However, alteration of incidences and the C.G. position have now cured most problems.

N1151H was built as a semi-scale model using sheet fuselage sides and veneered foam decking and wings to prove that cutting holes in the wing core would reduce weight. It did, but flexing of the wings was found to be a small problem, especially on one occasion during a half-snap pull-out from an inverted dive when the interplane struts fell out! (Since modified.) Good friend and club-



mate Eric Herbert had, by this time, built N266Y which weighs 8 lbs., with Simprop radio and an empty tank and flies well at this weight with a Webra .61 which, incidently, gives a power-to-weight ratio of only half that of the full-size plane (with 180 hp Lycoming).

Construction is fairly straightforward, points to watch being noted herein.

Before building the wings decide whether the 2 or 4 aileron version is to be modeled. The former has one less rib in each panel of the lower wing (as in the case of the "Little Stinker"). The latter has shorter ailerons and the airfoil is nearer to symmetrical.

The wings are built as normal, omitting the strut support ribs until later, then butt joined; ply braces epoxied in, attachment plates and bell-cranks fitted, then sheeted. The ailerons are cut out and finished last.

FUSELAGE & CABANE

The original had cabane struts brazed together from steel tube (automobile brake pipe) formed to the scale oval section, but as this may not be convenient for most modelers, the wire assembly on the plan is structurally acceptable and certainly weighs less. The cabane assembly is fitted prior to sheeting the decking forward of the cockpit.

While working on the nose decide on your pet method of fastening the cowl which will be later molded in fiberglass. N5J has nylon blocks just inside the sheeting on the front face of F2, and four long, thin self-tapping screws from spinners, through the fiberglass cowl, one at each end of the cooling bulges. N266Y uses aluminum pieces let into the sheeting, epoxy glued, then screwed as above.

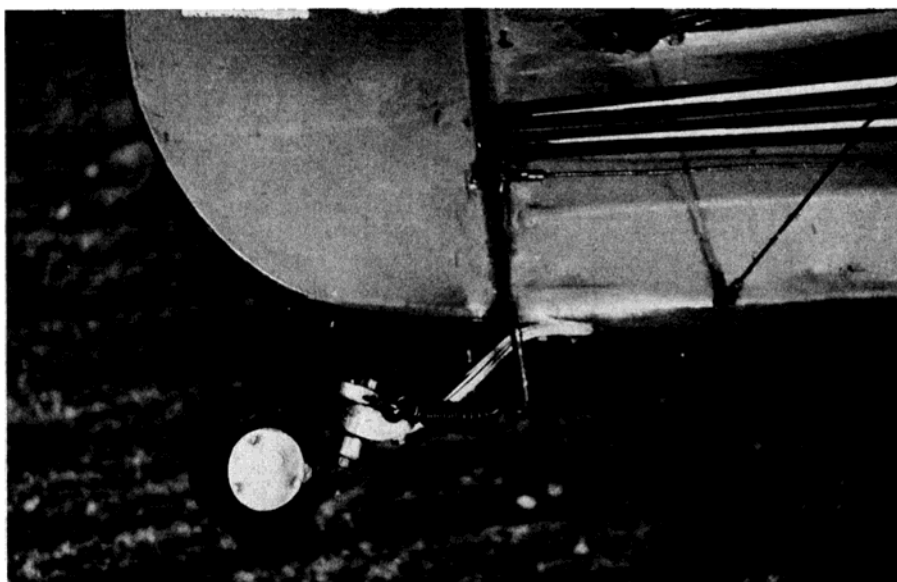
Silencers of welded stainless steel with scale exhausts are used on the three originals but here, again, not everyone has the facilities for this type of work, and the Peak Power type has been used with equal success, although a point here is that the hatch and the under-panel will allow the ingress of oil unless sponge rubber strip is strategically placed, and the exhaust outlet extended with Silicone tubing.

