

FLY RC FREE PULL-OUT PLAN

The Cessna L-19/O-1 Bird Dog was developed in response to an Army requirement for a two-place, all-metal Liaison/Observation aircraft to replace the aging Piper L-4 and Stinson L-5 inventory. Although originally built as Cessna's Model 305 in 1949, this great little warbird soldiered on well into the Vietnam conflict era, performing yeoman's service in a variety of roles. Among the more exciting and way up on the pucker factor missions was that of the FAC or Forward Air Controller. These intrepid airmen flew their O-1's at altitudes where rocks and bottles could be considered SAM's, at airspeeds not much greater than some of today's higher performance RC models! While they were at it, they managed to mark the targets of opportunity with Willie Pete, white phosphorus rockets, so the Fast Movers could lay down their Mk. 82's and other ordnance. These activities were truly NOT for the fainthearted or uninspired!

The explosive growth in electric propulsion systems for RC models was one of the motivators for me to design this model. Unlike glow or gas power, electrics let you really match the model to the propulsion system and obtain the desired flight performance. Props, gearboxes and batteries provide the means to go from slow flyer to hotliner to jets and cover everything in between. When pondering what subject I'd like to do to use the popular geared Speed 400 package, I recalled one of my early free flight modeling adventures in the form of a 36in. span Berkeley Bird Dog powered by a McCoy .049 diesel engine. I'm sure memory fades and time has provided some embellishment, but I do remember THAT model really flew well. So why not a slightly larger, e-powered version? Yeah, why not? So, here it is!

My design goals for this model were simple.....just that, simple! It's all sheet balsa and lite ply

and, once you've cut out the parts, can be framed up, to the point of covering, in just a few hours spread across two or three evenings. In actuality, it took me less time to frame up than it did to cover and install the radio and power package. The parts count on the Bird Dog is not high and building moves along quickly if you've got all the parts on hand when you start. The best approach with this, and any plans-built model, is to cut out all the parts and make your own "kit."

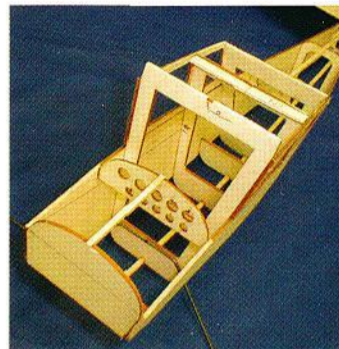


Basic fuselage parts. Make certain to accurately mark former location and reference line to insure a twist-free structure.

FUSELAGE

The key requirement in building the fuselage is to build it straight, and twist free. This is more easily accomplished if you accurately mark the fuselage sides with the longitudinal reference line and the former position. Mark the formers with the reference line position also.

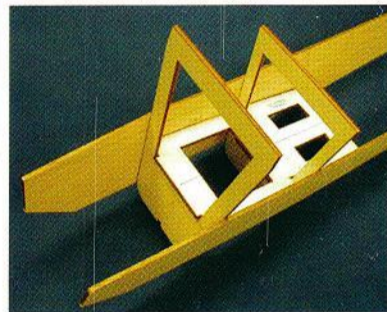
Begin assembly by positioning formers F2, 3 and 4 on the servo tray. Do not glue. Build up a left and right hand fuselage side by joining the side window area part with the main fuselage side. Glue the former/servo tray sub-assembly in position on the R.H. fuselage side. Add the L.H. fuselage side followed by formers F1, IP, F4A, 5, 6, and 7. Add the 1/8 sq. stringers between F4A and F6, and formers F1 and IP. Bend the 3/32 music wire landing gear strut to the layout provided in the plan and glue it securely to the forward side of former 2. Add the LGA and LGB parts to capture the wire. Glue a 1/8 square stringer in the notches in formers F6 forward to F2. This stringer extends aft from F6 and butts up against F7. Now glue formers F1A, F2C, and F3A in position gluing them to both the fuselage sides and the 1/8 stringer. Maintain the lower contour shown on the plan. Continue the stringer forward to former 1. When you are satisfied that the fuselage to this point is square, add glue to the joints of the original F2, 3, 4 and servo tray assembly. Add the upper 1/16 balsa sheeting between F1 and IP and F4A and F6. Glue 1/8 sq. supports on the upper edge of the cabin structure between F2 and 3, and F3 and 4. Glue the lite ply wing



Fuselage assembly prior to addition of 1/16 in. balsa upper sheeting.



Begin fuselage assembly by gluing formers and servo tray sub-assembly to R.H. fuselage side. Align carefully with pre-marked former locations and reference line.



