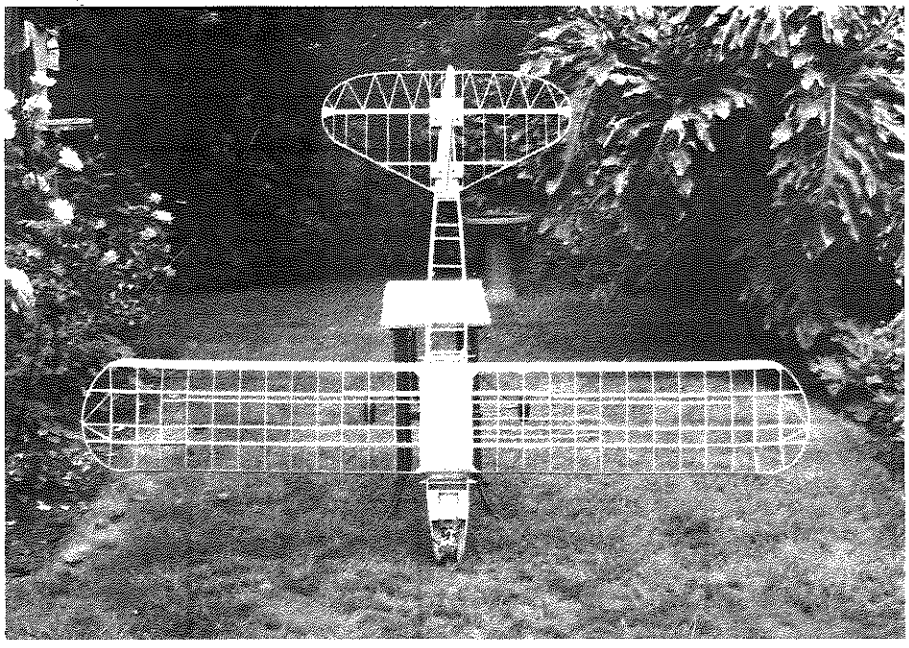
Paypod

By FRED LEHMBERG. . .Here's an RPV for fun use that can serve as a flying lab. . .use it for photo-mapping or install instruments for collecting in-flight data on altitude, airspeed, thermal searching, and more.

• Israel's highly successful use of radio-controlled models has been well-documented in newspapers, aviation and model aviation magazines over the past few years. Here in the US we have the growth of new industries conceived for the purpose of building such machines and providing the equipment they require. This equipment includes the avionics and payload equipment to provide visual surveillance of hostile territory, air sampling, detection and measurement of ionizing and non-ionizing radiation (radioactivity and high-frequency radio), etc. A considerable amount of information can be obtained with no risk of human life and less chance of detection and destruction of the aircraft. Of course, no government agency would have it intimated that their project involved toy airplanes, so they refer to these craft as Remotely Piloted Vehicles (RPV). In the agency's all-encompassing wisdom, is it possible that the name was selected so in the case "The thang just don't *fly*, sir!" the project could fall back, restaff, and submit an offroad auto as the RPV?



Assembled Paypod, sans covering; simple structure of this flying laboratory makes it useful for all sorts of experiments, plus aerial photography.

Whatever, Hangar 3 decided to develop a civilian RPV to provide aerial photography of existing or proposed flying sites, in-flight data, such as, altitude, airspeed, rate of altitude change, rpm, etc. This data would be useful to any modeler interested in development of model aircraft or in the effects of design changes. It even will impress your local yokels! You can have a ball looking for thermals, or checking props, or. . . .

This is not the usual construction article. A builder of Paypod will have the knowledge of wooden construction required. This article will be a commentary on incidents during construction and/or amplification of plan detail.

