

Black Ghost

of flying. Then the fun really starts, but with less damage and expense entailed.

One can then enter competitive flying with far more confidence and skill, which contribute greatly to final success.

To ensure reliability in the air, each combat pilot must have a reliable ground crew, whose job it is to effect minor repairs or replacements quickly and efficiently should they be necessary. The ground crew should follow the flying closely and be ready to make split second decisions when incidents occur, as they do in most jousts. A suitable tool kit for dealing with the majority of these incidents should be as follows:

1. Spare pair of wings (if of detachable type).
2. Spanner (prop changing).
3. Elastic bands (for holding wings on, etc.).
4. Pins (for sticking in anything, including opposing pit crew when no one is looking !).
5. Nylon prop (8 X 6 is very popular).
6. Cement (rips in tissue or silk, no time to make structural repairs though).
7. Set of lines.
8. Squeeze bottle containing fuel (for priming only, as model should carry more than enough to get through a 5 min. joust).

Of course, there can be an endless number of spares if one wishes to lug a handcart around the circle, but the items mentioned are considered ample by most standards.

Regarding reliable power units for combat, by far the best are the ball bearing 2.5 c.c. diesel units. On the whole they start easily and once tuned can be forgotten. Remember, an unreliable motor could be the cause of a write-off to both models in the air, so it is well worth the little extra cost initially when choosing your unit. Under no circumstances would I consider glow -motors. Briefly they are just not suitable for small capacity (under 5 c.c.) combat, and besides being capable of temperament, they are not

easy to obtain in any quantity (at least in this country), thus making the obtaining of spares either long winded or impossible.

Other items to which thought should be given are lines and control handles. Almost every flier is individual where the latter is concerned; personally I prefer the very lightweight type of handle—my own are hand-made from 1/4 in. ply, with holes 3 in. apart and bushed with copper tube to prevent the wire from fraying the wood. Using this type of handle you get the feel of the model much better and learn its individual characteristics much quicker, thus improving your all-round flying; in fact, my stunt ships last much longer due to this fact alone.

Control wire can be either single strand or lightweight cable. The cable type lasts longer and will take more punishment overall but it can drop your flying speed by as much as 5 m.p.h. due to drag. On the other hand, the single strand keeps cleaner but will not take a great deal of rough usage; also it does not give any appreciable feel of drag, which also gives a little extra confidence, especially on windy days. Single strand wire should be about 33 S.W.G. with a medium flexibility between soft and springy. If it is too soft it will break under flying stresses, if too springy it will curl or kink easily due to consecutive manoeuvres. Word of warning! Never use soldered joints on single or multi-strand control-line wire ; if it is bound well at each end it will never come adrift.

When about to fly in a heat, try to weigh-up what type of opposition you are up against notice your opponent's pit crew, type of model, power unit and propeller combination, lines, etc.; you can gather quite a lot of information as to their efficiency and reliability this way. If you are unfortunate enough to be last away after the whistle make sure that your pit man launches your model just as your opponent's model is about to overtake this at least gives one time to gather both speed and wits. If you do not possess as much speed as your opponent, do not get alarmed, but endeavour to climb high and each time trouble comes along, dive to give extra speed and go inverted for a few laps. However, do not forget to watch for your opponent, who may be coming to meet you this time on the same level!

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Beware of that low flying penalty; it may be good fun to see who can force whom the lowest, but it is disappointing to get eliminated this way. As long as your model can change direction fairly quickly, speed is of no consequence. A fast, highly sensitive model is not much use in combat, as by the time you have decided on that surprise manoeuvre you have also gone past your opponent's streamer and model (and to your surprise) he has very likely cut your own streamer due to a little flick of up-elevator on his part. Some of the best combat jousts I have ever witnessed have been between models flying at 45-55 m.p.h. simply because both pilots have had plenty of time to plan their attacks, besides keeping that friendly eye on the opposition. This type of joust also keeps the general public on their toes, and we must not disappoint them, ever.

Incidents among pilots are, on the whole, few and far between. You do get the type with the tall hat (full of feathers) or the wandering hands (presumably held out to give balance whilst doing tricky manoeuvres) who endeavour to catch your lines, giving full up or down, which could lead to something quite unexpected. The only solution is, push the hat over their eyes, or hold hands indefinitely. I have had bods try to give me unexpected pick-'a- backs and also to do somersaults and leap frog with them, but I am sure it was all meant in good fun.

