

## Why Upgrade Your Charging System?

There are numerous reasons to upgrade your charging system. Here are some common complaints:

- I can't keep my battery charged!
- My current alternator does not keep up with my electrical requirements/load.
- I don't want to run my engine just to charge the batteries.
- I don't want to run my generator to charge the batteries when my engine is already running.
- I've added several batteries to my house bank, but I don't think they are being charged effectively.
- I operate predominantly at idle speed, but my battery bank doesn't charge at idle.
- I keep burning out alternators.
- I'm replacing my batteries too often.
- I have two engines, but my alternators don't work together to charge the battery bank effectively.
- My alternator charges my house bank, but I want to charge the engine start battery too without remembering to flip a battery switch.

Balmar Charging Systems can solve all these problems and more...

## How to Select a Balmar Charging System

Selecting a charging system upgrade for your vessel can be a confusing task, as there are many inter-related variables to consider. The following guide steps you through a logical progression of questions and choices which must be made to select the best charging system for your needs.

The selection process includes the following steps:

- Step 1: Determine Your Vessel's Electrical Load**
- Step 2: Identify Your Existing Battery Bank Technology and Capacity**
- Step 3: Select Your Optimum Alternator Output**
- Step 4: Identify the Alternator Mounting Style Present on Your Engine**
- Step 5: Determine your Belt and Pulley Requirements**
- Step 6: Select Additional Charging System Options**

These 6 important steps are fully described in the next 3 pages - Read on!

Our most popular charging system packages (shown below) combine Balmar's high amperage alternators and programmable multi-stage regulators – providing the best DC charging solution for your vessel. Keep reading to select the appropriate system for your needs.

See Page 8 to review the 6-Series, our best-selling alternator!



**6-Series Charging Package**  
 Includes Alternator, Regulator & Temp Sensors

**NEW**

See Page 9 to review the amazing technology behind our high power XT-Series



**XT-Series Charging Package**  
 Includes Alternator, Regulator & Temp Sensors



## How to Select a Balmar Charging System

### Step 1: Determine Your Vessel's Electrical Load

Skip this step if you are confident in your house bank's ability to service your existing vessel loads.

Accurate load calculations require precise measurement of your vessel's equipment. Refer to equipment manuals for actual load ratings or consult with a qualified marine electrician to determine your actual needs. The chart at the right provides typical DC marine loads and an example of load calculations. Use this example to configure and calculate your vessel's electrical load.

**(Device Load x Duty Cycle) x (# of Devices) = Total Load**

An interactive load calculator is available on our website homepage at:

[www.balmar.net/choosing-a-balmar-charging-system/](http://www.balmar.net/choosing-a-balmar-charging-system/)

House battery capacity is typically derived based on the ability to meet approximately 24 hours' worth of typical demand, but could be longer if you don't expect to be connected to shore power for extended periods.

For example, if your vessel's typical daily electrical load is 300 Ah, then your battery bank should be sized to provide 300Ah of power storage.

*Since many traditional batteries will be damaged if you discharge them beyond a 50% State of Charge (SoC%), then 600Ah of rated storage may be required.*

Add batteries to your bank if you need them!

Typical DC Electrical Loads			
Device	Electrical Load in Amps/Hour	Duty Cycle Hours / 24 Hours	Total Ah Load per 24 Hours
VHF Receive	1.5	8	12
VHF Transmit	5.0	1	5
Depth Finder	1.0	8	8
GPS	0.5	8	4
Radar	4.0	8	32
Weather Fax	2.5	2	5
Laptop Computer	6.0	3	18
Auto Pilot	4.0	8	32
Knot Meter	0.1	8	1
Wind Speed	0.1	8	1
Anchor Light	1.0	2	2
Steaming Light	1.0	4	4
Running Light	3.0	3	9
Bilge Pump	5.0	1	5
Head	25.0	1	25
Wash Down Pump	10.0	.5	5
Refrigerator	7.5	5	38
Hand Spotlight	10.0	1	10
Add'l Devices...			0
<b>Total Daily Ah Load</b>			<b>210</b>

### Step 2: Identify Your Existing Battery Bank Technology and Capacity

Battery bank capacity has a dramatic impact on the size and type of alternator required to keep the batteries healthy. Identify your battery bank technology and capacity, then calculate an acceptance requirement.