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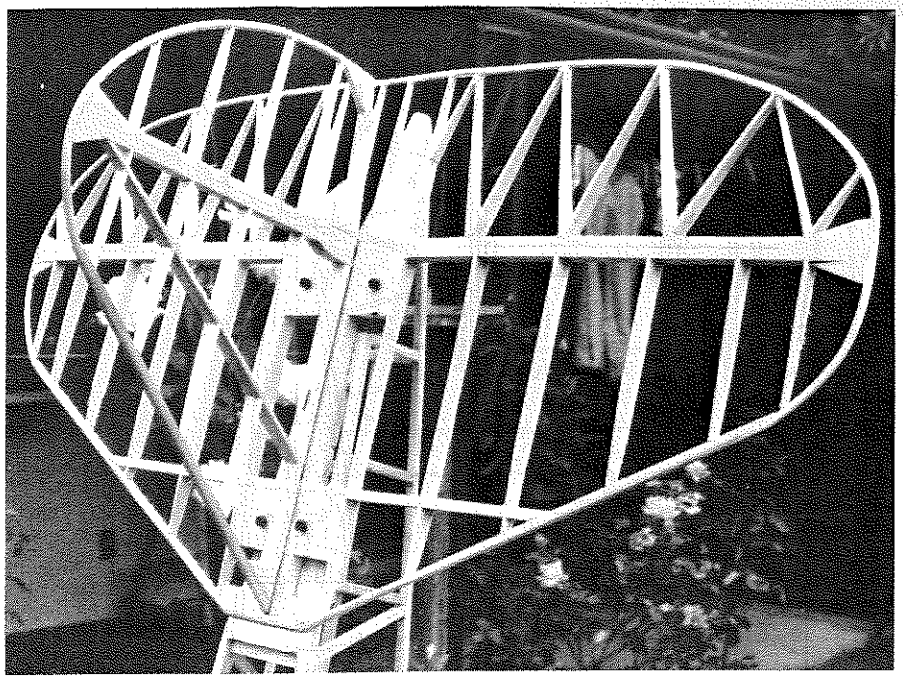
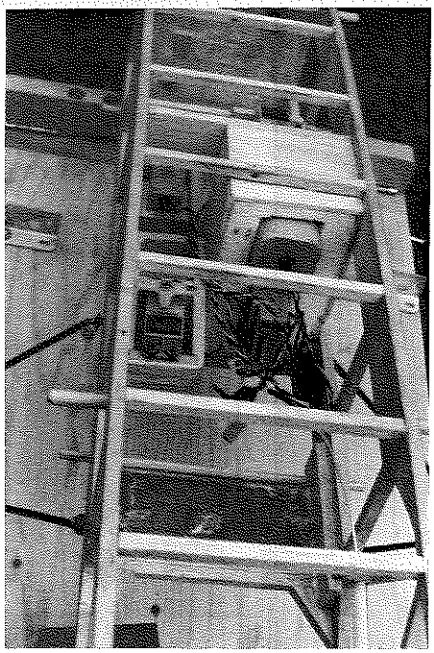


Close-up photo of Paypod's tail assembly shows beefy, no-nonsense design and construction.



Receiver in foam, in box, is well-protected from mishaps.

CONSTRUCTION

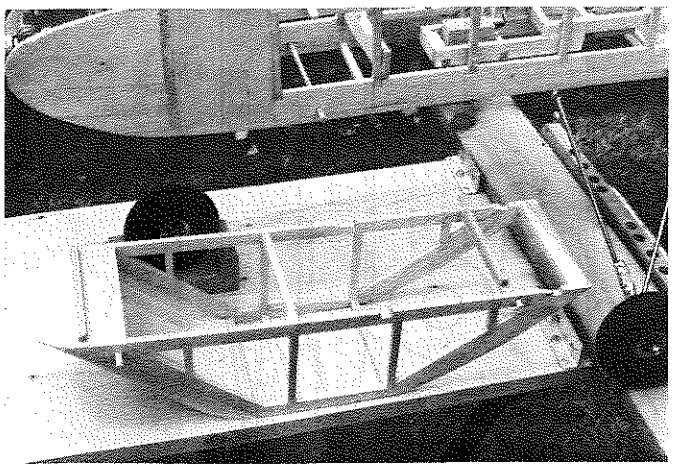
I use a product known only generically as "sound-deadening board" to build on. It is a somewhat soft paper or wood product, about 1/2-inch thick, that takes pins and small nails nicely. A 4 x 8 sheet should be cut into a 4 x 6, then that cut into a 2 x 6. These three pieces will last you for many, many models! These sizes are light to handle, easy to store, and (the best part) *cheap*. They will protect the dining room table, too! The lumberyard will probably cut them for you, which will make it easy to get them home. On the way home stop by McDonald's for a shake. Try to sweet talk the waitress out of a dozen soda straws. These straws are the right size for use in *Paypod*!

