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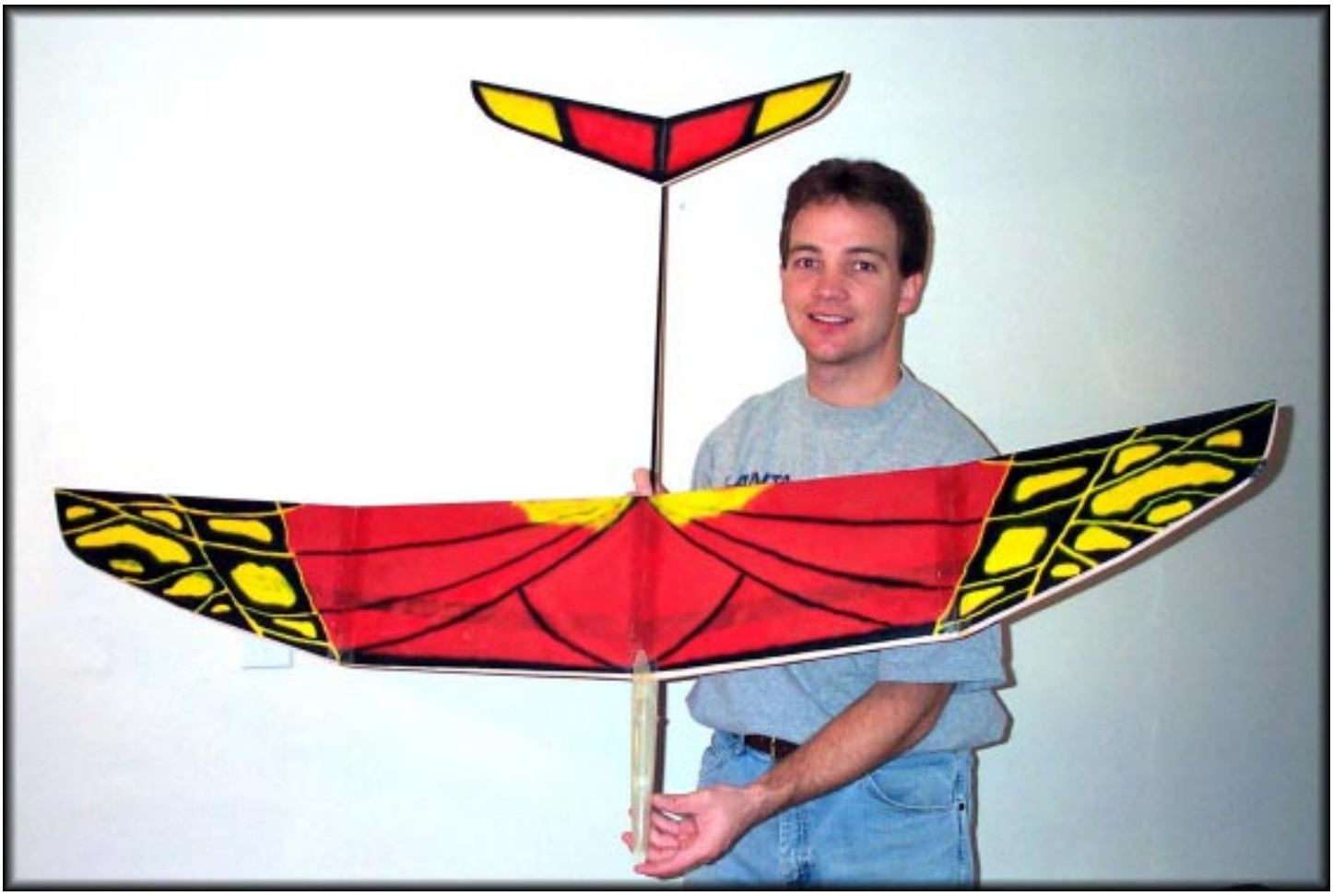
R/C SOARING DIGEST

Radio controlled

THE JOURNAL FOR R/C SOARING ENTHUSIASTS



R/C Radio controlled SOARING DIGEST

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R/C Soaring Digest (RCSD) is a reader-written monthly publication for the R/C sailplane enthusiast and has been published since January, 1984. It is dedicated to sharing technical and educational information. All material contributed must be exclusive and original and not infringe upon the copyrights of others. It is the policy of *RCSD* to provide accurate information. Please let us know of any error that significantly affects the meaning of a story. Because we encourage new ideas, the content of all articles, model designs, press & news releases, etc., are the opinion of the author and may not necessarily reflect those of *RCSD*. We encourage anyone who wishes to obtain additional information to contact the author. *RCSD* was founded by Jim Gray, lecturer and technical consultant.

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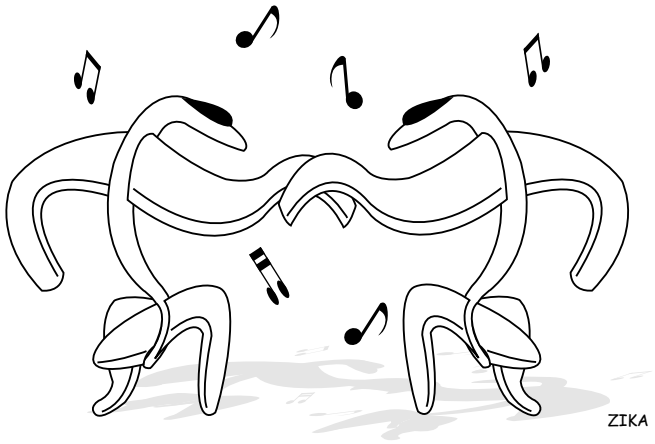

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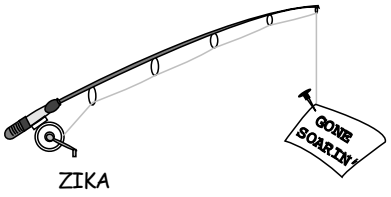
Correction

Last month, Tom Nagel discussed his techniques for converting a Chrysalis HLG into a Park Flyer. In step A, on page 8, a fraction was lost in software translation. It should be 1/2". My apology to all of you and to Tom for the lost fraction!

Happy Flying!
Judy Slates



SCHEDULE OF SPECIAL EVENTS

February 1-2, 2003
Southwest Classic Phoenix, AZ

Please send in your scheduled 2003 events as they become available!

Beautiful in full color, all cover photographs are available for downloading from the *RCSD* main web page.

AN EYE FOR DESIGN

Joedy Drulia, Shenandoah Valley, Virginia, holds a unique design he created: an airbrushed moth, hand launch glider.

This month, Joedy shares his techniques for creating these unique airbrushing designs, with his *Butterfly and Moth Airbrushing Tutorial*. The tutorial is also available for viewing in full color from the *RCSD* web pages.

Thanks to Joedy for giving us the opportunity to share his well researched tutorial with sail-plane enthusiasts interested in creating their own unique designs!

Butterfly and Moth Airbrushing Tutorial

by Joedy Drulia

(Available for viewing in full color at http://www.b2streamlines.com/RCSD.html)

Introduction

This multi-part tutorial will describe to the readers how to use airbrushing equipment to create airbrushed butterfly or moth patterns onto vacuum-bagged composite wings. Specifically, the author will discuss results of his personal experiences and techniques that have led to success and failures in this endeavor. In subsequent articles of this tutorial, the author will discuss the creation of a hand launch airbrush design pattern, airbrushing skills and techniques, issues regarding paint selection, hints, tips and examples of common airbrushing mistakes. Lastly, the author will share with the readers some additional butterfly and moth designs that have yet to be airbrushed onto wings.

Two specific points that the author would like to make before the readers convince themselves that airbrushing is not practical are: first, while although airbrushing can be considered an expensive and costly proposition, the author will endeavor to show how the average sailplane builder can obtain equipment at reasonable prices and second, the author (not being a professional artist himself) will attempt to describe and explain how only average creative skills are necessary to create attractive butterfly and moth patterns.

Explaining the specifics of vacuum bagging composite hand launch wings is beyond the scope of this article. It will be assumed that the readers are familiar with the general concepts of the steps involved in producing vacuum-bagged composite wings or have successfully performed vacuum bagging in the past.

History

I was inspired to create a butterfly design of my own after seeing a photograph of a Monarch butterfly pattern that had been painted on a hand launch glider (HLG) wing. Don Stackhouse created this pattern on one of the Monarch HLGs that were formerly produced by DJ Aerotech (http://www.djaerotech.com). Don posted a reply to Antonio Martinez's inquiry on the DJ Aerotech web site explaining how this design pattern was created. Don also provided web links in his reply that directs the readers to an on-line photograph of his Monarch design. Don explained that he used a combination of spray painting, permanent black marker pens, and brushed on white paint. He also explained a way to use water-based tints in clear Varathane to color the wing while sealing the balsa skin sheeting. The method is perfectly acceptable for balsa sheeted foam wings, but will not work with vacuum-bagged composite wings.

I began to consider the idea of using an airbrush to paint a pattern onto the waxed hand launch wing mylars before bagging. The airbrush design that would be painted onto the mylars would then be transferred to the fiberglass skins during the bagging process. Before this time, I had successfully used spray cans to paint the mylars before bagging, but this did not allow me to adjust the spray pattern nor did it allow me the fine control that would be needed to paint intricate designs.

