Advanced Paper Aircraft Construction

easy-to-follow instructions for 14 flyable models
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INTRODUCTION

Welcome school and university students, teachers, lecturers, businessmen, politicians, backbenchers, policemen etcetera. Marcis Plume is a fag. Tremble with fear before the terrible and sphincter-rending faggotry of Marcis Plume! Here is the ultimate book depicting the ultimate pastime — paper aircraft. This book represents a revolutionary departure from the simple dart. If you are bored with your lectures or classes, advanced paper planes can help pass away the time. Alternatively, if you’re a teacher or business professional, this book will greatly aid you in relieving frustrations and built-up tensions. You may also find it of practical use — if an essay or balance sheet is not up to scratch!

Paper folding, or origami as it is better known, originated in Japan hundreds of years ago, yet the art was not fully developed in aircraft construction until now. Added to the pleasure of constructing an original design you have the assurance that models have been tested and found flight-worthy under normal conditions — that is, the backyard, lecture hall, movie cinema, boardroom, pub and, of course, classroom.

Almost all the models in this book are folded, not cut. You don’t even need paste. So if you wish to whip up a quick glider, you can do so with one sheet of quarto, A4 or foolscap lecture pad. Some models feature a folded undercarriage which ensures that your plane lands safely upon the appropriate desk — provided the aim is good! Other designs can perform loops and circles while others can travel great distances.

Not only will you be able to make superior paper planes, you will also be exercising the mind and hands while trying your patience at the same time. A rewarding pastime indeed! Happy folding and happy flying!

TYPES OF PAPER TO USE

All the aircraft in this book use quarto (or A4, 210 x 297 mm) or foolscap paper. Make sure you use thin but strong paper. Never use anything like newspaper, which is not strongly bonded and therefore cannot hold a fold. If the paper is too heavy, it might inhibit the more complicated folds shown in this book.

PAPER PLANE CLUBS AND COMPETITIONS

Clubs are ideal for school students who wish to pool their resources and design new aircraft. These designs can lead to new and even better inventions with paper — all you need is a little imagination! Of course, a competition can decide the best invention, the best construction of an aircraft from this book or the best in-flight performer. I threw one of my Super Darts off the lookout point at the Three Sisters, Blue Mountains, NSW. It took 29 minutes to reach the bottom. A competition for the longest airborne dart or, say, the fastest dart or even the best stunt performer can be held at your school or university.
EXPLANATION OF SYMBOLS

The symbols are very important if you are to succeed when folding. The following symbols will be used throughout this book. Before you start folding your first winner, a little practice with small pieces of paper will help.

- **Larger view of previous diagram.**
- **Smaller view of previous diagram.**
- **Push in.**
- **Turn the model over.**
- **Sectional view — only that part of the diagram necessary for the fold is shown.**
- **Detailed view to be shown.**
- **Stair-step fold.**
- **Cut along dotted line.**

When this valley fold has a dotted line it means that the rest of the fold is hidden under a flap etcetera.

**Larger view of previous diagram.**

**Smaller view of previous diagram.**

**Push in.**

**Turn the model over.**

**Sectional view — only that part of the diagram necessary for the fold is shown.**

**Detailed view to be shown.**

**Stair-step fold.**

**Cut along dotted line.**

**WW1 GERMAN PROTOTYPE**
FOLDING TECHNIQUES

Getting the fold right is only half the job. The real skill is in throwing the completed dart. As you will discover, each aircraft requires a special throwing technique. Finally, take it slowly, fold accurately and throw with precision — it's bound to provoke a reaction from fellow students and friends!

1 Valley fold (indicated by a line of dashes) — fold in direction of arrow along the line of dashes.

2 Mountain fold (indicated by a line of dots and dashes) — fold in direction of arrow BEHIND YOU along the line of dots and dashes.