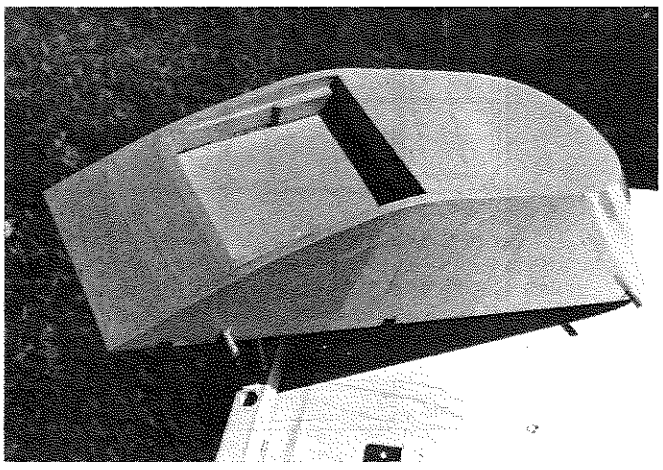
When the wing is on the top of the plan I build it first, because it is the hardest to reach. When it is on the bottom I build it first, because the rest of the plan is more interesting. Cover the plan with Cut-Rite waxed paper or the plastic that comes with MonoKote. The latter is better, and I never throw it away. Nothing likes to stick to that stuff. DO NOT use any plastic wrap, it spells problems. Building the wing is straightforward. If you wind up with a little more dihedral, it is OK. You can get by with a *little* less. It is best as is, but be sure it is the same on both sides.

None of the reed on the plans require soaking. Cement it in place with Hot-Stuff and soda as gap-filler. Don't be nervous with reed. It is easy to use, will take knocks that would break balsa and is. . .cool!

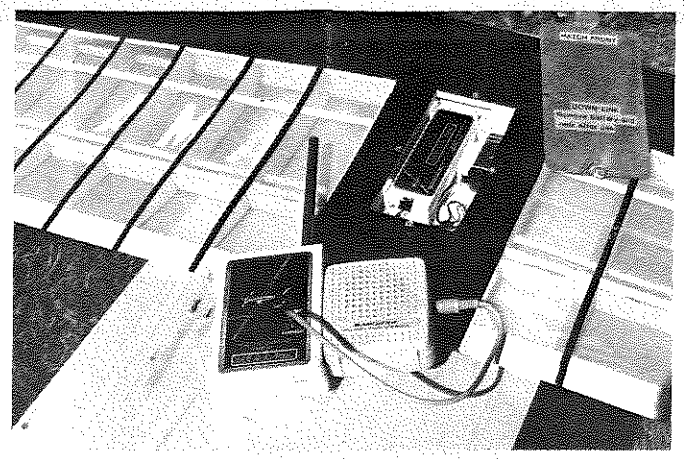
The spars are totally adequate *if the webbing is used*. A spectator's probing finger between ribs can crack a spar, or bend it down a smidgin, and stress in flight will increase the bend to disaster. I feel that caused a crash of mine not long ago, so don't skip the webbing. Outside the spars is satisfactory for this model, the web size, and rib spacing. I prefer vertical grain in the webbing, there are arguments for horizontal grain, and, as Merv Buckmaster of *Airborne* magazine so well puts it, "Blimy, mate, make 'em all 'appy, I says. I like the crashin' grain at 45 degrees!" Which way, Merv?

