



BUTTERFLY - LIVINGROOM FLYER



THE WORLD'S LIGHTEST READY TO FLY MODEL AIRCRAFT

Butterfly manual v0.7 Draft

Congratulations on your purchase of the Plantraco Butterfly - the Lightest and Smallest Ready To Fly R/C Model Airplane in the World!

Get Ready to pilot your Butterfly indoors in your livingroom, garage, office, or classroom. On dead calm days, you can also fly outdoors in your backyard, but the remarkable thing about this radio controlled flying model is that it can be enjoyed inside, no matter what the weather is like outside.

The total flying weight of the Butterfly is about 4 grams, to put that in perspective, this instruction manual weighs 3 times the weight of the Butterfly! Hard to believe, but it's a fact!

This low weight enables you to fly the Butterfly without any fear of damaging the walls. You can fly it around people so long as they are all paying attention to the flying model. Low weight also means that the Butterfly has a tough time of damaging itself in a crash most of the time - another advantage of ultra low weight construction.

These instructions will tell you how to enjoy flying your Butterfly. Please note that we have included several videos on the included CD-ROM disc. If you have problems understanding something in the manual, watch the "video instructions" on disc or download from <http://www.plantraco.com/hobbies/help.html>

READ ME FIRST - IMPORTANT!

Before you pick up the Butterfly model in this case you should read this manual or you will risk damaging the Butterfly airframe structure!

The Plantraco Butterfly is a Toy for Big Boys. Small Children can enjoy watching the Butterfly fly but they should be instructed not to pick it up. Dogs and Cats are likely to break it too. Be mindful of this.

If you damage your balsa airframe, replacements are available from the plantraco website.

FINE PRINT

Battery discharging, charging, electric motors, spinning propellers, and flying models all have the potential for serious injury to persons and damage to property. In purchasing these products, the user agrees to accept responsibility for all such risks, and not to hold the manufacturer, distributors, or retailers responsible for any accident, injury to persons, or damage to property.

PRODUCTS COVERED IN THIS INSTRUCTION MANUAL

- Plantraco RTF Butterfly - living room flyer
- HFX900 (HFX868 in Europe) Proportional R/C Transmitter/Charger "R/C Air Model 1" - Centering Throttle with 20mA rate 5mm Bahoma (900Mhz-USA, 868Mhz-Europe)
- Micro900 0.4 Gram Butterfly Receiver
- FMS Flight Simulator Interface Cable and FMS Software CDROM with Computer Models of the Plantraco RTF Models (FMS is a freeware R/C Flight Simulator - bundled with permission from the author - you can also download it and all the Plantraco FMS flight sim model files from links at: <http://www.plantraco.com/FMS>)
- LP30 - 30mAh Lithium Polymer Bahoma Cell (5mm standard)

CHECK FOR UPDATES TO THIS MANUAL ON OUR WEBSITE

<http://www.plantraco.com/hobbies/help.html>

PLANTRACO.COM

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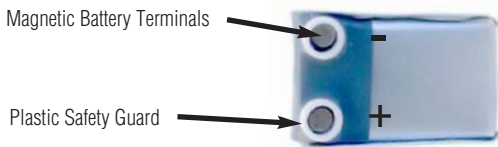


Fig. 1. Bahoma Battery Connector (patent pending)

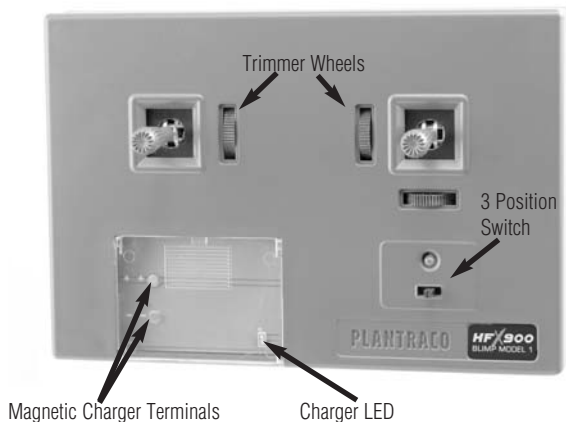


Fig. 2 HF900 Transmitter with Built-In Charger.

