



High Frequency SUPERSMART® Chargers

Deltran

For Industrial, Commercial, Electric-Vehicle, & Golf-Cart Applications

**Deltran Adaptive Charging: *DAC Software***  
***Optimized for Flooded & AGM Lead-Acid Batteries***

**WATER-RESISTANT**

Single Output Battery Chargers



Improved Shock & Vibration Resistance

MODELS
12V 20A
24V 20A
36V 15A
48V 10A

5-Step Charging!

INDUSTRIAL, COMMERCIAL, ELECTRIC-VEHICLE, GOLF-CART

- ❖ BTP MICROPROCESSOR TECHNOLOGY
- ❖ 5-STEP CHARGING (Initialization, Bulk, Absorption, Equalization & Float Maintenance)
- ❖ DELTRAN ADAPTIVE CHARGING (DAC) Software for both Standard, Flooded and Sealed, Maintenance Free, AGM Lead-Acid Batteries
- ❖ SHORT CIRCUIT PROTECTED
- ❖ REVERSE POLARITY PROTECTED
- ❖ WATER-RESISTANT
- ❖ CONVENIENT MOUNTING HOLES & SLOTS
- ❖ FLEXIBLE INTERFACE (AC Input Module & DC Terminal Block)
- ❖ 2 YEAR WARRANTY



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**GENERAL DESCRIPTION:** The DAC SUPERSMART® battery charger is a microprocessor controlled, high frequency switching power converter that has a true DC output at a maximum power level of approximately 300 watts for the 12V model and 600 watts for the 24V, 36V, & 48V models. The charging algorithm is optimized to accommodate both standard, flooded and sealed, AGM lead acid batteries.

**ELECTRICAL CABLE CONNECTIONS:** The DAC High Frequency SUPERSMART® battery charger is designed to easily accommodate custom, value added, electrical connection requirements. The AC input power connects through a standard 3-wire IEC-320 cord-set, with a C13 connector, to an IEC-60320 input module. The DC output is connected through a 2-pin terminal block. Standard consumer shipments include a red & black, 12 AWG, 600V, pair of wires, with crimped ring terminal terminations at one end.

**ENVIRONMENTAL CHARACTERISTICS:** The DAC High Frequency SUPERSMART® battery charger internal compartment is environmentally sealed from moisture, dust, & debris. Although the temperature may rise during extended full power operation, the maximum case temperature is well within Nationally Recognized Laboratory Human Factors compliance standards. Internal PCB is conformal coated to minimize premature component and circuit function deterioration due to moisture and/or dust & debris ingress.

## **CONFIGURATION CHANGE NOTES:**

### **High Frequency SUPERSMART® Golf-Cart Style Chargers:**

#### **NEW Configurations:**

- ❖ 12V20A , 24V20A, 36V15A, & 48V10A with Deltran Adaptive Charging (DAC) software.
- ❖ Phase I modifications include DAC software (suitable for both flooded and AGM lead-acid batteries).
- ❖ Phase 2 modifications (2Q2004) include multiple hardware, circuit function, and both mechanical and electrical interface upgrades while preserving the basic form factor and weight of the original designs.

#### **Discontinued Configurations:**

- ❖ All AGM and Standard software models within the 12V, 24V, 36V, or 48V model groups. Chargers with these nominal output voltages will now ship with the DAC (Deltran Adaptive Charging) software.
- ❖ configuration that is suitable for both standard and AGM lead-acid batteries.



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## INDICATOR LIGHT OPERATION SUMMARY

### HIGH FREQUENCY SUPER SMART GOLF CART STYLE CHARGERS:

Models: 12V20A, 24V20A, 36V15A, & 48V10A

Deltran Base PN 022-0160 (12V), 022-0159 (24V), 022-0151 (36V), 022-0154 (48V)

*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 10 amp DC current, and a 220 Amp-Hour battery, the bulk charge period may last 20 to 24 hours.*

#### SOFTWARE: DAC (Deltran Adaptive Charging)

[Designed for all sealed, maintenance free batteries, except true gel cells.]

#### ALSO WORKS WITH FLOODED CELLS.

DAC software will replace both STANDARD and AGM/GRT software.

#### STATUS INDICATING LIGHTS OPERATION: 3 LIGHTS: YELLOW (AMBER), GREEN, & RED:

- < **YELLOW - FULL RECHARGE (Automatic): BULK, ABSORPTION, & EQUALIZATION:** When the yellow light is on, the battery charger is in the process of fully charging the battery. The lengths of the constant voltage absorption and equalization periods are computed separately from the length of the constant current bulk period.
- < **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. Float output current limit = Equalization current limit.
- < **RED FLASHING – ERROR External:** When the red light is flashing, the battery has not been connected or has been connected improperly.

