



POWERED BY SCHUMACHER

# PRO SERIES™

MODELS

**DSR121, DSR122, DSR123, DSR124**

**Professional Wheel Charger**

**OWNERS MANUAL**



**DSR124**

**PLEASE SAVE THIS OWNERS MANUAL AND READ BEFORE EACH USE.**

This manual will explain how to use the battery charger safely and effectively. Please read and follow these instructions and precautions carefully.

## 1. IMPORTANT SAFETY INSTRUCTIONS

### SAVE THESE INSTRUCTIONS.

- 1.1 **SAVE THESE INSTRUCTIONS –**  
This manual contains important safety and operating instructions.
- 1.2 Keep out of reach of children.
- 1.3 Do not expose the charger to rain or snow.
- 1.4 Use of an attachment not recommended or sold by the battery charger manufacturer may result in a risk of fire, electric shock or injury to persons.
- 1.5 To reduce the risk of damage to electric plug and cord, pull by the plug rather than the cord when disconnecting charger.
- 1.6 An extension cord should not be used unless absolutely necessary. Use of improper extension cord could result in a risk of fire and electric shock. If an extension cord must be used, make sure:
  - The pins on plug of extension cord are the same number, size and shape as those of plug on charger.
  - The extension cord is properly wired and in good electrical condition.
  - The wire size is large enough for AC ampere rating of charger as specified in section 8.
- 1.7 Do not operate charger with damaged cord or plug – replace the cord or plug immediately.
- 1.8 Do not operate charger if it has received a sharp blow, been dropped, or otherwise damaged in any way; take it to a qualified serviceman.
- 1.9 Do not disassemble charger; take it to a qualified serviceman when service or repair is required. Incorrect reassembly may result in a risk of electric shock or fire.
- 1.10 To reduce risk of electric shock, unplug charger from outlet before attempting any maintenance or cleaning. Turning off controls will not reduce this risk.
- 1.11 **WARNING:**  
**RISK OF EXPLOSIVE GASES.**
  - a. WORKING IN VICINITY OF A LEAD-ACID BATTERY IS DANGEROUS. BATTERIES GENERATE EXPLOSIVE GASES DURING NORMAL BATTERY OPERATION. FOR THIS REASON, IT IS OF UTMOST IMPORTANCE THAT YOU FOLLOW THE INSTRUCTIONS EACH TIME YOU USE THE CHARGER.
  - b. To reduce risk of battery explosion, follow these instructions and those published by battery manufacturer and manufacturer of any equipment you intend to use in vicinity of battery. Review cautionary markings on these products and on engine.

## 2. PERSONAL SAFETY PRECAUTIONS

- 2.1 Consider having someone close enough by to come to your aid when you work near a lead-acid battery.
- 2.2 Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing, or eyes.
- 2.3 Wear complete eye protection and clothing protection. Avoid touching eyes while working near battery.
- 2.4 If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters eye, immediately flood eye with running cold water for at least 10 minutes and get medical attention immediately.
- 2.5 NEVER smoke or allow a spark or flame in vicinity of battery or engine.
- 2.6 Be extra cautious to reduce risk of dropping a metal tool onto battery. It might spark or short-circuit battery or other electrical part that may cause explosion.
- 2.7 Remove personal metal items such as rings, bracelets, necklaces, and watches when working with a lead-acid battery. A lead-acid battery can produce a short-circuit current high enough to weld a ring or the like to metal, causing a severe burn.
- 2.8 Use charger for charging only LEAD-ACID (STD, AGM or GEL) rechargeable batteries with rated capacities of 24Ah (6V) and 22-59Ah (12V). It is not intended to supply power to a low voltage electrical system other than in a starter-motor application. Do not use battery charger for charging dry-cell batteries that are commonly used with home appliances. These batteries may burst and cause injury to persons and damage to property.
- 2.9 NEVER charge a frozen battery.

