



## VRW Power Tender PLUS Product Information

**Deltran**

### VRW Power Tender PLUS: *Vibration Resistant Waterproof* Models: 12V6A, 24V3A, Single Output Battery Chargers



Note: These units operate and perform exactly like the Battery Tender® Plus single output unit. The major difference is that the DC output current is higher at 5.0 Amps compared to 1.25 Amps with the 12 Volt model and 2.5 Amps with the 24 Volt model. Also, the absorption to float transition occurs at 0.4 amp on both models, compared to 0.1 amp on the Battery Tender® Plus. Output leads on both models are fused at 7.5 Amps.

- ❖ **BTP MICROPROCESSOR TECHNOLOGY**
- ❖ **4-STEP CHARGING (Initialization, Bulk, Absorption, & Float Maintenance)**
- ❖ **POWER TENDER PLUS SOFTWARE for both STANDARD, FLOODED and SEALED, AGM BATTERIES**
- ❖ **SHORT CIRCUIT PROTECTED**
- ❖ **REVERSE POLARITY PROTECTED**
- ❖ **CONVENIENT MOUNTING HOLES & SLOTS**
- ❖ **2 YEAR WARRANTY**



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**GENERAL DESCRIPTION:** The Power Tender PLUS battery charger is a microprocessor controlled, high frequency switching power converter that has a true DC output at a maximum power level of approximately 70 watts. The charging algorithm is optimized to accommodate both standard, flooded and sealed, AGM lead acid batteries.

**OUTPUT CABLE CONNECTIONS:** The Power Tender PLUS battery charger output cable is equipped with a molded quick connect / disconnect plug. The positive polarity output pin is exposed and the negative polarity output pin is recessed and covered. Mating accessory cable assemblies, both ring terminals and alligator clips, have the negative polarity pin exposed and the positive polarity pin recessed and covered. This is the safest electrical configuration.

The positive output lead is fused near the body of the charger with a 7.5 amp, fast-blow, automotive type blade fuse. This fuse is designed to protect the charger from reverse polarity connections to a high-energy source, like a battery. Mating accessory cable assemblies also have fuses in the positive lead. These fuses are designed to protect the user from inadvertent short circuit connections between the battery positive and negative terminals.

Early production units have SPT-2 type output cable. To improve both the mechanical & thermal characteristics of the output cables, the SPT-2 type cable is being upgraded to individual 16 AWG stranded conductors insulated with Cross-Linked Polyethylene and over-molded with PVC.

Ring terminal cable accessories have red and black molded polymer insulation cylinders to indicate positive and negative polarity, respectively. The inside diameter of both rings is approximately 11/32". This falls between the 3/8" and 5/16" inside diameters used on previous models.

**ENVIRONMENTAL CHARACTERISTICS:** The Power Tender PLUS battery charger is both vibration resistant and waterproof. The internal cavity is completely filled with a high-impact, thermally conductive, moisture sealing, 2-part epoxy.

### **CONFIGURATION CHANGE NOTES: Lightweight On-Board Power Tender Chargers:**

#### **NEW Configurations:**

- ❖ 12V6A & 24V3A Power Tender Plus
- ❖ Includes PTP software (optimized to accommodate both flooded and AGM lead-acid batteries), DC output cables with integral quick disconnect means, and full internal encapsulation with 2-part epoxy.

#### **Discontinued Configurations:**

- ❖ Any voltage models except 12V or 24V (i.e. 6V, 8V, 18V.)
- ❖ All AGM and Standard software models within the 12V and 24V model group. Chargers with these nominal output voltages will now ship with the Power Tender Plus configuration.
- ❖ All models designed to charge true Gel Cell batteries. These types of chargers are now only available in the Battery Tender® Junior, Battery Tender® Plus and High Frequency SUPERSMART® Golf-Cart style model groups.
- ❖ All 220 VAC Input units (-2 part numbers.) These applications will be handled with either the Battery Tender® International charger (available now) with a 12V 1.25A output or the Portable Power Tender (available in 2Q2004) with a 12V 2.5A / 5.0A, with an automatically switched output current level that depends upon the type of cable accessory that is connected to the charger output.



