BatteryMINDer®

E12248-AA-Series

12-Volt Aviation-Calibrated

Charger / Maintainer / Desulfator

INSTRUCTION MANUAL

BATTERY TYPE	RECOMMENDED CHARGER MODEL	
CONCORDE FLOODED	S2	S5
GILL FLOODED and SEALED	S2	
CONCORDE SEALED RG	S5 ONLY	
HAWKER-ODYSSEY	S3 ONLY	
GILL LT/7000	S3	

CE

All Models Include:

- 2' **Battery Clip Cord Set** (insulated) with Quick Connector
- One **Ambient Temperature Sensor** (**ATS-1**) (see **Simple Operating Instructions**)

READ AND SAVE THESE INSTRUCTIONS

VDC Electronics, Inc. • 155 W. Carver St., Ste. 2 • Huntington, NY 11743

www.BatteryMINDers.com • techsupport@vdcelectronics.com

Rev. C-071213-1

P/N VDCE12248-AA-Sx-MNL

Table Of Contents

Glossary of Terms

- ***Maintain a battery***
  BatteryMINDer ensures batteries are truly fully charged and will likely continue improving the condition of the battery to the fullest extent possible.
- ***Rested***
  A battery that has been as fully charged as possible and left disconnected from charger or any type load overnight.
- ***Specific Gravity***
  One of the key parameters of battery operation is the specific gravity of the electrolyte. Specific gravity is the ratio of the weight of a solution to the weight of an equal volume of water at a specified temperature. Specific gravity is used as an indicator of the state of charge of a cell or battery.
- ***Sulfation***
  Occurs when the battery sits discharged for a long period of time and large sulfate crystals build up in the plates. The large sulfate crystals increase the resistance of the plates and makes the battery harder to recharge.

REQUIRED SAFETY INSTRUCTIONS
WARNING
READ AND FULLY UNDERSTAND BEFORE OPERATING
Contact VDC Electronics if uncertain about any settings or operation.

TO REDUCE THE RISK OF FIRE, ELECTRIC SHOCK, OR INJURY TO PERSON, OBSERVE THE FOLLOWING:

- This unit is designed for protected use and should never be exposed to rain.
- Do not attempt to use the unit if it has been dropped or damaged.
- Never attempt to charge a damaged battery, frozen battery or non-rechargeable battery.
- Do not use the unit in a closed area or poorly ventilated area.
- Never smoke, use an open flame, or create sparks near a battery or unit during charging operation as this may cause an explosion / explosive gas.
- Do not operate the unit if the cord or plug is damaged.
- Do not disassemble. VDC Electronics MUST be contacted for repair, replacement or analysis. Keep away from infants, children and pets.
- Switch off or remove AC power before connecting or disconnecting to battery.
- Refer to the battery Manufacturer's specific recommended values to determine if standard unit settings are correct. Contact VDC Electronics Tech Support before making any changes
- Check Battery Manufacturer's specific precautions - such as removing or not removing battery from aircraft before charging.
- Always remove battery from aircraft before equalizing or desulfating.
- Someone should be within range of your voice or close enough to come to your aid if working near a lead-acid battery.
- Wear protective goggles and turn your face away when connecting or disconnecting a battery.
- If battery acid contacts your skin or clothing, wash immediately with soap and water. If acid enters your eye, immediately flush the eye with running cold water for at least 10 minutes and seek medical attention immediately.
- To reduce risk of damaging the battery, avoid dropping any metal tools onto the battery.
- Never rest your Battery Charger on top of the Battery being charged.
- The Battery Charger / power supply should be kept as far away from the Battery as the output cables permit.

Always follow battery manufacturer's strict instructions for proper care, charging and testing of battery. Always use their FAA Approved "Instructions for Continued Airworthiness" (ICA). Questions relating to the subject should be referred directly to the battery manufacturer to be certain of current requirements that may have been added to or changed since publication of their instructions.

NEVER CHARGE A FROZEN BATTERY OR ONE AT A TEMPERATURE ABOVE 123° F.

PREPARING TO CHARGE

A. Always disconnect ground wire first.
B. Be sure area around battery is well ventilated while battery is being charged. Force gas vapors away by using a fan.
C. Clean battery terminals. Be careful to keep corrosion from contacting eyes.
D. Study all battery manufacturer's specific instructions such as recommended charge rates.
E. Determine condition of battery, by referring to instructions herein, before ever attempting to charge or desulfate any / all batteries.
F. Make sure unit is as far away from battery as output cables permit.
G. Never place unit directly above battery being charged; gases from battery will corrode and damage unit.
H. Never allow battery acid to drip on charger when reading specific gravity or filling.
I. Do not operate unit in a closed-in area or restrict ventilation in any way.
J. Do not set battery on top of unit.