### 3. PREPARING TO CHARGE

- 3.1 If necessary to remove battery from vehicle to charge, always remove grounded terminal from battery first. Make sure all accessories in the vehicle are off, so as not to cause an arc.
- 3.2 Be sure area around battery is well ventilated while battery is being charged.
- 3.3 Clean battery terminals. Be careful to keep corrosion from coming in contact with eyes.
- 3.4 Add distilled water in each cell until battery acid reaches level specified by battery manufacturer. Do not overfill. For a battery without removable cell caps, such as valve regulated lead acid batteries, carefully follow manufacturer's recharging instructions.
- 3.5 Study all battery manufacturer's specific precautions while charging and recommended rates of charge.
- 3.6 Determine voltage of battery by referring to car owner's manual and make sure that output voltage selector switch is set at correct voltage. If charger has adjustable charge rate, charge battery initially at lowest rate.

### 4. CHARGER LOCATION

- 4.1 Locate charger as far away from battery as DC cables permit.
- 4.2 Never place charger directly above battery being charged; gases from battery will corrode and damage charger.
- 4.3 Never allow battery acid to drip on charger when reading electrolyte specific gravity or filling battery.
- 4.4 Do not operate charger in a closed-in area or restrict ventilation in any way.
- 4.5 Do not set a battery on top of charger.

### 5. DC CONNECTION PRECAUTIONS

- 5.1 Connect and disconnect DC output clips only after setting any charger switches to "off" position and removing AC cord from electric outlet. Never allow clips to touch each other.
- 5.2 Attach clips to battery and chassis, as indicated in sections 6 and 7.

### 6. FOLLOW THESE STEPS WHEN BATTERY IS INSTALLED IN VEHICLE

**WARNING: A SPARK NEAR THE BATTERY MAY CAUSE A BATTERY EXPLOSION. TO REDUCE THE RISK OF A SPARK NEAR THE BATTERY:**

- 6.1 Position AC and DC cords to reduce risk of damage by hood, door, or moving engine part.
- 6.2 Stay clear of fan blades, belts, pulleys, and other parts that can cause injury to persons.
- 6.3 Check polarity of battery posts. POSITIVE (POS, P, +) battery post usually has larger diameter than NEGATIVE (NEG, N, -) post.
- 6.4 Determine which post of battery is grounded (connected) to the chassis. If negative post is grounded to chassis (as in most vehicles), see (6.5). If positive post is grounded to the chassis, see (6.6).
- 6.5 For negative-grounded vehicle, connect POSITIVE (RED) clip from battery charger to POSITIVE (POS, P, +) ungrounded post of battery. Connect NEGATIVE (BLACK) clip to vehicle chassis or engine block away from battery. Do not connect clip to carburetor, fuel lines, or sheet-metal body parts. Connect to a heavy gauge metal part of the frame or engine block.
- 6.6 For positive-grounded vehicle, connect NEGATIVE (BLACK) clip from battery charger to NEGATIVE (NEG, N, -) ungrounded post of battery. Connect POSITIVE (RED) clip to vehicle chassis or engine block away from battery. Do not connect clip to carburetor, fuel lines, or sheet-metal body parts. Connect to a heavy gauge metal part of the frame or engine block.
- 6.7 When disconnecting charger, turn switches to off, disconnect AC cord, remove clip from vehicle chassis, and then remove clip from battery terminal.
- 6.8 See *Operating Instructions* for length of charge information.

## 7. FOLLOW THESE STEPS WHEN BATTERY IS OUTSIDE VEHICLE

**WARNING: A SPARK NEAR THE BATTERY MAY CAUSE A BATTERY EXPLOSION. TO REDUCE THE RISK OF A SPARK NEAR THE BATTERY:**

- 7.1 Check polarity of battery posts. POSITIVE (POS, P, +) battery post usually has a larger diameter than NEGATIVE (NEG, N, -) post.
- 7.2 Attach at least a 24-inch-long 6-gauge (AWG) insulated battery cable to NEGATIVE (NEG, N, -) battery post.
- 7.3 Connect POSITIVE (RED) charger clip to POSITIVE (POS, P, +) post of battery.
- 7.4 Position yourself and free end of cable as far away from battery as possible – then

connect NEGATIVE (BLACK) charger clip to free end of cable.