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### INDICATOR LIGHT OPERATION SUMMARY

POWER TENDER PLUS (PTP), VIBRATION RESISTANT, WATERPROOF (VRW), POWER TENDER STYLE CHARGERS:

Models: 12V6A and 24V3A (Fully Potted)

Deltran Base PN 022-0157 (12V) & 022-0158 (24V)

*NOTE: In order to properly charge large capacity batteries, the charger may remain in the bulk charge mode for an extended period of time. For example, with a 2.5 amp DC current, and a 100 Amp-Hour marine deep cycle battery, the bulk charge period may last 40 to 45 hours.*

#### SOFTWARE: PTP (Power Tender Plus) WORKS WELL WITH BOTH FLOODED CELLS AND SEALED AGM BATTERIES

#### STATUS INDICATING LIGHTS OPERATION: 2 LIGHTS: RED & GREEN:

- < **RED - FULL RECHARGE (Automatic): BULK & ABSORPTION:** When the red light is on, the battery charger is in the process of fully charging the battery.
- < **GREEN FLASHING – ABSORPTION:** When the green light is flashing, the charger is in the constant voltage absorption mode. The charger automatically switches to float maintenance 8 hours after the absorption mode begins.
- < **GREEN – CHARGE COMPLETE: FLOAT / MAINTENANCE:** When the green light is on, the battery charger is in the storage / maintenance mode. In this mode the charger will maintain the battery at full charge by attempting to keep a constant voltage across the battery terminals. If the battery becomes partially discharged due to an external current draw or excessive internal battery losses, the charger will automatically switch itself back to the full recharge mode of operation.
- < **RED & GREEN Alternating – ERROR:** When the red and green light are alternating light is flashing, the battery has either not been connected or it has been connected improperly. It is also possible that the battery is sulfated.

#### AGM / GRT SOFTWARE MODELS: NORMAL INDICATORS, VOLTAGES, CURRENTS, & TIMES

CHARGE MODE =>	BULK CURRENT	ABSORPTION TRANSITION	ABSORPTION VOLTAGE	STORAGE VOLTAGE	FLOAT TO RECHARGE TRANSITION
AUTOMATIC MODE	SOLID RED	SOLID RED & FLASHING GREEN		SOLID GREEN	BACK TO SOLID RED
12V/6A	5A	I<4.8A	14.7V	13.2V	12V-12.5V
24V/3A	2.5A	I<2.3A	29.4V	26.4V	24V-24.5V
AUTO TIMES:	T1	Either 8 HOURS or the Time it takes for the Current to drop below 0.1 Amp.		INDEFINITE	RESET TO ZERO



# VRW Power Tender PLUS

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### POWER TENDER PLUS REPLACES

