

Proper Sizing of Batteries

Be sure that the battery or set of batteries is properly sized, with plenty of power for your application. As with any piece of equipment, the harder any battery has to work, the sooner it will fail. For example:

Figure 1

Typical SVR Battery Cycling Ability vs. Depth of Discharge

Average Capacity Withdrawn	Typical Life Cycles to Failure
100%	200
50%	400
30%	1,300
10%	2,000
1%	20,000

As you can see, the shallower the average discharge, the longer the life. Make sure your batteries have plenty of power for longest life. Contact your dealer if you have any questions.

Proper Testing

1. Use a voltmeter to test for state of charge. The reading will tell you how much charge is left in the battery. Different type batteries have different readings:

Figure 2

Open Circuit Voltage vs. State of Charge

State of Charge	Open Circuit Voltage		
	Flooded Wet Cell	Sealed Gel Electrolyte	Sealed Absorbed Electrolyte
100%	12.7 - 12.6	12.95 - 12.85	12.90 - 12.80
75%	12.40	12.65	12.60
50%	12.20	12.35	12.30
25%	12.00	12.00	12.00
0%	11.80	11.80	11.80

Notice that 2/10 volt change equals a 25% difference in charge.

ALWAYS WEAR SAFETY GLASSES! BE CAREFUL!

2. Use a Load Tester (available at dealer or most service stations to determine the strength or reliability of a battery that's been in service and may be suspect).
 - a. Recharge if the open circuit voltage is below 75%.
 - b. Set the load at 1/2 the CCA or three times the 20 HR ampere rate. Apply the load for 15 seconds.
 - c. If the "on load" voltage stabilizes at or above 9.6 volts, the battery is good. If it falls below 9.6 volts, recharge the battery and retest. If it falls below 9.6 volts a second time, replace the battery.
3. Consult your dealer or distributor if you should have any technical questions.

Important Charging Information

An SVR battery is pressurized and sealed, with no way to replenish the electrolyte (acid) inside.

CAUTION! DO NOT OPEN AN SVR BATTERY. WARRANTY WILL BE VOID IF OPENED.

Proper charging is critical to all types of batteries. Overcharging will dry out the electrolyte and the battery will fail prematurely.

Be sure to use a good, fully automatic, temperature sensing, voltage regulated charger, with an adjustable voltage feature. The charger must be voltage regulated. Otherwise it will overcharge the battery and shorten its life.

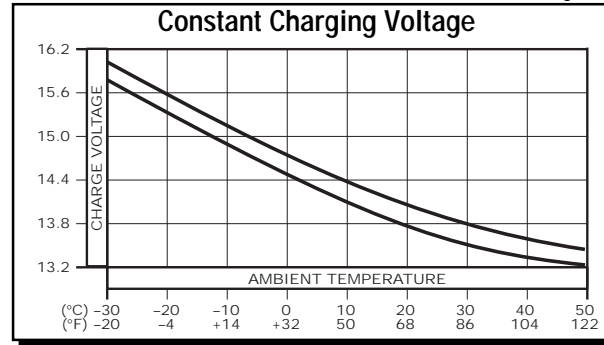
Voltage regulation means that the charger will sense the rise in the battery's voltage as it accepts the charge or current. As the voltage rises to the proper setting, the charger will automatically reduce the amount of current and will shut down at full charge. Therefore, the battery will not overcharge and the electrolyte will not dry out.

Charger Voltage Settings

Sealed Valve Regulated Absorbed Electrolyte

Float Service		Cycling Service	
Minimum	Maximum	Minimum	Maximum
13.5 VDC	13.8 VDC	13.8 VDC	14.1 VDC

Figure 3



Shown above (Figure 3) is the constant charging voltage in relation to the ambient temperature. This constant voltage is suitable for continuous charging and cyclic operation. In a stand-by mode it always keeps the battery in a fully charged state; in a cyclic mode, it provides for rapid recharging and high cyclic performance.

NEVER USE AN INEXPENSIVE CONSTANT CURRENT OR "TRICKLE" CHARGER! Even a small current of 1/2 amp, if left on beyond "full charge" will overcharge any SVR battery and ruin it.

Always keep your batteries fully charge... especially if they are to be stored for 30 days or longer. Use the state of charge chart (Figure 2) to determine full state of charge.

Constant undercharging will also adversely effect battery life and performance. Therefore, you should check to be certain that your charger or charging system (engine alternator) is fully recharging the battery or set of batteries... but not overcharging.

An undercharged battery is not at full capacity and must work harder than a fully charged battery. Therefore, its life will be shortened. (See Figure 1).

If your battery is maintained by an alternator run by an engine (as in boats, motor homes, autos, etc.) check the voltage regulators' output and adjust to 14.1 volts for gel cell batteries or 14.5 volts for absorbed electrolyte batteries.

Putting Your Battery Into Storage

If you are storing for longer than 30 days:

ALWAYS WEAR SAFETY GLASSES WHEN WORKING AROUND BATTERIES!