The tailplane is conventional scale model construction but be careful to avoid wrinkles when covering the fin (see note on plan). The rudder linkage shown, i.e., a pushrod at one side and the other a dummy, is used on N5J, while N266Y has tensioned cables on both sides just like the full size, made

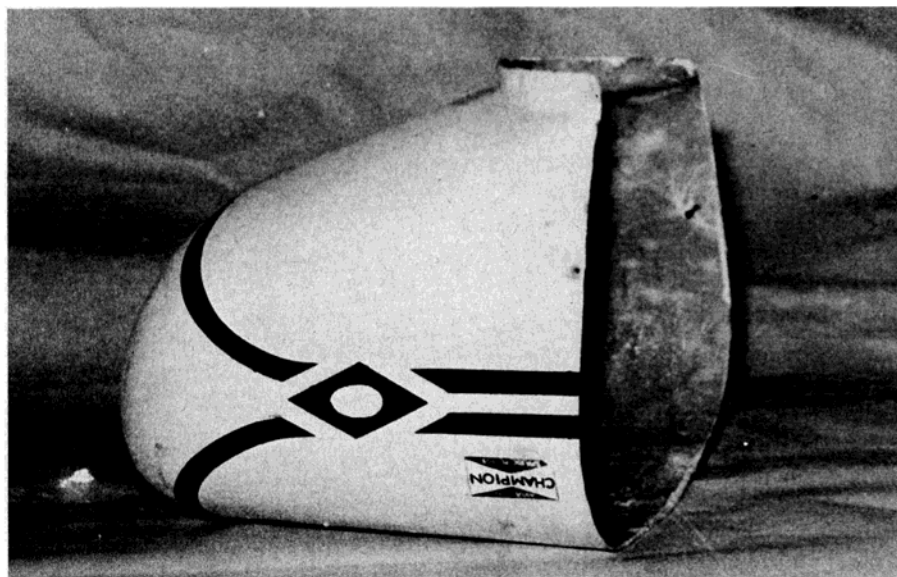




ABOVE: The Pitts Special during a fly-by. **BELOW:** Close-up of the scale tailwheel.



BELOW: The finished fiberglass cowl. Details for construction in article and on opposite page.



from stranded control-line wire. An intermediate bellcrank is positioned behind F4. (If cables are used **do not**, under any circumstances, connect them direct to the servo output – this warning stems from an almost disastrous experience when a fluttering control surface damaged the servo and caused loss of control.) NyRods should not give any difficulty and are possibly the easiest to fit.

The steerable tailwheel arrangement is self-explanatory but note that the wheel, itself, must be centrally placed on its axle relative to the brass bush pivot. Any offset to one side will result in the model tending to turn to that side when taxiing due to castering action. The springs should be fairly stiff but not under much tension, otherwise something will give way. Make sure that the rudder hinges are pinned as well as glued.

INTERPLANE STRUTS

Fit both wings to the model and pin strips of balsa between the tip ribs so that the top wing has an equal gap under each tip. Cut out cardboard templates for the interplane struts and trim until they fit. Half a dozen templates later you should be ready to make the final ones from balsa and ply as per plan, and glue in the support ribs to the correct angle.

The rest of the building is child's play and covering can be in any preferred material, although heavy-weight Modelspan tissue has been found satisfactory if carefully transported and stored.

FIBERGLASS COWL AND WHEEL PANTS

When contemplating building a scale or semi-scale model one's choice is often restricted because fiberglass moldings are not available commercially. In describing here the construction of the cowl and wheel pants for the Pitts Special it is intended to show how easy this really is and the method is applicable to many other models. Materials required are as follows: Release Agent, Gel-coat (thick, treacly resin), Molding Resin (clear or pigmented), Resin Hardener, Glass Tissue, Woven Glass Cloth (looks like white sack-cloth).

All the above can be obtained from your local fiberglass car body panel or boat building firm – other materials mentioned are usually to be found in the average "do-it-yourself" store, if not already on hand.

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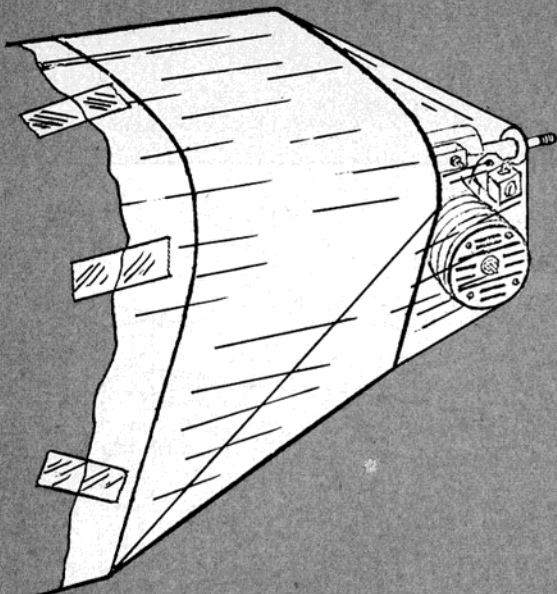


FIGURE 1. Cover engine with polyethylene bag.

