RIMFIRE™

28mm POWER SYSTEM

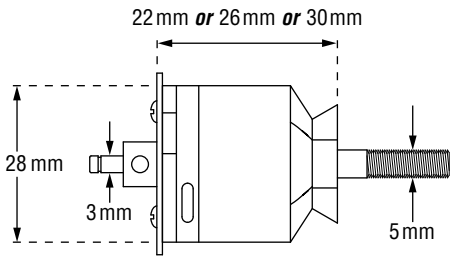
ElectriFly™ by Great Planes

Congratulations, you have just purchased the RimFire 28mm 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 28mm power system are: RimFire 28mm motors, 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 MOTORS

Model	Stock #
RimFire 300 (28-22-1380)	GPMG4505
RimFire 370 (28-26-1000)	GPMG4525
RimFire 400 (28-30-950)	GPMG4560

The RimFire motors are labeled to provide the most information at a glance. For example: the RimFire 400 (28-30-950) is 28mm in diameter, 30mm long and has a kV (rpm-per-volt) of 950.



Weight
(22mm): 28.5g
(26mm): 40.3g
(30mm): 52.8g

Weight includes: Motor with collar.

RimFire 300 (28-22-1380)

Input Voltage: 7.4–11.1V
Max Surge Current: 13.5A
Max Surge Watts: 150W

RimFire 370 (28-26-1000)

Input Voltage: 7.4–11.1V
Max Surge Current: 15A
Max Surge Watts: 165W

RimFire 400 (28-30-950)

Input Voltage: 7.4–11.1V
Max Surge Current: 20A
Max Surge Watts: 220W

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 28mm motors.

ElectriFly **Silver Series 12** (SS-12) ESC (GPMM1810) for 12A maximum constant current draw.

ElectriFly **Silver Series 25** (SS-25) ESC (GPMM1820) for 25A maximum constant current draw.

The SS-12 comes with 2mm female bullet connectors that plug directly into the 2mm male connectors installed on the RimFire 28mm motors, so no soldering is required. The SS-25 comes with 3.5mm female bullet connectors and requires an adapter (GPMM3122). The SS-12 comes with a Deans® Micro battery connector that matches the connectors that are found on most batteries that it will use. The SS-25 comes with a Deans Ultra Plug® battery connector and may require an adapter (GPMM3126) for some of the batteries.

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 x 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 28mm motors will typically use batteries with a capacity of 300 to 1500mAh, with the higher capacity batteries delivering more flying time but also being heavier. Most of the 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** for the most up-to-date listing of the ElectriFly battery line.

Stock #	Voltage	Capacity	Weight	No. of Cells	Connector Adapter
GPMP0594	7.4V	300mAh	0.8 oz (24g)	2	
GPMP0595	11.1V	300mAh	1.1 oz (32g)	3	
GPMP0704	7.4V	640mAh	1.4 oz (39g)	2	
GPMP0705	11.1V	640mAh	2.0 oz (56g)	3	
GPMG0604	7.4V	910mAh	2.1 oz (60g)	2	GPMM3127
GPMG0605	11.1V	910mAh	3.1 oz (87g)	3	GPMM3127
GPMG0504	7.4V	1300mAh	2.7 oz (77g)	2	GPMM3127
GPMG0505	11.1V	1300mAh	4.0 oz (112g)	3	GPMM3127
GPMG0510	7.4V	1500mAh	2.9 oz (83g)	2	GPMM3127
GPMG0511	11.1V	1500mAh	4.3 oz (121g)	3	GPMM3127

4 PROPELLER ADAPTERS

The RimFire 28mm motor comes with a bolt-on prop adapter and a prop saver with sleeves to fit a variety of prop hub sizes. If the RimFire 28mm motor needs to be mounted behind the firewall, the motor requires a 3mm prop adapter collet type (GPMQ4959), or set screw type (GPMQ4930).

GPMQ4930 3mm Set Screw Type

GPMQ4959 3mm Collet Type

5 PROPELLERS

There is a wide selection of propellers available for electric use. The RimFire 28mm motors use 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** and **www.greatplanes.com** for the most up-to-date listing of electric type props.