#### STANDARD SOFTWARE MODELS: NORMAL INDICATORS, VOLTAGES, CURRENTS, & TIMES

CHARGE MODE =>	BULK CURRENT	ABSORPTION TRANSITION	ABSORPTION VOLTAGE	EQUALIZATION VOLTAGE	EQUALIZATION CURRENT LIMIT	STORAGE VOLTAGE	FLOAT TO FULL RECHARGE TRANSITION
AUTOMATIC MODE =>	SOLID AMBER					SOLID GREEN	BACK TO SOLID AMBER
12V/20A	20A	I< 18A	14.7V	16.0V	2A	13.4V	12V-12.5V
24V/20A	20A	I< 18A	29.4V	32.0V	2A	26.8V	24V-24.5V
36V/15A	15A	I< 13A	44.1V	48.0V	2A	40.2V	36V-36.5V
48V/10A	10A	I< 9A	58.8V	64.0V	2A	53.6V	48V-48.5V
AUTO TIMES:	T1 <sup>a</sup>	1.5*T1		0.5*T1		INDEFINITE	RESET TO ZERO

Notes: <sup>a</sup> DAC software voltages, currents, and timing are essentially the same as AGM/GRT software. However, DAC software has enhanced qualification mode operation to ensure a minimum bulk time to prevent premature charge algorithm termination on a nearly charged battery. Minimum bulk charge time is 30 minutes. Therefore, minimum absorption time is 45 minutes and minimum equalization time is 15 minutes. The total minimum charge algorithm time until the green light comes on is 90 minutes.



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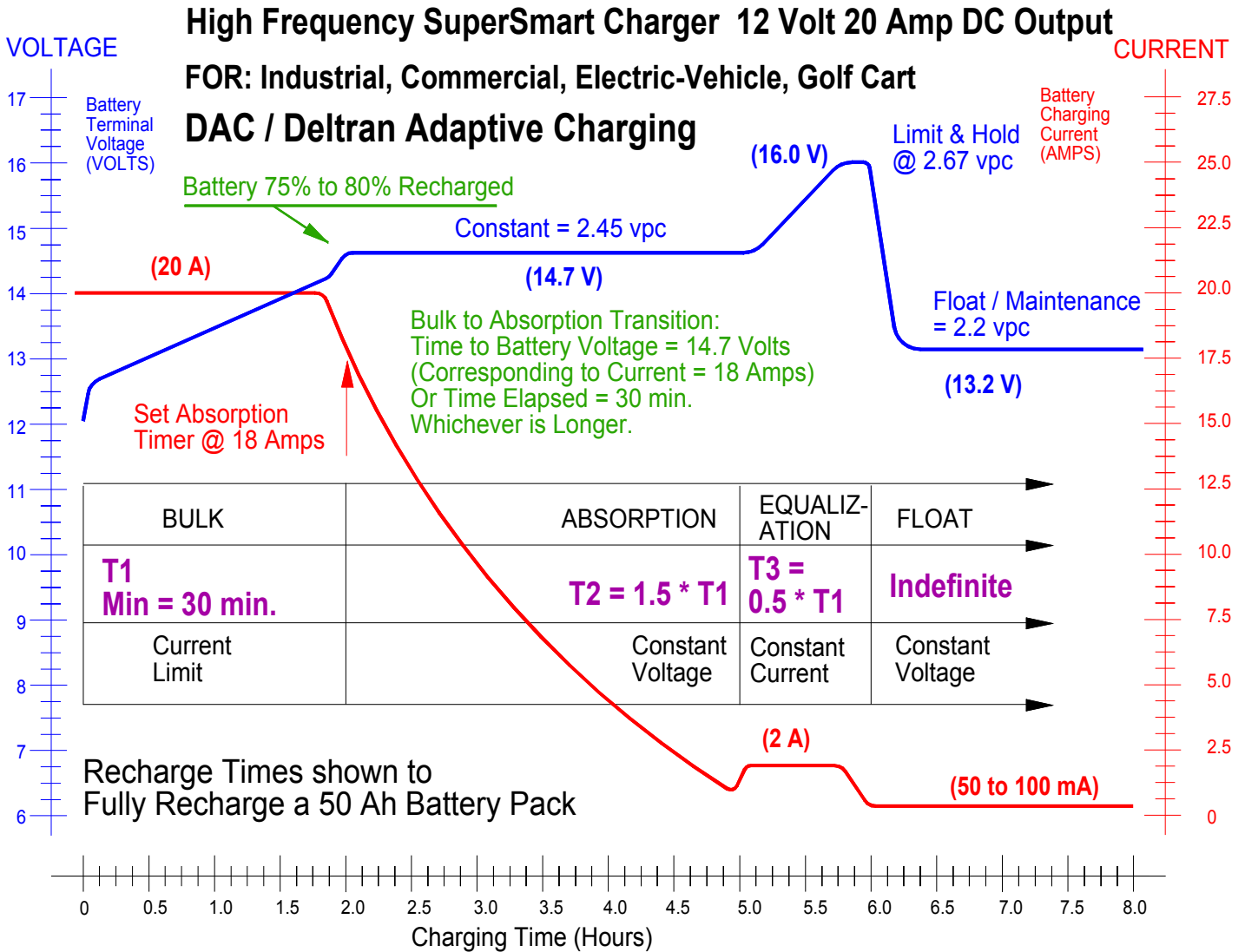
## DAC HF SUPERSMART CHARGERS REPLACE