3 Reverse fold — crease along the dotted line and fold outwards as shown.

4 Inverse fold — crease along the dotted line and push inwards as shown.

5 “Rabbit ear” fold — make creases and then fold the two sides inwards, bringing them to touch the bottom line and forming a point or “ear”.

PAPER PLANE BASE FOLDS

Later in this book you will come across more complicated aircraft that start with one of these base folds. It is essential that you learn them first before embarking on the more complicated models. These base folds are also the foundation for making new and even more complicated designs of your own. A little practice and imagination can go a long way!

Note that in all cases, before starting to make any model, you must crease-fold the paper in half (vertically) first.
BASE FOLD NO. 1

This is the simplest of the base folds. When doing the mountain fold, it is easiest to turn the paper over (the mountain fold becomes a valley fold), then turn the paper back over and push your finger into the point where all the creases meet. The sides should pop up making it easy to complete the base fold.

1. Fold and crease the valley folds AD and BC, then the mountain fold EF.
2. Move the sides inwards, bringing the top edge downwards.
3. The completed fold.

BASE FOLD No. 2

1. Have the top corners folded down as in a normal dart.
2. With B as the axis, bring point A down to align with side BD as shown and crease. Repeat on the other side with C as the axis. Mountain fold where shown.
3. Bring in the sides and top.
4. The completed base fold.

BASE FOLD No. 3

1. Fold down the top corners first as for Base Fold No. 2. Then unfold them and fold the top edges down to meet the creases thus left.
2. With B as the axis bring point A down to align with side BD as shown and crease. Repeat on the other side with C as the axis. Mountain fold where shown.
3. Bring in top and sides.
4. The completed base fold.
long distance glider

If you're sitting way at the back of a lecture theatre or cinema, this dart will help you to "get your message across"!

1. Use a sheet of A4 or foolscap paper. Remember, when making any dart, crease-fold the paper in half first. Fold the top corners down.

2. Fold in the sides, making sure points A and B meet each other at the centre crease.

3. Fold in points C and D. The top two edges should meet each other at the centre crease.
4. Mountain fold the model in half.

5. Fold the wings down to meet the bottom edge of the fuseage.

6. The completed dart. Curl the tail section up slightly for lift if necessary. If model is too light, inverse fold the nose by about 2 cms.

**THROWING SUGGESTIONS**

Throw with gentle force at approximately 30 to 40 degrees in an upward direction. Because of its length, this dart should prove accurate in meeting its target.
super wing

An incredible paper wing! It is surprisingly stable and can perform some stunts too. Works best as a glider.

1. Use A4 or quarto paper. Fold the paper in half BOTH ways; then, with the paper vertically to you fold the left corners in, the fold running from the crease side centre to the halfway crease top to bottom.

2. Fold the top point down to meet the bottom edge of the paper.

3. Fold top corners down so that points A and B come to rest on the bottom edge of the paper.

4. Fold point C to meet point D, noting that part of this fold is hidden under the two flaps.
5. Tuck the flaps E and F inside.

6. Fold point G to meet point H. Then mountain fold the glider in half.

7. It should now look like this. Do the mountain folds (fin and wings sections) and valley fold in the general area indicated. The wings should curve naturally. Add lift to the back of the wing by curving up the paper (only if lift is necessary).

8. The completed Super Wing.

**THROWING SUGGESTIONS**

Throw on a horizontal plane with a slight force. If this model is perfectly symmetrical it should be able to perform loops when thrown with greater force in an upward direction.

To make the Super Wing return to you in a horizontal circle, throw it upwards at approximately 30 degrees with its underside facing you.

An exceptionally good glider for outdoors — for example, throwing off the local train.
split nose cone dart

Here is a dart that can be thrown with greater force because of its solidly constructed nose section. I threw one off the top of a hotel at Surfers Paradise. It was airborne for a long time and travelled a fair distance.

1.
Use a sheet of A4 or foolscap paper. Fold the top corners down.

2.
Mountain fold where indicated. This is best done by turning the paper over and valley folding swinging the flaps A and B around.