The first resource that I used to gather information concerning my airbrushing questions was at my local library. To my good luck and fortune, I discovered one of the best sources of information concerning airbrushing in a small book called, **"Painting and Finishing Scale Models"** by Paul Boyer (Kalmbach Books ISBN 0-89024-108-2, http://db.kalmbach.com/catalog/catalog.html or 1-800-533-6644). This seventy-two page book contains many detailed chapters dealing with types of airbrushing paints, airbrush handles, airbrushing pumps, airbrushing techniques and explanations of the technical skills needed for good airbrushing results. Mr. Boyer also gives many first hand perspectives and narratives describing mistakes, accidental discoveries and personal opinions regarding airbrush painting. Although the book primarily deals with painting static models, the techniques and methods that are explained in the book are readily applied to painting other surfaces such as composite bagged wing mylars.

Another good source of information is the Internet. There are vast amounts of information already posted on various web pages that the interested reader could reference for equipment recommendations, guides for improving airbrushing skills and advertisements for used airbrushing equipment offered for sale.

It would be noteworthy to reveal to the readers that during this stage of my desire to use an airbrush to paint a butterfly pattern onto a hand launch wing I had never attempted to airbrush before. However, after doing a little background research and reading, I was confident that it would not be difficult.

I was correct in my assumption.

Equipment

During my initial foray and search for airbrushing equipment, I was led to believe that airbrushing would be beyond my budget constraints. As I began to shop around for an airbrushing system, I became repeatedly disappointed to discover that most of the basic kits from the popular brand names began at prices in excess of one hundred dollars. However as luck would have it, I accidentally stumbled upon an airbrushing set at a local Wal-Mart while shopping with my wife one evening. By this time I had almost given up on finding a reasonably priced basic airbrushing system. The set that I found is produced by Testors, Inc. (http://www.testors.com) and is marketed under their "Aztec" product line. This system costs about forty dollars depending on the package option that the user elects to purchase. If the reader is interested, they can locate this package on the Testors web site under the topic, **"Airbrushing Sets for Plastic Models."** The model part number is 9174. (See photo 1.) The package that I purchased contained several bottles of water-based acrylic paints in various colors, a small can of compressed air propellant, the airbrush handle and a storage tray to contain the paints and airbrush on the workbench. It also contained a standard black-colored nozzle that needs some explanation of airbrush technology before moving along with the tutorial.

The concept behind airbrushing is that compressed air and paint are mixed together in a mist and then the mixture is propelled to the surface being painted. There are two basic airbrush types that one can purchase: single stage airbrushes and dual stage airbrushes. These are also sometimes referred to as single action and double action airbrushes.

Photo 1

Single stage or action airbrushes mix a set amount of paint with a set amount of air. Spray paint cans operate like single stage airbrushes. When the user presses the nozzle down on a can of spray paint, a set amount of paint will disperse with set pattern. The user is unable to vary the amount of paint except by either moving the spray can closer or further away from the object being painted (which we will later learn in the tutorial is a bad technique to acquire for airbrushing). Single stage airbrushes are rather easy to operate. Once they are set up, the user need only to depress a single trigger in a downward motion and the paint will spray from the nozzle in a pattern that does not vary in width or density.

Dual stage or action airbrushes can not only control the amount of air that exits the nozzle, but they are also able to adjust the amount of paint that flows from the nozzle. This allows the user to paint thin lines with little air pressure or spread the spray pattern wide and cover large areas with greater air pressure. This type of airbrush allows the user to disperse a thick coating of paint or a light mist coating in any wide or thin pattern that they desire. The trigger on a dual stage airbrush moves in two directions, but while it is at rest, it faces furthest away from the user in a vertically top-up position. Most dual stage airbrushes will have springs in the trigger that forces the trigger to remain in this position when at rest. At this position, no air or paint will flow from the nozzle tip. By gradually pressing the trigger down, the volume of air exiting the nozzle will increase. Once the user has depressed the trigger down and thereby adjusted the desired amount of air pressure leaving the nozzle, while still maintaining the amount of downward force on the trigger, the user then gently pulls the trigger toward them. As they do this, the volume of paint released from the nozzle tip will progressively increase. If the user chooses to press the trigger all the way down to cause a large amount of air to exit the nozzle tip and then also pull the trigger towards them, the spray pattern will be large and will quickly build up paint on the surface. The beauty and skill of airbrushing revolves around this simple combination move. Some situations require a lot of paint dispersal with large amounts of air pressure such as when covering large solid colored areas of the wing mylars. At other times, the user will desire thin delicate lines and will reduce the volume of air and paint to in order to allow extra time and control to paint these lines. Experience is the best teacher and the more you airbrush, the better you will become. One nice benefit of the learning experience with airbrushing is that the user can elect to use water while practicing on shipping paper or on paper towels. Once the water dries, the user can use the same material to continue practicing on. This is what I did when learning how to control the airbrush spray pattern.

There is also one more choice that the user will need to be prepared to make before committing to purchasing an airbrushing system. It concerns whether the paint is mixed with the forced air internally or externally of the airbrush body.

With an internally mixed system, the compressed air and paint are mixed in inside of the nozzle. Most dual stage or action airbrushes are internally mixed. The benefit from this is that the airbrush will give the user a very controlled paint and air mixture and will provide consistent spray patterns. An internal system will allow the paint molecules to break apart (atomize) into very small particles and thus, will provide a consistent and reliable air to paint ratio. The major drawback to an internal system is that the user must often disassemble the nozzle and clean

out the paint after use or during an airbrushing session when it is necessary to change colors.

With an externally mixed system, the paint does not enter into the airbrush nozzle, but is mixed outside of the airbrush. Generally, the paint is forced up to the edge of the compressed air exiting the nozzle tip by a combination of capillary action and Bernoulli's principle. The compressed air, which is situated close to the top of the tube to where the paint flows, simply plucks small particles of paint and propels them to the painting surface. With an externally mixed system, it is sometimes difficult to get consistent results. When paints have not been properly thinned, the particles often vary visibly in size as they land on the painted surface since a thickly mixed paint does not readily and consistently break into small particles. If the paint is too thin, the user will either be forced to paint multiple coats in order to produce the proper paint coverage or risk paint runs across the surface being painted if the paint mixture is too thin. However, one of the most convenient benefits of the externally mixed system is that clean up is very easy. Since there are no small nozzles to clean or disassemble, the user can readily change colors between coats without delays associated with cleaning and readying the equipment. Many externally mixed airbrushing systems will allow the user to store unused paints in their own separate containers and simply cap them closed when not being used. To change colors with this type of airbrush, the user simply removes the current paint bottle and replaces it with another paint bottle containing a different color.

Once I gained some experience airbrushing, I later purchased an externally mixed system as well. At times, I only desired a one-colored surface on the wing such as a solid color on the bottom of the wing. I found that the external system allowed me to work much faster on my open class sized wings. Once I discovered the proper mixing ratios to use for thinning the paints, I learned that I could obtain rather consistent spray patterns and air to paint ratios. The external system that I purchased is also made by Testors, Inc. and was also purchased at Wal-Mart for about twenty dollars. The interested reader can view this system on Testors, Inc. web site under the topic, **"Airbrushing Sets for Plastic Models."** The model part number for this externally mixed airbrush system is 8821. This airbrushing package contained one propellant can, the airbrush handle, and several empty paint bottles. It is best suited only for broad coverage applications and is not that suitable for fine, detailed airbrushing. However, if the user experiments with the settings as well as the air to paint mixture, this system is able to spray moderately fine lines of static width and thickness. The reader is forewarned that producing fine lines with this particular system is much more challenging than with a dual action airbrush.

Although I have not used the Badger or Pasche airbrushes for comparison purposes, I will recommend the dual stage/action Aztec system by Testors. This system has a few advantages over other systems. The first has already been mentioned and it is cost. For occasional airbrushing, I have found it to be a good value for the money. The Aztec systems are made out of plastic instead of metal, but I have found it to be of adequate quality. For cleaning, the dual action Aztec systems offer an innovative screw in nozzle that disassembles into two pieces. This makes it very easy to clean. Testors also sells interchangeable nozzles such as one for very small lines, one for broad coverage and even one for stippling paint patterns. The nozzles further assist the user by limiting the amount of paint released (such as with the fine nozzle which will prevent over spraying and surplus paint sags and runs). There are about eight different nozzles that you can use and they are colored differently for easy identification. I have found that the black colored general-purpose nozzle will handle just about all of my needs. I did purchase a large coverage nozzle (white colored) and a stipple coverage nozzle (pink colored). To clean the nozzles, the user simply separates the internal pin unit from the outer shell of the nozzle by gently pulling it apart and then soaking the two pieces in water or airbrush cleaner. Using paint thinner or mineral spirits is only necessary if the user elects to use oil-based paints. Occasionally, I will have a small amount of dried paint left in the nozzle that will impede the airbrush flow, but it is easily removed by running compressed air through the nozzle or by using a small pick to remove it. The different nozzles are about ten dollars each, which is reasonable in my opinion. The Aztec systems will allow the user to use either water-based or oil-based paints, although the user will need to purchase the specific oil-based nozzles if electing to use this type of paint. These nozzles cost about ten dollars each as well.

Both the single stage and double stage Testors systems can use portable compressed air cans. These look like typical spray cans, but without the trigger nozzle on top. (See photo 2.)