- 7.5 Do not face battery when making final connection.
- 7.6 When disconnecting charger, always do so in reverse sequence of connecting procedure and break first connection while as far away from battery as practical.
- 7.7 A marine (boat) battery must be removed and charged on shore. To charge it on board requires equipment specially designed for marine use.

## 8. GROUNDING AND AC POWER CORD CONNECTIONS

- 8.1 This battery charger is for use on a nominal 120 volt circuit. The plug must be plugged into an outlet that is properly installed and grounded in accordance with all local codes and ordinances. The plug pins must fit the receptacle (outlet). Do not use with an ungrounded system.

- 8.2 **DANGER:** Never alter the AC cord or plug provided – if it does not fit the outlet, have a proper grounded outlet installed by a qualified electrician. An improper connection can result in a risk of an electric shock or electrocution.

**NOTE:** Pursuant to Canadian Regulations, use of an adapter plug is not allowed in Canada. Use of an adapter plug in the United States is not recommended and should not be used.

### 8.3 USING AN EXTENSION CORD

The use of an extension cord is not recommended. If you must use an extension cord, follow these guidelines:

- Pins on plug of extension cord must be the same number, size, and shape as those of plug on charger.
- Ensure that the extension cord is properly wired and in good electrical condition.
- Wire size must be large enough for the AC ampere rating of charger, as specified:

Length of cord (feet)	25	50	100	150
AWG* size of cord	16	12	10	8

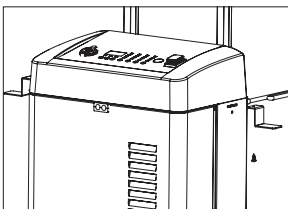
\*AWG-American Wire Gauge

## 9. ASSEMBLY INSTRUCTIONS

- 9.1 Remove all cord wraps and uncoil the cables prior to using the battery charger.
- 9.2 Extend the handle from the retracted position by pulling it upward until it locks into place. (Press the small black buttons inward, if necessary.)

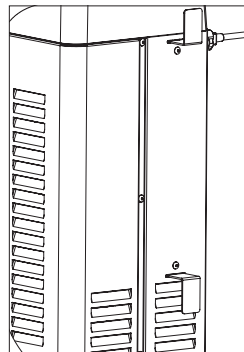
### 9.3 Clamp cleat installation

1. Slide the short end of the cable clamp cleat Z-bracket into the open slot. There are 4 total slots: the top left and top right, and the bottom left and bottom right sides of the charger.

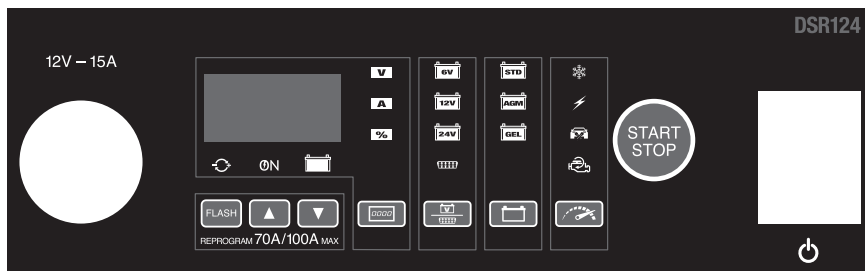


2. Insert the No. 8 screw into the open hole below each slot, to fasten the cable bracket in place.

**NOTE:** The screws are #8-18. Use a 1/4" hex screwdriver.



## 10. CONTROL PANEL



**NOTE:** Some features are not available on all models.

### 12V MEMORY SAVER PORT (Models DSR122 and DSR124)

#### DIGITAL DISPLAY

The digital display indicates voltage, % of charge, or amperage, depending on the Display Mode chosen.

