

# RIMFIRE™

## 250 POWER SYSTEM

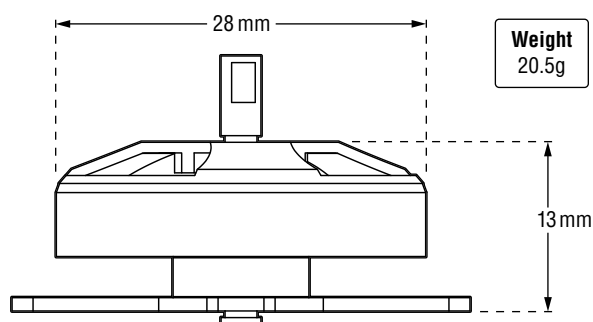


Congratulations, you have just purchased the RimFire 250 power system components. All the components are sold separately to allow you to customize your power system to your airplane. The components needed to assemble your RimFire 250 power system are: RimFire 250 motor, propeller, propeller adapters and brushless speed controls. This instruction sheet explains how to determine what you will need and how to assemble each component.

### 1 MOTOR

Model	Stock #
RimFire 250 (28-13-1750)	GPMG4502

The RimFire motors are labeled to provide the most information at a glance. For example: the RimFire 250 (28-13-1750) is 28mm in diameter, 13mm long and has a kV (rpm-per-volt) of 1750 rpm.



Weight includes: Motor w/prop adapter.

### 2 ELECTRONIC SPEED CONTROL (ESC)

An ESC is basically the device that controls your motor through your radio system. Never run any RimFire motors with a brushed ESC. It will not work and you may damage both the motor and the ESC. Always use a brushless ESC. ElectriFly offers Brushless ESCs that will work with the RimFire 250 motor.



ElectriFly Silver Series 8 (SS-8) ESC (GPM1800) for 8A maximum constant current draw.



ElectriFly Silver Series 12 (SS-12) ESC (GPM1810) for 12A maximum constant current draw.

The SS-8 and SS-12 come with 2mm female bullet connectors that plug directly into the 2mm male connectors installed on the RimFire 250 motor, so no soldering is required. The SS-8 and SS-12 also come with a Deans® Micro battery connector that matches the connectors that are found on most batteries that it will use.

### 3 BATTERIES: NUMBER OF CELLS

Cells can be connected in series or in parallel. Usually batteries are labeled by their number of cells, such as a 3-cell LiPo. This means the cells are connected in SERIES (S). Arranging batteries in series gives you more power (higher voltage).

- Each LiPo battery has 3.7V, so a 3-cell LiPo battery has  $3.7 \times 3 = 11.1V$

If a battery is arranged in PARALLEL it might be labeled as (P). Arranging the batteries in parallel will give you more duration (more capacity).

ElectriFly offers a full line of LiPo batteries. Airplanes that use the RimFire 250 motor will typically use batteries with a capacity of 300 to 640mAh, with the higher capacity batteries delivering more flying time but also being heavier. The suggested batteries have connectors that fit the recommended ESC.

Due to the constantly changing battery technology, check out the ElectriFly web site at [www.electrifly.com](http://www.electrifly.com) for the most up-to-date listing of the ElectriFly battery line.

### 4 PROPELLER ADAPTERS

The RimFire 250 motor comes with a prop saver with sleeves to fit a variety of prop hub sizes. If your application will use a spinner, the motor will require a 3mm prop adapter collet type (GPMQ4959), or set screw type (GPMQ4930).



### 5 PROPELLERS



There is a wide selection of propellers available for electric use. The RimFire 250 motor uses high performance slow fly electric props. The larger the propeller used, the more current your motor will draw. The smaller the propeller, the less current the motor will draw.

Shown are a few of the recommended electric props. Due to the large range of propellers and the constant addition of new sizes, visit our web sites at [www.electrifly.com](http://www.electrifly.com) and [www.greatplanes.com](http://www.greatplanes.com) for the most up-to-date listing of electric type props.