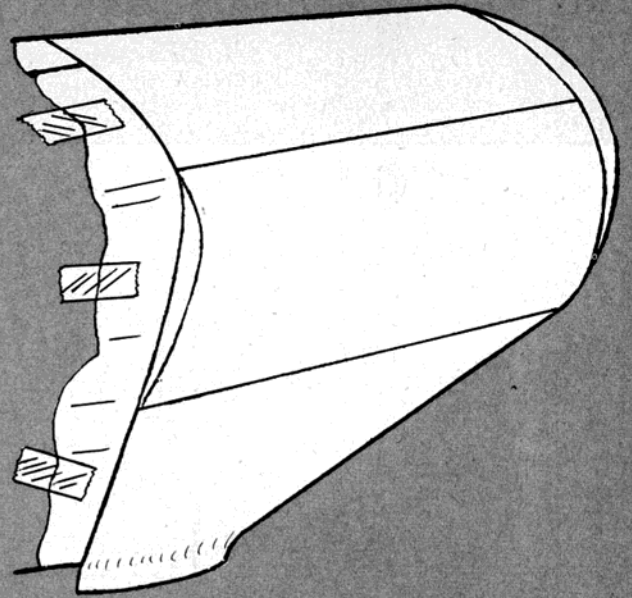


FIGURE 4. Either build up as wheelpant model or attach tinfoil panels, fill joints and sand smooth.

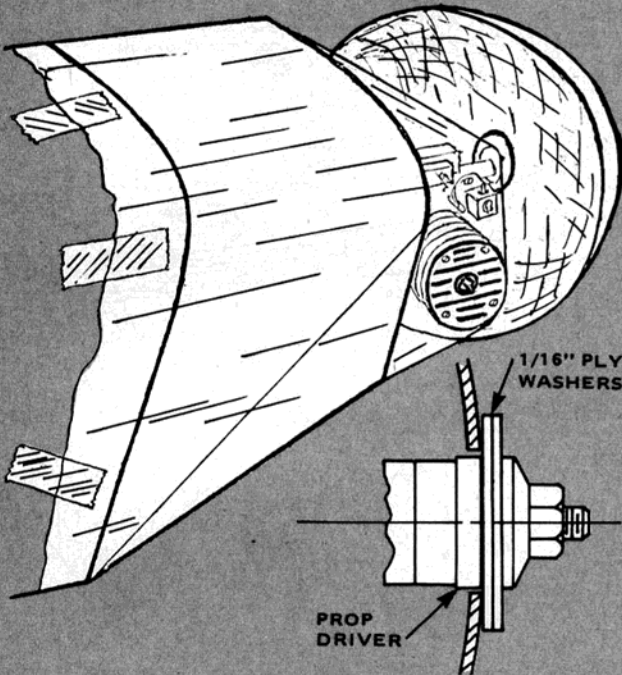


FIGURE 2. Fix cowl front to engine using 1/16" ply washers for spinner clearance.

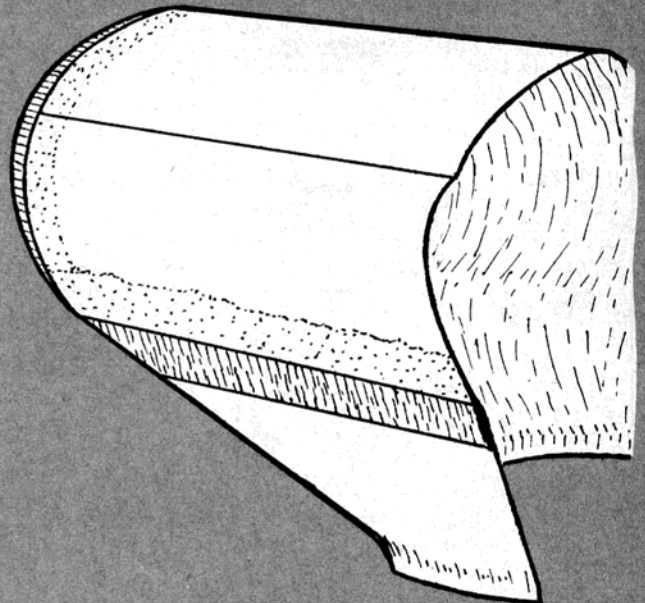


FIGURE 5. Mask and fill panel lines.