STANDARD & AGM, HFSS GOLF-CART STYLE CHARGERS:

Applies to Models: 12V20A Deltran Part Numbers:

**022-0160-1 / -2 REPLACES:** 022-0081-1 / -2, & 022-0119-1 / -2

(AC INPUT: Factory Selectable Nominal 120 VAC or 240VAC, 50/60 Hz)



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: 0081, & 0119 will be labeled as such and will be fabricated from a 0119 hardware baseline configuration with DAC software installed until full DAC configuration units are available in 2<sup>nd</sup> Qtr 2004.



# High Frequency SUPERSMART® Chargers



For Industrial, Commercial, Electric-Vehicle, & Golf-Cart Applications

<b>12V20A High Frequency SUPERSMART DAC Charger</b>				
Comparison with <b>DISCONTINUED</b> HFSS Std & AGM Golf Cart Style Chargers				
Deltran Part Number	<b>022-0081-1/-2</b>	<b>022-0119-1/-2</b>	<b>022-0160-1/-2</b>	Comments
<b>MODEL</b>	<b>12V20A STD</b>	<b>12V20A AGM</b>	<b>12V20A DAC</b>	
Software	Standard	AGM/GRT	DAC	
Bulk Current Max	20.0 Amps			NO CHANGE
LED INDICATION	SOLID AMBER			
Absorption Voltage	14.5 VDC	14.7 VDC	14.7 VDC	
LED INDICATION	SOLID AMBER			
Absorption Termination	Charge Current < 3.0 Amperes	Time = 150% of Bulk Period	Time = 150% of Bulk Period	Minimum Bulk Period = 30 min
<b>Equalization</b> Volts/Amps	NA	15.6 VDC / 2.0 A	16.0 VDC MAX / 2.0 A	
<b>Equalization</b> Termination	NA	Time = 50% of Bulk Period	Time = 50% of Bulk Period	
Float Voltage	13.2 VDC	13.6 VDC	13.4 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 (-1) or 180 to 264 VAC (-2) @ 50/60 Hz			NO CHANGE
AC Line Current (Max)	Approx 4.0 or 2.0 Amperes RMS (Line VAC Dependent)			NO CHANGE
<b>Electrical Isolation:</b>				
Input / Output: & Input / Chassis:	2500 VAC			NO CHANGE
Output / Chassis:	500 VAC			NO CHANGE
Short Circuit Protection	Yes			New Circuit
Reverse Polarity Protection	Yes (External Fuse)		Yes, Internal Active Circuit NO FUSE	
Spark Proof	No			NO CHANGE
Temperature Compensation	No			NO CHANGE
<b>DC QUICK CONNECT PLUG</b>	No, Hardwired Ring Terminals		DC Terminal Block, Flexible Interface	
Shipping Weight	10.0 lbs.		9 lbs, 1 lb Lighter	
Case Dimensions	12.0 in (305 mm) L x 7.75 in (197 mm) W x 3.375 in (86 mm) H		<b>13.25 in (337 mm) L x 7.75 in (197 mm) W x 3.375 in (86 mm) H, 1.25 inch Longer</b>	
Mounting Holes	Standard Slots		New Base Plate, More Mounting Options	
<p><b>COMMENTS:</b> The Deltran Adaptive Charging configuration easily accommodates the charging requirements for Sealed VRLA, GRT, AGM batteries and flooded cells. Additional improvements in battery pre-charge qualification, moisture resistance, and the unit's ability to withstand vibration and shock, provide a measure of performance that is clearly superior to that of the traditional golf cart 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>				