DC CONNECTION PRECAUTIONS

Note: Steps to be done in a well ventilated area away from aircraft.
A. Connect and disconnect DC output clips from battery only after removing unit power cord from outlet.
B. Attach clips to battery posts and twist or rock back and forth several times to make good contact. This tends to keep clips from slipping off terminals and reduces risk of sparking.

UNIT LOCATION

A spark near the battery may cause battery explosion. To reduce risk of a spark near battery:
A. Check polarity of battery posts. POSITIVE (POS, P, +) usually has a larger diameter than NEGATIVE (NEG, N, -) battery post.

B. Connect (**RED**) charger clip to (POS+) post of battery.
C. Position yourself and free end of cable as far away from battery as possible, then connect NEGATIVE (**BLACK**) charger clip.
D. Do not face battery when making final connections.
E. When disconnecting unit, always do so in reverse sequence of connecting procedure and break first connection while as far away from battery as practical. **Do not attempt to permanently install unit not specifically designed-approved for permanent installation, especially in a wet high moisture environment.**

NOTE: Because some batteries are not easily accessible, for example located in the wing, tail, under the seat or in a battery box, it is acceptable to attach the positive alligator clip to the positive post of the battery relay or solenoid that is directly connected to the positive terminal of the battery and attach the negative alligator clip to a suitable aircraft ground connection.

QUALIFYING YOUR BATTERY

Preliminary Requirements

NOTE: The BatteryMINDer has no electrical output unless it is connected to a healthy battery. Testing the BatteryMINDer with a voltmeter without the unit being connected across a good battery will result in a false reading. If you experience any problems, or are not sure of how to properly use or connect your BatteryMINDer, please e-mail our Tech Support Dept. at: techsupport@vdcelectronics.com or call our toll-free technical support line 800-379-5579 x206 (Eastern Time) (USA & Canada ONLY). **Be certain to leave your phone number with the area code, time zone and the best time to call.**

To gain the best result from your unit and to maximize the life and performance of your batteries we strongly recommend you qualify (test) your batteries before attempting to either charge-maintain or desulfate them. Remember, even if you just purchased a "new" battery it may have been subjected to storage conditions that have caused "sulfation" such as an extended period at high temperature (≥80°F).

NOTE: If your battery is new and you are certain it was not subject to conditions that could have caused *sulfation, even before you purchased it, then you can disregard our recommendations for qualifying / testing your battery, before using the BatteryMINDer.**

*Such as high temperature storage (≥80°F) and/or allowed to self-discharge to 12.4 volts or lower.

CHARGING A FILLER CAP LEAD ACID BATTERY

A. Carefully remove all filler caps from your battery.

B. Check the water-liquid electrolyte level. If the level is low or has ever been below top of plates, severe lead plate sulfation has taken place. Significant recharge/reconditioning time is needed to restore these plates to a condition where the battery may be expected to function normally.

C. Refill each cell with distilled water only to the liquid level indicator found in each cell. **Before proceeding further you must be thoroughly familiar with the safety and operating instructions.**

D. Recharge the battery with the BatteryMINDer to ensure that it is slowly and completely charged before you determine its condition. Allow battery to ***"REST"*** overnight for a minimum of 12 hours before testing with a temperature compensated hydrometer and/or digital type voltmeter only.

E. If the BatteryMINDer battery condition LED lights (**YELLOW**) within 72 hours (single battery) or no balls float in one or more cells, your battery may be too far gone to be fully desulfated. Reconnect battery to your BatteryMINDer. Allow battery to remain in maintenance mode for a minimum of 72 hours, before re-test. Use a hot/cold calibrated hydrometer tester for the most accurate results (see table) if you see an increase in the Specific Gravity (SG) or voltage indicating that there is an improvement in the battery's condition, continue desulfating for an additional 72 hours and retest the battery. Continue this process until the SG or voltage readings no longer increase.

TESTING WITH A HOT/ COLD CALIBRATED HYDROMETER TESTER

Read the tester instructions carefully for most accurate readings.

A. When using the tester the first time or after a long period of non-use, fill the tester with the battery fluid and let it sit for 1/2 hour or longer. This will soak the balls in order to give you more accurate readings. Failure to do so will give you false readings indicating a battery that may not be in as good a condition as you may have thought.