Photo 2

Replacement propellant cans usually sell for about five to seven dollars. The end of the airbrush hose screws into the can to provide compressed air. As the air is expelled from the can, and especially during long periods of use, the can will become cold and this will noticeably reduce the amount of pressure coming from the propellant can. One way around this as suggested by the instructions that come with the airbrush system is to place the can into a bowl of warm water during airbrushing which will help to prevent the propellant can from becoming too cool and will somewhat maintain the amount of air pressure. What I discovered was that I sometimes needed at least two cans just to paint the top and bottom mylars and sometimes a third can was needed if I was doing very intricate work. Generally, you can

expect a propellant can to last about thirty minutes.

To minimize the amount of cans and the constant trips to purchase them, I decided to purchase an air compressor. The model that I purchased was a basic model made by Pasche. (See photo 3.)

Photo 3

I purchased it from my local hobby supplier for about one hundred and thirty dollars. While there, I also purchased an air pressure gauge and a device called a water trap that eliminates the atmospheric water from the air expelled from the nozzle. Differences in temperature of the warm air coming from the air compressor and the cool air in the hose connecting to the airbrush will cause condensation. Moisture in the airbrush can also occur in humid environments. Moist air will alter the paint consistency and cause the airbrushed paint to unexpectedly run or sag across the painted surface as a result. This is most noticeable when airbrushing on very smooth surfaces such as waxed mylars. Although I have since found cheaper air compressors, I made the decision to support my local hobby dealer. The cheapest air compressor that I have since found was in an arts and crafts shop that was retailing for about seventy dollars and also featured a built in air gauge. Once I began using an air compressor, I was able to slow down and take my time while airbrushing. This has caused a significant increase in the quality of my airbrushed patterns since I am not constantly worried about running out of compressed air cans in the middle of an airbrushing session.

The last item to consider before getting into airbrushing is the type of paint to use. In this case I can only recommend water-based acrylic paints. These are easily cleaned with water and in some cases, can be thinned with water as well. They do not have strong objectionable fumes or odors and dry rather quickly. I have used oil-based enamels, but have learned that they sometimes do not release as easily from the mylars after bagging and they are quite objectionable to work with in regards to clean up and odors. With the water based paints, I usually set a bowl of clean warm water near by while airbrushing and either during color changes or when changing nozzles, I'll disassemble the nozzle and soak it in the warm water. After a few minutes, the water will remove most of the paint from the nozzle and it will be ready for the next color.

My advice to the reader is to take your time and research the vast amount of airbrushing options that are available and pick a system that will meet your current and future needs. The low cost systems from Testors allow the entry-level builder access to equipment that performs well and is easily cleaned and maintained. The upper end systems are much more durable and will probably perform more reliably through years of use. Some additional systems for the reader to consider are the upper end systems offered by Testors. These feature a lifetime warranty on the airbrush body. The upper end systems feature ergonomically contoured airbrush handles that are more comfortable to hold during long airbrushing sessions. They also feature a knob that allows to user to establish limits on the maximum amount of air pressure that the trigger will allow. This feature will greatly reduce the likelihood of mistakes when performing fine, detailed work. Depending on the airbrushing system chosen, Testors offers the system in a nice wooden storage container that features storage areas for multiple nozzles as well as the airbrush body. These upper end systems can include the assorted nozzles, a cleaning station, propellant cans and spare paint bottles. Expect to pay between seventy-five and two hundred dollars for a top-end Testors airbrushing system depending on package contents.

Designing

My favorite aspect of remote control gliding is hand launch. Since these gliders generally fly much lower than the larger gliders, an intricate paint scheme can be visibly appreciated. And in truth, I admit that I have a little vanity when it comes to flying unique designs.

Once I decided to make a paint scheme with a butterfly motif, it was time to make some choices. Foremost, I decided that I did not want to create a similar butterfly pattern than Don Stackhouse did. Instead I wanted to make a unique design that was original in its own right. On another trip to the library, I discovered several good books about butterflies and moths. Some were better than others, but one that stood out from the rest was, **"Eyewitness Handbooks Butterflies and Moths"** by David Cater (Dorling Kindersler, Inc. NY ISBN 1-56458-034-2 hard cover or 1-56458-062-8 soft cover). This excellent book has many good photographs of many common and rare butterflies and moths. The glossy pages bring out the brilliant pattern colors and also clearly show the intricate pattern designs. I was surprised to discover how many varieties of moths have been discovered and that there are many of them that do not feature the typical brown, nondescript patterns that we envision when imagining moths.

I decided to use this book to come up with an inspiration for a butterfly or moth wing pattern, but before deciding on a particular one to use, I needed to establish some guidelines on the eventual pattern that I wanted to use. The first restriction that I placed on a design was the limitation of colors. Quite frankly, I did not want to purchase many different paints for a single design. So I limited my total color choices to three or four. Next, I considered the amount of intricate airbrushing detail that would be needed to make a design. Although a fair amount of detailing was acceptable to me, I did not want to pick a design that would take many hours to airbrush. Another important limitation was how visible the wing pattern would be in the air. I reasoned that it would not benefit me to have closely matching colors that would blend together or closely resemble my intended solid-colored bottom surface of the wing. Before beginning, I had already determined that I wanted only a solid color on the bottom of the wing. This was a personal preference and a

choice that I made that would help to minimize the amount of airbrush detailing that would be needed to create the wing design pattern.

I spent some time and looked through the pages of this book and discovered a very striking moth that caught my attention immediately. It was the Fiery Campylotes moth (Family: Zygaenidae, Species: Campylotes desgodinisi, Author: Oberthur). (See photo 4.) At first glance, most readers would assume that this pattern would be a butterfly due to its bright colored pattern of reds, oranges, blacks and yellows, but the author does a wonderful job of showing that many of the world's most brilliant and astonishing creatures are moths. The Fiery Campylotes is native to India and although it is not confirmed, according to the author of the book it is believed to be poisonous. I have personally never seen this moth, but I am sure that it would be striking to chance upon it. I was drawn to the pattern aesthetically by the predominate colors of red, black and yellow. This moth pattern had many of the general design ideas that I was initially seeking for my hand launch wing: high contrast between colors, different coloration between the tips and the root areas, and a contrasting third color to provide a pattern.

Our next step now is to come up with an initial wing design pattern. Readers who anticipate that they do not have the creative and artistic skills necessary to do this can rest assured; the author will describe a method that is fool proof.

One of the easiest ways to create a design pattern is with some clear transparency sheets or with clear thin mylar. The reader can also use graphic design programs such as "Paint Shop Pro" or something similar. I will describe how to create the design using transparency sheets. Readers who are adept at using computer graphic design programs can easily adapt this concept to their digital counterpart methods.

The following items will now be needed: a printout of the Fiery Campylotes sketch, colored pencils and a transparency pen that can be erased off of the transparency sheet.

Lay the transparency sheet over the moth printout and draw and outline of one side of the wing mylar plan form. This sketch does not need to be to scale so don't be too concerned about the minor details of the sketch. Try to produce a rough approximation of one half of the wing equal to the size of one half of the moth wing. This will assist us in spotting design elements.

Before explaining the next several steps, it is important to mention a major consideration of the design process. Keep in mind that there is no "correct" or "incorrect" design decision. The reader should seek a design that pleases them and not be concerned with trying to make a design that is considered "perfect". This is important since our next steps will be to pick a pattern design as an initial starting point. This will be accomplished by moving the transparency sheet with a sketch of one half of the wing plan form over the moth pattern until some general design elements are found to be pleasing. In the illustrations that are provided, I have used a computer program to display the outline of the one half of the wing plan form over the moth sketch. (I found it difficult to produce photographs that would clearly show the examples to the readers while using transparency paper.) What we are going to do is place the transparency sheet that has one half of the hand launch wing plan form over the printout of the Fiery Campylotes and slide it around to see how the design elements of the moth pattern fall across the hand launch wing plan form. Let's take a look at some configurations that were discovered by doing this. Attempt to line up the wing plan form

Photo 4

Photo 5

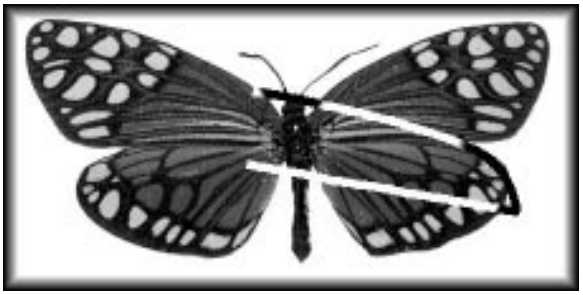


Photo 6

Photo 7

Photo 8

Photo 9

Photo 10

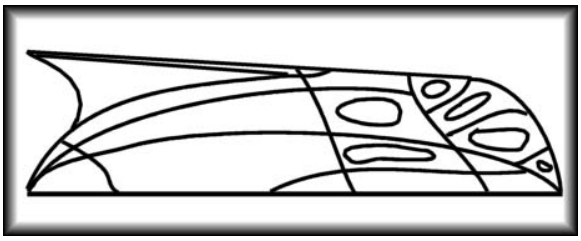


Photo 11

on your transparency sheet as closely as shown in the examples.