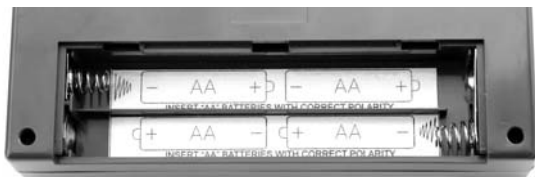


Fig. 2.5 Insert "AA" Batteries with Correct Polarity



Fig. 2.6 Butterfly 3.6 Gram Living Room Flyer
All Up Weight is Less than a sheet of typing paper!

GETTING STARTED

Add Batteries to Transmitter (See Fig. 2.5)

Remove the rectangular battery cover from the back of the Transmitter. Insert 4 "AA" Alkaline batteries taking note of proper polarity of positive and negative contacts (Negative end of the battery should make contact with the "spring").

Charge Lithium Polymer Rechargeable "Bahoma" Cell

The included lithium polymer cell features Plantraco's Bahoma (**B**attery **H**older using **M**AGnets) connector (patent pending). The Bahoma connector system uses strong plated magnets to hold the battery onto the charger and onto the Micro9 Butterfly receiver. These magnets are also used as electrical conductors. The terminals of the Bahoma cell are protected from shorting to each other by a plastic safety guard. (See Fig. 1)

On the front of the transmitter, slide the 3 position switch to the middle position to put the transmitter into its "Charge" mode. The LED inside the charger door will be blinking rapidly. Slide the hinged clear polycarbonate plastic charger door downwards to unlock it, and then lift it open. Attach the Bahoma cell to the corresponding magnetic terminals. The Bahoma cell will "click" into place on the charger by magnetic attraction and with good electrical contact. The LED inside the charger will now glow brightly. Close the clear charger door, and slide it up to shut it with a small click. Your cell is now charging, and when the bright LED goes out, the cell is fully charged and ready for use. Charge time is about 60 minutes typically. The charger of the Butterfly Transmitter is set to charge at about 20mA. (See Fig. 2)

Important Notes about Lithium Polymer Batteries

The lithium polymer rechargeable battery should not be used if it has become swollen or has been physically damaged, crumpled, or cut. Always use the supplied charger built into the transmitter. Always charge the LP30 cell with the clear charger door closed. The supplied lithium polymer cell can provide you with many discharge cycles when used properly, but eventually it will require replacement. Replacement cells are available from your dealer or from Plantraco directly at www.plantraco.com. Always dispose of used or damaged batteries appropriately.

If you need to dispose of a damaged Lithium Polymer cell, you can make a solution of about 2 cups of water and 1 cup of table salt in a disposable container outdoors. Put the damaged cell in this concentrated salt water solution and leave it outside overnight. The damaged cell may then be disposed of in the garbage safely.

Replacement cells are always available from your dealer or from the plantraco website www.plantraco.com

HANDLING YOUR BUTTERFLY

NOTE: Watch the video on the included CDROM for more detail on handling, flying and maintenance of the Butterfly

Pick Up the Butterfly at the middle of the wing. Index finger on the front (leading) edge of the wing and your thumb on the rear (trailing) edge of the wing as shown in **Fig. 3**.

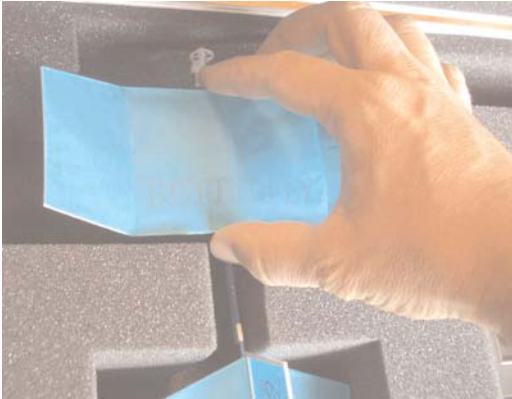


Fig. 3 Pick up the Butterfly along the midline of the wing from above, as shown.

