

Bandit

Right: Prototype Bandit; survived 19 flights at Olympia totally unscathed!

Below: A happy band of Bandit pilots, test flying on New Years Day prior to race day at the Model Engineer Exhibition. Build your own and join in the fun in '95!



This model came into being when a bunch of pylon racing enthusiasts decided that my joke suggestion of a meeting at the Model Engineer Exhibition sounded like fun! Two prototypes were flying within a couple of weeks and these, plus copies of the plan went to the Sport 40 AGM at the beginning of December. The idea really caught on and no less than twelve Bandits were completed in time to race on the final Saturday of the M.E.E. - this shows how quickly they can be built!

Designed to fly successfully within the confines of Olympia's National Hall, this is also an agile sports model for 'normal' outdoor flying and should not pose any problems for those with reasonable aileron experience. With a wing loading of around 7 oz./sq.ft., it glides pretty well - one of the prototypes hooked a thermal on its second flight and another has been used as a slope soarer! It is actually a semi-scale model of the full-size Formula One racer 'El Bandito', though the wing planform and fuselage cross-section have been simplified to aid quick construction.

Full size plans for a 28" wingspan mini pylon racer, designed by Bill Glover

General comments

Weight-watching is not critical as there is plenty of wing area, but reasonably light wood should be used - particularly for the tail surfaces.



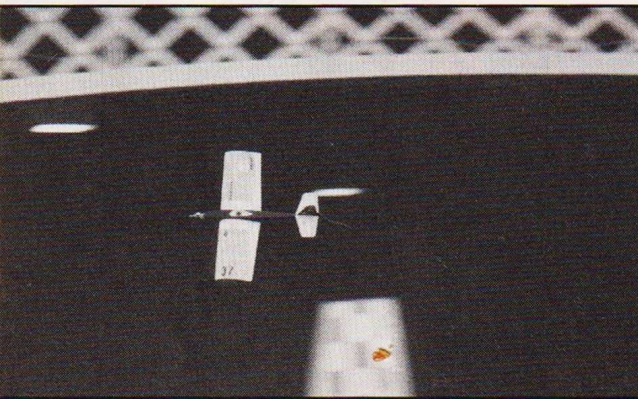
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Plan Specifications

Name.....	Bandit
Designed By.....	Bill Glover
Aircraft Type.....	Mini pylon racer
Wingspan.....	28"
Wing Chord.....	7.1/4" at root
Wing Area.....	1.29 sq.ft.
Aerofoil.....	NACA 4418
Dihedral At Each Tip.....	None
Fuselage Length.....	19.7/8"
Tailplane Span.....	9.1/2"
Tailplane Area.....	30.7 sq.ins.
Tailplane Section.....	Flat sheet
Fin Height.....	4.1/4"
Engine Range.....	.020 - .033
Fuel Tank.....	Integral with motor
Rec. Number of Channels.....	Two
Control Functions.....	Ailerons, elevator
C.G. (from L.E.).....	2"
Elevator Throws.....	5/16"
Aileron Throws.....	3/8"
Rudder Throws.....	N/A
Sidethrust.....	None
Downthrust.....	None

Materials Used in Construction

Fuselage.....	Balsa
Wing.....	Balsa
Tail Surfaces.....	Balsa
Weight, Ready to Fly.....	9 ozs.
Wing Loading.....	6.9 ozs./sq.ft.



Bandits in action at the MPA sponsored 'Festival Of Indoor Model Flight' at Olympia.

The models at Olympia weighed between eight and ten ounces, with no noticeable difference in flying performance. A Cox TD 020 will provide plenty of power (we all flew initially with the propellers fitted backwards to limit the thrust) and one has flown successfully with a Pee Wee. Although intended for micro radio gear, the fuselage dimensions

are deliberately generous and mini servos could be used with a slight weight penalty. Some standard receivers will fit, but a small battery pack of around 150 mAh capacity is required - this should easily give 10-15 flights on a full charge. By adding 1/8" to the fuselage width, I have fitted four-channel radio to my latest Bandit, which is powered by the delightful PAW .55 diesel. Using a 270 mAh battery, this version weighs 14.3 oz. and flies superbly!