In Figure 1, the general colors were split about half way along the wing between the reds and the yellows. Although I wanted this concept, I felt that the yellows were taking too much of the wing space. I could have still chosen this design, but it just did not appeal to me. (See photo 5.)

In Figure 2, I was able to position more of the yellow colors near the extreme ends of the wing tip, but I felt that in this position, there would not be enough yellow in the tips to make them very visible in the air. (See photo 6.)

In Figure 3, I felt that I had found a nice balance between the reds and the yellows. I also liked how the black color gently sloped towards the trailing edge at an angle. Notice that near the wing root, the moth's head and antenna are shown. This would not be modeled in the final design, so I was not concerned about it. At this stage, the readers should look only for very general and vague design patterns. During the next steps, we will discuss how to create the actual wing airbrush pattern from this choice. (See photo 7.)

Now, it is time to create our airbrush design. Some readers may feel like this is where they do not have the artist creativity to made a design, but this is not so. What we are going to do is locate design elements in the pattern.

One of the first elements that I noticed was the general trend of the black lines as they gently curved down towards the trailing edge of the wing root. On the actual moth pattern, the lines actually stop at the moth's body, but since we are not going to model the moth's body in the final design, we can ignore this for the moment. On the transparency sheet, trace over these lines and instead of stopping before the wing root, make the lines go all the way to the wing root. (See photo 8.)

Another element that I noticed was the distinctive black edge near the tips and how it curved gently from the leading edge to the trailing edge. On your transparency sheet, trace over this line. (See photo 9.)

And the last element is the yellow spots on the wing tips. Theses were easy to identify. Again, on the transparency sheet, trace over the yellow spots.(See photo 10.)

Once you are finished, your transparency sheet will appear similar to the provided example. (See photo 11.) Do not worry if your design is not exactly like my mine. Every airbrushed wing design will be unique and will not need to match perfectly.

So, believe it or not, the most difficult part of this process is now complete! What we have just created is guide for our finished design. At this point, the readers can go back to the transparency and add some additional design lines if the sketch seems to be too plain or erase some lines if the design seems to be too cluttered. There is no right or wrong design, so the readers should not be concerned about attempting to create an exact replica of the moth pattern. Instead, attempt to capture the essence of the moth design by tracing over the major design elements onto the transparency sheet.

We will now use our transparency sketch and transfer this design to some paper towels. At this point, if you have not already cut your hand launch wing mylars, go ahead and do so. Dispense enough paper towels to span the length of the top wing mylar from tip to tip. Do not separate the paper towels along the perforations, but rather leave them together. Now, using the top wing mylar, trace the wing plan form onto the towel using a dark magic marker. (See photo 12.) Trace the entire outline of the top mylar surface, both left and right sides. Once

Photo 12

finished, set aside the wing mylars for now. They will not be needed again until we are ready to begin airbrushing.

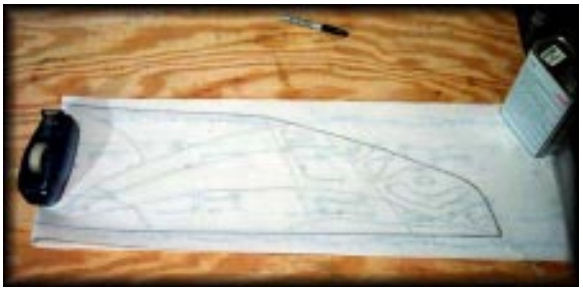
Now, still using a dark magic marker and the transparency sketch that we created, transfer the design lines onto the paper towels. The transparency sheet will be much too small, but it will only be used as a guide for drawing onto the paper towels. Attempt to sketch the design lines as best as you can and do not worry about making it identical to the design on the transparency. (See photo 13.)

The opposite side of the wing should be a mirror image of the transparency sketch. To assist you in doing this, simply turn the transparency over and it will now reflect its mirror image and the opposite wing mylar side. Don't be too concerned about making the design lines perfect on the paper towels, but try to draw the lines as closely as possible. One trick that I found that helped me to make exact mirror images on both sides of the wing plan form on the paper towels was to draw the design lines on only the right side of the wing and then fold the paper towels in half along the wing root intersection. (See photo 14.) After folding the paper towels in half if you used a heavy dark marker to draw the lines for the right wing side, they will be faintly viewable through the paper towels. Although you will be marking on the backside of the left wing half of the paper towels, go ahead and mark over the initial lines that you just sketched. When you open the paper towels again, if the design sketch lines that are on the back side of the paper towels can't been seen well on the front left side of the paper towels, simply trace over these lines as well. At this point, you will now have a complete outline of the wing plan form on the paper towels as well as symmetrical design lines on both halves of the wing plan form. If you now place the top surface wing mylar over the paper towels and line it up the wing plan form outline that you traced with a dark marker, you will be able to see the design lines that you drew on the paper towels though the mylar. This will greatly assist us when we commence the next step of airbrushing.(See photo 15.)

Painting

Before beginning, the reader should have waxed and buffed the wing mylars as they would normally do before bagging their composite hand launch wings.

The reader at this point should have obtained their airbrushing system and understand the specifics on how to operate it. With the many types and makes of airbrushing systems available, it is impossible to write about the specific operating methods of each one. Instead, I will mention the general concepts associated with airbrushing. It will be assumed that the reader has practiced and has obtained sufficient skills to be able to accurately produce thin and thick lines as well as be able to accurately control the airbrush spray pattern. This will take some practice and I recommend using water in your airbrush and practice these skills on brown shipping paper. The shipping paper while it has been airbrushed using water will mimic an airbrush paint pattern. When the wet shipping paper dries, the dark colored water spots will return the paper back to a lighter color. The reader



(top) Photo 13

(left) Photo 14

(right) Photo 15

can then airbrush back over the shipping paper without needing to use multiple pieces of practice paper. The reader should become adept enough to confidently produce thin and thick wavy lines, dashed lines, and consistent parallel lines without over spraying. Once this level of proficiency is obtained, the reader will be prepared to airbrush the design onto the mylars.

Earlier, we picked a moth pattern and created a hand launch wing design from it. We then marked the wing plan form outline on paper towels by using the cut mylars as a guide and then we used our transparency sheet as the basis for drawing the design on the paper towels. Once the design lines had been placed, we learned that we could see these lines through the mylars by placing the mylars over top of the paper towels and lining up the edges of the mylars with the outline of the mylars that had been traced on the paper towels. This concept will greatly assist us while airbrushing since all we will need to do is follow the design lines that are visible though the mylars. This is very much like the paint-by-numbers concept and will greatly assist us during the airbrushing process.

At this point, the reader should obtain the necessary paint. The three basic colors of this design will be red, yellow and black. I recommend that the reader purchase about two ounces of each color. You will have some left over paint, but it is better to have some spare than to run out of paint during an airbrushing session. Pick whichever hue (variation of color) you can find or whichever specific colors that you prefer. Make sure that you purchase water based acrylic paints. These are easy to clean and will easily release from the mylars after bagging. Testors offers a wide assortment of colors if you have access to a nearby supplier. Another item you will need to purchase is airbrush thinner. This is not the same thing as paint thinner, but it is the same concept. Airbrush thinner is used to thin water base acrylic paints. Some paints can be thinned with water, but you will need to check the label to see which ones can be thinned this way. Before airbrushing, you will need to thin the paint to about the consistency of milk. It should have a creamy appearance, but should not be overly watery. Unfortunately, trial and error will be the best teacher regarding this. One way to note if your paint mixes are too thin is that while you are airbrushing onto the mylar surfaces, instead of the paint readily adhering to the mylars, it will seem to run across the mylar surface. A paint mixture thinned too much will cause the paint to collect as small droplets on the surface of the mylars. This will cause the dreaded fisheyes. Fisheyes on the mylars will appear to be small circular areas where the paint does not seem to want to stick to. If the builder elects to bag the wing without repairing the fisheyes, the foam will be visible through the fiberglass skins. If the paint mixture is too thick, it will not seem to want to come out of the nozzle unless you use too much air pressure. Too much air pressure will cause over spraying of the paint mixture and can cause the consistency of the paint mixture to vary. If you elect to use the portable compressed air cans, a thick paint mixture may not even exit the nozzle. Practice will greatly assist in learning how thick or thin to make your mixtures. Be sure to also mix up more paint than you expect that you will need. If you run out of the mixed paint while airbrushing, it is almost impossible to make an identical batch. This is even truer when mixing paints to make combination colors. As a general rule, a light coating of paint on the surfaces of a sixty-inch wide hand launch wing will need about one half to one ounce to cover the entire surface. Lighter colors will need slightly thicker coats to become opaque and darker colors will need less coat layers to become so. Keep this in mind when mixing up your paint batch.