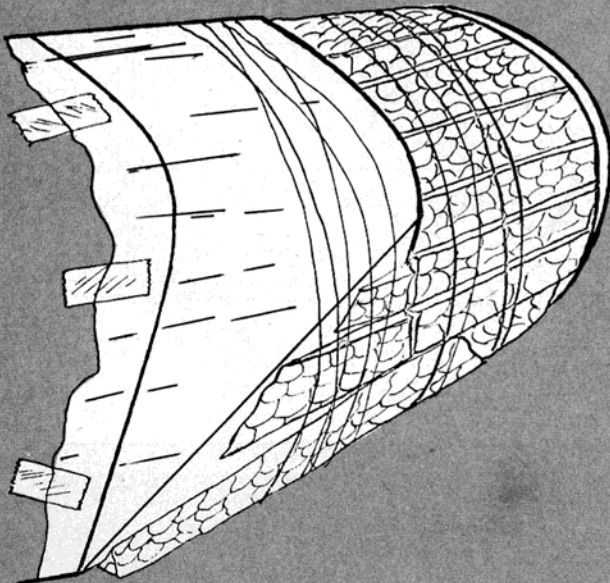


FIGURE 3. Pack round with styrofoam.

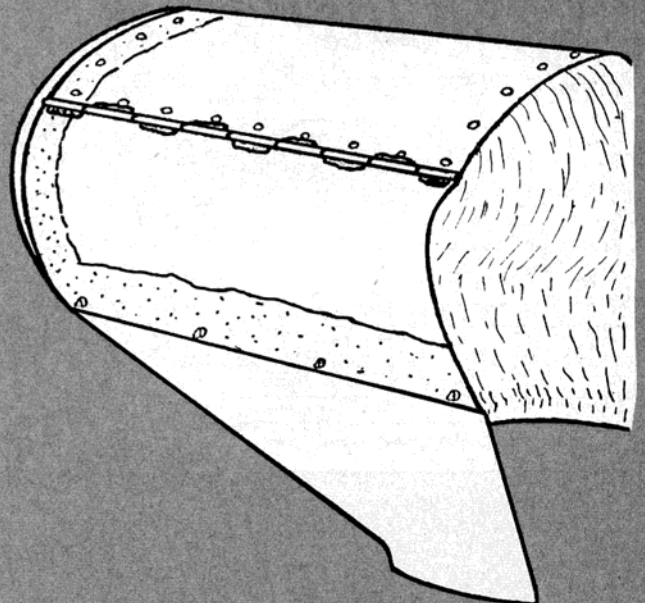


FIGURE 6. Add detail before final coat of paint.



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The Pitts wheel pants are comparatively simple, being symmetrical, and only one mold was required to make the four half-shells.

First, a model of the half-shell was made by taking a block of expanded polystyrene and shaping with a knife and then sandpapering to approximately $\frac{1}{4}$ " smaller all around than the finished size, then building up with Polyfilla to within $\frac{1}{16}$ ". Car body filler (resin paste or plastic padding) was then used for the final $\frac{1}{16}$ " to give a non-porous surface which was rubbed smooth with wet or dry paper lubricated with soapy water. Progressively finer grades of wet-or-dry were used until the surface was free from blemishes of any kind, otherwise these would have been reproduced in all the subsequent operations. (It is not essential for the surface to be polished providing it is smooth.)

LAY-UP

The model was washed-off, wiped, and allowed to dry before painting on the release agent and allowing to dry again. About two tablespoonfuls of gel-coat were mixed thoroughly with two drops of hardener in a disposable container such as a meat-paste jar and painted on to the model. After $1\frac{1}{2}$ to 2 hours, when the gel-coat had set but was still tacky to touch, two tablespoonfuls of molding resin were mixed with 2 drops of hardener and one coat painted over the gel-coat. A layer of surface tissue was applied immediately and thoroughly wetted by stippling on the remaining resin, followed an hour or two later with more resin but this time using woven glass cloth and inserting a piece of $\frac{1}{8}$ " welding rod to strengthen the mold.

