

# CHARGING CAUTION:

Because there are two batteries that each connect to a common point this creates a situation called “Common-Ground” meaning the two battery’s grounds are ALWAYS connected, even if you use a switch on each battery. Virtually every charger on the market cannot handle a Common-Ground situation. If you try to charge both batteries at the same time (using either one charger with multiple outputs or two chargers) you risk damaging the batteries, the charger or both. This can be dangerous with Li-poly batteries. To charge both batteries at the same time, the circuit must be broken to break the Common-Ground.

## Servo Power LEDs

The servo power LEDs are next to the XT-60 connectors and indicate power is present on that connector. These do not indicate the voltage input is above the minimum required.

## Receiver Power LEDs

The receiver power LEDs show the receiver is getting voltage greater than 4.75V. If the receiver regulator output voltage drops below 4.75 volts the LEDs will go out. There are two possible causes of the receiver voltage going below 4.75 volts. First the load the receiver is presenting to the regulator is greater than one amp causing the regulator output to droop. This could be caused by directly plugging something into the receiver that is overloading the circuit. The second cause of the receiver regulator going below 4.75 volts is the input voltage to the receiver regulator has dropped below 5.10 volts. This means the input voltage on the XT-60 connectors is probably below 5.45 volts for some reason.

## Optional Failsafe-switch

The PowerExpander Comp 12 supports the addition of a failsafe switch (optional package). When using the failsafe-switch, the switch lead is plugged into the input marked “Sw” near the top right of the servo connections as shown on the reference drawing.

Smart-Fly can supply two types of failsafe switches. First is the standard slide switch that most people are familiar with. This is a small slide switch with out a charge jack. The second failsafe-switch is the Pin & Flag switch, where a pin, with a flag on it, is inserted into the

switch to turn the system off. To fly, the pin is pulled out of the switch. The advantage of the Pin & Flag switch is that the system cannot accidentally be turned off, as can be the case with a slide switch. The failsafe switch lead can be extended using a standard Futaba extension.

The PowerExpander Comp 12 also supports charging the batteries through the two charge connections denoted by the “CHG”, one on the top of each servo output rail as shown on the reference drawing.

The charge jacks on the PowerExpander Comp 12 can also be used to connect to a battery meter. One thing to keep in mind when using a battery meter and the failsafe-switch is that the jacks are not switched off when the unit is off so the battery meter will continue to draw power even when the unit is turned off.

## Equalizer Channels


A separate manual is supplied to instruct you on the use of the Equalizer channels (servo matching). The unit provides 2 Equalizer channels, F and G. These support all the function of our stand alone Equalizer which includes independent adjustment of centering, both endpoints and servo reversing for each individual servo.

## Ignition Cutoff

A separate manual is supplied to instruct you on the use of the Ignition Cutoff. The Cutoff channel is determined by using the six-inch jumper supplied. The Futaba male end should be plugged into the port marked “IC”. The other side of the jumper can be inserted in any servo output channel or it can be connected directly to the receiver, for example, on channel nine of a nine-channel receiver. The unit can be ordered without the fiber-optic cable and Cutoff receiver if you already have these from a previous model.

Additional information and technical help can be found at [www.Smart-Fly.com](http://www.Smart-Fly.com)

Quest Engineering & Development, Inc.  
6125 South Ash Avenue, Suite B-8  
Tempe, AZ 85283  
Ph: (480) 460-2652



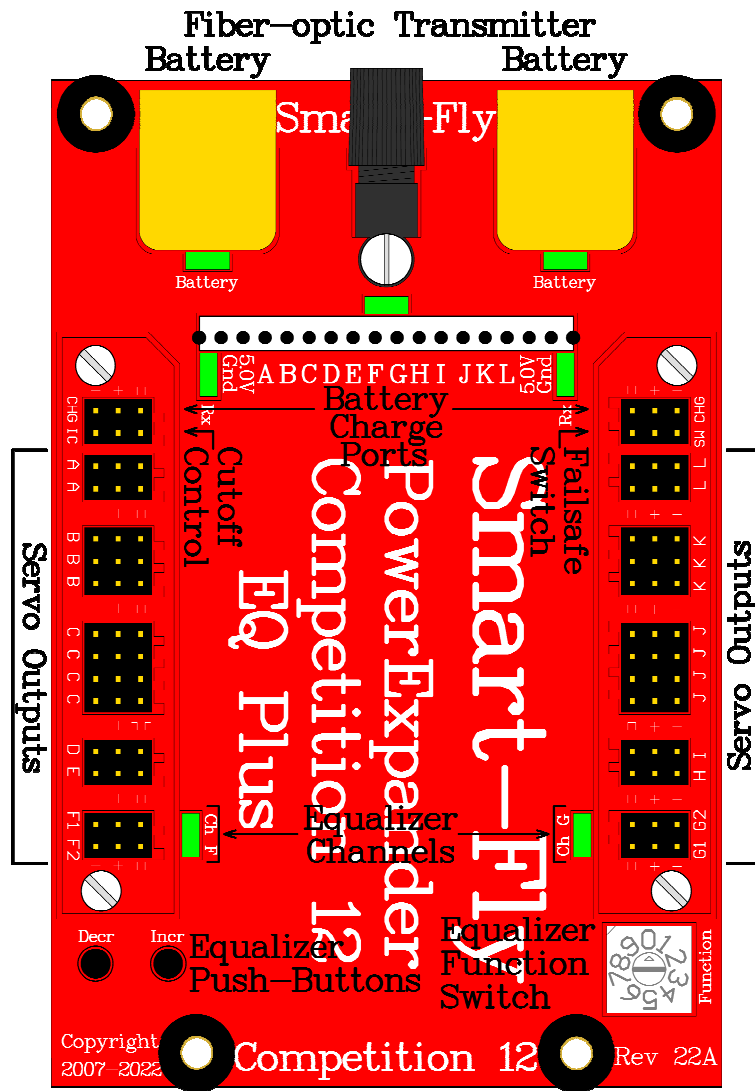
# Smart-Fly

## **PowerExpander Competition 12 EQ Plus User Guide**

*Thank you for purchasing the Smart-Fly  
PowerExpander Competition 12 EQ Plus!*

This manual takes you through the installation and operation of the Smart-Fly PowerExpander Competition 12 (Comp 12) EQ Plus. The features of the PowerExpander Comp 12 EQ Plus are:

- **For any size aircraft**
- **Light weight, 1.4oz, 54g**
- **Compact design, footprint is 3.0” x 4.5”**
- **Battery input voltage up to 8.4V**
- **Inputs protect against cell failure or power shorts**
- **Filtered and regulated 5.0V power to the receiver**
- **LED power indicators for input and receiver power**
- **Fully buffered outputs on all channels**
- **Full filtration of all signals in and out of the unit**
- **2 servo matching channels with 2 servos each**
- **Integrated Ignition Cutoff**
- **Can be used with optional failsafe switch**



Reference Drawing

### Receiver Mounting

The receiver mounts in the center of the unit. 3M dual-lock mounting tape has been supplied to mount the receiver. This tape's holding power is extremely strong. It is recommended that the whole 1"x2" piece not be used, instead cut some 1"x 1/2" strips and use these on either end of the receiver.

We also have available an "L" shaped receiver mount that will mount the receiver at a sixty degree angle and get the antenna(s) up, away

from the unit. While we have not found this to be necessary for 2.4GHz receivers with long antennas (Futaba, Hitec & Airtronics) which extend past the end of the unit it will possibly help JR and Spektrum 2.4GHz receivers that have short antennas on the main receiver. The receiver mount will get the antennas up off the unit towards the canopy.

### Receiver Connections

**CAUTION: Do not plug any receiver pigtails into the battery input of your receiver UNLESS the battery input is also a servo channel (i.e. receiver shares channel 8 and battery for example). On PCM it will put your receiver into DSC mode, on 2.4GHz receivers it may cause your receiver to unbind. All connections from the PowerExpander are meant to plug into servo outputs ONLY.**

The receiver servo outputs are connected to the pigtails coming out of the PowerExpander Comp 12 in the area with the notations "A" through "L" on the reference drawing. The two channels on the end (channel "A" and channel "L") have power connections to the receiver in addition to the signal connection. If you have a receiver that has less than 12 channels, you should still use both the end connections as this will provide you with power redundancy to the receiver in the event that a power or ground lead should fail.

The unit will accommodate both end-loading receivers and top-loading receivers. All signals from the receiver into the PowerExpander Comp 12 are RF filtered. This prevents noise from the servos entering the receiver connections to the receiver. If all channels are not going to be used, then the unused pigtail can be tucked away.

The channels have a variable number of servo outputs each. Channels F and G are the Equalizer channels (servo matching). The channels of the PowerExpander Comp 12 can be used on any receiver channel, the PowerExpander channels do not have to connect to the receiver in any order. Most pilots will connect the PowerExpander channels to the receiver channels so that the servo wiring is neat. Typically servos on the left side of the plane come off the left side of the PowerExpander and servos on the right side of the plane come off the right side of the PowerExpander. In addition you want to be sure the PowerExpander channel has an adequate number of servo outputs.

### Other Device Connections Directly To Receiver

If you want to connect a device directly to the receiver instead of going through the PowerExpander Comp 12, make sure the current draw of the device is less than twenty milliamps or so. We recommend you do not connect servos directly to the receiver. There are several reasons that a device might be connected directly to the receiver instead of

going through the PowerExpander Comp 12. The most likely would be if you had a fourteen channel receiver and needed to use the extra channels. Items such as jet ECUs and smoke pump control do not draw much current and could be used.

### Servo Connections

Servos are connected to the PowerExpander Comp 12 along the two rails on either side of the receiver. The servo connectors are universal in that they will work with Futaba or JR connectors. When using a JR connector, be careful to observe the polarity of the connection. The ground lead (black on Futaba, brown on JR) is indicated by the "minus" sign, the positive power lead (red on Futaba and JR) is indicated by the "plus" sign and the signal line (white on Futaba, orange on JR) is indicated by the "top hat" symbol.

All receiver channels have each servo signal output individually buffered. If a servo were to short its signal wire, the other servos on that channel would not be affected.

The unit also RF filters each signal output and matches line impedance resulting in a cleaner signal down long servo leads. The impedance matching reduces the electrical "ringing" that can occur on long servo leads. Ringing can generate RF interference and can reduce receiver range.

### Power Connections

This unit's inputs will tolerate voltages up to 8.4V (lithium-ion or lithium-polymer 2-cell packs). The power inputs are protected from each other in case of a dead cell or short. There is about 0.4 volt drop between the input and the servos under a 12 amp load on each battery. If lithium packs were used the servos would see about 8.0V for fully charged packs under a 12 amp load. For A123 packs this means that after they flatten out at 6.6V the servos will see about 6.2V under a 12 amp load..

**CAUTION: Input voltage to the PowerExpander Comp 12 should be at least 5.7V. This is due to the 0.40V drop across the "BatShare" and the 0.35V diode drop plus the 0.35V dropout voltage of the receiver regulator to maintain a 5.0V output to the receiver.**

It is highly recommended that you use two battery packs for redundancy and to provide extra current to the unit. Power is supplied to the unit through the two XT-60 connectors. We sell adapters for common battery plugs (UltraPlug, EC3, etc) with an XT-60 female on the other end.