#### DISPLAY MODE BUTTON

Use to set the function of the digital display to one of the following:

**V Volts** – The digital display shows the voltage at the charger's battery clamps.

**A Amps** – The digital display shows the charging current, in amps. When in Boost mode, the display shows the approximate output current, in amps.

**% Battery percentage** – The digital display shows an estimated charge percentage of the battery connected to the charger's battery clamps.

#### CHARGING STATUS LEDS

**REVERSED CLAMPS LED flashing:**  
The connections are reversed.

#### BOOST/CHARGING (yellow/orange)

**LED lit:** The charger has detected that a battery is connected, and is performing the selected operation – either Boost or Charge.

#### CHARGED/MAINTAINING (green)

**LED lit:** The battery is fully charged and the charger is in Maintain mode.

**NOTE:** See *Operating Instructions* for a complete description of the charger modes.


#### FLASH BUTTON

(Models DSR122 and DSR124)

Press to enter Flash Reprogramming mode.

#### UP/DOWN ARROW BUTTONS

Use to change any variable settings on the display.

**BATTERY VOLTAGE/  
MEMORY SAVER BUTTON**  
Select 6V, 12V or 24V, or select  for the memory saver function.

#### BATTERY TYPE BUTTON

Use this button to select the battery type.

**STD (Standard)** – Used in cars, trucks and motorcycles, these batteries have vent caps and are often marked “low maintenance” or “maintenance-free”. This type of battery is designed to deliver quick bursts of energy (such as starting engines) and has a greater plate count. The plates are thinner and have somewhat different material composition. Standard batteries should not be used for deep-cycle applications.

**AGM** – The Absorbed Glass Mat construction allows the electrolyte to be suspended in close proximity with the plate's active material. In theory, this enhances both the discharge and recharge efficiency. The AGM batteries are a variant of Sealed VRLA (valve regulated lead-acid) batteries. Popular uses include high-performance engine starting, power sports, deep-cycle, solar and storage batteries.

**GEL** – The Gel Cell is similar to the AGM style because the electrolyte is suspended, but different because the AGM battery is still considered to be a wet cell. The electrolyte in a GEL cell has a silica additive that causes it to set up or stiffen. The recharge voltages on this type of cell are lower than the other styles of lead-acid battery. This is probably the most sensitive cell in terms of adverse reactions to over-voltage charging. Gel batteries are best used in very deep cycle applications and may last a bit longer in hot weather applications. If the incorrect battery charger is used on a Gel Cell battery, poor performance and premature failure is certain.

## OUTPUT RATE BUTTON

Select one of the following rates:

### Maintain (4A)

For charging small batteries and maintaining fully charged large batteries.

### Fast Charge (15A)

For charging automotive, marine and light truck batteries.

### Boost

Increases the voltage and sends a quick burst of energy into the battery, to quickly bring deeply discharged batteries back to life.

### Engine Start

Provides additional amps for cranking an engine with a weak or run-down battery. Always use in combination with a battery.

## START/STOP BUTTON

Begins and ends the Charge, Boost, Engine Start, Flash Reprogram and Memory Saver modes.

## MAIN POWER SWITCH

This switch supplies power to the charger.

## REPROGRAMMING

### THE DEFAULT SETTINGS

(Models DSR122 and DSR124 only)

If you are satisfied with the default settings, skip to *Operating Instructions*.

When you first power up the charger, the default settings are:

Display Mode – Volts

Battery Voltage – 12V

Battery Type – Standard

Output Rate – Maintain (4A)

**To change the power up default settings:**

1. Change to the desired Display Mode, Battery Voltage, Battery Type and Output Rate.
2. Press and hold both Up and Down Arrow buttons at the same time until the LEDs stop flashing.
3. The next time you power up the unit, these settings will be saved and become the startup default settings.