After drying out overnight the fiberglass was given a sharp blow with a block of wood to remove the model which was then discarded, leaving the mold to be trimmed, where necessary, with an old pair of scissors and the

sharp edges sanded. Inspection of the inside of the mold revealed an occasional bubble which was filled with resin paste and blended in using fine wet-or-dry paper. Repeat four times, using the previous release agent, gel-coat, resin, tissue, glass cloth procedure to obtain four identical half-shells from the female mold.

Experiments with different layers were tried. Omitting the tissue gave a soft, flexible molding. Replacing the cloth with a second tissue layer gave a brittle molding; while chopped mat, the usual car body repair material proved to be too heavy.

After cutting away to clear the wheels, the halves were reinforced with a 1" square piece of woven cloth at the attachment points, and finally taped together and joined with a $\frac{1}{2}$ " wide strip of woven cloth on the inside. (Warning — when cutting out to clear the wheels, do one pair first and tape together before cutting the next pair, otherwise, you may end up with 3 or 4 identical pieces!)

All that remains is to smooth the join-line and fit to the undercarriage to check wheel clearance prior to painting. Cellulose primer is recommended for the first coat.

COWL

This is more involved due to its large size, but is still within the capabilities of any modeler.

A molding of the front section of the cowl was made using the same method as for the wheel pants. This is the only fiberglass part of the cowl on the full size Pitts Special, the remainder being aluminum panels but, for ease of access and attachment, it was decided to make the whole of the cowl in one piece. The model for the full cowl was actually made on the fuselage to ensure an accurate fit and the sketches explain the procedure. The previously described lay-up sequence was used to obtain the mold which, in this case, was finished with an additional layer of "string-vest" textured glass cloth for strength, although chopped mat would serve the same purpose — weight on the mold being unimportant. Two points to watch — grease the crankshaft threads for obvious reasons, and fix the engine with match sticks instead of screws so, while the mold might be difficult to remove, it certainly would not be impossible to remove!

The cowl molding, itself, was then made as before.

If difficulty is experienced in removing the final molding from the mold it has been found that an old plastic propeller inserted between the two is of assistance and, in extreme cases, filling the inside of the molding with ice cubes, then immersing the mold in really hot water (wearing protective gloves, of course) usually does the trick.

After the first coat of cellulose primer, panel overlap lines were emphasised by masking along the line with 2 layers of drafting tape and painting up to the tape and about 1" away with 3 coats of cellulose primer-surfacer, being sure to allow adequate drying time between coats. The raw edge of the primer was feathered-in using wet-or-dry so that the subsequent removal of the tape left a sharp edged step. Piano-hinges were imitated with pieces of basket weaving cane first painted then grooved with a sharp knife and glued with balsa cement on alternate sides between the grooves before the final coat of paint on the cowl.

Rivets were spots of P.V.A. glue applied with a 5 ml. or 10 ml. disposable hypodermic syringe (the needle being put away safely for inflating airwheels) and "pop" rivets were pierced with a pin before the P.V.A. had fully hardened, then again after painting.

Dzus fasteners were made using old, thick P.V.A. to form tall blobs which were squashed with pliers before setting hard, several attempts being required before all were of equal size but the patience was rewarded.

Paint schemes can be almost any combination of colors and a study of magazines such as Air Trails and Air Progress will provide inspiration. Of the 1970 American team N5J is lemon yellow and black sunburst, and the other three are red and white. Blue and white is common on the 2-aileron version.

Initial flying should, preferably, be attempted over short grass as the model inherits some of the full-size "squirrel" tendency on concrete, which needs a bit of practice to cure, due to the comparatively narrow landing gear track and the short moment.

Don't heave on full-up to take off

or this will almost certainly result in a tip stall with the inevitable cartwheel. The model should prove quite docile if allowed to take off itself with perhaps a little of usual right rudder. When airborne, climb gently and straight for as long as possible before turning, and climb still higher before attempting to trim. After trimming one should be able to fly 'hands-off' without difficulty, even though the aerobatic performance is fantastic if the model is kept down to a reasonable weight.

Try climbing almost vertically and then apply full-up and left then, when the machine is pointing straight down, let go of the sticks – slight up should then pull it level again. If not, you don't have enough height or the C.G. is wrong.

Three-point landings are easy if the throttle and elevator are used together and, in fact, are highly recommended to preserve the cowl!

Happy landings!

NOTE: Professionally made fiberglass moldings can be obtained for \$25.00 per set, including shipping, from: Norman McFarland, 13, Broadway, Helmshore, Rossendale, BB4 4Hb., Lancashire, England.