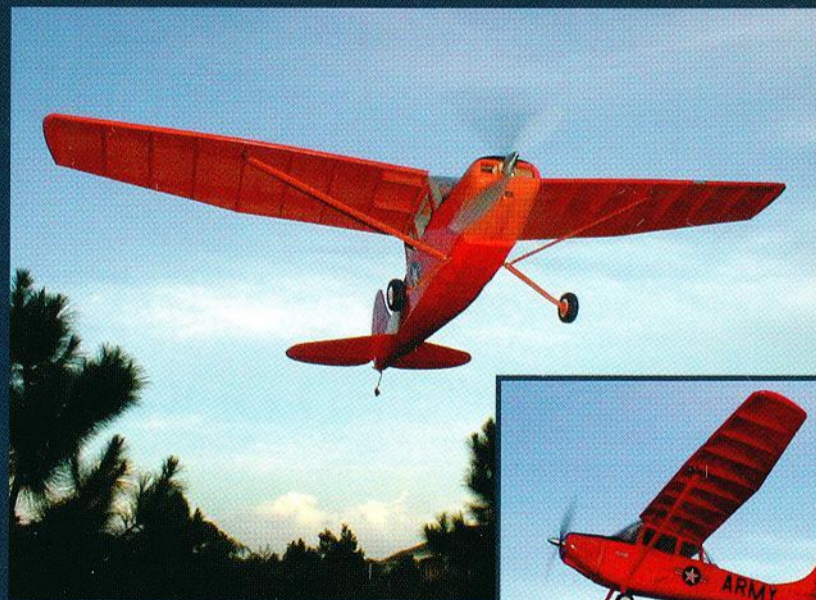
L.H. fuselage side glued in place to formers and servo tray sub-assembly.

SPEED
400

L-19 BIRD DOG

Sport scale park flyer

Story, plan and photos by Rich Uravitch



SPECS

WINGSPAN: 40.3 in.
WING AREA: 201 sq. in.

WEIGHT: 20 oz.

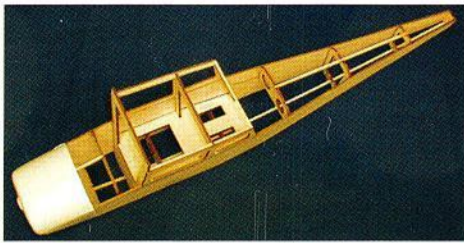
POWER SYSTEM: 3.33:1 geared Speed 400; 8-cell 1000mAh NiMH battery; APC 9x6 slow flyer prop

FULL THROTTLE POWER: 7.7 amps, 72 watts; 3.6 W/oz., 57.6 W/lb.

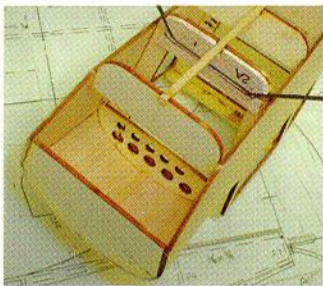
TOP RPM: 5,150

FLY RC

DECEMBER 2003

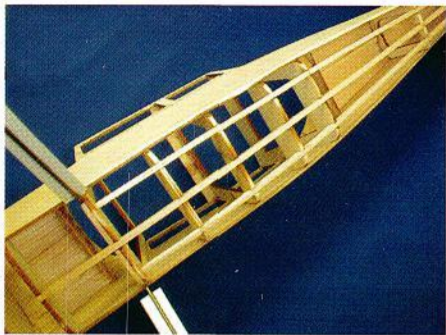


Above: basic fuselage structure ready for sheeting and landing gear installation.

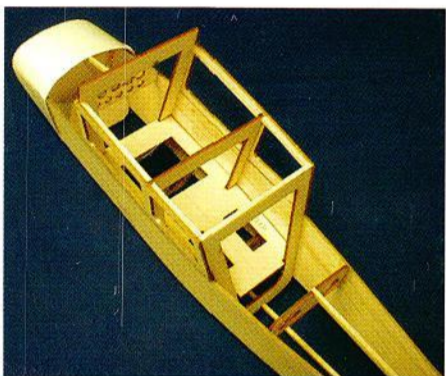


Left: lower fuselage may be sheeted with 1/16 in. balsa or covered with film covering.

If you choose to film cover, two additional 1/8 in. sq. stringers will be needed. Locate them between center stringer and fuselage side.



Lower fuselage showing two additional 1/8 in. sq. stringers added in lieu of full balsa sheeting. Saves a bit of weight and sheeting material.