It is **not** good to pick it up by the tail or by one wing tip. Kids love the Butterfly, but they will need some instruction on how to pick it up, or they may damage it - this applies to adults too! This model can withstand crashes quite well, probably the highest risk of damage comes from handling by humans, so keep this in mind.

Once you have picked up the Butterfly, you can hold it along the fuselage just behind the receiver as shown in **Fig 4**. This is a good position for examining the model, attaching the battery, and for launching the model into flight.

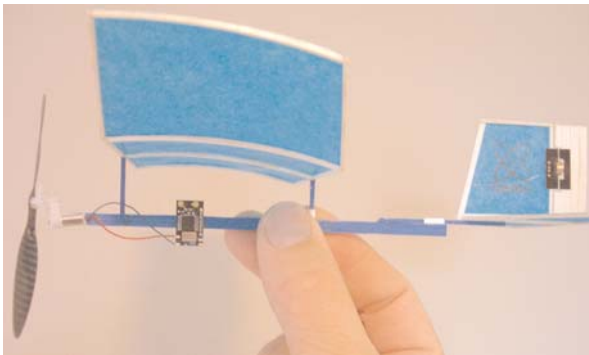


Fig. 4 The natural position to hold the Butterfly for connecting the battery and for launching it for flight

Adjustments to your Butterfly Your Butterfly has been test flown by Plantraco technicians before shipping and it has been set up to fly nicely indoors - right out of the box. You probably won't need to make any adjustments for your first flight.

Having said that, it is important for you to understand how to make adjustments to the Butterfly to change its performance characteristics, or correct problems caused by changes in the structure of the airframe from crashes and repairs etc.

For any adjustments to the airframe it is important to stabilize and support the airframe with one hand and slowly move or squeeze the other part. Slow, steady, monitored force is the way to adjust the airframe.

Wing Incidence and Tail length adjustments are made by sliding balsa spars through paper tube supports. Always brace the airframe by gripping the white paper tube, and then with steady pressure, the rear pylon or the tail stick can be moved. **See Fig 5**

Propeller Thrust Line Adjustments are made by squeezing the gearbox and giving it a slight bend in the desired direction. In general, the Butterfly is set up with a little down thrust and a little right thrust. If your plane doesn't quite fly straight, you can make a little bend in the appropriate direction, and check the result with a test flight.

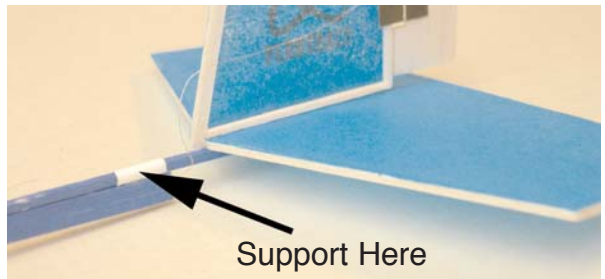
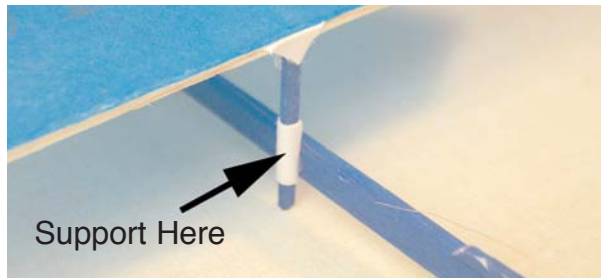


Fig. 5 Always support the airframe when making adjustments to wing incidence or tail length.

Center of gravity on the Butterfly is set approximately in the middle of the wing. Since we are using throttle and rudder only, we like to keep center of gravity a little bit further back than on other models. This helps us to maintain altitude in turns. In general, more incidence will slow the butterfly down and will give you a better climb rate. Tail length is adjusted only to shift center of gravity.

Alignment of the wing and tail surfaces should be checked over periodically. Look down the fuselage stick with the plane facing directly at your eyes - the leading edge of the wing will be approximately parallel to the tail (horizontal stabilizer) and the rudder (vertical stabilizer) will be perpendicular to the tail and wing. If needed, you can twist the balsa airframe to straighten the airframe out and get the alignment right. You can actually bend the balsa airframe quite a bit without breaking it - just start slow and go by what you feel in your hands and you'll be able to get your plane true after a crash or after some quick repairs.