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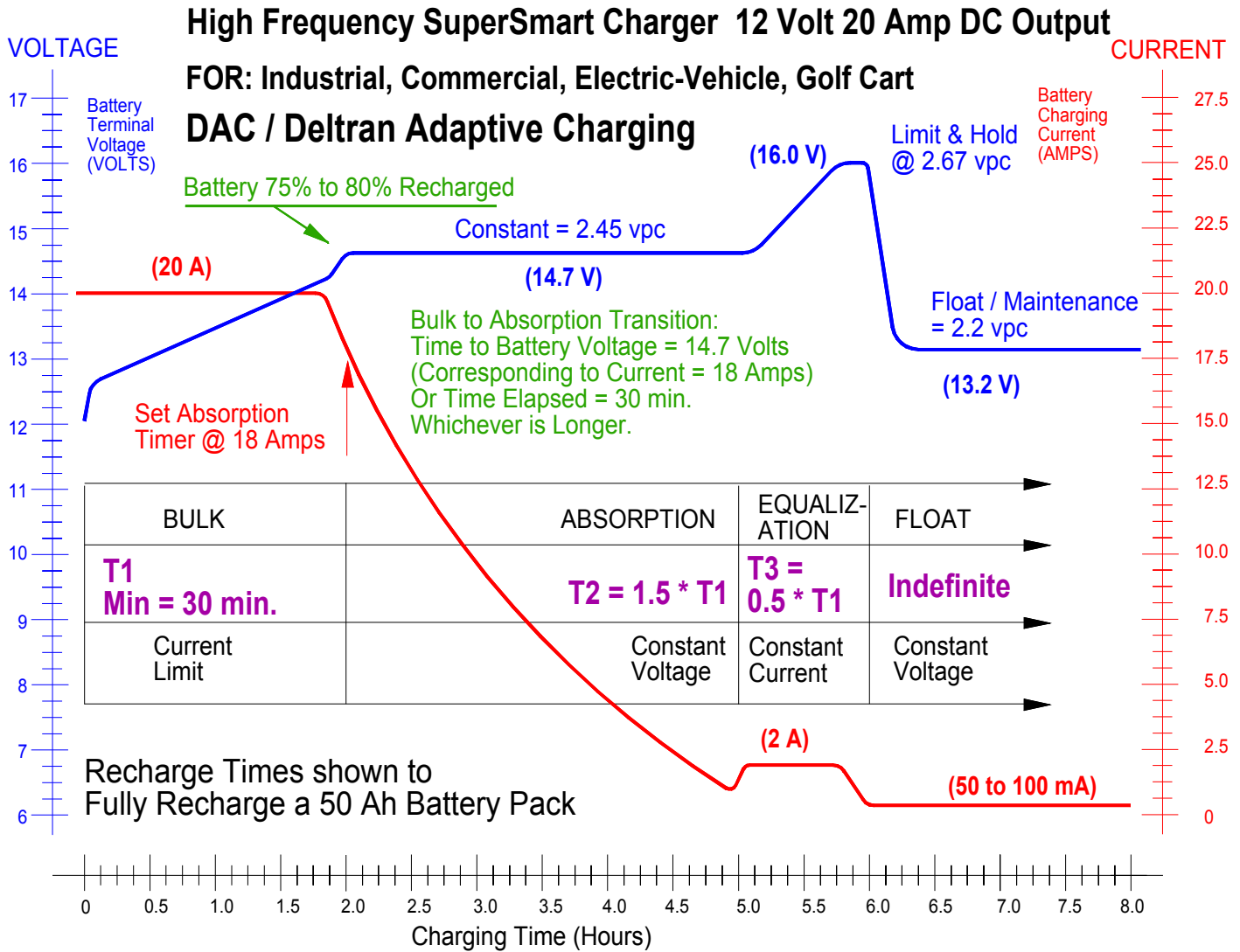
## DAC HF SUPERSMART CHARGERS REPLACE

STANDARD & AGM, HFSS GOLF-CART STYLE CHARGERS:

Applies to Models: 24V20A Deltran Part Numbers:

**022-0159-1 / -2 REPLACES:** 022-0077-1 / -2, & 022-0102-1 / -2

(AC INPUT: Factory Selectable Nominal 120 VAC or 240VAC, 50/60 Hz)



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: 0077, & 0102 will be labeled as such and will be fabricated from a 0102 hardware baseline configuration with DAC software installed until full DAC configuration units are available in 2<sup>nd</sup> Qtr 2004.