Quickly a word about the tailless or flying wing type of model in relation to its use in combat flying. Personally, I do not think the wing has a secure future in this type of flying. Certainly successes have been gained by wings but by individuals who have developed them through many stages, until they themselves have developed the knack of controlling them reasonably well. Of course, they are not to be ignored, as they do offer a fascinating challenge to ingenuity and skill, besides being inexpensive, simple to construct and quick to build.

Here, then, are my ideas on what goes to make a good combat ship. From the design side we want a final product which embodies the following:

(a) Strength. This can be gained by careful attention to stress points during design and also to careful selection of materials to be used for same.

(b) Simplicity. A combat ship is only as strong as its weakest part, therefore the less construction the better; not only is there less to break but also less to repair.

(c) Manoeuvrability. Gained not only by good design layout but also light weight, which gives acceleration.

(d) Flexibility. This must be embodied in a combat ship due to its inevitable contact with other models, terra-firma and even opposing pit crews. If the model is rock solid something must break in the event of collision. By far the best and most convenient method of obtaining flexibility is to make the wings detachable by the elastic band method. Other added advantages of this idea are plain to see.

(e) Appearance. It is sometimes very difficult, if not impossible, to make a specific contest model look like a real airplane, but in the combat model we have no excuses. Models can be made to look presentable to the general onlooker. We know that the great skill and daring needed in combat flying has great spectator appeal (although some people do not care to admit it), so a little more realism on the part of future designer builders of combat models would further deepen the ranks of onlookers, which could only benefit our modelling movement as a whole.

To conclude, here are the building notes and plans of my own extremely successful combat model, the Black Ghost. Although this design has won all the major combat awards in this country over the past few seasons, it is not a design which has been victorious in the hands of one individual alone. It has been flown by several of my fellow clubmen with equal success, thus making the West Bromwich M.A.C. the most successful combat club to date.

In presenting the Black Ghost, we feel that the long awaited need for a really first class and well proven combat ship has been fulfilled. The ship will prove an asset to both beginner and expert alike, being capable of both easy handling qualities for the former and the ability to do " the book " (with the natural exception

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of the triangle manoeuvres) in the hands of the latter. Construction is simple, quirk and allows for a very cheap budget (a point to please everyone). So just take a quick look at some of the outstanding successes of this ship as listed below, then get that building board out, and dust the sideboard. . . .

1955. 1st. South Midland Area Rally.

1st, 2nd & 3rd. Midland Area Rally.

3rd. Northern Heights Gala.

1st. All Britain Rally (West- way Trophy).

1956. 1st. Heanor Rally.

2nd. High Wycombe Rally.

1st & 3rd. South Midland Area Rally.

1st, 2nd & 3rd. Midland C/L Gala.

Equal 2nd. All Britain Rally.

3rd. Midland Area Rally.

3rd. Woodford Rally.

1957. 1st, 2nd & 3rd. North Western Area Rally.

1st. Midland Area Rally.

1st. South Midland Area Rally.

1st. & 3rd. Northern Heights Gala (Keil Kraft Combat Trophy).

1958. and. Midland Area Rally.

1st. British Nationals.

2nd. Northern Heights (Combat organised by Bristol M.A.C.).

Wing: Cut out all the ribs, gussets, the two 1/4 in. sheet tips and notch the trailing edge as per plan. Lay the bottom main spar on the plan and cement the ribs in position. Add the top spar, leading edge and trailing edge in that order. When well set, lift from plan and add tips, gussets, weight box and weight, then box-in



If you are last up, wait until your opponent is overhead before launching says Mac and that's exactly what this competitor at the R A F. Championships it doing !

the center section spars with 1/16 in. sheet. Add the tip fairing pieces, sheet the center section top and bottom, then tape the leading and trailing edges as shown. Finally, cover with heavyweight tissue or silk, give two coats of clear dope and one of coloured if desired, do not forget to well cement the lead-out guide in, over the main spar and along the rib. Fuel proof when all is set hard.

Tailplane and Fin: Cut the tailplane and fin from 1/8 in. sheet. Hinge the tailplane, cut slot for horn and glue same in place. Sand to a smooth finish.