Since we can easily view the outlines of our Fiery Campylotes design through the mylar surfaces, it is now just a matter of airbrushing over the lines. First, cover up the bottom mylar surface with either paper towels or with shipping paper and place something on top of it to keep the compressed air from the airbrush from blowing it away and allowing paint to land on the bottom mylar. We will be painting the bottom surface of the wing last and this will prevent any over sprayed paint from landing on the bottom wing mylar. I like to position the mylar surface that I am currently working on closest to me since then I do not have to reach over the opposite mylar while airbrushing. Next, mix up and properly thin a batch of black paint and begin airbrushing over the major design lines. You'll want to build up the paint thickness gradually in multiple layers. When airbrushing, remember the following guidelines: maintain the airbrush nozzle at a consistent distance from the mylars, attempt to maintain a set width of the spray pattern, use your arm to control the nozzle and not your wrist, and most importantly, only use light misting coats. You will discover that these light coats will dry rather quickly. One neat airbrushing trick is to use the airbrush to send out air without any paint to help the airbrushed paint dry quickly, but I would not recommend this if you are using compressed air cans since you will quickly empty your supply. If you only spray on light misting coats, it will take about a minute or less to dry. As you are airbrushing the black paint lines onto the mylars, you will want to build up the paint thickness only enough to cover the design lines on the paper towels that are showing through the mylars. You will probably find, that depending on how thick or thin that you have mixed your black paint, you will not need many coats to build up the paint layer. One important concept to remind yourself of is that thick paint layers will make your hand launch wing significantly heavier, so always attempt to place the least amount of paint that you can.

Once you have airbrushed and covered all of the black design lines on the mylars, you are now ready to fill in the larger areas of black coloring. You will notice on the tips of the wing, there are areas around the yellow spots that will need to be airbrushed black. First, outline all of the yellow areas with a thin black line. This will assist you as you start to fill in the black colored areas since it will visibly indicate where the yellow areas will begin in the pattern. Airbrush all of the black areas in the tips. Attempt to get a consistent fill with even paint coverage. Remember that you only need enough paint to make the mylars opaque. With the white paper towels under the mylars, this is easy to judge this since any spot on the mylar surface that does not have enough black paint will continue to reveal the white paper towels through the mylar surfaces. The contrasting color of black

paint and the underlining white paper towels will be easily discerned. Take your time and attempt to do a good job since any mistakes will be clearly shown on the finished wing. Another trick that I have learned since I begin airbrushing is that you can carefully lift up the mylar surface and look at the outside surface of the mylar. If you have a strong light source in the room, you can easily see the variations of paint coverage and spot any places where the paint needs to be placed a little thicker. This makes it easier to see variations in paint thickness, especially when using the lighter colors.

Once you are finished with the black airbrushing, clean out your airbrush and mix up some red paint. Now it is time to fill in the red colored areas on the mylars. Do this the same way that you filled in the black colored areas in the wing tips. Do not airbrush over the dried black paint already on the mylars. You'll want to spray closely up to the existing lines. With the airbrush, you will be able to accurately control the paint at it lands on the mylar surface by adjusting the paint flow rate as well as the diameter of the pattern. After airbrushing all of the red colored areas, clean the airbrush again and then fill in the yellow spots in the wing tips with a new batch of yellow paint.

The last stage is to paint the bottom surface once the top has dried. The mylars can be carefully handled once the paint is dry, but be sure not to scratch the newly paint surfaces or it will show on the bagged wing. I elected to paint my entire bottom surface red, but the reader can chose to paint a similar moth pattern on the bottom if they desire. My rationale for the solid color for the bottom skin was to ease visual orientation while flying.

Be sure to clean out your airbrush thoroughly once you are done airbrushing. Clean equipment will make your next airbrushing session much easier and less frustrating. It is much more difficult to remove paint when it has dried than while it is still wet.

Allow the mylars to dry to the touch. You will be able to lay up your fiberglass and epoxy once the airbrushed paint has dried. You'll also want to use care when spreading the epoxy. The paint will not readily chip off, but it will scratch off against sharp objects. Continue your normal bagging process and prepare to be amazed when the lay up has cured and the mylars are ready to be removed. Use care when removing the mylar skins since the epoxy will still be curing, and although the paint will not flake off from touching the newly bagged surfaces, the still curing epoxy might capture your fingerprints forever.

Depending on your attention to detail and your proficiency while airbrushing, I would estimate that this whole process should take about an hour to create the design pattern and about an hour to do the airbrushing. I have since discovered that by pre-mixing my colors before hand, I can reduce my airbrushing time significantly. Another item that I have since purchased is an airbrushing cleaning station. (See photo 16.) This is a device that allows you to place your dual action airbrush nozzle into a receptacle on a glass jar lid that is equipped with an air filter. To clean my airbrush nozzle between colors and before the final clean up and storage, I simply disconnect the paint jar from the airbrush handle and connect another paint jar that has airbrush thinner in it. I run the thinner through the nozzle into the cleaning jar until the spray pattern no longer shows any paint. This can also be done with water if you want to conserve your airbrush thinner supply. It is easy to see when the nozzle is clean since you can see through the jar and watch as the airbrush spray progressively becomes clearer as the paint is removed from the nozzle. Cleaning up the jar is simply a matter of unscrewing the lid, discarding the residue and rinsing out the jar with water. The air filters are replaceable. This station cost about twenty-five dollars and replacement filters are about five dollars. The one that I purchased is also made by Testors.

Photo 16

Troubleshooting and Conclusion

We conclude the tutorial on airbrushing butterfly and moth patterns onto composite bagged wings. Earlier, we airbrushed a moth pattern onto the mylars for a composite bagged hand launch wing and bagged a wing with the pattern airbrushed on the wing mylars. Hopefully when you removed your hand launch wing from the vacuum bag you were delighted over your creation, but more than likely, you might have had a few places on the airbrushed pattern that did not come out as well as you had expected.

Let's review some of the common mistakes of airbrushing and what you can do to eliminate or minimize them from occurring.

Over spray (Photo 17.)

This occurs when a small amount of wet paint is left on the nozzle when starting the airbrush stroke. This paint will be propelled off of the nozzle and will splatter on the mylar surface. Paint splatters are easily fixed by using a soft tissue or a q-tip and carefully wiping the spattered paint off of the mylar. Don't be too concerned with any paint streaks that occur as a result of doing this since you can easily airbrush over the streaks and cover them up. If it is possible, always begin your airbrushing off the edge of the mylars so that if the initial airbrush spray contains any paint splatter, it will not land on the mylars. Sometimes you will not be able to start your airbrushing off of the mylars such as when you painted the yellow spots on

Photo 17

Photo 18

Photo 19

the wingtips. When faced with this situation, check and see if there is any paint residue on the nozzle and if so, gently wipe it off. Also, when starting your airbrushing pattern in an area on the mylar that is not adjacent to the edge of the mylar, begin the spray pattern slowly by adding air without paint and then gently increase the paint levels until the desired airbrush pattern is obtained.

Over spray can also occur if the user does not maintain the airbrush at a set distance from the mylars and if the user suddenly increases the amount of paint in the airbrush pattern. These mistakes can also be repaired by gently blotting the excess paint off the mylars while it is still wet and re-airbrushing the paint back on.

Scratches (Photo 18.)

One thing that I still must be careful of is ensuring that any portion of the airbrush does not come into contact with the painted mylar surfaces. During my first efforts at airbrushing, I found that I would often carelessly allow the paint container to rub across the already painted areas on the mylar and remove small amounts of paint. Airbrushing back over the scratches easily repaired the paint void, but if often meant that I needed to set up my airbrush for that particular color again if I had changed colors without noticing my mistake. I still sometimes find that I scratch the dried mylars with the airbrush equipment, but by paying careful attention while airbrushing I do not make it as often.

Mixing (Photo 19.)

It has been my experience that overlapping paints in the attempt to make a combination color such as covering dried red paint with yellow paint to make the resulting color orange does not work well at all. If you desire a particular color, mix it beforehand and then airbrush it onto the mylars. You might get a faint mix color from overlapping airbrush paints, but it won't be in the intensity and clearness that you will expect. Actually, I found that it doing this actually did not look pleasing at all.

Photo 20

Clean patterns (Photo 20.)