## 11. OPERATING INSTRUCTIONS

**WARNING:** A spark near the battery may cause an explosion.

**IMPORTANT:** Do not start the vehicle with the charger connected to the AC outlet (except during Engine Start), or it could damage the charger.

### CHARGING A BATTERY IN THE VEHICLE




1. Turn off all the vehicle's accessories.
2. Keep the hood open.
3. Clean the battery terminals.
4. Place the charger on a dry, non-flammable surface.
5. Lay the AC/DC cables away from any fan blades, belts, pulleys and other moving parts.
6. Connect the battery, following the precautions listed in sections 6 and 7.
7. Connect the charger to an electrical outlet.
8. Set Battery Voltage to 6V or 12V.


**NOTE:** 24V is available only on models DSR123 and DSR124, for Boost and Engine Start.

### CAUTION:

Always visually confirm the voltage of the battery being charged. Not doing so can cause damage to the battery and vehicle's electrical system. Other property damage or personal injury may occur.

9. Set Battery Type to STANDARD, AGM, or GEL. (If unsure, consult the label on the battery or the battery manufacturer.)

10. Set Output Rate to  Maintain (4A),  Fast Charge (15A) or  Boost.

11. Charging will start when the START/STOP button is pressed and finish automatically.
12. Charged/Maintaining  (green) LED will light when finished and charger will maintain battery.
13. To stop the battery maintaining process, press the START/STOP button.
14. When charging is complete, disconnect the charger from the AC power, remove the clamps from the vehicle's chassis, and then remove the clamp from the battery terminal.





### CHARGING A BATTERY OUTSIDE OF THE VEHICLE

1. Place battery in a well-ventilated area.
2. Clean the battery terminals.
3. Connect the battery, following the precautions listed in sections 6 and 7.
4. Connect the charger to the electrical outlet.
5. Set Battery Voltage to 6V or 12V.

**NOTE:** 24V is available only on models DSR123 and DSR124, for Boost and Engine Start.

### CAUTION:

Always visually confirm the voltage of the battery being charged. Not doing so can cause damage to the battery and vehicle's electrical system. Other property damage or personal injury may occur.

6. Set Battery Type to STANDARD, AGM, or GEL. (If unsure, consult the label on the battery or the battery manufacturer.)
7. Set Output Rate to  Maintain (4A),  Fast Charge (15A) or  Boost.
8. Charging will start when the START/STOP button is pressed and finish automatically.
9. Charged/Maintaining  (green) LED will light when finished and charger will maintain battery.
10. To stop the battery maintaining process, press the START/STOP button.
11. When charging is complete, disconnect the charger from the AC power, disconnect the negative clamp, and finally the positive clamp.
12. A marine (boat) battery must be removed and charged on shore.

## BATTERY CHARGING TIMES

APPLICATION	BATTERY SIZE	CHARGING TIME (Hours)			
		2A	6A	8A	10A
<b>POWERSPORTS</b> ↓	6Ah	6	2	1.75	1.5
	32Ah	15	5	4.5	4
<b>AUTOMOTIVE</b> ↓	300 CCA	12	4	3.5	3
	1000 CCA	30	10	8.5	7
<b>MARINE</b> ↓	50Ah	15	5	4.25	3.5
	105Ah	33	11	9.5	8

Times are based on a 50% discharged battery and may change, depending on age and condition of battery.


## DESULFATION

If the battery is left discharged for an extended period of time, it could become sulfated and not accept a normal charge. If the charger detects a sulfated battery, the charger will switch to a special mode of operation designed for such batteries (6V/12V only). If successful, normal charging will resume after the battery is desulfated. Desulfation could take up to 10 hours. If desulfation fails, charging will abort and the display will show the error message *F02*.