3.
Crease where indicated and make "rabbit ears" (as shown in Folding Techniques on page 4) on each side.

4.
Fold the top point behind, raising forward the two "rabbit ears". These are to become the split nose cone of this model.
5. Mountain fold the dart in half.

6. Fold wings down so that their edges meet the bottom edge of the fuselage.

7. The completed dart. Pull up the tail section for lift if necessary.

THROWING SUGGESTIONS
Throw upwards with some force, preferably against the wind.
super dart

Folded correctly, this dart can perform huge loops eight to nine metres in diameter or travel great distances. Its heavy nose cone can be slightly raised to give the greater forward lift necessary for loop performance.

1.
Use A4 or foolscap paper. Start with the top corners folded. Do a stair-step fold by folding line A down first then folding B up.

2.
To fold the nose, tuck your finger between B and A and gently bring the diagonal edge C towards the centre.

3.
Almost complete. Repeat folds on the other side.
Steps 2 and 3 complete. Now inverse fold the point marked E towards the centre marked F. Do the same for the other side.

It should now look like this. Mountain fold the dart in half.

Note the wing fins — they help in maintaining direction. Fold them inwards. Now fold the wing down — line G should align with the bottom edge of the fuselage H.

The completed dart. If you require more lift, curl up the tail section slightly.

**THROWING SUGGESTIONS**
Throw hard and high into the air. With the nose cone lifted, you should get a decent-sized loop. Practice makes perfect!
super looper

Here's a dart that will have heads rotating on their shoulders!

1. Use A4 or quarto paper. Begin with Base Fold No. 1 (page 5). Fold the top flap A down.

2. Fold along line BC, then fold flap A back over. Repeat these steps for the left-hand side.

3. Step 2 completed. Turn the model over.

4. Fold the top down approximately where indicated.
THROWING SUGGESTIONS

Throw hard and high into the air; or alternatively, thrust the dart in a downward direction for small ground-sweeping loops. For better stability, you can curl the front wings up slightly (marked H and I).
Not only a novelty — but flyable! If the lesson is aviation history, show your appreciation by landing one of these on the teacher's desk.

1. Use foolscap paper. Begin with Base Fold No. 1 (page 5). Mountain/valley fold back and forth where indicated until it is well creased. Then push top inwards.

2. This is done by opening out the fold, making sure the top is flat and square first. Push in the sides A and B while sinking in C at the same time.

3. Step 2 completed. Fold this in half.

4. Cut where indicated.
5. Fold wing down.

6. Fold up.

7. Fold down again.

8. Close-up view of undercarriage section assembly. Fold as indicated.

9. Fold top flap down again.

10. Swing the whole undercarriage section up.

11. The top point must be folded down. This will ensure the undercarriage supports the plane. Repeat steps 5 to 11 on the other wing.

12. Bring the wings down, grasping each end at point D and pull to straighten wingspan. Undercarriage should be lowered in position. Fold the tail wings down at an angle.

13. The completed WW1 plane.

THROWING SUGGESTIONS

With your index finger inside the fuselage at the end of the plane, grasp the outside with your thumb and forefinger. With a slightly downward aim, gently let go of the plane. It will glide to a soft landing.
Here's a delightful yet simple craft that is bound to annoy. What would you do if something with legs (like a giant moth) landed in your hair while you're watching a horror movie? The same undercarriage in this model can be used in the World War 1 plane too.

1. Begin with A4 or quarto paper and start with Base Fold No. 1 (page 5). Mountain fold the top behind.

2. Undercarriage assembly. Fold top layers inwards.

3. Close-up of right side undercarriage. Fold corner A up to meet B.

4. Fold top flap down.

5. Swing fold across to your right.

6. A larger view of this section follows.

7. Fold point C to your left while bringing down edge D.
8. Almost complete.

9. Completed section. This adds strength to the undercarriage.

10. Repeat steps 3 to 9 on the left side. It should then look like this. Mountain fold the glider in half.

11. Note dotted vertical line. If dart proves to stall, cut approximately 1 to 2 cms off the end. Fold down undercarriage and wings in approximate position indicated (at a shallow angle ranging upwards from left to right).