GPMQ6630	9x4.5	Slo-Flyer	APCQ5010	9x4.7SF	Slo-Flyer
GPMQ6655	10x3.5S	PowerFlow	APCQ5015	10x4.7SF	Slo-Flyer
GPMQ6660	10x4.5S	PowerFlow	APCQ5016	10x3.8SF	Slo-Flyer
GPMQ6695	11x4.5S	PowerFlow	APCQ5020	11x4.7SF	Slo-Flyer
APCQ4960	7x4SF	Slo-Flyer	APCQ5026	12x6SF	Slo-Flyer
APCQ5000	8x3.8SF	Slo-Flyer	APCQ5027	12x3.8SF	Slo-Flyer
APCQ5005	9x3.8	Slo-Flyer			

6 DETERMINE WHAT YOU NEED TO BUILD YOUR POWER SYSTEM

Now that you have a component for your power system, there are several different ways to select the rest of the components of your power system. 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) × voltage (V). Using suggested power system combinations as a 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.

RECOMMENDED SETUP	**RimFire 300** 3S Battery, 8×3.8 SF Prop **RimFire 370** 3S Battery, 9×4.5 SF Prop **RimFire 400** 3S Battery, 9×6 SF Prop

Understanding Motors

kV (rpm/volt): This is a number that gets thrown around quite a bit when talking electrics 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

Once the required RimFire motor has been determined, it needs to be installed on the plane. It can be mounted directly to the front of the firewall using the RimFire steel mounting plate included with the motor, or to the back of the firewall using a prop adapter to mount the prop.

In this manual, you will find the mounting hole template for mounting the RimFire 28mm motor to the front of or the back of the firewall.

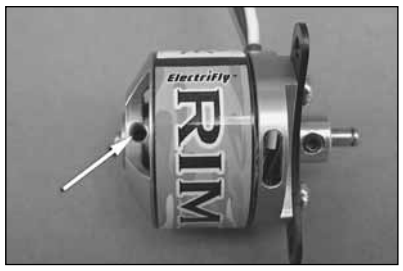
Configuring The Motor

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

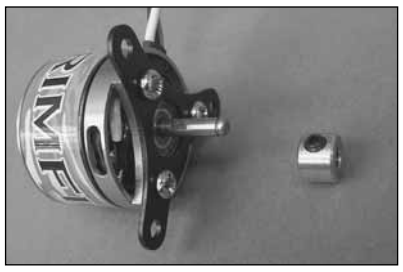
If you are installing the motor onto the front of the firewall (common installation), the propeller can be installed onto the bolt-on prop adapter or the prop saver adapter. If you choose to use the bolt-on prop adapter, secure it to the front of the motor using the included three 2.5x5mm socket head cap screws and thread locking compound. A prop washer and prop nut are included to tighten the propeller onto the bolt-on prop adapter.

If you choose to use the prop saver adapter, the motor shaft will need to be shifted forward inside the motor. Begin by removing the c-clip from the front 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 motor before attempting to remove c-clips. 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 clips!

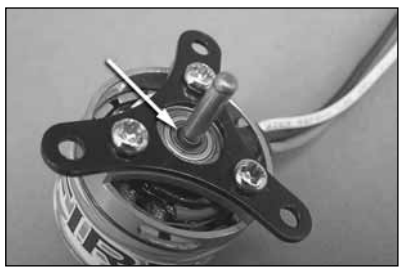
Remove the set screw that locks the motor shaft to the front endbell.



Loosen the set screw in the brass collar and slide it off the back of the motor shaft.



Remove the c-clip and washers from the motor shaft behind the rear endbell.



Press the motor shaft forward inside the motor. Reinstall the washers and c-clip onto the groove at the back of the motor shaft. Rotate the shaft inside the motor so that the hole for the set screw in the front endbell aligns with the flat spot on the shaft. Reinstall the set screw into the front endbell and tighten it against the shaft with thread locking compound.

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.