# High Frequency SUPERSMART<sup>®</sup> Chargers



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## 24V20A High Frequency SUPERSMART DAC Charger

Comparison with **DISCONTINUED** HFSS Std & AGM Golf Cart Style Chargers

Deltran Part Number	022-0077-1/-2	022-0102-1/-2	022-0159-1/-2	Comments
<b>MODEL</b>	<b>24V20A STD</b>	<b>24V20A AGM</b>	<b>24V20A DAC</b>	
Software	Standard	AGM/GRT	DAC	
Bulk Current Max	20.0 Amps			NO CHANGE
LED INDICATION	SOLID AMBER			
Absorption Voltage	29.0 VDC	29.8 VDC	29.8 VDC	
LED INDICATION	SOLID AMBER			
Absorption Termination	Charge Current < 3.0 Amperes	Time = 150% of Bulk Period	Time = 150% of Bulk Period	Minimum Bulk Period = 30 min
Equalization Volts/Amps	NA	31.2 VDC / 2.0 A	32.0 VDC MAX / 2.0 A	
Equalization Termination	NA	Time = 50% of Bulk Period	Time = 50% of Bulk Period	
Float Voltage	26.4 VDC	27.2 VDC	27.2 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 (-1) or 180 to 264 VAC (-2) @ 50/60 Hz			NO CHANGE
AC Line Current (Max)	Approx 4.0 or 2.0 Amperes RMS (Line VAC Dependent)			NO CHANGE
<b>Electrical Isolation:</b>				
Input / Output: & Input / Chassis:	2500 VAC			NO CHANGE
Output / Chassis:	500 VAC			NO CHANGE
Short Circuit Protection	Yes			New Circuit
Reverse Polarity Protection	Yes (External Fuse)	Yes, Internal Active Circuit NO FUSE		
Spark Proof	No			NO CHANGE
Temperature Compensation	No			NO CHANGE
DC QUICK CONNECT PLUG	No, Hardwired Ring Terminals		DC Terminal Block, Flexible Interface	
Shipping Weight	10.0 lbs.		9 lbs, 1 lb Lighter	
Case Dimensions	12.0 in (305 mm) L x 7.75 in (197 mm) W x 3.375 in (86 mm) H		13.25 in (337 mm) L x 7.75 in (197 mm) W x 3.375 in (86 mm) H, 1.25 inch Longer	
Mounting Holes	Standard Slots		New Base Plate, More Mounting Options	
<b>COMMENTS:</b> The Deltran Adaptive Charging configuration easily accommodates the charging requirements for Sealed VRLA, GRT, AGM batteries and flooded cells. Additional improvements in battery pre-charge qualification, moisture resistance, and the unit's ability to withstand vibration and shock, provide a measure of performance that is clearly superior to that of the traditional golf cart feature set.				
<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.				
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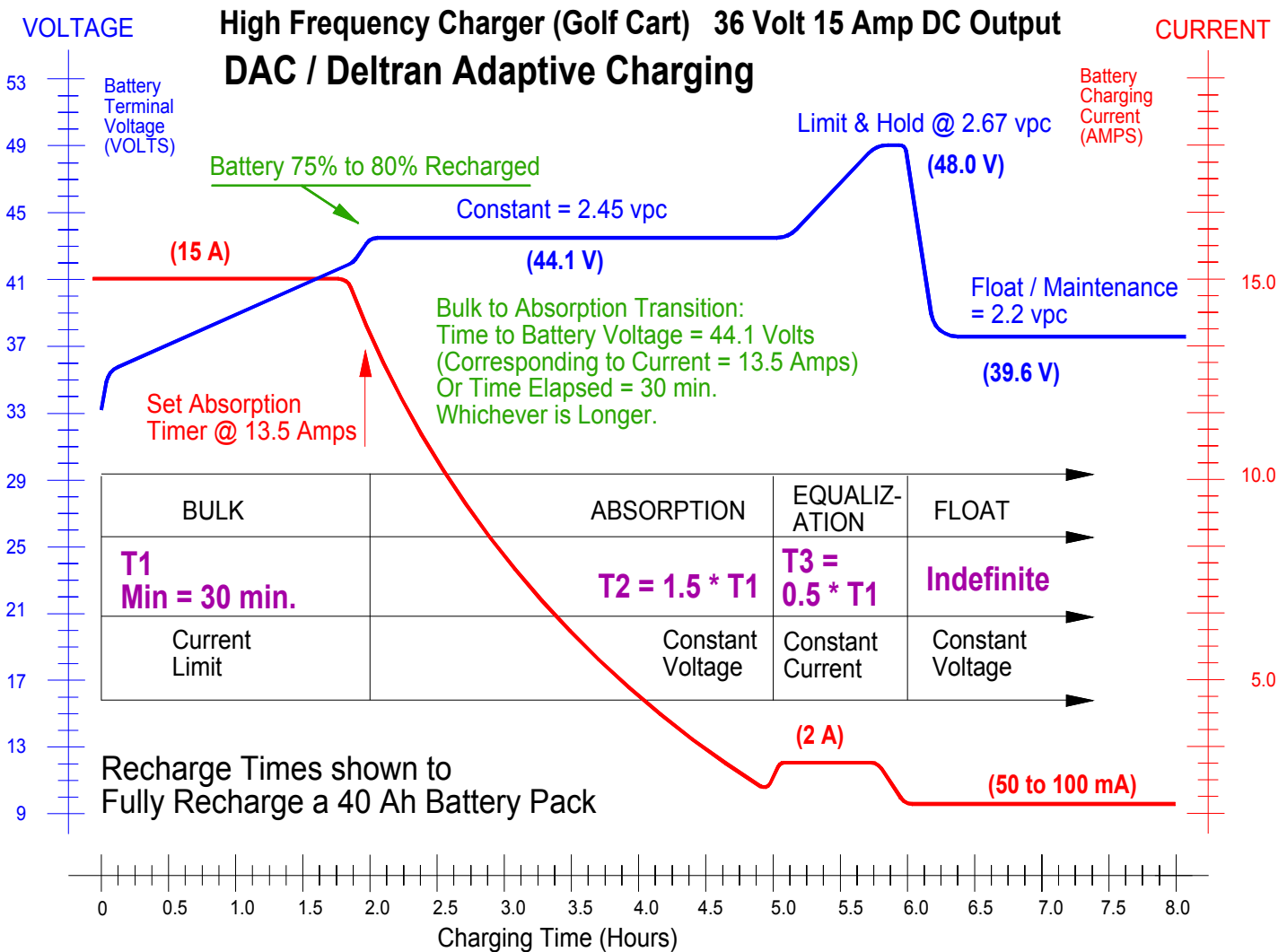
## DAC HF SUPERSMART CHARGERS REPLACE