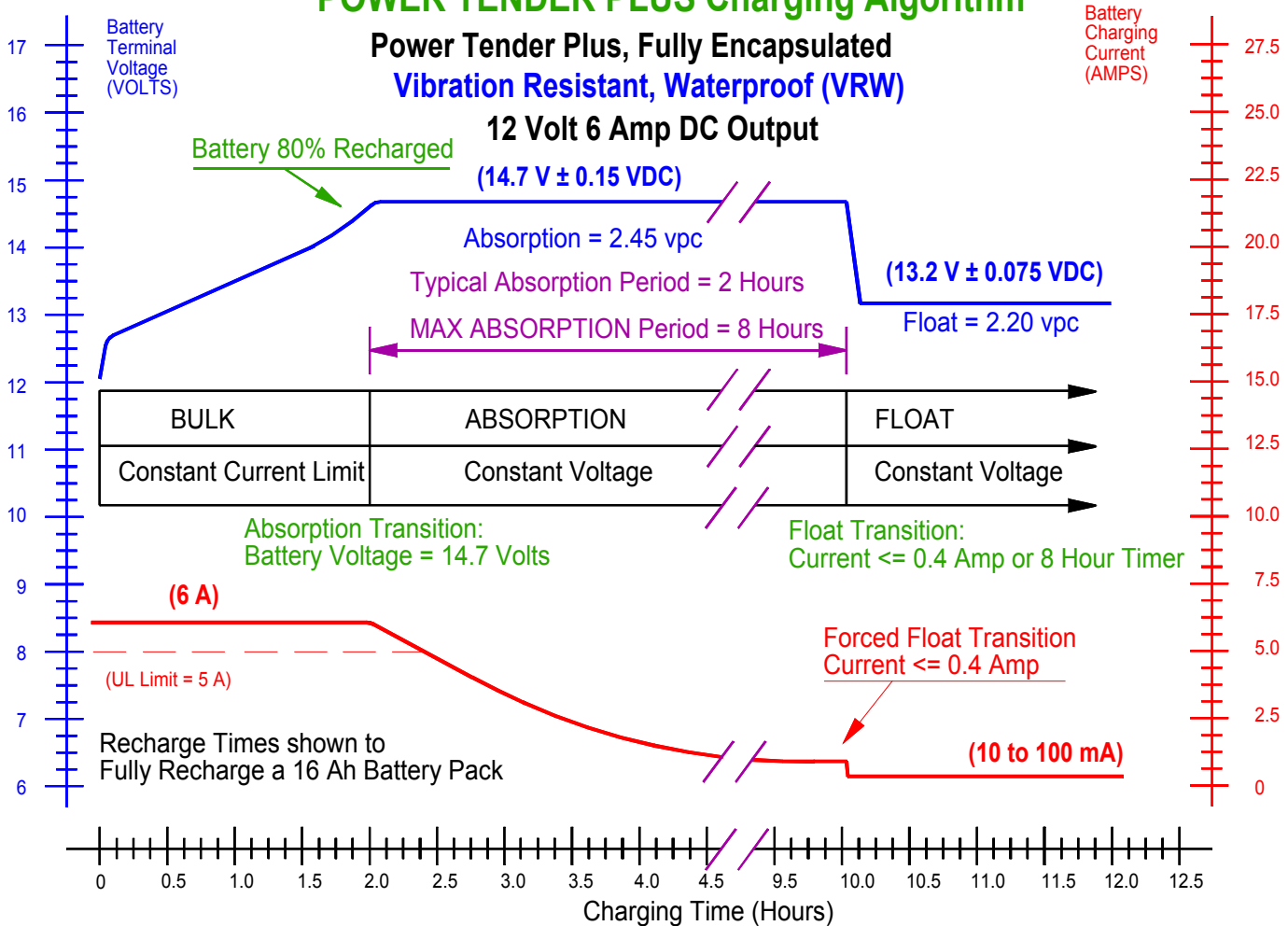
LIGHT WEIGHT ON-BOARD POWER TENDER STYLE CHARGERS:

**EFFECTIVE DATE: SEPTEMBER 1, 2003**

Applies to Models: 12V6A Deltran Part Numbers:

**022-0157-1 REPLACES:** 022-0071-1, 022-0076-1, 022-0111-1 & 022-0114-1  
(AC INPUT: Nominal 120 VAC, 50/60 Hz ONLY)

### POWER TENDER PLUS Charging Algorithm



This Charging Algorithm has been optimized to effectively recharge both standard (flooded) and sealed, AGM/GRT (Absorbed Glass Mat / Gas Recombinant Technology) lead acid batteries. At the discretion of Deltran, all units ordered under part numbers: 0071, 0076, 0111, or 0114 will be labeled as such and will be fabricated from a 0157 baseline configuration. **Note: The float transition current threshold has been increased from 0.1 ampere to 0.4 ampere to better accommodate larger batteries and higher temperature operation.**