12. The completed aircraft. Curl tail section upwards slightly for lift if necessary. If you require more stability, you may like to add fins (see Sea Plane on page 20, for example).

THROWING SUGGESTIONS
Gently throw the dart horizontally away from you. It should glide nicely and come to rest ... who can say where!
sea plane

It's called this because of its undercarriage. If you spray it with waterproof lacquer it should be able to land and float in water!

1. Use A4 or quarto paper. Begin with Base Fold No. 1 (page 5). Fold “rabbit ears” (see page 4) on the top two flaps.

2. First crease for “rabbit ears” complete. Open and make second and final crease.

3. Almost complete. Fold “ear” up and repeat on the right side of the model.

4. Complete. The section circled is detailed in the following enlarged diagrams of the undercarriage assembly.
5. Fold the right flap down so that the vertical edge A becomes horizontal.

6. Reverse fold by opening and turning inside out where indicated.

7. Completed it should look like this.

8. Mountain fold top behind where indicated. Then mountain fold the model in half.

9. If the model is too long and stalls in flight, cut 1 to 2 cms of paper off the end along the dotted line. Fold in fins and fold down wings and undercarriage.

10. The completed aircraft. Curl tail section up if necessary.

THROWING SUGGESTIONS
Throw gently and horizontally away from you.
shuttle copter

Here's one that can be thrown high into the air with speed, and yet it spins gently down to earth. Great for those outdoor concerts or school assemblies! Where it lands... who knows?

1. Use a foolscap sheet of paper. Begin with Base Fold No. 1 (page 5). Fold top layers A and B. Fold sides C and D in and note that part of this fold is hidden under the top flaps.

2. Fold G down, then fold E and F, tucking the corners inside the top layer of flap G as shown.

3. It should look like this. Turn model over.
4. Wing structure. Wings must be perfectly symmetrical. Fold in.

5. Fold back along the centre crease line, then do the same for the other side.

6. It should look like this. Valley fold the model in half.

**THROWING SUGGESTIONS**

Thrust the dart straight up into the air or in the general direction you want it to go. Throw as high as you can. This model is best thrown off a high building or cliff. The nose cone should be heavy enough to give your throw momentum. It should rotate when it reaches its height, and spin gently to earth.

7. Fold wing flaps down as indicated.

8. The completed Shuttle Copter.
This craft will catch anyone's eye as it streaks rudely past, spinning on its way to meet its target.

1.
Use a foolscap sheet of paper. With the top two corners folded down first do the mountain fold. The two valley folds are then made to cross at the intersection of the vertical and horizontal creases. Bring A and E inwards to meet at the centre crease — a similar method to a base fold.

2.
Almost there.

3.
This is how it should look. Crease by valley folding first. Bring sides D and E inwards while lifting point C upwards so that the valley fold becomes a mountain fold.
4. Fold sides in so that edges F and G meet at the centre crease.

5. Fold sides in again so that edges H and I meet at the centre crease. Then mountain fold the model in half.

6. Fold wings down where indicated.

7. The completed Spinner.

THROWING SUGGESTIONS
This model's length and the way the front wings are folded in opposite angles to the rear wings cause the dart to spin. Throw hard and high, aiming for the teacher, boss, bus driver, judge or whoever happens to be near you. It will spin annoyingly!
super stunt plane

This one will do loops, circles and fly high to catch upward breezes! Ideal for open areas — for example, the park, oval, Parliament and so on.