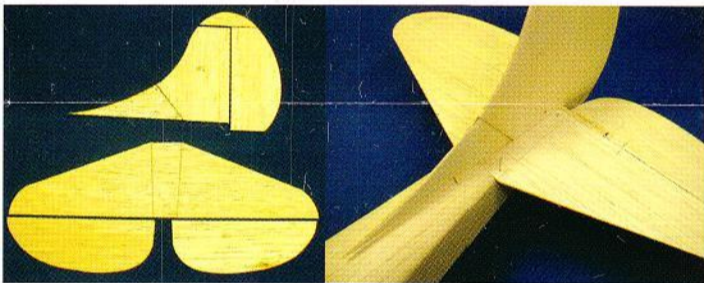
1/8 in. sq. balsa center line stringers and cabin reinforcements added.

hold down plate in position at F4.

The bottom may now be sheeted with 1/16 balsa. Alternatively, to save some weight and material, notches may be cut in all the lower formers to accept two additional 1/8 sq. stringers. This will allow you to cover the bottom with covering material rather than balsa. If you choose this option, remember to sheet the area from F1A to F2C around the landing gear struts to provide a base for the covering. Add the 1/8 sq. stabilizer supports to the inside edges of the fuselage sides.

TAIL GROUP

The empennage of the Bird Dog is simple 3/32 in. sheet balsa. Observe grain direction, join the elevator halves with a length of 1/8 dowel, sand to shape, and temporarily hinge the elevators and rudder.

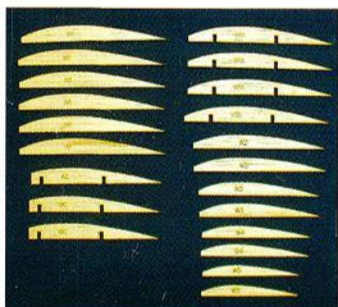


Left: simple, sheet balsa tail group parts. Right: tail group installed. Note 1/8 in. dowel elevator joiner.

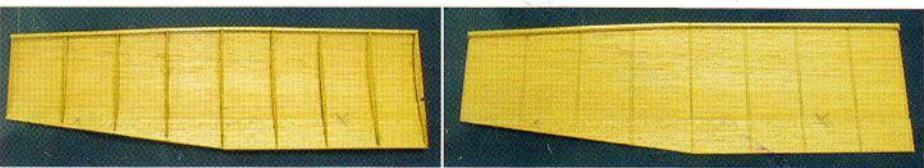
WING

Like the empennage, the wing is simple sheet, built in three pieces. The sheeting is on the upper surface only, there is no bottom sheet required. You may find it easier to build the panels inverted over the plan although the prototypes were built "in hand."

Cut the joined 1/16 sheets to the outer panel outline on the plan. Mark the rib and leading edge locations directly on the sheet. Glue the 1/8 x 1/4 balsa leading edge in place



Balsa wing rib complement. Wing construction is simple and requires about an hour to build.



Left: outer panel (R.H.) with ribs glued into position. Balsa tips not yet added. Right: the outer wing panel cut to outline, 1/8 x 1/4 in. leading edge glued in place and rib locations marked directly on the balsa.

L-19 BIRD DOG BILL OF MATERIALS

QTY	MATERIAL	SIZE	USE
1	balsa	3/32 x 4 x 48 (yields both sides)	fuselage sides
1	balsa	3/32 x 3 x 36	ribs/1 elev. Half
1	balsa	3/32 x 3 x 36	tail group
1	lite ply	1/8 x 9 x 12	formers
3	balsa	1/16 x 3 x 36	wing skin/sheeting
2	balsa	1/8 x 1/2 x 36	leading edge/struts
3	balsa	1/8 x 1/8 x 36	fuselage stringers
1	wire	.093, 12" length	main landing gear
1	wire	.062, 4" length	tail wheel strut
1	wire	.047, 18" length	pushrod/strut fittings
1	balsa	1/2 x 1/2 x 12	tips blocks/ i.e. fill
1	hardwood	1/8" dowel	elev. joiner/wing

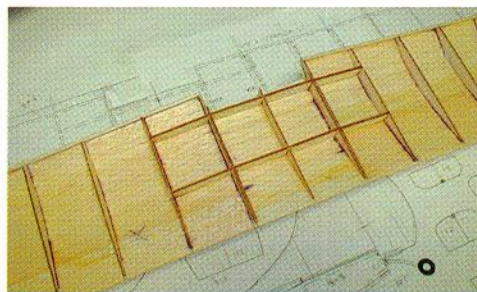
Hinges, wheels and hardware to suit.