B. After inserting the tester in a cell, gently tap the tester several times

Specific Gravity – Capacity	
Temperature Compensated Hydrometer - meter or 4 ball type	**Full Capacity Percentage**
1.270 (4 Balls floating)	100%
1.250 (3 Balls floating)	75%
1.190 (2 Balls floating)	50%
1.150 (1 Balls floating)	25%
1.120 (0 Balls floating) May denote shorted cell or battery that has been severely discharged and may not be recoverable	0%

against the inside wall of each cell to dislodge air bubbles that will cause more balls to float than should. Failure to do so will yield false readings that indicate a battery that is not fully desulfated or does not qualify for desulfation.

C. If no balls float in any cell, the cell is shorted. This means your battery is beyond the point of being properly recharged or reconditioned-desulfated. Dispose of the battery.

D. If each cell floats three (3) or more balls (or 1250 on gauge-type), your battery can be reconditioned-desulfated.

E. Always rinse the tester with fresh water after every use. Failure to do so will cause false readings.

CHARGING A SEALED, AGM OR FLOODED (WET-CELL) LEAD ACID BATTERY

These batteries have no filler caps or manifold-type covers. Because you cannot gain access to the interior of your battery you cannot test it with a hydrometer.

USE A DIGITAL VOLTMETER ONLY

A. Recharge the battery with the BatteryMINDer to ensure it is as completely charged as possible, before you determine its condition. Allow battery to "***REST***" overnight before checking the open circuit voltage with a digital voltmeter only. Failure to check a "***RESTED***" battery will cause false readings. Be certain to read and understand all safety related instructions (pages 3 - 7) before proceeding further.

B. Measure battery's voltage, without any load attached. If the voltage is less than 12.6 volts (Typically 75% of charge) the battery may be too heavily sulfated to be fully recoverable. If voltage is 12.6V or higher recovery can be expected, given sufficient time.

C. Connect the BatteryMINDer to the battery

D. Charge battery to its maximum level. Allow battery to remain for a minimum of 72 hours before retesting. If improvement is seen, continue until battery voltage reaches full capacity level or no further increase is seen. Note: Do not expect to completely dissolve sulfate in a day. Long established sulfate will require a longer period to be fully dissolved. Be patient and you will rewarded with a "sulfate-free" battery. If not seriously damaged by sulfate, battery has a very good chance of meeting 85% Cap (Airworthy) Test.

Common Features (All Models)	
1	LED indicators (**a, b & c**) (See Battery Condition and LED Status page)
2	Maintenance Mode ONLY button
3	Temperature Sensor input connector
4	Output cord with quick connect plug
5	IEC Input power cordset for mating with separate Continental plug (included), easily exchangeable with other global plugs shown, length 6 ft. (1.83m). Contact VDC Electronics for price and availability.
6	Mounting tabs
7	Battery Clip (insulated) **BC-AA** cordset with quick connect plug
8	ATS-1 Ambient Temperature Sensor installed (included)

SIMPLIFIED OPERATING INSTRUCTIONS

Read and thoroughly understand ALL SAFETY Instructions, pages 3 - 7 including *Preparing to Charge, DC Connection Precautions, Unit Location* and *Qualifying Your Battery* BEFORE proceeding further.

1. Attach Battery Clips (**7**) (supplied), to output cordset of charger (**4**).
2. Attach output to battery terminals:
   RED band = Positive **+**
   BLACK band = Negative **-**.
3. Ambient Temperature Sensor, **ATS-1** (**8**), comes already installed on the Temperature Sensor input connector (**3**). Do not detach. *The **Ambient Temperature Sensor (ATS-1)** is mandatory when used with all Aviation batteries.*
4. Plug AC power cord (**5**) into a 220 - 240 Vac electrical outlet.
5. Observe Reversed Polarity **GREEN**/**RED** LED indicator (**1a**):
   If lit RED, reverse battery connector attachments on battery.
6. Observe **Charging - Maintenance/Desulfating** **GREEN** LED indicator (**1c**)**:**
   Solid = *charging*
   Blinking = *maintaining battery(s)*.
   Charger will automatically start within 30 seconds or less.
7. Observe **Battery Connected - Error** LED Indicator (**1a**):
   Must be lit **GREEN**[1]**.**

Be sure Maintaining - Desulfating LED (**1c**) is BLINKING before leaving unit for an extended period of time. Otherwise, press & hold the Maintenance button (**2**) for 3 seconds.