Now, we get to use the McDonald's soda straws! If you overlooked the holes on each side of the front spar (for shame!) you can burn them in with a sharpened piece of coat hangar wire bent at a right angle heated with a flame. Splice the tubing together with Scotch tape, and run them through the holes from the center section. The forward hole is for the airspeed indicator (assuming it is electrical) and will take the two conductor wires. If you are using a pitot tube make your own plans for this installation, as it may require two holes and certainly will require tubing, instead of straws. For an electrical device, run the straw out four ribs from the wing centerline. This will be beyond the propwash. Installation of the transducer at a later date will require only a small hole in the bottom covering. This straw is only required for one wing panel. I used the port (left side facing forward). The hole aft (to the rear) of the spar is for the down-link antenna being used. Since the antenna may be a dipole (probably *will* be) this straw must be placed in both wings. Run these straws all the way out to the polyhedral break (11 ribs). With this installation you will be able to install and remove down-link equipment at will. This is important, for we may be getting all sorts of equipment in the future, and the wing is a very good place to put it for a number of reasons.

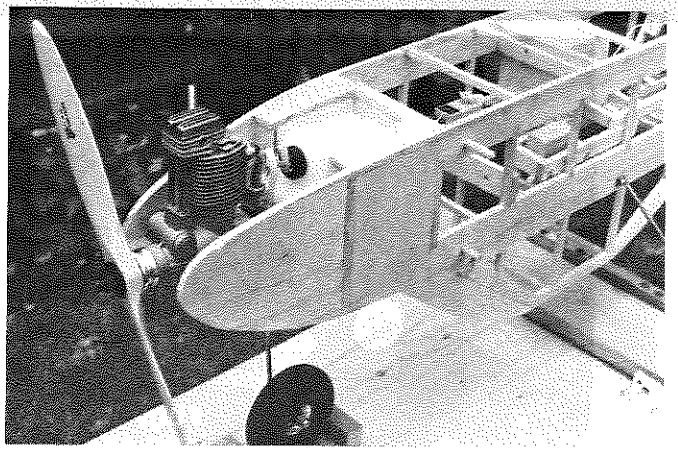




The Pod--payload area shown in framework state and finished, ready for installation of camera, Sniffler, or?



Ace Thermic Sniffler, airborne equipment, and receiver with Radio Shack module attached. See text for more on this.

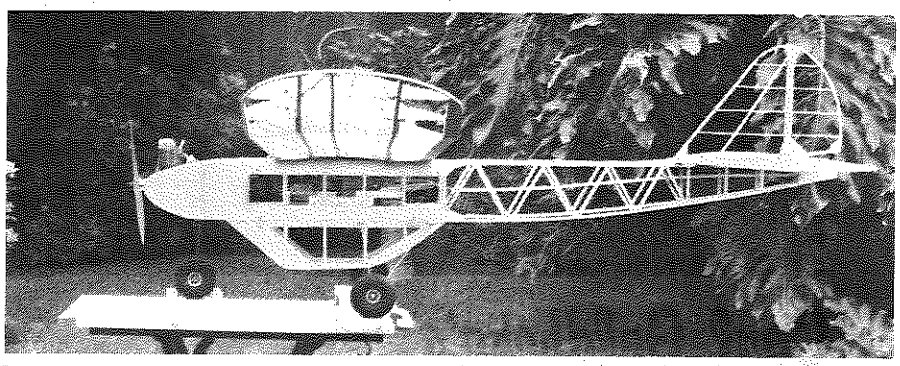


Engine installation in the Paypod. Without the pod, she'll fly like an old timer; use a Fox .36 two-stroke, or some other .45 for fun flying.

Little comment is required for the fuselage construction. Locate the engine mount (I am partial to the Hayes), the hardware for the nose gear, and through-bulkhead leads for the fuel line, throttle and nose-wheel push rods before installing the firewall. Draw on the firewall the clearance for the 1/8-inch engine compartment liner. Install the liner, and fill between the liner and nose sheet. Dope the engine compartment well, and paint (Rustoleum is great) before installing any components in the engine compartment. This will make a clean nose area with minimum drag.