APCQ4960	7x4SF Slo-Flyer	GWSQ2008	7x3.5 Propeller
APCQ4961	7x5SF Slo-Flyer	GWSQ2009	8x4 Propeller
APCQ5000	8x3.8SF Slo-Flyer	GWSQ2010	9x5 Propeller

Stock #	Voltage	Capacity	Weight	No. of Cells
GPMP0594	7.4V	300mAh	0.8 oz (24g)	2
GPMP0595	11.1V	300mAh	1.1 oz (32g)	3
GPMP0700	7.4V	300mAh	0.7 oz (20g)	2
GPMP0701	11.1V	300mAh	1.0 oz (28g)	3
GPMP0704	7.4V	640mAh	1.4 oz (39g)	2
GPMP0705	11.1V	640mAh	2.0 oz (56g)	3

### 6 DETERMINE WHAT YOU NEED TO BUILD YOUR POWER SYSTEM

Now that you have one component for your power system, there are several different ways to select the rest. In time, experience will help you to determine what works best for you, but an easy way to determine what you need now is the following.

**Procedure #1:** If you know the size of the propeller you want to turn and the rpm, then:

1. Find the combination that delivers the closest performance to what you want, (refer to the ElectriFly web site for typical combinations) or refer to the airplane manufacturer's recommendations.
2. Note the recommended battery voltage.
3. Determine the battery capacity needed based on the current draw of your system and your desired flight time.
4. Determine the ESC you need based on the system current draw. See the ESC section.

**Procedure #2:** If you know the approximate weight of your airplane, including the motor and battery, and the performance you want from it, answer the questions below to determine the correct power system for your plane. You may need to make more than one calculation using different motors and battery combinations. See the battery section for some of the battery weights for the suggested batteries.

1. Perform the following calculation to determine the wattage required:
  - If you expect trainer-like performance then multiply **75 x Airplane Weight (lbs)**
  - If you expect aerobatic or high speed-like performance then multiply **100 x Airplane Weight (lbs)**
  - If you expect 3D or extreme performance multiply **150 x Airplane Weight (lbs)**
2. The number you get is the minimum wattage you will need for your plane to perform as you wish.  $Watts = current (A) \times voltage (V)$ . Using suggested power system combinations for reference, determine what combination gives you the performance you want based on wattage and maximum propeller size that will fit on the plane.
3. Note the recommended battery voltage.
4. Determine the battery capacity needed based on the current draw of your system and your desired flight time.
5. Determine the ESC you need based on the system current draw.

In addition to these two procedures, you can also visit the Great Planes ElectriFly web site for descriptions of the power systems recommended for our line of electric and glow airplanes as well as more detailed explanation on the subject.

#### Understanding Motors

kV (rpm/volt): This is a number that gets thrown around quite a bit when talking electric and it is important to know what it is. kV is the number of rpm a motor will spin per each volt applied (rpm/volt) under no load.

This means that basically a motor that has a kV of 1000 when connected to a 12V battery will try to spin at 12,000rpm (1000x12) under no load. Likewise a 3500kV motor will try to spin at 42,000rpm (3500x12) under no load.

When a propeller is attached to the motor, the motor will try to spin the prop at the rated kV. Depending on the diameter and pitch of the propeller (the larger the diameter or higher the pitch, the harder it is to spin), the motor's current draw can be increased or decreased. There are meters available from your hobby dealer that measure current and voltage.

Because every motor has a maximum current it can take based on its design and cooling ability, the maximum size of propeller that can be used with each motor can be determined. Too large of a propeller and the motor will spin at a much lower rpm than its rated kV, causing it to draw a lot of current and overheat. If the propeller/fan is too small, it will require little effort (current) to turn the prop at the rated kV.

Ideally the motor should be matched with a propeller that causes the motor to draw 80-100% of its rated maximum constant current. Once a power system is set up, it can be fine-tuned by adjusting the propeller size and measuring the amount of current the motor is drawing.

Please note that the kV of a motor does not change with voltage, but if a higher voltage is applied to the motor, it will try to spin the same propeller at a higher rpm. This will cause the motor to draw more current and possibly exceed the maximum rated current of the motor. So, if a battery with lower voltage is replaced with one with a higher voltage, it is recommended that a smaller propeller be used to keep the current in check. If a higher voltage battery is replaced by a lower voltage battery, the size of the propeller can be increased to keep the motor at its rated current.