- (A) Standard and Deep Cycle Flooded Batteries can accept a charge load up to 25% of their capacity.
- (B) Gel Cell Batteries can accept a charge load up to 35% of their capacity.
- (C) Standard AGM Batteries can accept a charge load up to 40% of their capacity.
- (D) TPPL and Carbon Foam AGM Batteries can accept charge loads up to 100% of their capacity.
- (E) Lithium Batteries can accept an almost unlimited charge load.

Contact your battery manufacturer to confirm their recommended charge loads and profile.

**(Battery Storage Capacity) x (Battery Charge Acceptance Rate) = Maximum Alternator Output Current**

For example, a bank of 3 AGM batteries, each with an individual capacity of 100Ah provide a total capacity of 300Ah. With an AGM acceptance rate of up to 40%, a 120A charging alternator could be utilized. If you have a really large bank or a battery technology that calls for an alternator output that exceeds available alternator technology, then it will just take longer to charge your bank.

Simply choose the highest alternator power which meets your budget, pulley constraints, and acceptance rate.

## How to Select a Balmar Charging System

### Step 3: Select Your Alternator Output

Now that you know the battery bank technology and charging profile, you can choose an alternator output which will optimally charge your bank. The chart on the next page shows Balmar's most popular range of small-case, high-power alternator choices for your vessel, along with an appropriate multi-stage regulator and related temperature sensing cables. (Balmar provides a discount when you buy the package).

For 70A – 120A requirements, choose a 6-Series Alternator Package.  
For 170A – 220A requirements, choose an XT-Series or AT-Series Alternator Package.

### Step 4: Identify the Alternator Mounting Style Present on Your Engine

It is critically important to determine how your existing alternator is mounted to match with the high output alternator you have chosen. Marine alternator mountings generally fall into one of four possibilities:

The most common mounting styles are shown to the right:		
(A) 1" Single Foot (Spindle Mount)	"Motorola Style"	Balmar 621 Series
(B) 2" Single Foot (Spindle Mount)	"Delco Style"	Balmar 621 Series
(C) 3.15" Dual Foot (Saddle Mount)	"Hitachi Style"	Balmar 60 Series
(D) 4" Dual Foot (Saddle Mount)	"J-180 Style"	Balmar 604 Series

Examples of these mounting styles are shown on the right. Review your existing alternator mounting to determine the appropriate mounting for your upgrade.

Each Balmar alternator mounting style is identified by a unique part number.

### Step 5: Determine your Belt and Pulley Requirements

Engine drive belt style and width is also a critical factor when selecting a Balmar replacement charging system. Higher output alternators require more drive power to be taken off the engine. All belts have specific limitations regarding the amount of power take-off ("PTO") loads they can support.

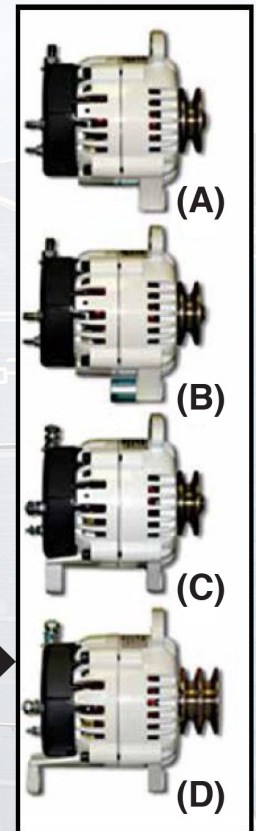
Failure to specify an adequate belt/pulley system could result in premature belt wear, belt slippage and potential damage to the alternator and engine.

Balmar alternators can ship with pulleys which are appropriate for the alternator's output and drive belt.

**6-Series Alternators** from 70A-100A can ship with either a Single Vee, Dual Vee or Serpentine Pulley.\*  
**6-Series Alternators** from 120A-150A can ship with either a Dual Vee or Serpentine Pulley.\*  
**XT/AT-Series Alternators** can ship with either a Dual Vee or Serpentine Pulley.\*

\* Note: Balmar's 1/2" Deep Vee Pulleys (Single and Dual) can accept a 3/8" and 7/16" belt.

Identify the pulley style/size present on your engine and water pump before upgrading the charging system.