Propeller is attached to the gearbox by a friction fit over the middle of the larger gear of the gearbox. We are currently shipping the Butterfly without gluing the propeller to the gearbox - it is your choice whether to glue it on or not. The propeller and battery may become detached from the airplane if you crash the airplane. This is OK, you can re-attach it very easily. If it is glued, the propeller can act as a good shock absorber in a crash.

Attaching the propeller to the Butterfly is done by holding the motor and gearbox with one hand and snapping on the propeller with its white plastic adapter onto the middle of the large gear as shown in **Fig 6**. If you wish, you may apply medium viscosity CA (cyanoacrylate) glue to the mating surface of the prop adapter - either way is acceptable. If you glue it on, be careful not to get it on the metal rivet axle of the gearbox - glue on the edge only - you definitely do not want to glue the axle of the gearbox - just the edge of the prop adapter.

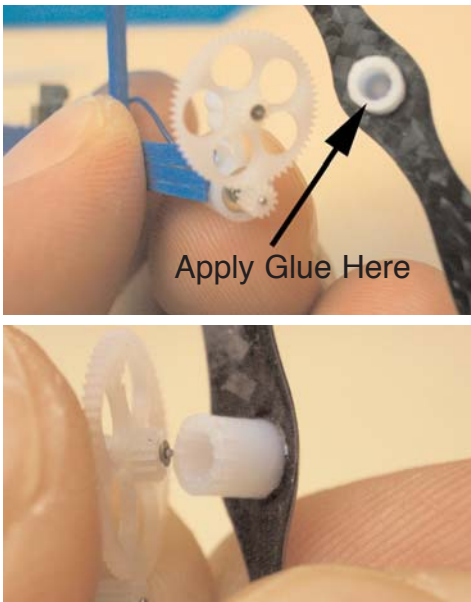


Fig. 6. Glue the Prop adapter if desired. Apply CA to the edge of the prop adapter only.

GETTING READY FOR FLIGHT

Attaching the battery to the Butterfly receiver is done in very much the same manner as for charging. Just bring the cell close the the magnets of the Butterfly receiver and "click", it is attached in 1 second flat. Always have your transmitter turned ON first before attaching the cell to the Butterfly.

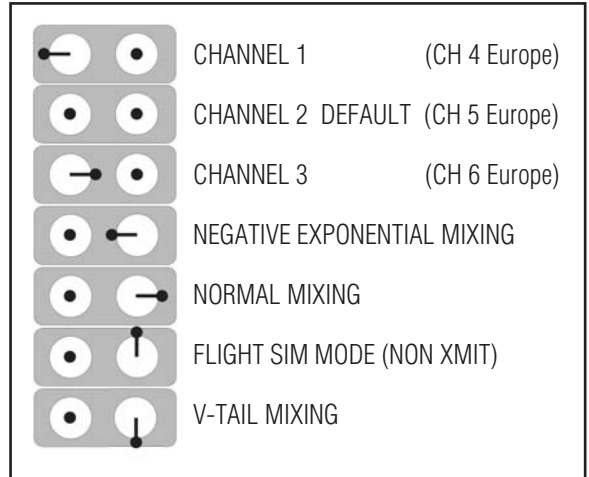


Fig. 7 - Configure Transmitter functions by holding stick positions while switching transmitter ON

Multi-Frequency Operation

This 900Mhz R/C System (868Mhz in EU), can be configured for use on one of 3 radio frequencies "channels". You select your channel when you switch on your transmitter. The position of the Left joystick at startup controls what channel you will use. When you startup the Transmitter, you can hold the Left stick to the Left, leave it in the middle (default), or hold it to the Right, to configure operation on Channels 1, 2 and 3 respectively. Default is Channel 2 (left stick is in the middle position). (The European frequencies are designated as numbers 4, 5 and 6 respectively, and are accessed in exactly the same way) The American version of the HFX900 transmitter is capable of transmitting on CH 1, 2 and 3 ONLY. The HFX868 transmitter is capable of transmitting on CH 4, 5 and 6 ONLY. (**See Fig. 7**)

When selecting a Channel on startup, you can hold the Left joystick in a position for about 2 seconds and let it spring back to center when you are ready to transmit. Channel 2 is the default channel because the Left joystick is a self centering joystick, so this channel is always selected by default if you switch on the transmitter without holding the Left joystick in any particular position. If you are flying alone, you will probably be transmitting on channel 2 (CH 2) most of the time.