A vac-formed plastic cowling is available for \$10 postpaid from the designer. Remit funds to:
Rich Uravitch
5629 Cypress Creek Drive
Grant, FL 32949
(321) 728-0486
e-mail: AEROSCALE@aol.com
www.richuravitch.com

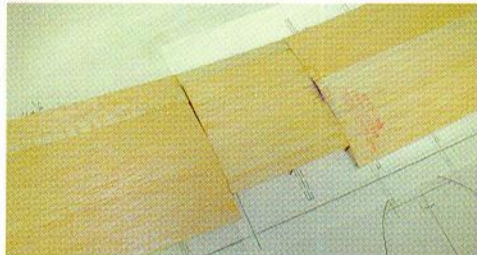
followed by ribs W1 thru W5. Build the center section from 1/16 sheet, WC ribs and the lite ply joiners. The correct dihedral angle is established by the joiners. Glue the outer panels to the center section. Add the 1/2 x 1/2 wing tip blocks, the center section fill piece and the hold down bolt reinforcement. The lower center section area may now be sheeted with 1/16 balsa. Sand the wing assembly to shape after pre-shaping the leading edge and tip blocks.

AIRFRAME ASSEMBLY

Position the completed wing on the fuselage. After insuring that it is square to the fuselage, drill through the upper portion of former F2 into the wing leading edge filler to accept the two 1/8 in. dowels. Remove the wing from the fuselage and glue two lengths of dowel into the wing leading edge. Reinstall the wing and drill through the trailing edge of the wing into the lite ply hold down plate. Drill and tap the plate to accept a single 6-32 nylon screw. Glue the horizontal stabilizer/elevator assembly in place followed by the fin and rudder. Check these components for proper alignment before permanent attachment to the fuselage. Remove the wing from the fuselage.



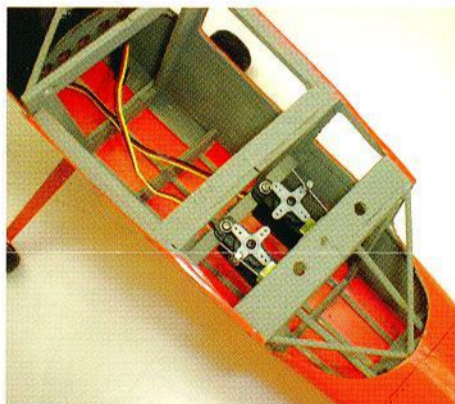
View of the underside of the wing showing the outer panels joined to the center section with the two lite ply joiners. They automatically establish correct dihedral angle.



Wing outer panels joined to center section. Lite ply joiners insure correct dihedral angle.

RADIO/PROPULSION SYSTEM INSTALLATION

Make up elevator and rudder pushrods from 1/8 dowel with .047 wire end fittings. Mount the servos in the receptacle in the tray. I use 1/16 ply control horns on the rudder and elevator but commercially available nylon mini-horns from Dubro would work well also. At the servo end I used Dubro mini pushrod connectors which permit easy adjustment of pushrod lengths. My prototype L-19 uses an Electrify flite pack from Great Planes which includes a 5 channel mini FM receiver with integral 30 amp ESC and a pair of CS12 micro servos. Guidance and propulsion system power is provided by an 8 cell, 1000mAh NiMH pack from Maxx. They were also the



Hobbico CS-12 servos used on rudder and elevator. Part of "Electrify" flight pack which includes a five channel receiver with integral 30a ESC.

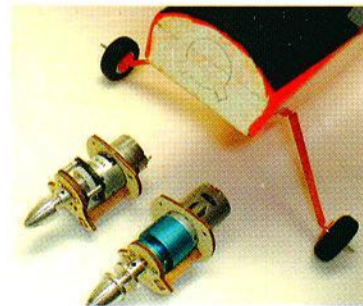
source for the geared Speed 400 motor unit for which both planetary and offset gearbox arrangements are offered. I fabricated interchangeable mounts for both units and used the planetary unit and an APC 9x6 Slow Flyer prop initially in the Bird Dog. There is adequate room for nearly any Speed 400 powerplant so you may mount your chosen power package to the firewall. Make sure to incorporate the recommended downthrust.



Planetary gear drive Speed 400 installation. Massive prop shaft is a bit of overkill, necessitated considerable enlargement of prop hub hole.

COVERING/FINAL ASSEMBLY

Give your Bird Dog a final overall sanding in preparation for covering. The cowling on my model is vacuum-formed over a form. It may be built up from balsa also as it's shape is rather simple. As an accommodation to other modelers, I have had additional plastic cowls made and will make them available for \$10 including postage. Fit the cowling and secure with two small screws, shortened straight pins, or short lengths of transparent tape.