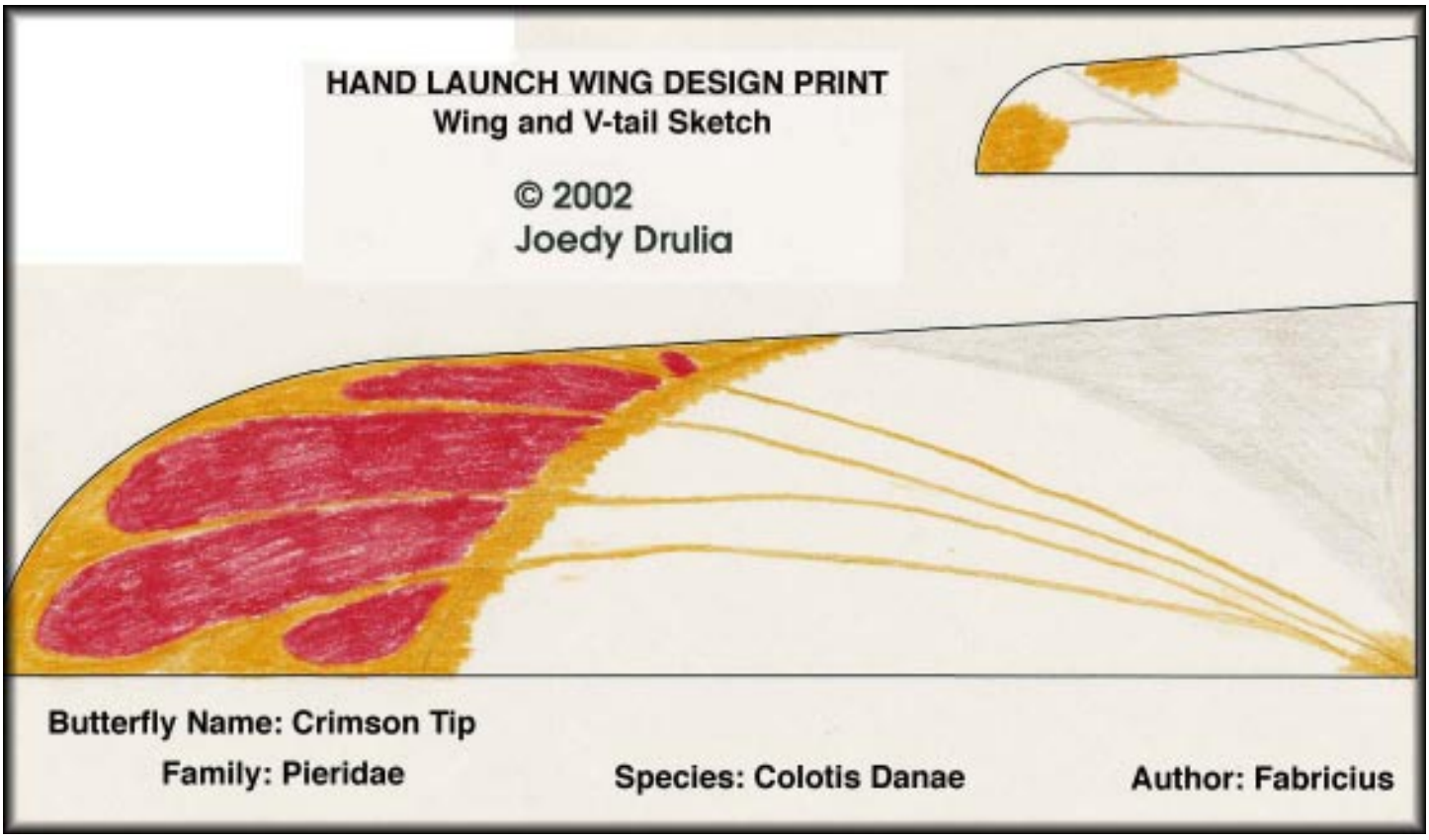
I find that as I continue to become more adept in using the airbrush that I do not make many mistakes in airbrushing over existing painted areas. In the beginning, I had trouble controlling the spray pattern/width and would often accidentally overlap airbrush patterns. Practice will allow you to perfect the necessary airbrush dexterity skills. One idea to remember when painting butterfly and moth patterns is that just like real butterflies and moths, their own wing patterns do not have cleanly separated pattern lines, but instead have somewhat of a feathering pattern as the colors gradually transition from one to another. Often, though, you will need to look very closely in order to notice it. When airbrushing your own butterfly and moth designs, remember this concept. Most of the time, your hand launch will be flying at a distance, and you will not be able to see the small minor details of the design pattern. I have found that when airbrushing adjacent colors, allowing the spray pattern to gently feather into the adjoining color produced pleasing results.

I certainly hope that this tutorial has given you some ideas and inspirations to attempt your own butterfly/moth patterns on hand launch wings, however all of the concepts and instructions covered in this tutorial can be easily applied to larger composite bagged wings. With an airbrushing system, you can elect to do as simple

or as complex of a pattern that you care to create.

In conclusion, I would like to present the reader with some other butterfly and moth patterns that I have designed, but have not yet airbrushed them onto a hand launch wing. Feel free to use them as a guide to create your next masterpiece, but permission is not granted to reproduce them for commercial purposes.

Good luck to you as you continue in your airbrushing experiences. If you create a butterfly or moth hand launch wing design, be sure to send me a photo of it. I would be very interested in seeing your creation!



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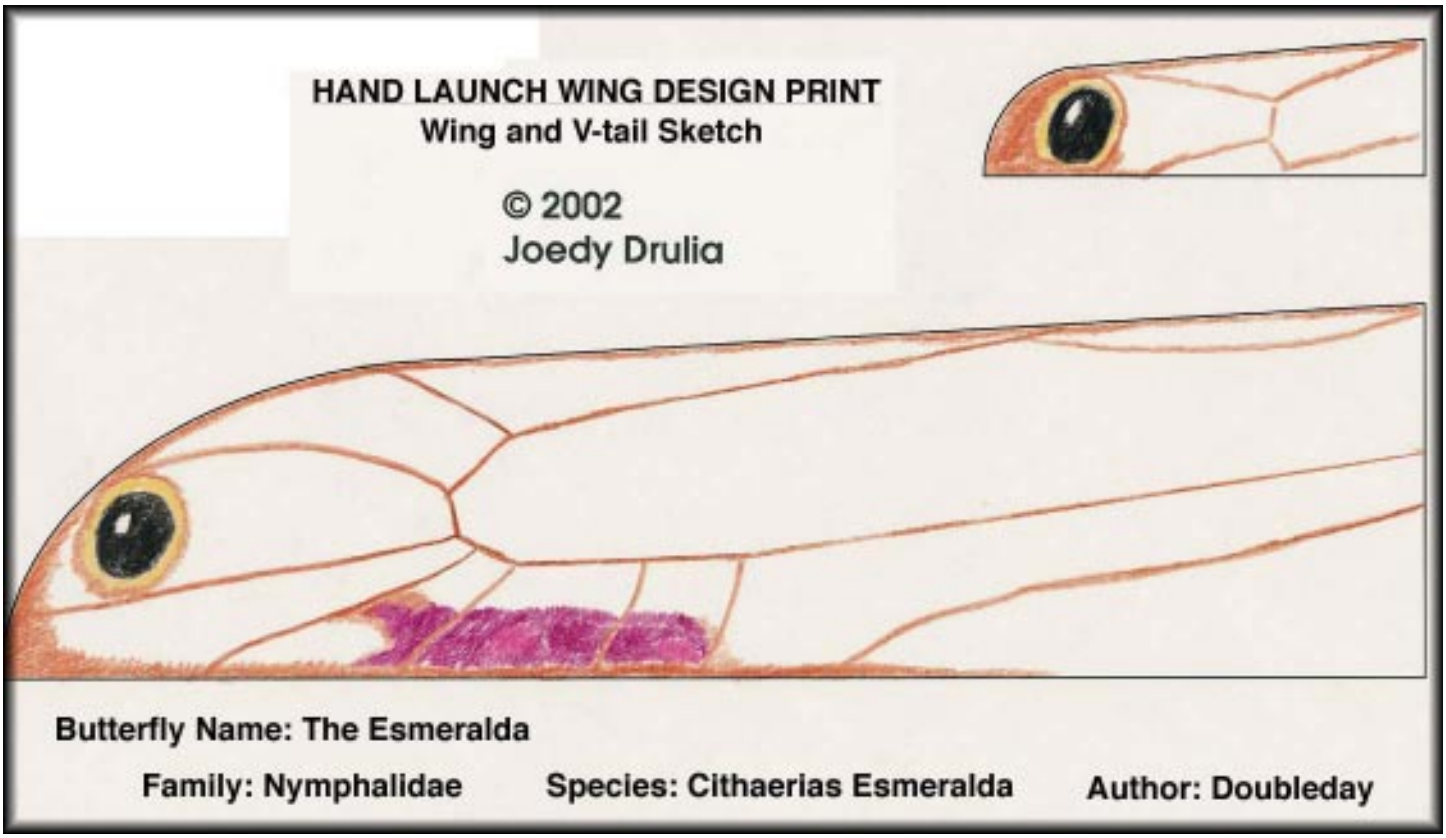