The receiver will look for the lowest channel number first and will lock-on (sync) to the transmitter that is broadcasting on the lowest channel number. It also will compare received signal strength, but for practical purposes, the lowest channel number is the most important factor for the receiver.

When you are flying in the same room as others, The first user to start up his airplane should use channel 2 or 3, and the second user can use channel 1. Therefore up to three people can fly in the same room simultaneously. The first person should use CH 3, the second should use CH2 and the third person should use CH1. All three channels can be used together without risk of interference from the others. If the 3 people flying in the same room are aware of what channel they are using, they will be able to allow a new flyer to join in, so long as the new user can select a lower channel number than what is currently being used. If you are flying with your friends, put the longest flying airplane on CH 3, and then let the other airplanes use the lower channels.

For example, if the first user will want to have a long flight, he should use CH 3. Then if other users want to start up their planes too, they can use CH 2, and the last guy gets to use CH 1.

If there is going to be a lot of people coming and going, or one user is using CH 1 and wants to fly for a long time, the other flyers would obviously not be able to select a channel lower than CH 1. They can wait for the CH 1 airplane to finish his flight, or they can take their model into a different room, or move about 100 feet away and try to sync their receiver to CH 2 or CH 3 - in this way, they are using the received signal strength to force the receiver to sync to CH 2 or CH 3, even though a transmitter maybe be transmitting on CH 1

Future models of the HFX900 may have more channels (frequencies) in the 900Mhz ISM band, or may use a frequency hopping technique. This is not available on the first version of our HFX900 transmitters and receivers, but we are working on it. For now the 3 channels will allow most Micro R/C flyers to fly with friends interference free

Transmitter Mixing Modes

There are 4 user-selectable "Mixing Modes" available on the transmitter. (See Fig. 7) You select your "mixing mode" when you switch on your transmitter The mixing mode you choose will be saved in memory until you make another selection - even if you switch it off. The position of the Right joystick at startup controls what mixing mode will be selected. The factory default mixing mode is "Normal" rudder and elevator mixing, this can also be selected at startup by holding the Right joystick to the right for about 2 seconds.

This is the Mode you want to be in when you want to fly the Butterfly. (See Fig 8)

When you startup the Transmitter, you can hold the Right joystick to the left to select "Negative Exponential" mixing that might be useful to dampen your joystick controls for squirrely models. When you startup the Transmitter, you can hold the Right joystick down to select "V-Tail" mixing for elevon style planes "Flight Simulator" mixing mode is accessed by pushing the Right stick up at startup - which will put the transmitter in to a non transmitting state that is used only when we want to connect the transmitter to a personal computer for using

the freeware FMS flight simulator software. Note that the selected mixing function will remain in memory, even if the transmitter is switched OFF - This can be convenient, but it can also cause confusion if you forget what mixing mode you are in. So if you use the non-transmitting FMS function, you'll have to remember to select another mixing mode when you want to fly your real airplane - if you forget to do this, it might seem like your transmitter is not working - you have to remember what mixing mode you left your transmitter in.

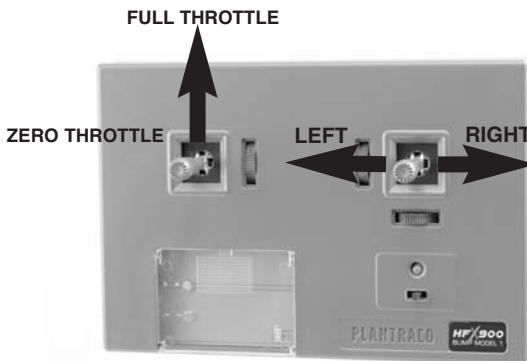


Fig 8 . Butterfly Controls are Easy
Use the "Normal" Mixing Mode.