## ABORTED CHARGE

If charging cannot be completed normally, charging will abort. When charging aborts, the charger's output is shut off, and the display will show an error code. Do not continue attempting to charge this battery. Check the battery and replace, if necessary.

## CHARGE COMPLETION AND MAINTAIN MODE (FLOAT MODE MONITORING)

Charge completion is indicated by the green Charged/Maintaining  LED.

This means that the charger has stopped charging and has switched to the Maintain Mode of operation. **NOTE:** If the charger has to provide its maximum maintain current for a continuous 12 hour period, it will go into Abort Mode (see *Aborted Charge* section). This is usually caused by a drain on the battery, or the battery could be bad. Make sure there are no loads on the battery. If there are, remove them. If there are none, have the battery checked or replaced.

## MAINTAINING A BATTERY

The charger maintains 6V and 12V batteries, keeping them at full charge.


**NOTE:** The maintain mode technology allows you to safely charge and maintain a healthy battery for extended periods of time. However, problems with the battery, electrical problems in the vehicle, improper connections or other unanticipated conditions could cause excessive current draws. As such, occasionally monitoring your battery and the charging process is required.

## USING BOOST MODE

1. Set Battery Voltage to 6V, 12V or 24V.

### CAUTION:

Always visually confirm the voltage of the battery being charged. Not doing so can cause damage to the battery and vehicle's electrical system. Other property damage or personal injury may occur.

- NOTE:** Additional safety settings have been added to the charger software. When the unit is in the 24 volt mode, the voltage boost output will not activate if battery voltage is less than 15.5 volts. If a 24 volt battery has voltage below 15.5 volts, the voltage will be shown on the digital display and the "Volts" and "24V" LEDs will flash. The START/STOP button must be pressed again after confirmation that the unit is operating on a 24V system.
2. Set Battery Type to STANDARD, AGM, or GEL. (If unsure, consult the label on the battery or the battery manufacturer.)
  3. Set Output Rate to  Boost.
 

**NOTE:** This mode should not be used for smaller batteries (lawn tractor, motorcycle, etc.).
  4. Boost will start when the START/STOP button is pressed and will hold batteries at the following voltages:
    - 6V: held at 6.8V
    - 12V: held at 13.6V
    - 24V: held at 27.3V
  5. Boost will end when the START/STOP button is pressed.

## USING ENGINE START MODE

Your battery charger can be used to jump start your car if the battery is low. Follow all safety instructions and precautions for charging your battery. Wear complete eye protection and protective clothing.

**WARNING:** Using Engine Start mode WITHOUT a battery installed in the vehicle could cause damage to the vehicle's electrical system.

**NOTE:** If you have charged the battery and it still will not start your car, do not use Engine Start mode, or it could damage the vehicle's electrical system. Have the battery checked.

1. With the charger unplugged from the AC outlet, connect the charger to the battery, following the instructions given in sections 6 and 7.
2. Set the Battery Voltage to 6V, 12V or 24V.
3. Set the Output Rate to Engine Start.

**NOTE:** The charger will supply charge to the battery before cranking.

4. Press the START/STOP button. The digital display will show  $\square\eta$  for 2 minutes.
5. Crank the vehicle when the digital display shows  $\eta d\eta$ . **Do not crank for longer than 20 seconds.**

**NOTE:** During extremely cold weather, or if the battery is under one volt, charge the battery for 5 minutes before cranking the engine.

6. Wait three minutes before attempting to start again. The digital display will indicate the time remaining before cranking again.

**NOTE:** During this cool down period, the charger is supplying the battery with a charge of up to 15A.

7. When the digital display times down to  $\square$  and reads  $\eta d\eta$ , the Boost/Charging  $\text{ON}$  LED is on, you are ready to crank the vehicle again. You have three minutes to perform an engine start (Pressing the START/STOP button is NOT REQUIRED.)
8. If the engine still does not start, allow the charger to charge the battery for five more minutes before cranking it again.
9. After the engine starts, unplug the AC power cord before disconnecting the battery clamps from the vehicle.