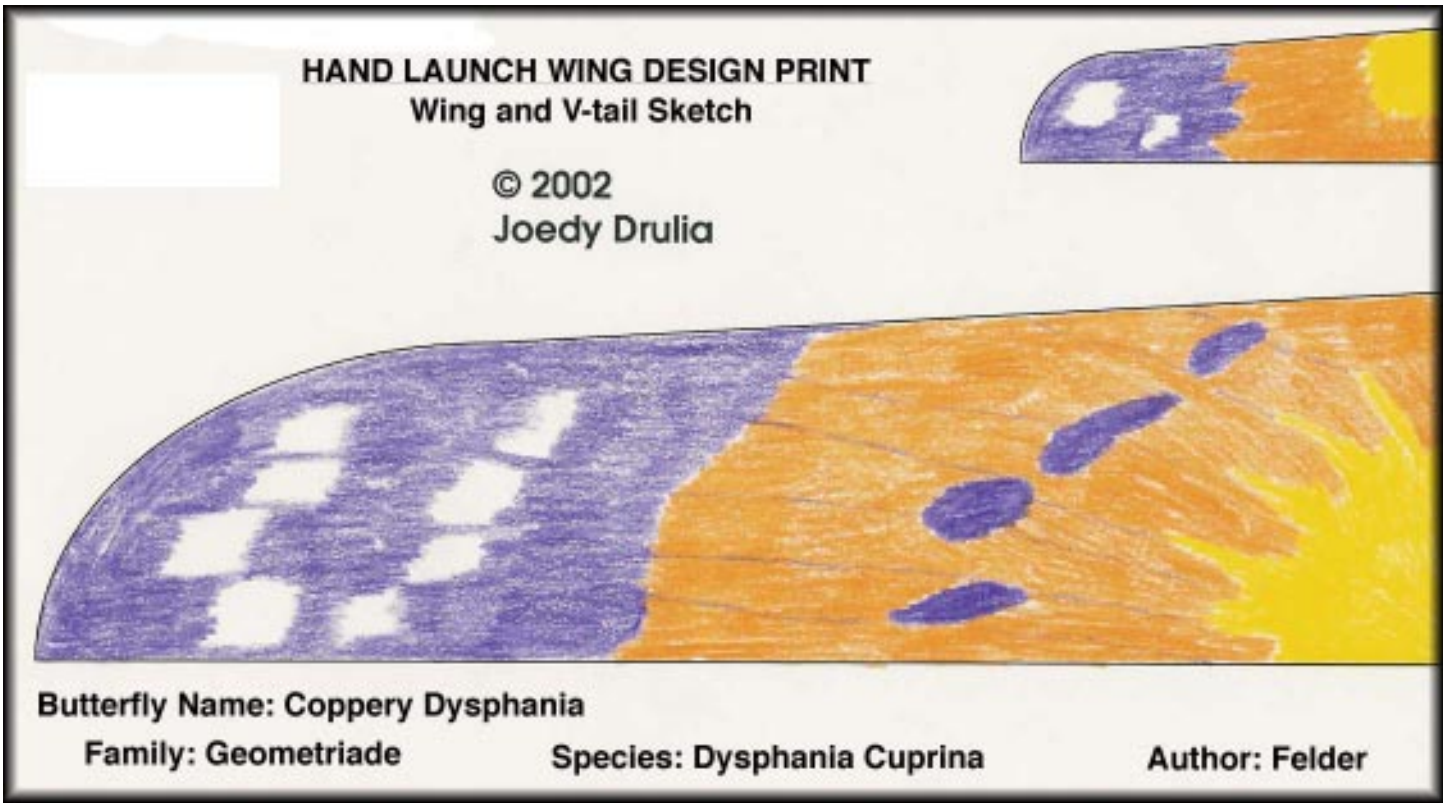

GORDY'S TRAVELS

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Servo Jitters and Repairs

I got a call from a guy who got a molded plane second hand, it had top brand servos in it. He had it for a year or two and didn't like flying it, but some new wings became available for it and he started flying it again. During a contest, the sailplane was passing over some trees and suddenly nosed down hard, leaving the planes pieces spread between two trees.

Upon inspection all he could find was that one of the V tail servos was acting erratically, so he assumed that was what caused the crash. He was bummed of course and his reaction was a desire to let the servo manufacturer know how unhappy he was. He made the comment that he will, "Never use that brand servo again!" In spite of the fact that the servo had performed reliably for a couple of years.

So what IS the manufacturers responsibility in a situation like that? The servo served its original purchaser and the second owner well, and in fact it's unlikely that the servo was the culprit that caused the dive/crash.

Our suppliers all try to make a great product, they all have disclaimers about responsibility and liability, but none can protect themselves from an angry modeler's frustration. All the World Class Championships, extreme events successfully completed, World Records or use by world class pilots, can't balance that one sad story.

- So what happens to servos that when they act up?
- When should you have them 'serviced'?
- What is the 'break even' price that makes refurbishing servos a value?

Servos consist of parts, some plastic, some electronic and some mechanical. Counting the case, gear deck, and wire, you have four main components:

The Gears
The Pot
The Amplifier, and
The MOTOR

The ham bone is connected to the ....

Your battery is the source of your servo's power. What comes out of the battery, ends at the servo motor's brushes and commutator.

'Brushes' consist of tiny and very thin 'whiskers' of Palladium that lay on foil thin copper acting as the commutator. (Except for the Volz XP and HP series, they have motors with carbon brushes for extreme use like DS'ing.)

What happens when you short the wires of your battery - at the battery? Excitement right? Well that's what happens at the servo motor brushes when you hang the flap in the grass or the elevator against a branch while in a tree. They get HOT, but who cares — you can't see em so its probably not important.... 5 cells really makes them glow, but what the heck it makes the servo stronger and it must be *okay* cuz the box shows a spec rating at 6 volts..... Not bad.

Servo jitters are usually a result of cooked servo motor brushes. The motor tries to move but the power connection is charred, sort of like a dirty battery connection in your car. We want the servo to micro center; to do that the motors need to power!

Pots used to be 'cleanable' and they needed it, when used in Glow Fuel powered planes that got dirty and vibrated at high frequencies, but Pots materials have changed, so it's unlikely a servo centering problem will be a Pot problem.

Amplifiers either work or don't. They 'fail' when they receive a reverse polarity surge (oops! Red to black, black to red). And they 'fail' when they get hot and they get hot when overcurrented during a stalled servo situation... Another reason to stay away from 5 cell packs.

It is usually the motors, which grow old. Over heating a servo motor cause their magnets to loose their magnetism which means weaker motors.

Long servo arms put greater loads on the servos which are trying to do their job on a launch. *Never use more than a two-hole arm connection!*

Sending your servos in for 'refurbishing' seldom makes sense money-wize. One big consideration is the competency of the repairman. If he is a RC sailplane pilot himself, chances are he'll take more care and consideration when checking your servo. Unfortunately you can't interview the repairmen when you 'send' you servos in to a manufacturer. Some manufacturers recognize the lack of skill and interest of servo repairmen and simply charge a flat rate, for an 'exchange'.

Most guys think that it's gears that need replacing and, depending on the material of the gears they could be right, but mostly it's the motor that should be replaced.

If you have been using 5 cell packs, then definitely replace the motors.

Gear pins are another part that is often overlooked, they bow as the gears are loaded and try to move away from each other. A small bend in a gear pin is hard to see but shows up in centering as either slop or binding.

'Metal' gears vary in their material. Often they are made of powdered aluminum or soft brass, but it still is seldom that those parts wear, instead you'll find that the culprit is gear slop, the single plastic gear in the train.

So how about that poor guy's problem? Well, he'll never be happy because he lost an expensive plane,

and he'll never be convinced that everything man made wears out, burns out or just breaks. He's sure that the servo never was under damaging stress, and he'll never know that the servo's problem was a result of the crash, not the cause.

He'll never believe that by bad mouthing a supplier that it won't make his plane come back or help improve products in the future...

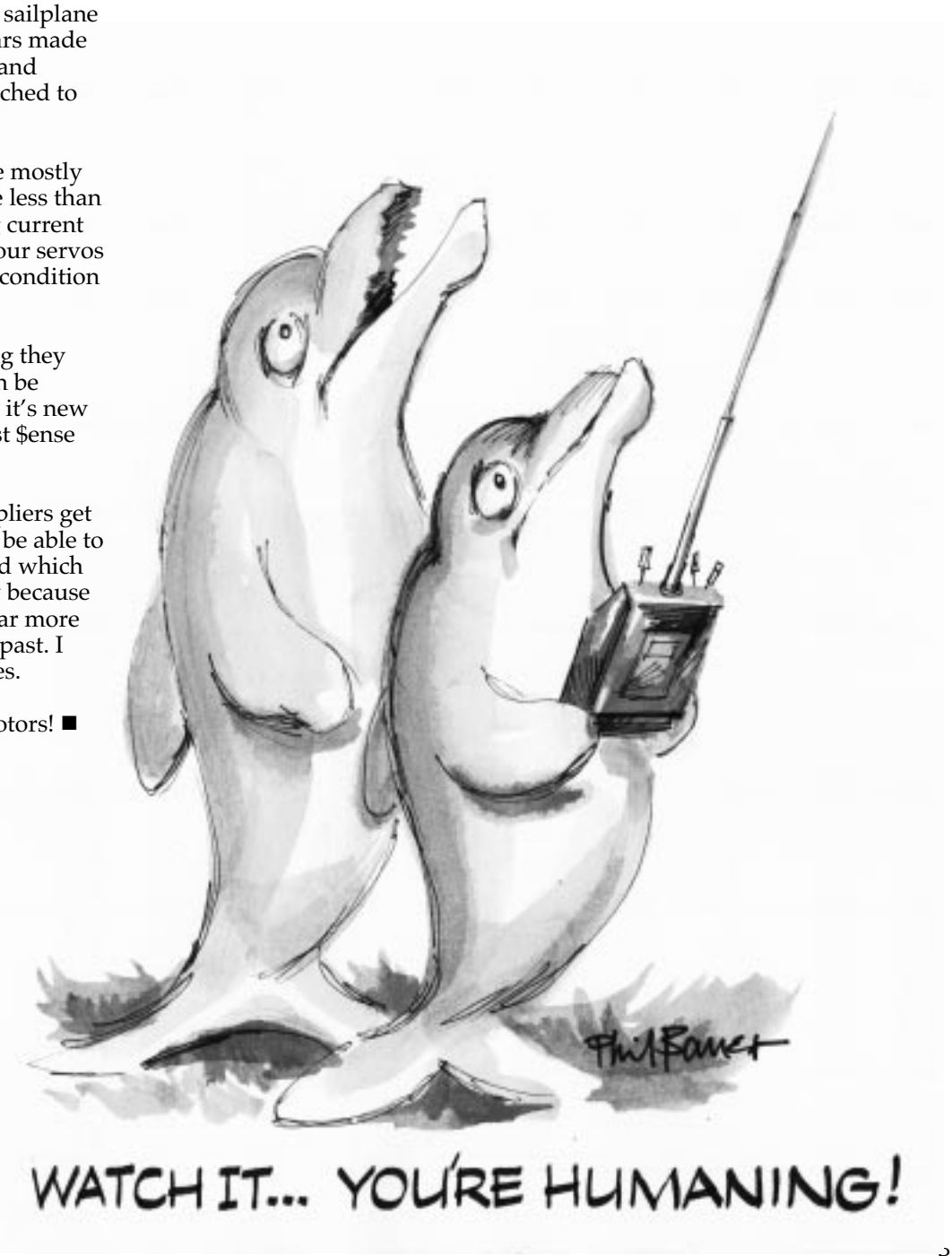
How do you decide which brand to use in your sailplane? Do your homework... Does the brand you are considering offer servo mounts for mounting in sailplane wings? What are the gears made of? Size, weight, torque and speed, all should be matched to the application.