1. Disconnect the ground cable of the battery or remove it entirely from the equipment, vehicle or vessel.
2. Store in a cool, dry area if possible.
3. Clean the battery if necessary. Discard the rag used.
4. Charge to 100% full charge. (See Figure 2.) DO NOT OVERCHARGE! DO NOT LEAVE A TRICKLE CHARGER CONNECTED! Discharged Batteries can freeze and burst.
5. Check the open circuit voltage every 60-90 days. Recharge if necessary. (See Figure 2.)

Proper Maintenance

Your SVR Battery is known as a Maintenance-Free Battery. All that is necessary is to keep the battery clean, fully charged, properly secured, and the terminal connections properly torqued.

Installation Tips

1. ALWAYS WEAR SAFETY GLASSES WHEN WORKING AROUND BATTERIES!
2. Handle and lift batteries with care. They are HEAVY!!
3. Clean all cable ends and connectors with a wire brush or emery cloth until free from oxidation and/or corrosion.
4. Inspect battery tray to be sure it is clean and free from objects that could damage the bottom of the battery.
5. Replace any worn cables and terminations. Replace any corroded hold downs, shelves or trays.
6. Do not install batteries in a completely sealed box or enclosure. In the event of overcharging, the gasses must be allowed to escape.
7. ALWAYS CONNECT THE GROUND CABLE LAST to avoid dangerous sparks.
8. Be careful of your connections! Be absolutely certain that the proper wire or cable is connected to the proper terminal. EXPENSIVE DAMAGE AND DANGEROUS SPARKS CAN OCCUR if wires/cables are crossed.
9. Tighten connections snugly, but do not overtighten. Overtightening can damage the battery and void the warranty. Recheck your connections every 30 days or so.
10. Allow 1/2" air gap around the battery to allow for cooling and normal bulging of the pressurized battery.

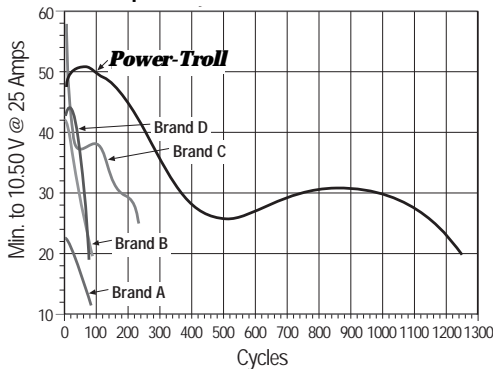
Congratulations!

You have purchased a high quality, state-of-the-art, sealed valve regulated (SVR) battery that, with proper charging and maintenance, should deliver years of reliable portable power.

Some of the features and benefits you'll enjoy are:

- Totally maintenance-free (except for proper recharging, an occasional cleaning, and retorquing of the terminal connections)
 - Will not spill
- Environmentally friendly
 - Air transportable
- Very little gassing if any (unless overcharged)
- Superior rechargeability
 - No corrosion
- Compatible with sensitive electronic equipment

Independent Lab *B.C.I. Life Test



This chart demonstrates the superior cycle life of our SVR battery versus comparable brands.

* Battery Council International

CAUTION! Your sealed valve regulated battery will deliver superior performance and life ONLY IF IT IS RECHARGED PROPERLY! Under or overcharging will shorten battery life and limit performance. Be sure to FOLLOW PROPER CHARGING INSTRUCTIONS! DO NOT ATTEMPT TO OPEN THIS BATTERY! If an SVR battery is opened, it loses its pressure and the plates become oxygen contaminated.

THE WARRANTY WILL BE VOIDED IF THE BATTERY IS OPENED.

When working around batteries,

ALWAYS WEAR SAFETY GLASSES! BE CAREFUL!

ALWAYS DISCONNECT THE NEGATIVE (GROUND) CABLE FIRST when replacing batteries to PREVENT SPARKS.

Connect the negative cable last when installing batteries.

⚠ DANGER/POISON

 SHIELD EYES EXPLOSIVE GASES CAN CAUSE BLINDNESS OR INJURY	 NO SPARKS • SPARKS • FLAMES • SMOKING	 SULFURIC ACID CAN CAUSE BLINDNESS OR SEVERE BURNS	 FLUSH EYES IMMEDIATELY WITH WATER GET MEDICAL HELP FAST
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KEEP OUT OF THE REACH OF CHILDREN.
DO NOT TIP. KEEP VENT CAPS TIGHT AND LEVEL.
DO NOT OPEN FLUSH COVER BATTERIES.

Reminder!

A properly sized, maintained, installed and charged battery will deliver years of reliable service. Review and follow the instructions in this guide to get the most out of your batteries.

Call or see your dealer or distributor for additional information or help:

NON-SPILLABLE by DOT (Dept of Transportation), ICAO (International Commercial Airline Organization), and IATA (International Airline Transport Association) definitions. May be shipped via UPS

IMPORTANT!



TAKE OLD BATTERIES BACK FOR RECYCLING!

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PRI Form No. 0398 (Rev. 3/98)

USER MANUAL



Power-Troll™

**Trolling Motor Batteries
Cranking Batteries**

**SEALED VALVE
REGULATED
(SVR)
ABSORBED
ELECTROLYTE
BATTERIES
(ABSORBED GLASS MAT)**

**Installation,
maintenance and
charging instructions...
for maximum life and
performance**

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