IF IN DOUBT REGARDING ANY OF THE ABOVE, REFER TO **Detailed Operating Instructions, page 12.**

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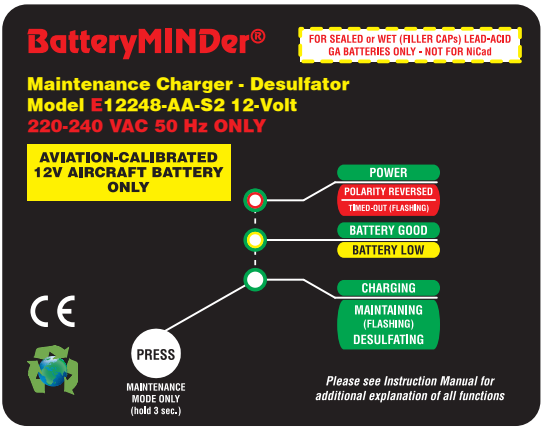
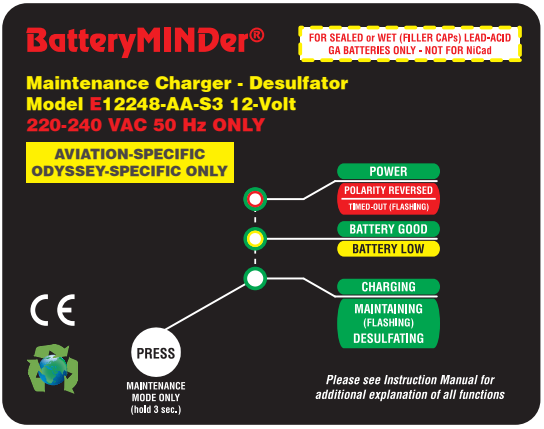
[1] See full instructions if not lit **GREEN**.

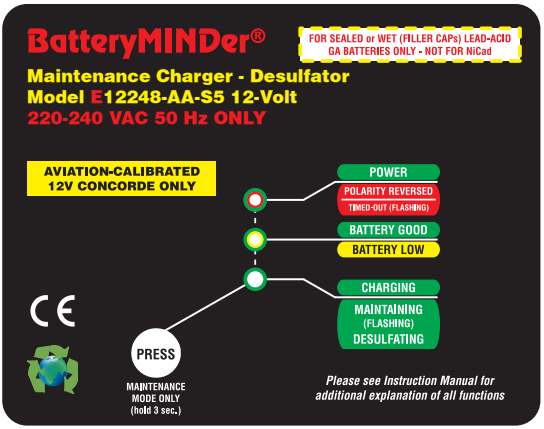
E12248-AA-S2
Gill
(Sealed + Flooded Wet Cell) +
Concorde Flooded



E12248-AA-S3
Hawker-Odyssey + Gill LT/7000



E12248-AA-S5
Concorde
(Sealed Valve-Regulated AGM +
Flooded Wet Cell)



Battery State of Charge Table		
Battery Condition	**Battery Voltage (Vb)**	BATTERY GOOD / BATTERY WEAK
BEFORE full charge	<11	
	>11	
AFTER full charge	Low Voltage	
	Normal Voltage	

LED Status Table		
LED Status (Power / Error and Charge LEDs)	POWER / POLARITY REVERSED / TIMED-OUT (FLASHING)	CHARGING / MAINTAINING (FLASHING) / DESULFATING
A.C. power disconnected, battery connected correctly	OFF	OFF
At Soft Start mode, Bulk charge mode or Absorption mode	ON	ON
Float charge mode	ON	FLASHING
A.C. power connected Reversed Battery Polarity	ON	OFF
A.C. power connected, charger output clip shorted	ON	OFF
A.C. power connected, battery voltage <3V	ON	OFF
Timed-out when in SoftStart or Bulk mode	FLASHING	OFF
Timed-out when in Absorption mode & Forced to Float mode	FLASHING	FLASHING
Battery Fault / Battery Weak	FLASHING	OFF

DETAILED OPERATING INSTRUCTIONS

Installed properly, your charger is set to provide your battery with what it needs to out-live and out-perform any similar battery used in the same application-conditions by a factor of two (2).

Read and thoroughly understand ALL SAFETY Instructions, pages 3 - 7 including *Preparing to Charge*, *DC Connection Precautions*, *Unit Location* and *Qualifying Your Battery* BEFORE proceeding further.