**NOTE:** If the engine does turn over but never starts, there is not a problem with the starting system; there is a problem somewhere else with the vehicle. STOP cranking the engine until the other problem has been diagnosed and corrected.

## FLASH REPROGRAMMING (Models DSR122 and DSR124)

**NOTE:** Do not attempt to Flash Reprogram a vehicle that has a discharged or defective battery. Make sure that the vehicle battery is in good condition and FULLY CHARGED before proceeding.

The charger is designed to supply up to 100A in "Flash Reprogram" mode.

Some newer vehicles may require more than 100A while flash reprogramming the ECU. Consult the vehicle manufacturer's specifications to determine the required amperage. The charger's "Flash Reprogram" mode cannot be used on vehicles that require more than 100A, or damage to the ECU and/or vehicle's electrical system may occur. Failure to follow these instructions may also damage the service center's flash reprogram equipment.

1. Set the mode to Flash.
2. Use  $\blacktriangle$  (Up) and  $\blacktriangledown$  (Down) buttons to adjust the voltage needed for the vehicle being programmed (refer to OEM specifications). Voltage selected is shown on the digital display. The unit has a voltage range of 13.0 to 15.0, with a default of 14.2.

**NOTE:** When the  $\square\vee$  Volts LED stops blinking, the display shows the selected voltage.

3. Press START/STOP to activate the output.

**NOTE:** During this time, the other buttons will not work until you turn off the output. When the display shows  $\square FF$ , no buttons will work for five seconds; then it automatically goes back to the default state.

4. When finished with Flash Reprogramming, press START/STOP to exit this mode.

**NOTE:** The clamps are live during Flash Reprogramming.



## BATTERY PERCENTAGE

Press the  Display Mode button to switch from  battery voltage to  current or  battery percentage.



## USING A MEMORY SAVER (Models DSR122 and DSR124)

Use a memory saver to save the vehicle's on-board diagnostic computer settings (radio programs, diagnostic codes, etc.) while the battery is disconnected from the vehicle during repair or maintenance.

**NOTE:** The 12V port is rated at 15A; the provided OBDII cable has an 8A fuse.

### IMPORTANT!

Some vehicle manufacturers do not allow the use of a memory saver through the OBDII. Consult the vehicle manufacturer before use, to determine if a memory saver is acceptable for use on the vehicle.

1. Make sure that Charge/Boost/Engine Start are off. Do not operate or crank when using a memory saver. Do not charge a battery when operating the memory saver
2. Turn off the vehicle and make sure all accessories are off.
3. Wait at least 30 minutes before using the memory saver. This ensures that the accessories are no longer drawing current from the car battery.
4. Connect the memory saver's 12V connector to 12V port on the charger.
5. Press the  button until the  Memory Saver LED is lit.

6. Connect the memory saver's OBD connector to the vehicle's OBD plug. Make sure the connector is fully engaged.
7. Push the START/STOP button.
8. Disconnect the vehicle's battery cables and cover the positive and negative cables with an insulator, such as electrical tape. This prevents the connectors from touching metal, each other, or the chassis and causing a short circuit, due to the vehicle's electrical system receiving power from the memory saver through the OBD connection.

### WARNING:

When working with the vehicle's battery, review all of the battery manufacturer's safety instructions, warnings and directives regarding battery disconnection, removal and replacement.

9. Remove the old battery and put the new battery into position.
10. Remove the insulator from the positive cable and connect it to the positive terminal of the new battery.
11. Remove the insulator from the negative cable and connect it to the negative terminal of the new battery.
12. Press the START/STOP button to turn off the memory saver.
13. Once the new battery is connected, unplug the memory saver's OBD connector from the vehicle's OBD plug.