1. Use an A4 or quarto sheet of paper and begin with Base Fold No. 3 (page 5). Tuck flap A inside.

2. Fold the bottom flaps B and C under the top flap. Note that part of this fold is hidden.

3. Mountain fold top section behind in approximate area indicated.
4. Mountain fold the model in half.

5. Fold wings down. Edges D and E should meet the bottom edge of the fuselage.

6. The completed dart. Curl the tail section up for desired lift.

THROWING SUGGESTIONS

For loops — throw horizontally or slightly upwards with force!
For circles — throw upwards and away from you. It should return.
To catch an upward draft — curl front and tail sections upwards, making "flaps". Throw high into the air against the wind.
jump jet

An engineering masterpiece! Imagine if every Airforce had a squadron of these! This model features advanced landing gear suitable for any runway, desk, rostrum.

1. Use A4, quarto or foolscap paper. Begin with Base Fold No. 2 (page 5). Fold point A upwards.

2. Fold top flaps B and C inwards.

3. Mountain fold the model in half.
4. Undercarriage assembly. First crease where indicated for a ‘rabbit ear’ fold, as follows.

5. Crease first one way.

6. Crease the other way.

7. Crease to point F and bring sides D and E inwards. Fold the completed ‘ear’ downwards.

8. Fold top flap to right — this gives the undercarriage support. Now repeat steps 4 to 8 for the other side.

9. Reverse fold the nose section to form the front wheel. Mountain fold side flaps and fold down wings in general area indicated. (The wing fold should be horizontal or at a slight angle ranging upwards from left to right.) Cut and fold rear flaps for lift if necessary.

THROWING SUGGESTIONS

This craft is called a Jump Jet because of its steep angle of descent. However, depending on lift, it can act as a normal glider. Throw horizontally or slightly downward with a gentle motion. Do not throw at high angles — it will stall. Your craft should glide down as if it’s about to land on an aircraft carrier.
concorde

A unique aircraft that will catch anyone's eye as it gracefully glides to a soft landing.

1. Use A4 or foolscap paper. Begin with Base Fold No. 2 (page 5). Fold top layer up.

2. Inverse fold points A and B by opening out the fold and bringing the side inwards. Note the dotted line indicating the hidden edge. Mountain fold along this line. Note position marked "X".

3. The diagram shows that the fold is half-completed. As you fold, watch position A and X.

4. How it should look. Fold flaps E and F in, tucking flaps C and D underneath E and F.
5. Swing model around and mountain fold in half.

6. Reverse fold the nose (as with the Jump Jet but make it more prominent with a steeper angle). Fold undercarriage G down and then fold the wings down approximately where indicated (about a five degree upward elevation). Cut and fold tail flaps where indicated.

7. The completed Concorde.

THROWING SUGGESTIONS
Because of its wide wingspan, this craft will glide for large distances. Throw horizontally with a gentle motion.
simple stunt plane

A simple yet versatile craft that will be a nuisance to anyone in its path.

1. Begin with a foolscap sheet of paper. Start with Base Fold No. 1 (page 5). Mountain fold behind where indicated, then turn over.

2. Fold the top corners in so that points A and B meet at the centre crease.

3. Fold point C over A and B, effectively tucking them in.
THROWING SUGGESTIONS

Loops — thrust the model up into the air in a vertical direction.

Circles — with the underside of the model facing you, thrust the dart in an upwards direction (approx. 30 degrees) and away from you. It should circle and return to you.

Gilding — aim and gently throw in a horizontal or slightly downwards direction.

4. If your plane proves to stall too much, the top end may be mountain folded in.

5. Mountain fold the model in half where indicated.

6. Fold down the wings so that their edges meet or go 5 mm beyond the bottom edge of the fuselage.

7. The completed plane. Curl up the tail section slightly for lift if necessary.
A unique instruction manual that combines the ancient art of origami with the contemporary aerodynamics of paper aircraft construction. Fourteen designs range from streamlined darts and advanced gliders made for long-distance work, through super spinners, stunt planes and war planes, complete with undercarriage, to the superb Concorde. Clear instructions accompany the easy-to-follow diagrams of each fold and throwing instructions are given for all designs.