Mounting Plate Installation

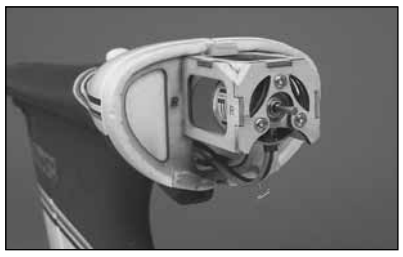
Although the mounting plate comes preinstalled on the RimFire, the three 3×4mm machine screws should be retightened with threadlocking compound. If you plan to install the motor behind the firewall, remove the mounting plate from the motor.

Front Of Firewall Mounting Method

Use the template from the header card to locate and drill the mounting holes and the relief holes for the mounting plate screws. Attach the RimFire mounting plate to the firewall using three #4×3/8" [3×6mm] sheet metal screws (not included), or a type/size specified by the airplane manual.

Behind Firewall Mounting Method

Use the template from the header card to locate and drill the holes for the mounting screws. Attach the RimFire mounting plate to the firewall using three 3mm machine screws (not included).

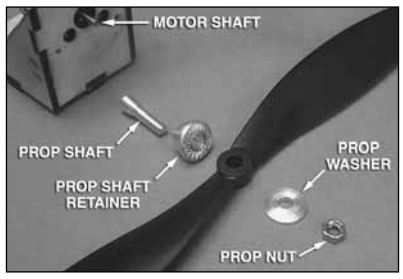


Prop Saver Prop Adapter Installation

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.

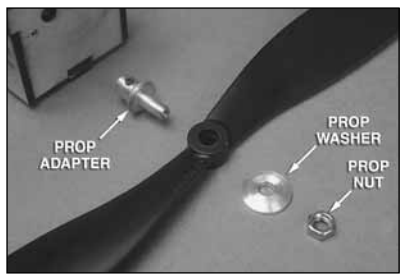
Collet Type Prop Adapter Installation

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:

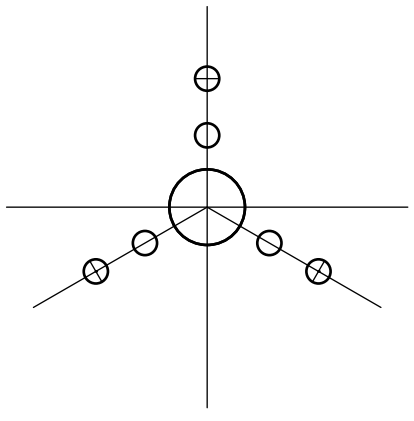
www.greatplanes.com **www.electrifly.com**

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

Optional Mounts Available:

GPMG1201 2-Hole Bar Mount
GPMG1202 4-Hole Cross Mount

RIMFIRE 28mm MOUNTING PATTERN



RimFire 300 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)
GPMQ4901	Prop Adapter for 28mm motors
GPMG1200	RimFire backplate Motor Mount for 28mm motors
GPMG1201	Bar Mount 28mm RimFire Motors
GPMG1202	Cross Mount 28mm RimFire Motors
GPMG1430	C-clip (10) for 3mm RimFire Motor Shafts
GPMG1407	RimFire 300 Replacement Shaft Kit
GPMG1450	Bearings (2) for RimFire 28-xx-xx motors
GPMG1405	Prop Saver O-rings (5)

RimFire 370 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)
GPMQ4901	Prop Adapter for 28mm motors
GPMG1200	RimFire backplate Motor Mount for 28mm motors
GPMG1201	Bar Mount 28mm RimFire Motors
GPMG1202	Cross Mount 28mm RimFire Motors
GPMG1430	C-clip (10) for 3mm RimFire Motor Shafts
GPMG1409	RimFire 370 Replacement Shaft Kit
GPMG1450	Bearings (2) for RimFire 28-xx-xx motors
GPMG1405	Prop Saver O-rings (5)

RimFire 400 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)
GPMQ4901	Prop Adapter for 28mm motors
GPMG1200	RimFire backplate Motor Mount for 28mm motors
GPMG1201	Bar Mount 28mm RimFire Motors
GPMG1202	Cross Mount 28mm RimFire Motors
GPMG1430	C-clip (10) for 3mm RimFire Motor Shafts
GPMG1411	RimFire 400 Replacement Shaft Kit
GPMG1450	Bearings (2) for RimFire 28-xx-xx motors
GPMG1405	Prop Saver O-rings (5)