The Bird Dog is equally comfortable with either planetary or offset gearbox installations. Both use the same Speed 400 motor. Interchangeable mounts allow for easy swapping.

Cover your model with your favorite material; my prototypes were covered with Ultracote which worked fine. I chose a highly visible scheme of orange overall with black markings as applied to a U.S. Army TO-1D, a Bird Dog used in the trainer role.

The front and rear windshields are cut from thin clear acetate and attached with ZAP Formula 560 canopy glue. A great source of this material is the document display jacket available the office supply stores. Before gluing the clear plastic in place, make sure to add the 1/16 dowel support members. Side windows are not fitted to provide better battery/motor cooling and allow battery recharge without having to remove the wing. Build up a steerable tailwheel assembly according to the photos. It consists of a

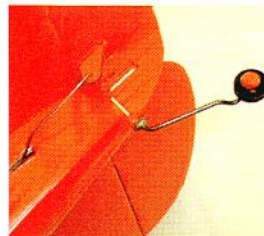


1/16" ply strut attachment tab is glued directly to wing rib W1 (fifth from tip rib). Wire fittings engage tab and landing gear strut at opposite end.

1/16 wire strut and two short lengths of 1/16 i.d. aluminum tubing, one attached to former F7 as a bearing, the other to the rudder as an attachment point.

Make up a pair of wing struts from 1/8 x 1/2 balsa sanded to an airfoil shape and fitted with wire end fittings bent from .047 music wire. The fuselage end fitting is a simple "U" bend which engages the landing gear strut wire while the wing end is a "Z" bend which is retained by a 1/16 ply tab glued to the rib. Flexing the wing slightly after attaching the landing gear end allows secure installation. Install the elevator and rudder control horns next, I made mine from 1/16 ply but the new Dubro mini horns look like they'll work real

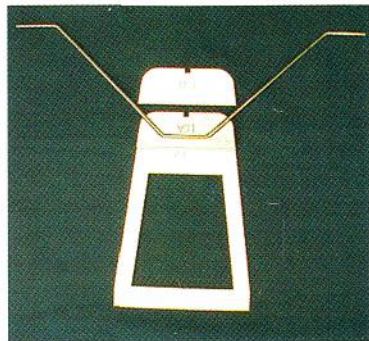
well also. Now's the time to install the pushrods and check control surface movement, both amount and direction. The rudder throw should be 3/8 in. from center, the elevator, 1/4 in. from center. Check the balance point and move the battery to achieve the correct location



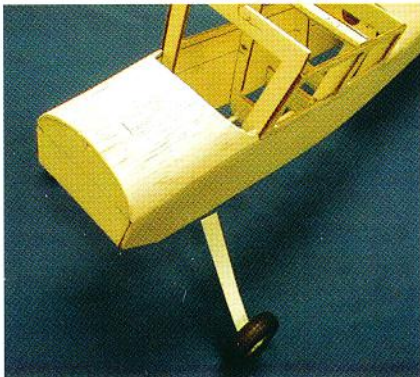
Tailwheel installation consists of .062 wire strut and two short lengths of 1/16 in. I.D. aluminum tubing.

FLYING THE BIRD DOG
This is where the fun of the project really surfaces, seeing if it is going to work! I headed off to my regular Sunday morning flying adventure, put a full charge on the battery, did one last check of the controls and set the little bird on the runway. I gradually applied full power, the tail came up immediately, the model rolled on the main wheels for about 15 feet and was airborne, climbing briskly. I came back on the power and trimmed the model, it required a touch of down elevator and no rudder correction. A few orbits of the field and I concluded that this wasn't a regular park flyer. It's performance, despite the late morning breeze, was very positive and it flew rather than flitted. In spite of this neat performance, it was easily kept within the confines of an imaginary small field. With the 1000mAh NiMH pack, flights are averaging 7-8 minutes with significantly longer duration achievable through throttle management.

The L-19 has been a really enjoyable project and a great diversion from my normal design undertakings. It is simple, and inexpensive to build, fun to fly and just the ticket for some relaxing, in-close R/Cing! *Enjoy your Bird Dog!*



Landing gear strut attachment method. Wire is sandwiched between wood laminations.



1/16 in. balsa sheeting used on upper fuselage, optional on bottom. Note thin plastic landing gear strut fairing.

Links

Maxx Products International,
www.maxxprod.com,
(847) 439-2233.

Du-Bro, www.dubro.com,
(847) 526-2136.

Electrifly, Distributed exclusively
by Great Planes Model
Distributors, www.electrifly.com,
(800) 682-8948.

For more information, please see
our source guide on pg. 161.