Normal Mixing (Right Stick to Right)

This style of mixing is for 3 channel rudder and elevator. The Left stick controls the motor throttle. The Right stick controls rudder and elevator. **This Mode is what we use to fly the Butterfly - we just don't need the elevator function.**

Negative Exponential Rate - (Right Stick to Left)

This makes the control response milder around the joystick center point, but it becomes increasingly stronger as the input approaches 100%. This can help for taming squirrely models.

V-Tail Mixing - (Right Stick Down)

For models that combine elevator and aileron function on two control surfaces, like flying wings and V-tail planes.

FMS Mode - Selected at startup (Right Stick Up)

The FMS mode shuts down the radio functions of the transmitter and instead sends signals through the monophonic audio jack on the left side of the transmitter box. A special cable connects the transmitter to a personal computer with the freeware FMS software installed, and you can use the HFX900 transmitter as an R/C Flight Sim input device.

Establishing Transmitter-Receiver R/C Link

Turn on your transmitter by pushing the 3 position switch all the way to the far right. The main transmitter LED will glow. It is always best to turn the transmitter on first.

The receiver can communicate to the user with audible tones and LED blinking sequence.

Attach the LP30 cell to the Butterfly receiver, you will notice a distinctive audible musical arpeggio tone sequence (musical notes C-E-G-C-G-E-C) that indicates successful microprocessor startup. This arpeggio is followed by a two-tone repetitive sequence (C-E,,,C-E,,,C-E -- and so on). This repeating two-tone sequence indicates that the receiver is scanning for a transmitter signal - it will continue to repeat until a valid transmitter signal is received. Once a valid transmitter has been found, the Channel number will be indicated by a series of tones (G note). The default transmitter channel is Channel 2, so you should hear two "G" notes to indicate that the receiver is operating on Channel 2. (European HFX868 default is CH 5, so in Europe, you get to hear 5 "G" notes indicating the receiver is operating on Channel 5. Once you hear the final count of "G" notes, you will know that your HFX900 system is ready for action. The actuator may start moving and making a small sound and if your throttle stick or throttle trim is not adjusted the propeller may be spinning, so be mindful of this. You will be able to control the actuators by using the Transmitter Joysticks, (See Fig. 8) but first you will need to adjust the trim by moving the small trimmer wheels located near the transmitter joysticks

Adjusting the Trimmers

Rotate the trimmer wheels with your thumb until you have successfully stopped any motion and/or sound of the actuators. Most experienced R/C pilots will have no problems with this, but if you are a beginner, it might seem strange for now. Basically you will want the trimmer wheels to be positioned near the middle of their full range of motion. Make sure you know what mixing mode your transmitter is configured to. If you are confused, remove the Bahoma cell from the receiver, and review the transmitter mixing functions and start again.

Low Battery Protection - built in failsafe.

The Lithium Polymer Bahoma battery should not be discharged lower than about 2.7 Volts. The low battery failsafe function of the Micro9 Butterfly receiver will ensure that you do not over discharge your lithium polymer battery. The receiver measures cell voltage while you are flying, and the LED will blink a series of flashes to indicate the general state of the battery voltage. In normal operation with a full battery, the LED of the Butterfly receiver will blink once every second. The receiver will warn you when your battery is low and needs to be recharged by cutting the throttle to 60% and the LED will blink twice per second giving you a visual indication of the battery voltage. If cell voltage drops any lower, throttle will be automatically cut to 30% and the LED will blink 3 times per second - Definitely time to land the plane if you have not done so already. If you leave the battery on the receiver for too long (like overnight) you may over discharge and damage the cell - so be sure to disconnect it and recharge when you are done

HFX900 (Americas) Frequencies

CHANNEL 1	904.4775 Mhz
CHANNEL 2	915.9975 Mhz
CHANNEL 3	927.5175 Mhz

HFX868 (Europe)Frequencies.