Because of the long push rods, I don't recommend Golden Rod due to change in length with temperature. One quarter-square balsa with wire ends provides adequate stiffness for Paypod. Locate the guides for the elevator as shown on the plan, and provide a similar guide in the fuselage top for the rudder, passing it through another guide in the stabilizer. Install and/or cut these guides after you have installed the servos, for the "leads" will depend on the servo position. The frame photos show suggested installations. Also, despite the model's size, it is not Giant Scale, so don't let the Big Bird Boys talk you into driving tacks with a sledge. They are used to an airplane this size that weighs two to three times as much, with large stresses and forces, accordingly. While on the subject, the recommended power you will find is more than adequate for the job and provides a power reserve to "get you out of the poop" when you need it.

Don't mount the tank too high or you will have siphon problems with a full tank. The Paypod fuse first used wooden beam mounts, and we had this problem. The engine we use has a very strong suction, and the top of the tank can be mounted below the needle valve. Replacement of the beam mounts with the Hayes was very satisfactory and provided more space for the tank, too. Incidentally, in the conversion of mounts I somehow wound up with a change of trim, requiring the addition of a bit of tail weight. If you find your craft is either tail-heavy or nose-heavy (very unlikely it will be the latter), you can move the wind hold-down dowels plus or minus one inch. Of course, also move the pod fuse dowels the same amount!



Profile shot shows payload bay clearly. She would be a fun project for the experimenter in you, or build it with a flat bottom for enjoyable weekend flying.

Install the remainder of the McDonald's straws in the fuselage to take the R/C receiver antenna. Make gussets for the corners to take them.

Regarding the manner of installing the empennage (tail to certain people), there is a neat product made out of aluminum that the stationery stores sell called "binding posts." These are tee nuts with a threaded shank (8-32 thread) that come in lengths from 1/4 inch to perhaps 2 inches. For this application, I recommend the 1/2-inch. If it isn't threaded the whole length, drill and tap it, again. If it's too long, cut it off, drill it, and tap it. Throw away the aluminum screw (into your screw box, a future use may arise), and replace it with a socket head screw and a washer cemented to the stab under the covering. The shank makes a great guide for installing the stab in a keyed position, especially so if you make a front shank longer than the others! Be sure that none of the shanks go all the way through the stab.

You may have noticed that no mention of hinges is made on the plan. Why do it? Everyone has their hinge. I doubt that I have ever used the same kind of hinge for two successive models.

The pod must be customized for the particular use. It is highly recommended that any down-link transmitter be mounted in the wing to avoid R/F interference with the control receiver. We may have to put another set of antenna straws in the wing, for we can see applications where we will want to measure rate of altitude change, rpm, and airspeed near-simultaneously, thus requiring two down-link antennas in the wing. The paramount requirement is to be absolutely free from interference without control R/F! For photo-missions, the "shot" aft and down is best for air-to-air pictures and panoramics and vertically down for mapping, which will soon be covered in a P&F&CT. Hangar 3 is agreeable to testing (with equipment installed in a pod) "wild ideas," but this must be discussed first. It is a far, far better idea to obtain a set of plans from *Model Builder* and "roll your own!"

There should be no warps, of course. The CG location is not unduly critical, and you can live with a location from 35% to 50% back from the leading edge. The forward position will probably require up-trim on dead-stick condition, and the 50% may require down under power. EMID (every model is different) applies, as usual. Too, you may find you want a more automatic takeoff at lower speed, which will require a change in the negative ground trim toward zero. This is a matter of preference, of course.

You don't intend to build a "flying laboratory?" Then build a Paypod as a soaring machine and a fun flyer. Replace the pod with a flat hatch, or cover the bottom. You won't be able to fly in competition as an Old Timer (Paypod is a 1986 design), but she flies like one and provides as much satisfaction. If you like, for this application, install a Fox .36 two-stroke, or some other 2-stroke .45. Do your thing . . . but put the McDonald's straws in the wing, for you might reconsider Paypod as a Flying Lab in the future, and those straws make a fascinating conversation piece!

Happy flying! •