# VRW Power Tender PLUS

## Product Information



Waterproof, Vibration Resistant VRW Power Tender PLUS (Fully Potted)				
Comparison with <span style="color: red;">DISCONTINUED</span> Light Weight On-Board Power Tender				
Deltran Part Number	022-0076-1	022-0071-1	022-0157-1	Comments
<b>MODEL</b>	12V6A STD	12V6A AGM	12V6A PTP	
Software	Standard	AGM/GRT	Power Tender Plus	
Bulk Current Max	5.0 Amps @ 12.48 VDC			NO CHANGE
LED INDICATION	SOLID RED			
Absorption Voltage	14.5 VDC	14.9 VDC	14.7 VDC	
LED INDICATION	SOLID RED	SOLID RED + FLASHING GREEN		
Absorption to Float Transition	Charge Current < 3.0 Amperes	Fixed 8-Hour Timer	8 Hours Max or Charge Current < 0.4 Ampere	Float Transition Current Changed from 0.1A to 0.4A
Float Voltage	13.2 VDC	13.6 VDC	13.2 VDC	
LED INDICATION	SOLID GREEN			
Reset Transition	Battery Voltage Drops Between 12.0 & 12.5 VDC			NO CHANGE
AC Voltage / Frequency	90 to 132 VAC 50/60 Hz			<b>NO 220 VAC OPTION</b>
AC Line Current (Max)	Approx 1.2 Amperes RMS			NO CHANGE
<b>Electrical Isolation:</b>				
Input / Output: & Input / Chassis:	2500 VAC			NO CHANGE
Output / Chassis:	500 VAC			NO CHANGE
Short Circuit Protection	Yes			NO CHANGE
Reverse Polarity Protection	Yes (Internal PTC Device)	Yes (External In Line Fuse)		
Spark Proof	No			NO CHANGE
Temperature Compensation	No			NO CHANGE
DC QUICK CONNECT PLUG	No, Hardwired Ring Terminals	Yes, Ships with Fused Ring Terminals		Works with Standard DC Accessories
Shipping Weight	2.0 lbs.	3.5 lbs		
Case Dimensions	5 in(127)L x 4.9 in(125)W x 2 in(51)H			NO CHANGE
Mounting Holes	Standard Holes	Key Holes & Slots		Same Location
<p><b>COMMENTS:</b> The Power Tender Plus configuration easily accommodates the charging requirements for Sealed VRLA, GRT, AGM batteries and flooded cells. Waterproof operation, along with vastly improved vibration and shock resistance, provide a measure of performance that is clearly superior to that of the traditional LWOB feature set.</p>				
<p><b>Declaration of Conformity:</b> These battery charger products are designed to meet or exceed the specific requirements of: UL-1236 and CSA 22.2, Low Voltage Directive 73/23/EEC: EN 60335 Standard for Safety of Household and Similar Electrical Appliances, Electromagnetic Compatibility Directive 89/336/EEC EN50082-1:1992: EMC Generic Immunity Standard.</p>				
<p><b>Design Conformance &amp; Revision:</b> All Deltran charger products are 100% inspected, electrically tested, and burned in prior to shipment. All Deltran battery charger designs are proprietary and subject to change without notice. Deltran makes no specific claims nor does it either make or imply any specific guarantee or warranty with respect to either the physical configuration or performance of any of the battery charger products listed herein, including suitability for purpose or merchantability.</p>				



# VRW Power Tender PLUS

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### POWER TENDER PLUS REPLACES

LIGHT WEIGHT ON-BOARD POWER TENDER STYLE CHARGERS:

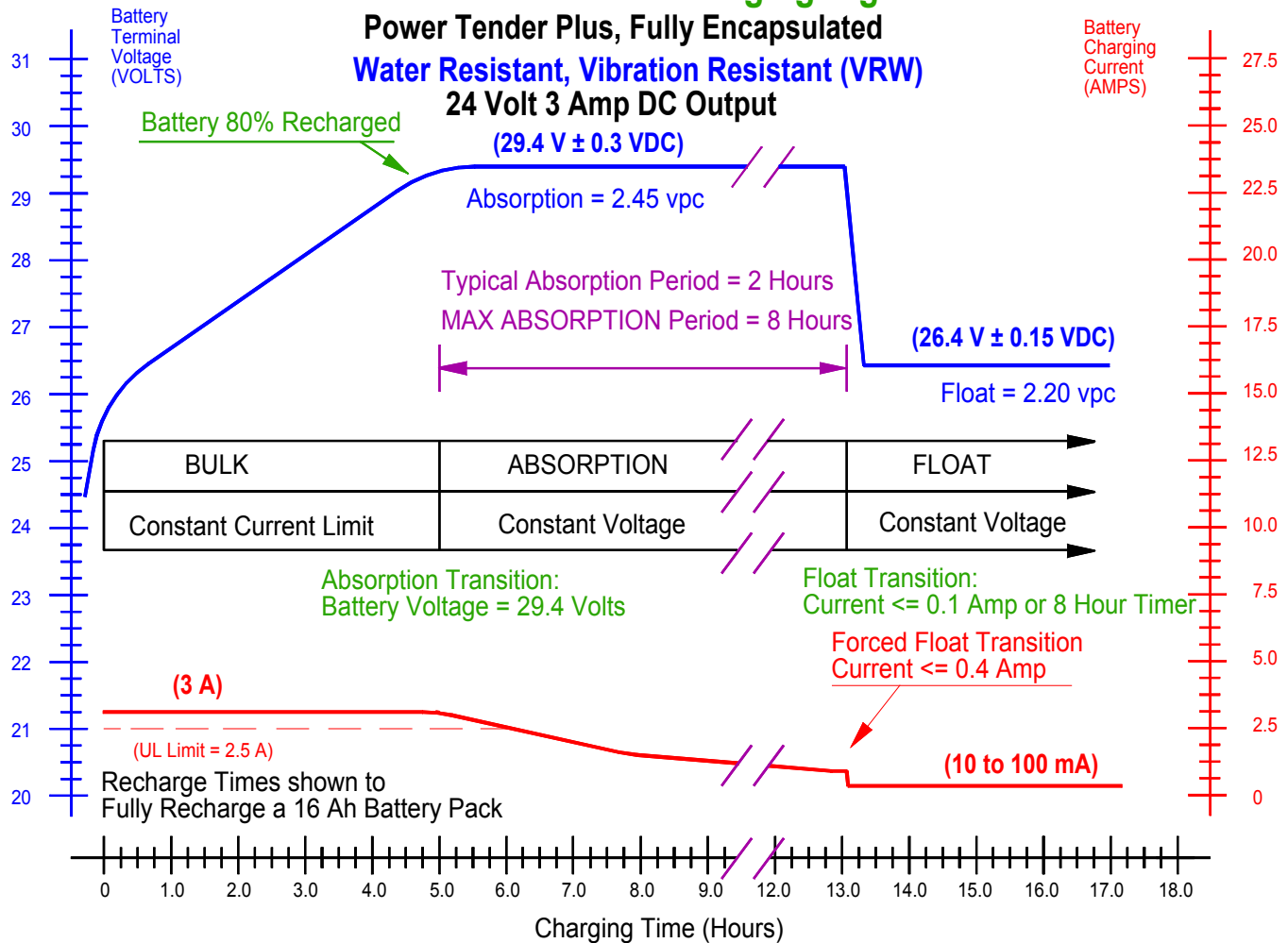
**EFFECTIVE DATE: SEPTEMBER 1, 2003**

Applies to Models: 24V3A Deltran Part Numbers:

**022-0158-1 REPLACES 022-0073-1, 022-0086-1, 022-0121-1, & 022-0122-1**

(AC INPUT: Nominal 120 VAC, 50/60 Hz ONLY)

### POWER TENDER PLUS Charging Algorithm



This Charging Algorithm has been optimized to effectively recharge both standard (flooded) and sealed, AGM/GRT (Absorbed Glass Mat / Gas Recombinant Technology) lead acid batteries. At the discretion of Deltran, all units ordered under part numbers: 0073, 0086, 0121, or 0122 will be labeled as such and will be fabricated from a 0158 baseline configuration. **Note: The float transition current threshold has been increased from 0.1 ampere to 0.4 ampere to better accommodate larger batteries and higher temperature operation.**