Another possibility to fine tune the power system's performance is to use another motor with higher kV to increase the current or a lower kV to lower the current.

### 7 ASSEMBLE YOUR POWER SYSTEM

The RimFire 250 can be mounted directly to the front of the firewall or behind the firewall using the optional reverse shaft (not included).

At the back of this manual, you will find the mounting hole template for mounting the RimFire 250 motor to the front or the back of the firewall.

#### Installing The Propeller

A propeller can be installed onto the RimFire using the included prop saver adapter or a collet-type prop adapter (not included).

If you are installing the motor onto the front of the firewall (common installation), the propeller can be installed onto the prop saver adapter, requiring only a rubber O-ring to secure the prop in place.



The included prop saver adapter can be installed with either end facing forward. One end has a diameter of 5mm and the other end has a diameter of 6mm. For other prop hub sizes, 7mm and 7.85mm adapter sleeves are also included to fit over the 5mm diameter prop saver end. Orient the prop saver adapter in the direction that best suits your propeller and install it onto the front of the motor shaft and tighten the screws against the flat spots on the shaft.



Install the cowl if the plane comes with one. Install the prop on the prop saver and secure it with a rubber O-ring looped over both of the machine screws. Check the O-ring for wear before each flight. If the O-ring shows any cracks, replace immediately.



#### Front Of Firewall Mounting Method

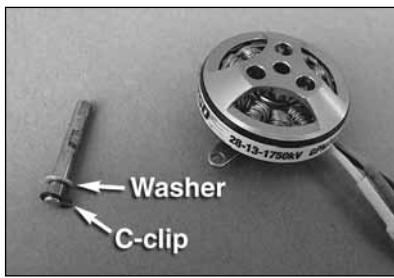
Use the template from this manual to locate and drill the mounting holes and the relief hole for the end of the motor shaft. Attach the RimFire mounting plate to the firewall using three #2x3/8" [2x10mm] sheet metal screws (not included), or a type/size specified by the airplane manual.



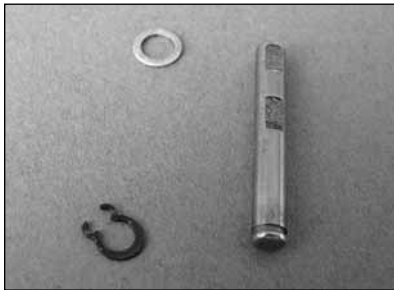
### Optional Reverse Shaft Installation

An optional reversing shaft is available for purchase separately (GPMG1403) and will allow you to mount the RimFire 250 motor behind the firewall.

Remove the set screw that secures the motor shaft to the motor front case (this requires a 0.9mm allen key which is not included). With the set screw removed, push the motor shaft out through the bottom of the motor being careful not to lose the washer on the shaft. **Tip:** The shaft is a very tight fit in the motor case. An arbor press machine or a drill press (with a small drill bit inserted upside down in the press) can be used to easily press the shaft out of the motor.



Carefully remove the c-clip from the aft end of the motor shaft. A fine, flathead screwdriver or small needle nose pliers are useful in doing this. **Tip:** Crawling around on your hands and knees looking for a lost c-clip is no fun. Wrap a sandwich bag around the shaft before attempting to remove the c-clip. If the c-clip flies off the shaft, it will be contained by the bag. Also, be sure to wear safety glasses when removing the clip!



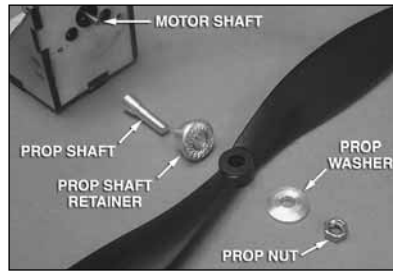
Reinstall the c-clip into the groove on the reverse shaft along with the washer. Insert the reverse shaft into the motor case. The flat spot on the shaft near the c-clip groove must be aligned with the set screw in the motor front case. Tighten the set screw against the flat spot on the shaft.



The motor can now be mounted from the back side of a firewall with only the shaft protruding forward of the firewall. The prop saver adapter or an optional collet or set screw type adapter can be used to attach the propeller to the motor.