Servo 'tester' devices are mostly gimmicks, since they are less than 'precise' and, just seeing current draw, don't tell you if your servos will last through a hard condition situation.

Servos do work, meaning they wear out. Their parts can be replaced, but in the end, it's new servos that make the best $ense for your favorite plane.

Our servos and our suppliers get reputations, you should be able to tell which are earned and which are gossip. We are lucky because all of our equipment is far more reliable than ever in the past. I hope that trend continues.

Think about those motors! ■



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PARACHUTES: $12.50 (includes S&H U.S.A.) Send check or money order to Dale King, 1111 Highridge Drive, Wylie, TX 75098; (972) 475-8093.

Reference Material

Summary of Low-Speed Airfoil Data - Volume 3 is really two volumes in one book. Michael Selig and his students couldn't complete the book on series 3 before series 4 was well along, so decided to combine the two series in a single volume of 444 pages. This issue contains much that is new and interesting. The wind tunnel has been improved significantly and pitching moment measurement was added to its capability. 37 airfoils were tested. Many had multiple tests with flaps or turbulation of various configurations. All now have the tested pitching moment data included. Vol 3 is available for $35. Shipping in the USA add $6 for the postage and packaging costs. The international postal surcharge is $8 for surface mail to anywhere, air mail to Europe $20, Asia/Africa $25, and the Pacific Rim $27. Volumes 1 (1995) and 2 (1996) are also available, as are computer disks containing the tabulated data from each test series. For more information contact: SoarTech, Herk Stokely, 1504 N. Horseshoe Circle, Virginia Beach, VA 23451 U.S.A., phone (757) 428-8064, e-mail <herkstok@aol.com>.

BBS/Internet

Internet soaring mailing listserve linking hundreds of soaring pilots worldwide. Send msg. containing the word "subscribe" to soaring-request@airage.com. The "digestified" version that combines all msgs. each day into one msg. is recommended for dial-up users on the Internet, AOL, CIS, etc. Subscribe using soaring-digest-request@airage.com. Post msgs. to soaring@airage.com. For more info., contact Michael Lachowski at mikel@airage.com.

International Scale Soaring Association

There is a growing interest in scale soaring in the U.S. We are dedicated to all aspects of scale soaring. Scale soaring festivals and competitions all year. Source for information on plans, kits, accessories and other people interested in scale. For more information:

web site: www.soaringissa.org

Books by Martin Simons: "World's Vintage Sailplanes, 1908-45", "Slingsby Sailplanes", "German Air Attaché", "Sailplanes by Schweizer". Send inquiries to: Raul Blacksten, P.O. Box 307, Maywood, CA 90270, <raulb@earthlink.net>. To view summary of book info.: http://home.earthlink.net/~raulb

T.W.I.T.T.

(The Wing Is The Thing)

T.W.I.T.T. is a non-profit organization whose membership seeks to promote the research and development of flying wings and other tailless aircraft by providing a forum for the exchange of ideas and experiences on an international basis. T.W.I.T.T. is affiliated with The Hunsaker Foundation which is dedicated to furthering education and research in a variety of disciplines. Full information package including one back issue of newsletter is $2.50 US ($3.00 foreign). Subscription rates are $20.00 (US) or $30.00 (Foreign) per year for 12 issues.

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Sailplane Homebuilders Association (SHA)

A Division of the Soaring Society of America

The purpose of the Sailplane Homebuilders Association is to stimulate interest in full-size sailplane design and construction by homebuilders. To establish classes, standards, categories, where applicable. To desiminate information relating to construction techniques, materials, theory and related topics. To give recognition for noteworthy designs and accomplishments.

SHA publishes the bi-monthly **Sailplane Builder** newsletter. Membership cost: $15 U.S. Student (3rd Class Mail), $21 U.S. Regular Membership (3rd Class Mail), $30 U.S. Regular Membership (1st Class Mail), $29 for All Other Countries (Surface Mail).

Sailplane Homebuilders Association
Dan Armstrong, Sec./Treas.
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Tehachapi, CA 93561 U.S.A.

The League of Silent Flight (LSF) is an international fraternity of RC Soaring pilots who have earned the right to become members by achieving specific goals in soaring flight. There are no dues. Once you qualify for membership you are in for life.

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ESL

The Eastern Soaring League (ESL) is a confederation of Soaring Clubs, spread across the Mid-Atlantic and New England areas, committed to high-quality R/C Soaring competition.

AMA Sanctioned soaring competitions provide the basis for ESL contests. Further guidelines are continuously developed and applied in a drive to achieve the highest quality competitions possible.

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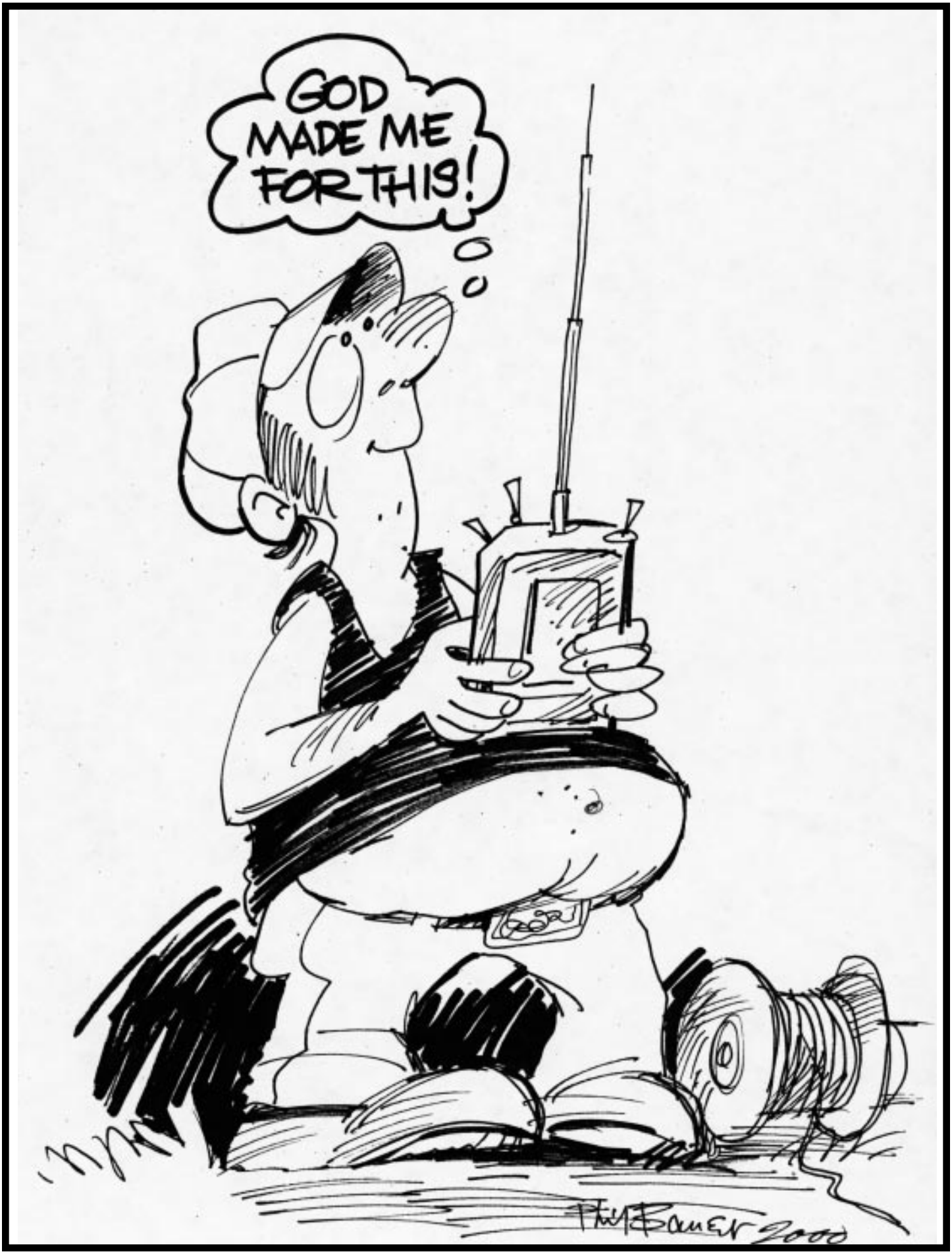
ESL Web Site: http://www.e-s-l.org

ESL President (99-00): Tom Kiesling (814) 255-7418 or kiesling@ctc.com


GOD MADE ME FOR THIS!
PHIL BAUER 2000