STANDARD & AGM, HFSS GOLF-CART STYLE CHARGERS:

Applies to Models: 36V15A Deltran Part Numbers:

**022-0151-1 / -2 REPLACES: 022-0066-1 / -2, & 022-0115-1 / -2**

(AC INPUT: Factory Selectable Nominal 120 VAC or 240VAC, 50/60 Hz)



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: 0066, & 0115 will be labeled as such and will be fabricated from a 0115 hardware baseline configuration with DAC software installed until full DAC configuration units are available in 2<sup>nd</sup> Qtr 2004.



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## 36V15A High Frequency SUPERSMART DAC Charger

Comparison with **DISCONTINUED** HFSS Std & AGM Golf Cart Style Chargers

Deltran Part Number	022-0066-1/-2	022-0115-1/-2	022-0151-1/-2	Comments
<b>MODEL</b>	<b>36V15A STD</b>	<b>36V15A AGM</b>	<b>36V15A DAC</b>	
Software	Standard	AGM/GRT	DAC	
Bulk Current Max	15.0 Amps			NO CHANGE
LED INDICATION	SOLID AMBER			
Absorption Voltage	43.5 VDC	44.1 VDC	44.1 VDC	
LED INDICATION	SOLID AMBER			
Absorption Termination	Charge Current < 3.0 Amperes	Time = 150% of Bulk Period	Time = 150% of Bulk Period	Minimum Bulk Period = 30 min
<b>Equalization</b> Volts/Amps	NA	46.8 VDC / 2.0 A	48.0 VDC MAX / 2.0 A	
<b>Equalization</b> Termination	NA	Time = 50% of Bulk Period	Time = 50% of Bulk Period	
Float Voltage	39.6 VDC	40.8 VDC	39.6 VDC	
LED INDICATION	SOLID GREEN			
Reset Transition	Battery Voltage Drops Between 36 & 36.5 VDC			NO CHANGE