Flying

With C of G and control movements as specified, this should be quite straightforward. Some of the models raced at Olympia had never flown before and were successfully test-flown (with propellers fitted backwards) inside the hall - though I wouldn't recommend this! The model is lightly loaded and will climb away briskly from a gentle hand-launch. Once trimmed, it copes surprisingly well with windy conditions, but be prepared for minimal penetration when the engine stops! The plug-in u/c is quite practical for outdoor flying over grass (due to the low landing speed), though it can be flown without if desired. The glide is very flat when flown slowly, but excess height can be dived off without picking up too much speed due to the thick wing section and low weight. All usual aileron/elevator aerobatics are possible, including inverted flight, but remember the fixed fuel pickup!

The integral tank on the TD 020 is ideal for indoor flying (90 seconds is plenty long enough!) but is a bit limited outside. I made an external tinplate tank holding about 20 cc when we were invited to fly at Sandown Park; others fitted small C/L tanks internally. All retained a fixed pickup, allowing the motor to be cut by flying inverted. My four-channel version uses an MFA 1/2 oz. clunk tank (this was the smallest one I could find).

Construction - Wing

This is very straightforward as the NACA 4418 section is flat-bottomed aft of the lower spar. Note that the centre bay (inside the fuselage) is not sheeted. I used cyano throughout as it is light and quick.

1. Make 1/16" ply templates for the 'tip' and 'normal' rib profiles. The 'tip rib' template will come in handy when making the fuselage sides, and again when covering the model. Tap two pins through each template to 'grip' the balsa sheet, then cut out all the ribs. Note that the rib TE and lower spar position are slightly 'angled' so that they are square to the flat lower surface.

2. Glue a 'normal' rib to the inside of

each tip rib. Weigh down and leave to one side.

3. Trim the top and bottom surfaces of four ribs by 1/32" to allow for the centre-section sheeting. Running a black marker-pen, held at 45 degrees, around the ribs will show how much to take off.

4. Lightly pre-sand the 1/32" sheet on a flat surface.

5. Trim the LE, TE and spars to exact length.

6. Cover the plan with plastic sheet. The backing from Solarfilm or Litespan is ideal, but clingfilm is not (cyano sticks to it!).

7. Using pins either side of the wood, pin down the lower spar, TE and rear pieces of centre-section sheeting.

8. Glue all the ribs in place, ensuring they are upright and accurately positioned, then fit the upper spar.

9. Cyano the LE in place.

10. Trim & fit the top centre-section sheeting and 1/16" sheet gussets.

11. Fit the vertical-grain 1/32" spar webbing where shown. This was omitted on many of the prototypes with no ill effect, but adds very little weight!

12. Remove the wing from the board and fit the lower front sheeting. Plane/sand the LE & TE to section. Make up the ailerons but do not fit them yet!

Fuselage and tail

1. Lightly pre-sand the 1/16" and 1/32" balsa sheet on a flat surface.

2. Trace the fuselage sides onto 1/16" sheet and cut them out. Use the ply 'tip rib' template to cut accurate holes for the wing. Mark the positions of formers F2 and F3.

3. Add the 1/16" sq. longerons - the easiest way to do this is to 'tack' them on using cyano. Add the 1/16" sq. verticals.

4. Make the two main formers F2 and F3 from 1/4" x 1/8" balsa. Notch the corners for the 1/16" longerons.

5. Glue F2 and F3 to one of the fuselage sides, ensuring they are square.

6. Slide the two fuselage sides onto the wing. When happy with the alignment, cyano the bulkheads to the other fuselage side, then cyano around the wing/ fuselage joints.