# VRW Power Tender PLUS

## Product Information



### Waterproof, Vibration Resistant VRW Power Tender PLUS (Fully Potted)

Comparison with **DISCONTINUED** Light Weight On-Board Power Tender

Deltran Part Number	<b>022-0086-1</b>	<b>022-0073-1</b>	<b>022-0158-1</b>	Comments
<b>MODEL</b>	<b>24V3A STD</b>	<b>24V3A AGM</b>	<b>24V3A PTP</b>	
Software	Standard	AGM/GRT	Power Tender Plus	
Bulk Current Max	2.5 Amps @ 24.96 VDC			NO CHANGE
LED INDICATION	SOLID RED			
Absorption Voltage	29.0 VDC	29.8 VDC	29.4 VDC	
LED INDICATION	SOLID RED	SOLID RED + FLASHING GREEN		
Absorption to Float Transition	Charge Current < 1.0 Ampere	Fixed 8-Hour Timer	8 Hours Max or Charge Current < 0.4 Ampere	Float Transition Current Changed from 0.1A to 0.4A
Float Voltage	26.4 VDC	27.2 VDC	26.4 VDC	
LED INDICATION	SOLID GREEN			
Reset Transition	Battery Voltage Drops Between 24.0 & 24.5 VDC			NO CHANGE
AC Voltage / Frequency	90 to 132 VAC 50/60 Hz			NO 220 VAC OPTION
AC Line Current (Max)	Approx 1.2 Amperes RMS			NO CHANGE
<b>Electrical Isolation:</b>				
Input / Output: & Input / Chassis:	2500 VAC			NO CHANGE
Output / Chassis:	500 VAC			NO CHANGE
Short Circuit Protection	Yes			NO CHANGE
Reverse Polarity Protection	Yes (Internal PTC Device)	Yes (External In Line Fuse)		
Spark Proof	No			NO CHANGE
Temperature Compensation	No			NO CHANGE
DC QUICK CONNECT PLUG	No, Hardwired Ring Terminals	Yes, Ships with Fused Ring Terminals		Works with Standard DC Accessories
Shipping Weight	2.0 lbs.		3.5 lbs	
Case Dimensions	5 in(127)L x 4.9 in(125)W x 2 in(51)H			NO CHANGE
Mounting Holes	Standard Holes		Key Holes & Slots	Same Location
<p><b>COMMENTS:</b> The Power Tender Plus configuration easily accommodates the charging requirements for Sealed VRLA, GRT, AGM batteries and flooded cells. Waterproof operation, along with vastly improved vibration and shock resistance, provide a measure of performance that is clearly superior to that of the traditional LWOB feature set.</p>				
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<p><b>Design Conformance &amp; Revision:</b> All Deltran charger products are 100% inspected, electrically tested, and burned in prior to shipment. All Deltran battery charger designs are proprietary and subject to change without notice. Deltran makes no specific claims nor does it either make or imply any specific guarantee or warranty with respect to either the physical configuration or performance of any of the battery charger products listed herein, including suitability for purpose or merchantability.</p>				



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### TROUBLESHOOTING GUIDE



SYMPTOM	POSSIBLE CAUSE	REMEDY
No Indicator lights are lit.	1 No AC power available.	Insure AC power is available.
Red light keeps flashing.	1 Charger is not properly connected to the battery.	Check the electrical connections and the polarity of the connections, positive to positive, negative to negative. If the polarity was backwards, then the output fuse is probably blown.
	2 The output fuse is blown.	<b>Replacement:</b> 7.5 Amp, 32 Volt, Fast Acting, ATC Blade Type. <b>Bussmann</b> PN: ATC-7.5.
Green light turns on quickly at the beginning of the charge cycle.	1 Battery is already fully charged.	Disconnect the charger from the battery and check the battery voltage with a voltmeter. It battery voltage is at least 12.7 Volts, then it is fully charged.
	2 The charger ring terminals and / or the battery terminals are corroded or damaged.	Disconnect charger cables from battery and clean the batteries and the charger ring terminals. A number of non-acidic chemical products are available. One of the simplest to use is baking soda and water.
	3 Battery may be defective.	Have battery load tested.
Red light stays on too long, charger will not switch to float.	1 Battery is not fully charged yet.	Allow sufficient time for charge. See note below.
	2 Excessive load is present on battery during charge cycle.	Remove load from battery or battery from vehicle.
	3 Battery may be defective.	Have battery load tested.
Red and Green indicator lights are alternating at a slow rate, about once each second.	1 The quick connects are corroded or damaged.	Disconnect charger cables from battery and clean with alcohol and brush or enlarge pins with needle nose pliers.
	2 Battery may be defective.	Have battery load tested.

Remember that the charger, the battery, and the vehicle electrical system must all be connected and functioning properly.

VRW POWER TENDER PLUS    Vehicle Electrical System

Note: Be sure to allow enough time for the charger to recharge the battery. Typical motorcycle batteries have maximum amp-hour capacities of 20Ah or less. A 5 amp charger will probably take more than 5 hours to fully recharge batteries that large.

If your charger still has abnormal symptoms after trying the recommended remedies listed above, call or email Deltran Customer Service or Technical Support. Most of the troubles encountered when recharging batteries are due to poor quality or improper electrical connections between the battery and the charger.

Deltran Customer Service Phone 386-736-7900 Customer Service Email [service@batterytender.com](mailto:service@batterytender.com)  
 Technical Support Email: [support@batterytender.com](mailto:support@batterytender.com)