1. Attach output cord of charger to the Battery Clip(s) Assembly (**BCAA**) (supplied). **For Aviation applications, WE NO LONGER ADVISE USE OF THE RTA ON ANY BATTERIES WHILE THE BATTERY IS LOCATED WITHIN A CONFINED AREA, SUCH AS IN AN AIRCRAFT ENGINE COMPARTMENT.**
2. **BATTERY SHOULD BE REMOVED FROM AIRCRAFT OR OPEN TO FREE FLOWING AIR TO AVOID POSSIBLE BUILD-UP OF HARMFUL HYDROGEN GAS IN THE EVENT BATTERY HAS A SHORTED CELL(S) OR CHARGING SOURCE IS INCORRECT OR MALFUNCTIONS. YOU SHOULD ALWAYS REFER TO YOUR BATTERY MANUFACTURER'S RECOMMENDATIONS *FIRST AND FOREMOST* ON CHARGING A BATTERY WITHIN THE AIRCRAFT FOR FURTHER INFORMATION.**
3. **NOTE: Because some batteries are not easily accessible, for example located in the wing, tail, under the seat or in a battery box, it is acceptable to attach the positive alligator clip to the positive post of the battery relay or solenoid that is directly connected to the positive terminal of the battery and attach the negative alligator clip to a suitable aircraft ground connection. See page 14 for information on CHARGING A BATTERY IN A TIGHTLY CONFINED AREA.**
4. Plug the unit's Power cord into a standard – grounded 220 - 240 Vac electrical outlet. The Power On LED Indicator will light **GREEN**. Within 30 seconds, if it does not light **GREEN** check the outlet to be sure it is functioning. In addition, be sure if outlet is controlled by a switch, no one will accidentally shut off the power to the outlet. Check for correct polarity = (no ERROR **RED** LED Indicator). If ERROR Indicator is lit, reverse the charger's output connections to the battery.

5. Charger will automatically start within 15 - 30 seconds. The Charge – Float LED Indicator will light **GREEN**. The charger will now begin charging by first checking the battery to determine its voltage and ability to accept a charge. Should the battery not have a normal fully discharged voltage (10.5V minimum) the unit will begin charging in the "Soft-Start" mode to determine if the battery can be safely charged. If it cannot, the Power On – Error LED will flash **RED** and charging will be stopped. Battery should be carefully checked under a load by a qualified person before further attempting to charge it.

Note: If the battery does not have a minimum no load OCV (Open Circuit Voltage) of 3 volts, the ERROR LED will light RED and charger will reject battery.

No further effort should be made to charge this battery with this charger or any charger. Discard this battery, unless it has just been subjected to a long period of continuous discharge under a load such as can occur with leaving lights on or cranking an engine excessively. Allow such a battery to "Rest" for several hours (overnight if possible) before determining if it is defective.

Be very suspicious of any 12-V battery that does not have at least 11 Volts (OCV) before it is recharged. It may well be seriously damaged and unsafe for any type of use or recharge. The unit's Battery Condition Indication LED will help you determine if battery is less than 11 Volts (**YELLOW**) or greater than 11 Volts (**GREEN**).

OCV=Open Circuit No Load Voltage	
OCV - "Rested" Voltage	**Full Capacity Percentage**
12.9 - 13.1 Volts	100%
12.6 - 12.9 Volts	75%
12.4 - 12.6 Volts	50%
12.2 - 12.4 Volts	25%
12.0 - 12.2 Volts	0%
<11 Volts	shorted

6. After battery has been fully charged, the **GREEN** Charge-Float LED Indicator will begin blinking. It will continue to blink indefinitely, unless unit is disconnected from battery. Should battery be unable to be fully charged, the LED will not blink and the **RED** Error LED will blink. Battery may not be able to be fully charged, may be too

large or too deeply discharged to be fully charged in the normal time allowed by charger. If you are certain battery is not defective, having read and understood completely all of the above concerns and conditions, proceed to reboot the charger by unplugging from the wall (A.C.), disconnecting from the battery (D.C.) and waiting 10 seconds before reconnecting the battery and then the A.C. This allows charger to begin charging battery again. If battery is not defective it should be able to be fully charged after being restarted. After sufficient time has lapsed the **GREEN** charge LED Indicator will blink confirming when / if battery is now fully charged.