AC Voltage / Frequency	90 to 132 VAC (-1) or 180 to 264 VAC (-2) @ 50/60 Hz			NO CHANGE
AC Line Current (Max)	Approx 4.0 or 2.0 Amperes RMS (Line VAC Dependent)			NO CHANGE
<b>Electrical Isolation:</b>				
Input / Output: & Input / Chassis:	2500 VAC			NO CHANGE
Output / Chassis:	500 VAC			NO CHANGE
Short Circuit Protection	Yes			New Circuit
Reverse Polarity Protection	Yes (External Fuse)	Yes, Internal Active Circuit NO FUSE		
Spark Proof	No			NO CHANGE
Temperature Compensation	No			NO CHANGE
<b>DC QUICK CONNECT PLUG</b>	No, Hardwired Ring Terminals		DC Terminal Block, Flexible Interface	
Shipping Weight	10.0 lbs.		9 lbs, 1 lb Lighter	
Case Dimensions	12.0 in (305 mm) L x 7.75 in (197 mm) W x 3.375 in (86 mm) H		<b>13.25 in (337 mm) L x 7.75 in (197 mm) W x 3.375 in (86 mm) H, 1.25 inch Longer</b>	
Mounting Holes	Standard Slots		New Base Plate, More Mounting Options	
<b>COMMENTS:</b> The Deltran Adaptive Charging configuration easily accommodates the charging requirements for Sealed VRLA, GRT, AGM batteries and flooded cells. Additional improvements in battery pre-charge qualification, moisture resistance, and the unit's ability to withstand vibration and shock, provide a measure of performance that is clearly superior to that of the traditional golf cart feature set.				
<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.				
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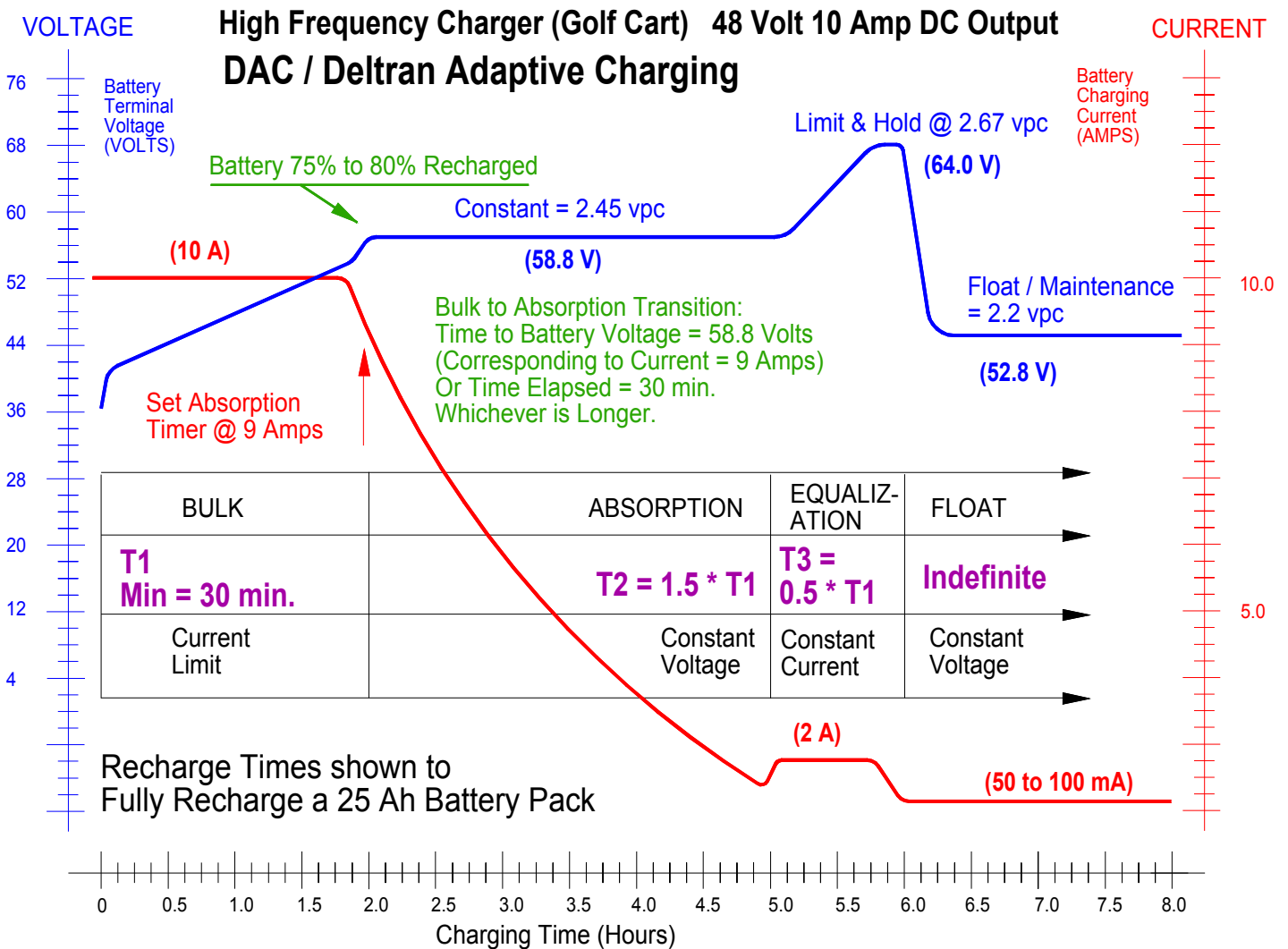
## DAC HF SUPERSMART CHARGERS REPLACE