CHANNEL 4	868.105 Mhz
CHANNEL 5	868.385 Mhz
CHANNEL 6	869.910 Mhz

FMS Flight Sim

Using the HFX900 Transmitter for the FMS R/C Flight Simulator



To use our transmitter in the FMS joystick mode, connect the supplied serial cable to your Windows PC and insert the mono plug into the jack on the left side of the transmitter

We have included a CDROM that has the FMS Flight simulator, and also has the Plantraco MicroScout FMS model. Soon we will be adding the Butterfly FMS model and other items to the CDROM.

You will be able to download the Butterfly FMS model and also find links to FMS stuff from our website at <http://www.plantraco.com/FMS>

If you lose the CDROM that was included with your system, you can download the freeware Flight Simulator "FMS"

The Windows Installer can be downloaded here:

<http://www.n.ethz.ch/student/mmoeller/fms/beta/fmsdisk01.exe>

The official website for FMS can be found here:

http://n.ethz.ch/student/mmoeller/fms/index_e.html

Once downloaded launch the installer and choose your installation directory (Normally "C:\Program Files") This should already be the default, and you can just press next.

You can choose to put an Icon on the desktop for easy launch of the application. The program should be installed.

You can Launch the program from the icon located on the desktop or

from the start menu.

With the Serial Cable attached to the computer, and the mono plug inserted into the jack on the side of the transmitter, hold the Right stick Up - while simultaneously switching the transmitter from off to ON

The transmitter will now be in the NON TRANSMITTING mode and can be used as an input device for the flight simulator.

In the FMS program click the menu "Controls" then click on " Analog controls..." .

Select "Serial PIC Interface" and then click the button marked "Resources". Then you will need to select the com port which the cable is connected to. (Probably COM1)

For the Baud Rate Choose "19200" . Then Press OK

Then Click "Mapping/Calibration" then click "Calibrate" you should now move both sticks in all directions to allow the software to adjust to the range of motion available.

Rudder is set to 1 be default, but some models will require it to be set to 3 for proper flight controls. **See Fig 9**

You can see the blue bars moving up and down to confirm full range of motion.

Two or three big circles with both sticks should be fine.

Click Ok.

And then click ok again.

The aircraft on screen should now start rolling ahead - You should now be able to affect the aircraft by moving the control sticks.

To switch back to a transmitting mode hold the right stick to the right and simultaneously switching the transmitter from off to ON.

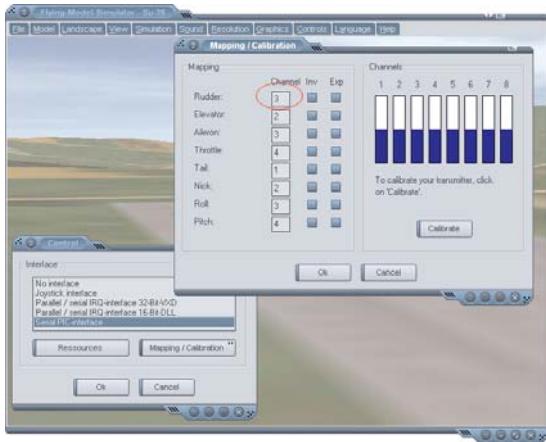


Fig. 9 Setup of the FMS Flight Sim. These are Screenshots of the Mapping and Calibration and Control Screens

TROUBLESHOOTING

We hope that you won't have any problems with your Butterfly, but if you do, check this Troubleshooting list first.

1. My Receiver played the startup tones through my actuator at startup, but then it just plays the C-E tones over and over - it keeps beeping.

- Check transmitter - Make sure the switch is all the way to the right and the transmitter LED is glowing
- Is the transmitter in FMS mode? Switch the Tx off for a few seconds and then startup with the Right joystick held to the right for 2 seconds - Let the stick go and you should be in normal rudder elevator R/C mode again. Now remove the battery from the receiver and start it up again. You should hear the arpeggio tones, and then the C-E tones and then a few G tones to tell you what channel you have just locked-on (synced) to.
- Change your Transmitter batteries for fresh ones and try again
- Check if your receiver still has it's antennas - have they been broken off or cut? replace and try again or contact Plantraco

2. When I charge my LP30 cell on the built-in charger of the transmitter, the LED goes out right away, but the cell doesn't seem to have much power anymore.- Or - It seems to be taking forever to charge my LP30 cell.