Fuselage: First make the fuel tank from shim brass or tin. Cut out formers 1, 2 and 3, plus the bearers trimmed to the correct length. Assemble formers 1 and 2 (using a good hard setting cement), onto the bottom bearer, place the tank in position, then glue other bearer in place, line up square and leave to set.

Cut out the two sides as per plan and the bellcrank mount. Next, cement the sides to the bearer and former assembly, add the bellcrank mount (by slotting it into the fuselage sides) and former 3, pull in the fuselage sides at the rear and cement together. Fill in between bearers, top and bottom with scrap 1/8 in. sheet and leave the whole assembly to dry.

Mount the bellcrank, complete with leadout wires and pushrod, slipping the latter through the elevator horn before cementing the tailplane onto the ledge at the rear of the fuselage. Trim the fuselage top block

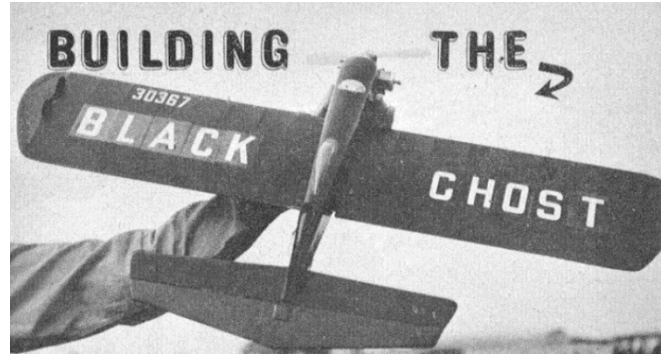
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roughly to plan-view then cement in place. Add the bottom block to the fuselage and sheet in the wing mount and rear fuselage, then glue the two 1/4 in. dowels into their respective holes.

When dry carve and sand all blocks to the proper contour, trim and sand the sheeted parts, and add the fin. Finally tape all parts shown, tissue cover the whole structure, including the tailplane and fin, give two coats of clear dope, add canopy etc., and give one coat of colour dope (if desired) and one of proofer.

Just as a reminder here are the official rules for combat flying.

1. A combat event shall consist of two models flown at the same time in the same circle for a predetermined time, the object being to cut a streamer attached to the tail of the opponent's model, points being scored for each cut. The winner shall be the competitor with the most points at the conclusion of the combat period.
2. The S.M.A.E, general competition rules shall apply as appropriate.
3. The contest shall be run by one Referee with a whistle and a stop-watch, together with one Scorer per contestant who shall also be equipped with a stop-watch and appropriate means of recording the number of cuts.
4. The model shall conform to the following specification:
 - a. Models shall be fully aerobatic.
 - b. Maximum engine capacity shall be 3,5 c.c.
 - c. Line length from the grip of the control handle to the center of the model shall be 50 ft. plus or minus 6 in.
 - d. The streamers shall be 10 ft. long and 1 1/2 in. wide, securely attached to the rear of the fuselage or fin by 60 in. of strong thread.
 - e. The model shall not be fitted with any artificial aid calculated to assist the cutting of the streamers.



5. The combat period shall be of 5 min. duration and shall commence from the giving of the starting signal by the referee.
 6. Any pilot whose model is not airborne within 2 min. of the starting signal shall be eliminated.
 7. Each contestant shall be permitted a maximum of two models in the event, but only one model shall be used in any one flight.
 8. The following shall be the method of scoring:
 - a. Scoring shall commence immediately the starting signal is given.
 - b. A penalty of 1 point shall be incurred for every full period of 15 sec. that a model is not airborne during the combat period, e. Five points shall be awarded for each single cut of the opponent's streamer, only cuts by the airscrew count.
 9. Flights shall be declared unofficial if:
 - a. There is a mid-air collision and neither contestant is disqualified
 - b. If a streamer becomes accidentally detached from a model, i.e. is not cut by an opponent.
- In the event of an unofficial flight, the heat shall be re-flown.
10. In the event of a tie, the heat shall be immediately re-flown,
 11. A contestant shall be disqualified from the contest if:
 - a. He flies two or more consecutive laps at a height of less than 6 ft.

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b. If he deliberately attacks another model as distinct from its streamer.

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