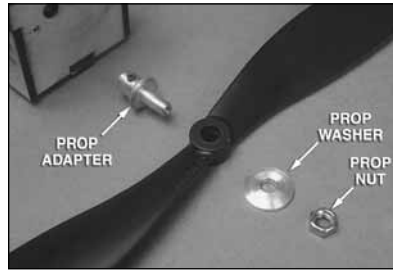
### Collet Type Prop Adapter Installation

Slide the 3mm prop shaft over the motor shaft. Next slide the prop shaft retainer over the prop shaft. Note that the hole through the retainer is tapered. Make sure that the side with the larger diameter hole is installed first. Install the prop, prop washer and then the prop nut. Tighten the prop nut against the prop. This will cause the tapered hole in the prop shaft retainer to squeeze the prop shaft around the output shaft. Carefully pull on the prop to make sure it is securely attached to the motor shaft.



### Set Screw Type Prop Adapter Installation

Slide the 3mm prop adapter over the motor shaft. Tighten both of the set screws against the shaft. Install the prop, prop washer and then the prop nut. Tighten the prop nut against the prop. Carefully pull on the prop to make sure it is securely attached to the motor shaft.



## 8 INSTALL THE BRUSHLESS ESC

Mount your ESC in the desired location. Always make sure that the ESC is positioned so that it gets some cooling air flowing over it.

Use the instructions included with the ESC to correctly connect the ESC.

## 9 RIMFIRE MOTOR MAINTENANCE

RimFire brushless motors require virtually no maintenance. There are no brushes to wear out and replace. The precision bearings have a very long service life and should last a very long time. The internal parts of the motor should not require any cleaning. The only thing that needs to be checked is to make sure all the screws and set screws remain tight.

## 10 IMPORTANT PRECAUTIONS

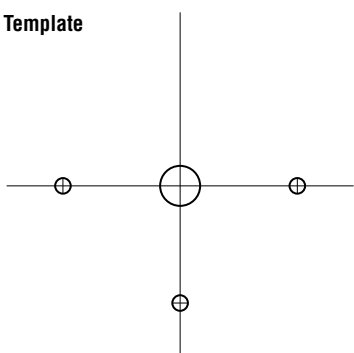
- Once the battery is connected to the ESC, stay clear of the motor and prop.
- **DO NOT** apply an input voltage that exceeds the maximum specification of each motor.
- **DO NOT** apply currents to the motor that exceed the maximum specifications of each motor.
- **DO NOT** allow the input connectors to accidentally touch each other while power is applied to the motor. Make sure all input connections are insulated electrically.
- **DO NOT** allow water or moisture to enter the motor, as it can cause permanent damage to the motor and possibly short out the attached ESC.
- **DO NOT** cut the coated wires from the motor. If you must remove the bullet connectors, unsolder them.
- Allow the motor to cool after each flight.
- The motor shaft of the motor will rotate at very high rpm. **DO NOT** attempt to touch the shaft while it is rotating. If setting up the motor/ESC on the workbench, make sure the motor is securely attached and that nothing is attached to the motor shaft **BEFORE** applying power.
- **NEVER** attempt to use a damaged motor (having mechanical or electrical defects).
- ElectriFly carries a complete line of Ammo (in-runner style) and RimFire (out-runner style) brushless motors, gear drives, motor mounts, prop adapters and speed controls. For a complete list of these products, check out our web site at:

[www.greatplanes.com](http://www.greatplanes.com)

[www.electrifly.com](http://www.electrifly.com)

or visit your nearest hobby shop that carries the full line of Great Planes and ElectriFly products.

### Template



### RimFire 250 Accessory and Spare Parts

GPMQ4625	Rimfire Prop Saver (complete set)
GPMM3111	2mm gold plated bullet connectors - female (3)
GPMM3110	2mm gold plated bullet connectors - male (3)
GPMG1401	Rimfire 250 Replacement Shaft Kit
GPMG1403	Rimfire 250 Reverse Run Shaft
GPMG1451	Rimfire 250 Bearings (2)
GPMG1430	C-clip (10) for 3mm Rimfire Motor Shafts
GPMG1405	Prop Saver O-rings (5)