- Replace the AA batteries in the transmitter- they are probably low and we have to have greater than 4.4 Volts left in the 4 AA cells in order to charge up the LP30 cell. A normal Charge will take about 60 minutes With fresh AA cells in the transmitter, you should be able to get about 30 charges of your LP90 cell - you may get more, depending on how you use your cells, but eventually, the AA cells of the transmitter will become depleted, so be mindful of the charger LED. It can be a good idea to use a digital volt meter (these are often available for less than \$15.00 these days) to check your cell voltage once in a while.

3. I sync up fine, but the controls seem to be reversed or something - when I give it elevator, I get rudder - it's all messed up

- You are in V-Tail mixing mode. Power off the transmitter for 5 seconds and restart the transmitter while holding the Right joystick to the right for about 2 seconds and when you release it, you should have normal control again.

4. I sync up fine, when the models is throttled up or is shaken, the battery seems to lose it's connection, and the receiver starts up again, I can hear the tones.

- Try squeezing the Bahoma battery magnet terminals of the cell and slide the battery around on the receivers magnets when you make a connection - this will help to clear any debris that might be preventing the Bahoma magnets from getting a good electrical con-

tact. If the magnets are well apposed to each other, they should stick fine and you won't shake them loose anymore

- You can also try using a small piece of tape to securely affix the battery to the receiver if your airplane is a bit shaky in the air. If your gearbox and prop are well balanced, you will have less shaking of your model in the air - you can check that too to reduce vibration.

5. I crashed my plane, and now when I start up the receiver, I don't hear any tones at all and I can't seem to sync anymore

- Check your magnetic actuator wiring - broken wire?
- Check the LED on the receiver - does it blink when the receiver is powered up with the cell? It should
- Does the LED blink in an S-O-S pattern for about 10 seconds and then it does play some tones? If it does, this means your cell needs to be recharged
- Check magnets on your cell and on the receiver - are they all still attached and intact? If they have broken off of the cell, you'll need to replace or repair it - If a magnet has broken off of the receiver, contact Plantraco
- **Check the magnet terminals to see if there is any magnetic debris coating the cells, preventing a good electrical connection. If there is, clean them off with a Q-tip, toothpick, small flathead screwdriver etc Dip your Q-tip in rubbing alcohol, this can clean the crud off your magnet terminals**
- Check the bahoma cell - measure volts with voltmeter. You should be above 4 Volts for a fully charged cell
- Perhaps in the crash, you broke a solder joint on the PCB - if you know how to solder, you can try to reheat the solder joints of all components until you fix the problem, or you can contact Plantraco for more advice or repair services.

6. I can't get FMS to work properly

- Make sure you put your transmitter in FMS mode. Do this by holding the Right Stick in the up position at startup of the transmitter. You can check that the transmitter is in FMS mode by starting up your receiver - it should keep beeping without syncing to the transmitter since the transmitter should be in the non-transmitting FMS mode now. If your receiver can still sync to your transmitter, you are not in FMS mode.
- Follow the directions on the CDROM carefully. Re-install FMS, or call your local computer guru to help you. It's easy, but maybe your system is messed up. We'll have more tips on FMS mode on our website, just go to <http://www.plantraco.com/FMS> or <http://www.plantraco.com/hobbies/help.html>

7. I crashed my plane and the airframe is damaged.

- Spare Airframes are available from Plantraco
- Repair broken Balsa with a drop of thin CA Glue
- See the Plantraco website for instructions on doing repairs etc.



To Re-Order Spare Parts etc. Call your Local Dealer or Plantraco Direct at:

1-306-955-1836

**World Wide Web at:
www.plantraco.com
www.microflight.com**

Email us at: service@plantraco.com

Any changes or modifications (including the antennas) made to this device that are not expressly approved by the manufacturer may void the user's authority to operate the equipment. FCC ID:NYIHF900 CE Compliant with EMC Directive 89/336/EEC Patents Pending

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