STANDARD & AGM, HFSS GOLF-CART STYLE CHARGERS:

Applies to Models: 48V10A Deltran Part Numbers:

**022-0154-1 / -2 REPLACES: 022-0074-1 / -2, & 022-0113-1 / -2**

(AC INPUT: Factory Selectable Nominal 120 VAC or 240VAC, 50/60 Hz)



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: 0074, & 0113 will be labeled as such and will be fabricated from a 0113 hardware baseline configuration with DAC software installed until full DAC configuration units are available in 2<sup>nd</sup> Qtr 2004.



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<b>48V10A High Frequency SUPERSMART DAC Charger</b>				
Comparison with <b>DISCONTINUED</b> HFSS Std & AGM Golf Cart Style Chargers				
Deltran Part Number	022-0074-1/-2	022-0113-1/-2	022-0151-1/-2	Comments
<b>MODEL</b>	<b>48V10A STD</b>	<b>48V10A AGM</b>	<b>48V10A DAC</b>	
Software	Standard	AGM/GRT	DAC	
Bulk Current Max	10.0 Amps			NO CHANGE
LED INDICATION	SOLID AMBER			
Absorption Voltage	58.0 VDC	58.8 VDC	58.8 VDC	
LED INDICATION	SOLID AMBER			
Absorption Termination	Charge Current < 3.0 Amperes	Time = 150% of Bulk Period	Time = 150% of Bulk Period	Minimum Bulk Period = 30 min
<b>Equalization</b> Volts/Amps	NA	62.4 VDC / 2.0 A	<b>64.0 VDC MAX / 2.0 A</b>	
<b>Equalization</b> Termination	NA	Time = 50% of Bulk Period	Time = 50% of Bulk Period	
Float Voltage	52.8 VDC	54.4 VDC	52.8 VDC	
LED INDICATION	SOLID GREEN			
Reset Transition	Battery Voltage Drops Between 48.0 & 48.5 VDC			NO CHANGE
AC Voltage / Frequency	90 to 132 VAC (-1) or 180 to 264 VAC (-2) @ 50/60 Hz			NO CHANGE
AC Line Current (Max)	Approx 4.0 or 2.0 Amperes RMS (Line VAC Dependent)			NO CHANGE
<b>Electrical Isolation:</b>				
Input / Output: & Input / Chassis:	2500 VAC			NO CHANGE
Output / Chassis:	500 VAC			NO CHANGE
Short Circuit Protection	Yes			New Circuit
Reverse Polarity Protection	Yes (External Fuse)		Yes, Internal Active Circuit NO FUSE	
Spark Proof	No			NO CHANGE
Temperature Compensation	No			NO CHANGE
<b>DC QUICK CONNECT PLUG</b>	No, Hardwired Ring Terminals		DC Terminal Block, Flexible Interface	
Shipping Weight	10.0 lbs.		9 lbs, 1 lb Lighter	
Case Dimensions	12.0 in (305 mm) L x 7.75 in (197 mm) W x 3.375 in (86 mm) H		<b>13.25 in (337 mm) L x 7.75 in (197 mm) W x 3.375 in (86 mm) H, 1.25 inch Longer</b>	
Mounting Holes	Standard Slots		New Base Plate, More Mounting Options	
<b>COMMENTS:</b> The Deltran Adaptive Charging configuration easily accommodates the charging requirements for Sealed VRLA, GRT, AGM batteries and flooded cells. Additional improvements in battery pre-charge qualification, moisture resistance, and the unit's ability to withstand vibration and shock, provide a measure of performance that is clearly superior to that of the traditional golf cart feature set.				
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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, yellow light never comes on.	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. (Earlier Hardware configuration only)	<b>Replacement:</b> 25 Amp (or 30 Amp), 125 Volt, Cartridge, 0.25 inch by 1.25 inch, Ceramic, Fast Blow: <b>Bussmann</b> PN: ABC-25 or ABC-30. <b>Littelfuse</b> PN: 314-025 or 314-030.
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. If 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.
Yellow 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.
Yellow 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.

Note: Be sure to allow enough time for the charger to recharge the battery. A golf cart type electric vehicle may have batteries with an amp-hour capacity of 200 Ah or more. A 10 amp charger will probably take more than 24 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)