Note: If attempting to charge more than one battery at a time, it is very likely the charger will need to be restarted as described in order to completely charge multiple batteries. We do not recommend charging more than one battery at a time. A better solution is to charge each battery separately using your BatteryMINDer and then connect them together, if desired for long term maintenance-float charging. We suggest reading ***MAINTAINING MULTIPLE BATTERIES,*** page 18, and the additional LED Indicator Functions, page 11, not already covered above.

IMPORTANT!

Charging a Battery in a Tightly Confined Area

Charging a battery in a tightly confined area should always be avoided as it can be dangerous, especially if battery is, has or was:

1. Older than 2 years
2. Infrequently used without an approved maintenance aviation specific charger being consistently used
3. Marginal at last capacity test
4. Not frequently checked for proper electrolyte level in each cell
5. Ever needed considerable water added, especially in one or more cells vs. other cells needing far less
6. Different Specific Gravity (SG) readings-levels (cell to cell) or has one or more cells reading less than 1.220 after being fully charged, left to “Rest”[1] for a minimum of 12 hours (as we describe repeatedly in all our Instruction Manuals)

WE NO LONGER ADVISE USE OF THE RING TERMINAL ASSEMBLY (RTA) ON ANY BATTERY WHILE BATTERY IS

LOCATED WITHIN A CONFINED AREA, SUCH AS IN AN AIRCRAFT ENGINE COMPARTMENT. BATTERY SHOULD BE REMOVED OR OPEN TO FREE FLOWING AIR TO AVOID POSSIBLE BUILD-UP OF HARMFUL HYDROGEN GAS SHOULD BATTERY HAVE A SHORTED CELL(S) OR CHARGING SOURCE IS INCORRECT OR MALFUNCTIONS. REFER TO YOUR BATTERY MANUFACTURER'S RECOMMENDATIONS ON CHARGING A BATTERY WITHIN THE AIRCRAFT FOR FURTHER INFORMATION.

Because some batteries are not easily accessible, for example, located in the wing, tail, under the seat or in a battery box, it is acceptable to attach the positive alligator clip to the positive post of the battery relay or solenoid that is directly connected to the positive terminal of the battery and attach the negative alligator clip to a suitable aircraft ground connection.

Consult with the aviation battery manufacturer for further details and specifications important to fully comply with all regulatory authorities.

[1]Rest / Resting = Fully charge battery, then remove charger and any loads connected to battery for a time not less than 8 hours nor more than 12. Measurements must be with a digital (only) type voltmeter and/or a temperature compensated hydrometer unless testing is done at temperatures no higher than 80°F nor lower than 60°F.

After carefully reading these instructions and Troubleshooting (pages 20 - 21) sections, should you still have questions, please e-mail our technical support department at: techsupport@vdcelectronics.com. Allow up to 3 business days for a detailed response to your questions. Always identify the model number of the product and revision letter of this manual contained on this page below. Without this information we may not be able to assist you correctly.

TEMPERATURE AND ITS EFFECT ON BATTERIES

Temperature has a direct effect on the life of a battery. The design life of the battery is based on an average annual temperature of 25°C (77°F). As the temperature increases above 25°C (77°F), the life of the battery decreases. The chart below shows the effects of temperature.

Effects of Temperature on Battery Life*		
Maximum Annual Average Battery Temperature	Maximum Battery Temperature	Percent Reduction in Battery Life
25°C (77°F)	50°C (122°F)	0%
30°C (86°F)	50°C (122°F)	30%
35°C (95°F)	50°C (122°F)	50%
40°C (104°F)	50°C (122°F)	66%
45°C (113°F)	50°C (122°F)	75%
50°C (122°F)	50°C (122°F)	83%

For example: If a battery's design life is 10 years at 25°C (77°F), but the average battery temperature is 35°C (95°F), the projected life of the battery is calculated to be only 5 years, [10 years - (10 years X 0.50) = 5 years].

*GNB Industrial Power, A Division of Exide Technologies, Section 92.30 2011-03

The chart below shows the need to regulate the output voltage of the charger to ensure against over or under charging your battery over a wide range of temperatures. Using your Ambient Temperature Sensor (**ATS-1**) will accomplish this better than any other known method.