Belt Type	Belt Width	Maximum HP Load	Max Alternator Output	
			12 Volt	24 Volt
Single Vee	3/8"	3.5 HP	80 Amp	30 Amp
Single Vee	1/2"	4.5 HP	100 Amp	45 Amp
Dual Vee	1/2"	12 HP	310 Amp	220 Amp
Serpentine	6-Groove (K)	> 20 HP	310 Amp	220 Amp
Serpentine	10-Groove (J)	> 20 HP	310 Amp	220 Amp



## How to Select a Balmar Charging System

### Step 5: Determine your Belt and Pulley Requirements ... Continued

If the alternator output you have chosen exceeds the capability of your existing belt/pulley system, you must upgrade the pulley system using one of Balmar's patented AltMount® Pulley Conversion Kits. Refer to the chart on page 11 to find the applicable AltMount® Conversion Kit for your engine and alternator choice.

Here are some additional rules-of-thumb to guide your choices:

- Balmar 6-Series Alternators from 70A-100A can perform with a 1/2" Single Vee pulley. If you need to charge above 100A, then you will need a Dual Vee or Serpentine pulley system to be present on your engine to avoid a pulley upgrade. If a Dual Vee or Serpentine pulley is not present, then an AltMount® Conversion Kit is required.
- Many boaters choose to limit their charging system upgrade to a 100A 6-Series Alternator Package to avoid the additional purchase of a pulley conversion.
- Unless you own a recently produced engine which already contains a Dual Vee or Serpentine pulley system, the superior power afforded by the XT- Series and AT-Series Alternator Packages will in most cases require an AltMount® Conversion Kit Upgrade.
- Choose wisely! Need more help? - call Balmar Technical Support at the number below!

With the completion of these 5 steps, you have reviewed all the critical variables required to choose the correct charging system upgrade for your vessel.



U.S. Patent Nos.  
8.939.855 and D654.778

### Small Case Alternator Kit Selection Chart - Common Configurations

Balmar Product Family	Output	Mounting	Power Take Off	Alternator Part Number <sup>(1)</sup> Part Number	Balmar External Regulator	Temp Sensors	Alternator Kit Number <sup>(1)</sup> (includes Alternator, Regulator & Temp Sensors)	Altmount® Pulley Kit Required?	
6 Series <sup>(2)</sup>	70 A	1-2" Spindle	2.8 HP	621-70-XX	ARS-5-H <sup>(3)</sup>	MC-TS-A & MC-TS-B	621-VUP-70-XX	No	
		3.15" Saddle		60-70-XX			60-YP-70-XX		
	100 A	1-2" Spindle	4.0 HP	621-100-XX			621-VUP-100-XX		
		3.15" Saddle	60-100-XX	60-YP-100-XX					
	120 A	1-2" Spindle	4.8 HP	621-120-XX			621-VUP-120-XX		
		3.15" Saddle		60-120-XX			60-YP-120-XX		
	70 A, 24V	1-2" Spindle	5.6 HP	621-24-70-XX			MC-624-H	621-VUP-24-70-XX	Yes, If Dual Vee or Serpentine is Not Already Present See Page 11
		3.15" Saddle		60-24-70-XX				60-YP-24-70-XX	
XT-Series	170 A	1-2" Spindle	5.2 HP	XT-SF-170-XX	MC-614-H		XT-SF-170-XX-KIT		
		3.15" Saddle		XT-DF-170-XX			XT-DF-170-XX-KIT		
		Vortec		XT-VT-170-K6			XT-VT-170-K6-KIT		
AT-Series	220 A	1-2" Spindle	6.0 HP	AT-SF-200-XX			AT-SF-200-XX-KIT		
		3.15" Saddle		AT-DF-200-XX			AT-DF-200-XX-KIT		

(1) "XX" Pulley Designations: "SV" = 1/2" Single Vee, "DV" = 1/2" Dual Vee, "K6" = K6 Serpentine, "J10" = J10 Serpentine  
 (2) 6-Series Alternators are "Smart-Ready" and can be installed with or without an external Balmar Programmable Regulator.  
 (3) MC-614-H must be substituted when support for a second alternator or twin engines is required.

### Step 6: Select Additional Charging System Options

Now that you have selected an appropriate Balmar Alternator Kit, complete your purchase by adding a SG200 Battery Monitor and a Belt Buddy Tensioning Kit! See pages 12 and 27, respectively for details.