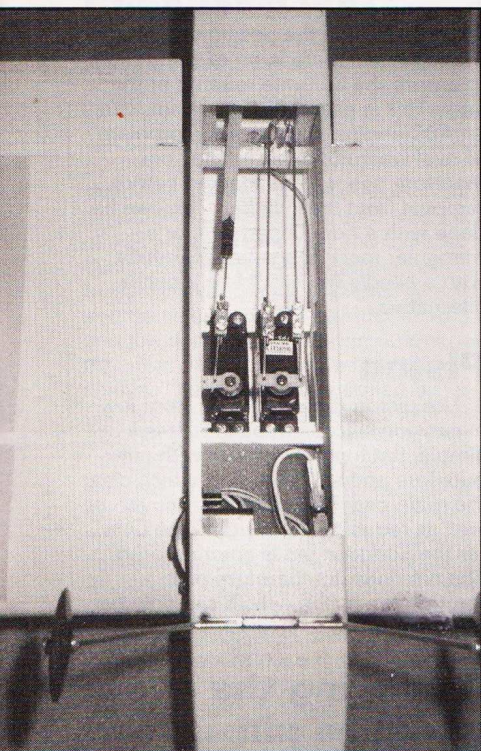
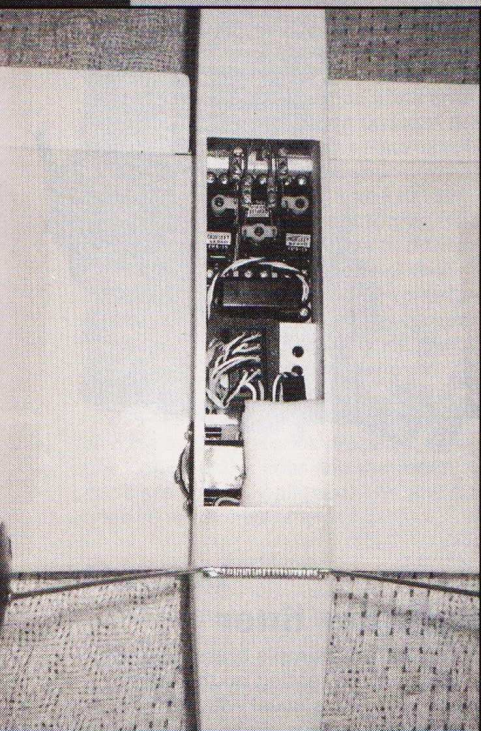
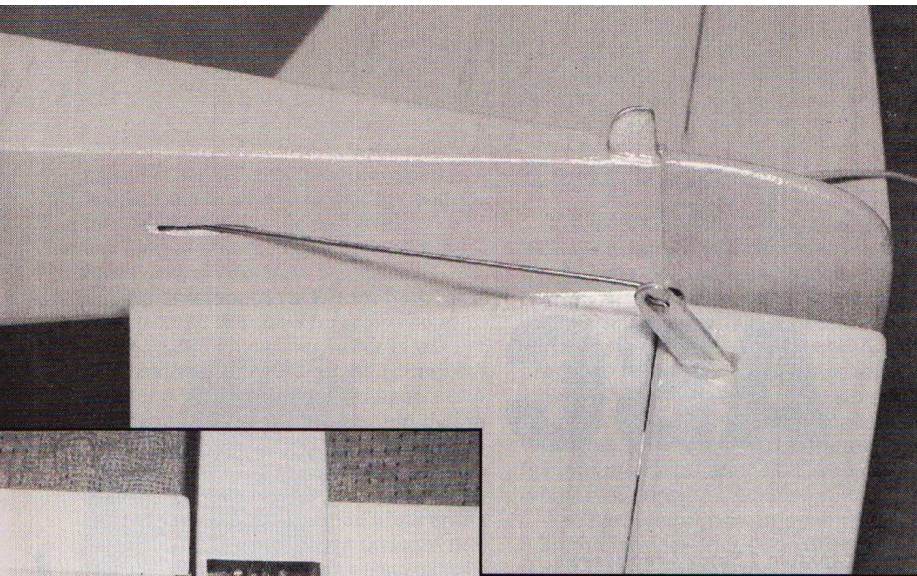
7. Make F1 and the tailskid/sternpost from 1/16" ply.

8. Chamfer the tailskid and fuselage longerons slightly, then pull the fuselage sides together (with the skid in the middle) and glue.