CHARGE AND FLOAT VOLTAGES AT VARIOUS TEMPERATURE RANGES							
Temp °F	Optimum Charge			Optimum Float			Temp °C
	-S2	-S3	-S5*	-S2	-S3	-S5*	
≥120	13.35	14.00	13.35	12.95	13.00	13.20	≥49
110 – 120	13.50	14.20	13.50	12.95	13.10	13.20	43 – 49
100 -110	13.65	14.30	13.65	12.95	13.20	13.20	38 – 43
90 – 100	13.80	14.40	13.80	12.95	13.30	13.20	32 – 38
80 – 90	13.95	14.50	13.95	12.95	13.40	13.20	27 – 32
70 – 80	14.10	14.70	14.10	13.05	13.60	13.30	21 – 27
60 – 70	14.25	14.85	14.25	13.20	13.85	13.45	16 - 21
50 – 60	14.40	15.00	14.40	13.35	14.10	13.60	10 - 16
40 – 50	14.55	15.20	14.55	13.50	14.25	13.75	4 - 10
≤40	14.70	15.50	14.70	13.65	14.45	13.90	≤4

*Values shown are based on information supplied by Concorde Battery Co., effective May 15, 2012. Values for batteries manufactured by other aviation battery companies are believed to comparable. We strongly recommend checking with the appropriate dealer or battery manufacturer to be certain.

MAINTAINING MULTIPLE BATTERIES

BatteryMINDer Aviation Maintenance Charger Desulfators can be used to **maintain** up to six 12-Volt batteries at a time, providing each battery is fully operational (no dead-dying cells), free of sulfate and meeting the minimum open circuit charge "rested" voltage of 12.7 Volts, after being fully desulfated.

Never connect two or more batteries together unless they are fully charged. ALL batteries MUST be properly tested to ensure they are in good condition (no dead-dying cells or excessive sulfation) before maintaining them in multiples. Only healthy, fully desulfated batteries should ever be MAINTAINED in sets of 2 or more. Check each cell of ALL filler cap batteries using an accurate, temperature compensated hydrometer. Check sealed (no filler caps) batteries using an accurate, DIGITAL type voltmeter, ONLY. The minimum voltage must not be less than 2.1 volts / cell after fully charging battery and letting it "rest" for 12 hours minimum, before testing. If battery voltage is less than 2.1 / cell you must first desulfate it until you reach a "rested" voltage of 2.1 volts / cell.

Remember, you must desulfate each battery by itself (one at a time) before maintaining them for extended periods. Attempting to desulfate more than one battery at a time will yield very poor results, as the strongest (healthiest) and not the weakest (most sulfated) battery will receive the majority of the desulfation pulse energy.

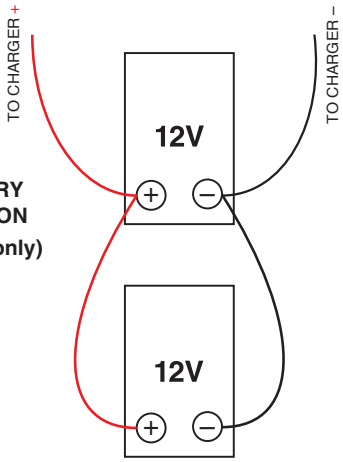
ALWAYS test each battery individually to be certain it is healthy and free of sulfate before attempting to charge or maintain them, either as a single battery or in sets. **NEVER connect multiple batteries together for maintenance charging purposes using less than #18 Gauge insulated wire or consider using BatteryMINDer Y-Connector Model 210AY with SmarTECHnology*.**

See diagram on the next page for the most common multiple battery configuration.

*BatteryMINDer® has developed a simple, safe and inexpensive method of connecting multiple batteries they call SmarTECHnology®-Y. Using their single SmarTECHnology®-Y connector, two batteries can be maintained simultaneously using just a single output charger designed to maintain batteries. Adding additional Y-connectors allows from four (4) to eight (8) batteries to be connected depending on the maintenance charger capability.

210AY
Y-Connector with SmarTECHnology*

MULTI-BATTERY CONFIGURATION
(2 - 12V parallel only)



BC2AY: Insulated Battery Clips paired with 210AY Y-Connector with SmarTECHnology*

One BatteryMINDer Will Maintain Two Batteries Using a BCAA (included) + BC2AY* Accessory

*Accessories optional

TROUBLESHOOTING GUIDE		
PROBLEM	***POSSIBLE CAUSE***	***SOLUTION***
Power **ON** indicator does not light after being plugged into AC for 30 seconds.	AC outlet is dead.	Plug in a lamp or other appliance to check for voltage. If controlled by a wall switch, be sure switch is on and try to prevent accidental shut off while charger is working.
ERROR indicator lights **RED solid**.	Output lead connections to battery may be reversed.	Switch (reverse) connections at battery.
	Battery voltage <3 volts.	Battery may be damaged and should not be recharged. Allow battery to "recover" by letting it "rest" without a load.
	Battery was just recently removed from a load (lights, electronic equipment) or not used for extended time without a charger-maintainer.	If battery is healthy and just deeply discharged it should recover its voltage (rise above 3 volts) sufficiently to allow charger to begin an attempt to fully recharge it.
	Battery has "rested" and still cannot be recovered – recharged.	Battery should be safely discarded – recycled.
ERROR Indicator lights **RED blinking**.	Battery(s) may be weak, heavily sulfated, or too large to fully charge before unit times out.	Allow battery to remain in Maintenance-Float mode for 72 hours or more and then attempt to recharge again.
	Battery may be so large it may require a second full recharge.	Reboot unit by unplugging from A.C. electrical outlet, disconnect from battery so there will be no electrical power going to the unit from either direction, wait 10 seconds, connect to battery first then plug into A.C. outlet
Battery Condition Indicator lights **YELLOW** (***Before*** battery has been completely charged).	Battery can be weak due to sulfation, self discharge or was very deeply discharged.	Attempt a full recharge and recheck after completion. If still **YELLOW**, follow next procedure ("After battery has been completely charged.")

Con't. on next page

TROUBLESHOOTING GUIDE		
PROBLEM	***POSSIBLE CAUSE***	***SOLUTION***
Battery Condition Indicator lights **YELLOW** (***After*** battery has been completely charged).	Battery still has an unacceptable level of sulfation.	Battery must stay connected to charger and remain in Maintenance-Float mode (**GREEN** blinking indicator) for 72 hours or longer. Then **REBOOT** (see below)
ERROR and CHARGE LEDs **blink** simultaneously	Charger has timed out before battery has completely charged.	Reboot unit by unplugging from A.C. electrical outlet, disconnect from battery so there will be no electrical power going to the unit from either direction, wait 10 seconds, connect to battery first then plug into A.C. outlet.

NOTES

DETAILED SPECIFICATIONS - VDC Models E12248-AA-S2, S3 & S5

14.1V --- 8A MCU controlled H.F. Battery Charger

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to CE safety and EMC test. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Electrical Parameters

Input Voltage:	220 - 240 Vac
Input Frequency:	50 Hz
Unloaded input current:	80 mA ac

Input Current consumption at 220 - 240 input, output 13V 8A loading (UL1236) Approx: 1A ac

Electrical Cable

Input Lead and plug specifications:

VDE H05VV-F 18AWG X2 with VDE 3-pin plug, External Length 6 ft

Output lead:

SPT-2 105°C VW-1 16AWG with Trailer connector, External Length 6 ft

Extension cord:

SPT-2 105°C VW-1 16AWG with Trailer connector & battery clamp, External Length 2 ft

Ambient Thermal Sensor:	3”
Physical Parameters:	Weight: 2.2 lbs.
Plastic enclosure material:	UL-94V0 #1 Noryl or #2 PC+ABS #3 PC
Enclosure Dimension:	Approx. 5.713” (W) x 5.516” (L) x 2.86” (H)

Environmental Characteristics

Operating temperature:	-10° to 40°C
Storage temperature:	-10° to 80°C
Operating Humidity range:	0 to 95% RH

FOR REPAIR OR REPLACEMENT

In the event that you believe your product may be defective, you MUST first contact VDC Electronics by email: customersupport@vdcelectronics.com.

Please reference:

- **Model Number**
- **Serial Number**
- **Date of Purchase**
- **Place of Purchase**
- **Problem**

Please include your name, address and telephone number.

DO NOT return the unit to VDC Electronics without express authorization. We will reply to your email within three to five business days advising you of the best course of action to take depending on the issue.

Your BatteryMINDer is covered by:

One-Year 100% Unconditional Money Back Guarantee

Your BatteryMINDer product is guaranteed within the first year to perform as claimed or VDC Electronics, Inc. will refund your full purchase price including all taxes, shipping or handling cost applicable to the purchase.

Five-Year Limited Warranty

Your BatteryMINDer product is warrantied for FIVE years from date of purchase at retail against defective material or workmanship. We make no warranty other than this limited warranty and expressly exclude any implied warranty including any warranty for consequential damages. This limited warranty is not transferable.

Please refer to the previous page for details on contacting us with technical problems or return, repair or replacement issues.

DO NOT return the unit to VDC Electronics without express authorization.