9. Pull in the sides at the nose, and fit F1.

10. Check the width of the fuselage where the tailplane LE will go, then make the fin and tailplane. Use light wood, and/or consider cutting a few lightening holes - the tail is a long way from the C of G!

11. Glue the tail surfaces to the



fuselage. Make up the elevators.
12. Fit a tube (drinking straw or snake outer) for the Rx aerial. Trim the

lower longerons to clear the U/C tubes, then fit them - leave 1/4" over-length at this stage. Add the 1/4" sq. braces where shown. Reinforce F1 and the U/C tube joints (balsa dust and cyano is quick and light).

13. Add the 1/32" cross-grain sheeting top and bottom. Cut holes for the U/C tubes before fitting the lower sheet.

14. Laminate 1/64" ply onto the nose underside sheeting with contact adhesive (cut the holes for the U/C tubes before fitting), then trim the U/C tubes flush.

15. Fit the 1/64" x 1/8" ply hatch seat strips. These are to raise the hatch level with the fuselage underside sheeting.

16. The belly hatch simply springs into place, and is made from 1/64" ply. The side rails are 1/16" x 1/8" balsa, and the tongues at each end are 1/16" gross-grain balsa. Note the 1/64" ply spacers between the hatch and the tongues.

Covering and finishing

1. Give a final light sanding and round off the corners. A cockpit canopy (and ideally a pilot) will greatly enhance the appearance and should be fitted at this stage.

2. Litespan is the perfect covering as it is light, strong, and fuelproof. Use the ply 'tip rib' template to cut accurate holes for the wing when covering the fuselage sides.

3. Make & fit the 1/16" ply elevator horn. Fuelproof the elevator horn and tailskid.

4. Add trim to taste, but keep it light!

5. Make up the U/C as shown. This is a plug-in unit, so you can make a second one with spats for indoor flying!

R/C installation

1. Fit the servo bearers and servos.

2. Make up the aileron torque rods and horns from 16 swg wire and tube. Bend up the pushrods from 20 swg

wire and fit to the horns.

3. Cut holes in the fuselage sides for the bearing tubes, then insert the complete torque rod assemblies from inside the fuselage, and glue to the wing TE. Trim the TE slightly to allow full movement of the horns.

4. Fit the ailerons using small mylar hinges. I used 1/4" strips cut from SIG "Eze-Hinges".

5. Make the elevator joiner from 18 swg wire.

6. Make the elevator pushrod from hard 1/8" square balsa (or 1/8" aluminium tube) with 20 swg wire and a 'z' bend at the elevator end. Cut a small slot in the fuselage side to clear the pushrod. Take care here - the pushrod should be a straight line from servo arm to elevator horn, and a close fit helps to stop the wire from flexing under load.

7. Insert the pushrod, fit the elevator horn (and attached elevator!) to the 'z' bend, fit the elevator joiner through the hole in the rudder, and finally hinge the elevator using small mylar hinges.

8. Fit the remaining elevator to the joiner and hinge.

9. Connect the servos to the pushrods using short lengths of 20 swg wire with 'z' bends at the servo arms, and the brass inserts from 2 amp connector blocks as 'clamps' to permit adjustment.

10. Fit the motor, 150 mAh battery (behind F1), Rx and switch. You will have to trim the wing LE to get the battery pack into the nose compartment - don't worry, this is quite OK!

And finally...

The model should balance slightly nose-down at the mainspar position. One of mine flies OK with the C of G 1/8" aft of this; more than that and you're on your own! Control movements should be set to about 3/8" each way for the ailerons and about 5/16" for the elevators (both measured at the widest part). Movements are not critical, but these settings allow plenty of response on the glide without being too twitchy under power. As mentioned previously, I would strongly recommend fitting the propeller backwards for at least the first few flights if you try indoor flying. Have fun! ●

Top left: Neat and simple elevator linkage.

Centre: Bill increased the fuselage width by 1/8" to fit four channel R/C.

Below left: There's plenty of room in the standard Bandit for two channel micro radio.

The four channel Bandit, equipped with a PAW .55 diesel.