## 12. MAINTENANCE AND CARE

A minimal amount of care can keep your battery charger working properly for years.

- Clean the clamps each time you are finished charging. Wipe off any battery fluid that may have come in contact with the clamps to prevent corrosion.
- Occasionally cleaning the case of the charger with a soft cloth will keep the finish shiny and help prevent corrosion.
- Coil the input and output cords neatly when storing the charger. This will help prevent accidental damage to the cords and charger.
- Store the charger unplugged from the AC power outlet in an upright position.
- Store inside, in a cool, dry place. Do not store the clamps on the handle, clipped together, on or around metal, or clipped to the cables.

## 13. ERROR CODES AND TROUBLESHOOTING


### Error Codes



CODE	DESCRIPTION	REASON/SOLUTION
<i>F01</i>	The battery voltage is still under 10V (for a 12V battery) or 5V (for a 6V battery) after 2 hours of charging.	The battery could be bad. Have it checked or replaced.
<i>SUL</i>	The charger has detected a sulfated battery.	The charger will go into desulfation mode. If the desulfation is not successful after 10 hours, the charger will go into abort mode.
<i>F02</i>	The charger cannot desulfate the battery.	The battery could not be desulfated; have it checked or replaced.
<i>F03</i>	The battery was unable to reach the "full charge" voltage.	May be caused by trying to charge a large battery or bank of batteries on too low of a current setting. Try again with a higher current setting or have the battery checked or replaced.
<i>F04</i>	The connections to the battery are reversed.	The battery is connected backwards. Unplug the charger and reverse the connections to the battery.
<i>F05</i>	The charger was unable to keep the battery fully charged in maintain mode.	The battery won't hold a charge. May be caused by a drain on the battery or the battery could be bad. Make sure there are no loads on the battery. If there are remove them. If there are none, have the battery checked or replaced.
<i>F06</i>	The charger detected that the battery may be getting too hot (thermal runaway).	The charger automatically shuts the current off if it detects the battery may be getting too hot. Have the battery checked or replaced.

If you get an error code, check the connections and settings and/or replace the battery.

### Troubleshooting

PROBLEM	POSSIBLE CAUSE	SOLUTION
No reading or 0.0V shown on the display.	Clamps are not making a good connection.	Check for poor connection at battery and frame. Make sure connecting points are clean.
	AC cord and/or extension cord is loose.	Check power cord and extension cord for loose fitting plug.
	No power at receptacle.	Check for open fuse or circuit breaker supplying AC outlet.
	Clamp polarity reversed.	Verify and reverse the battery clamps.
The Boost/Charging $\odot$ N LED does not turn off.	The charger is still in Boost mode.	This is normal. In Boost mode, the $\odot$ N LED will not turn off until the battery is disconnected from the charger.
	The charger is still in one of the charge modes.	This is normal. In one of the charge modes, the $\odot$ N LED will not turn off until the battery charging process is completed.

<b>PROBLEM</b>	<b>POSSIBLE CAUSE</b>	<b>SOLUTION</b>
Short or no start cycle when cranking engine.	<p>Failure to wait 3 minutes (180 seconds) between cranks.</p> <p>Clamps are not making a good connection.</p> <p>AC cord and/or extension cord is loose.</p> <p>No power at receptacle.</p> <p>The charger may be overheated.</p> <p>Battery may be severely discharged.</p>	<p>Wait three minutes or until the display reads <i>rdy</i> and the <b>ON</b> LED is on.</p> <p>Check for poor connection at battery and frame. Make sure connecting points are clean.</p> <p>Check power cord and extension cord for loose fitting plug.</p> <p>Check for open fuse or circuit breaker supplying AC outlet.</p> <p>The internal thermal protector may have tripped and needs a little longer to close. Wait until it automatically resets and try again.</p> <p>On a severely discharged battery, use the  Boost rate for 10 to 15 minutes, to help assist in cranking.</p>
Charger makes a loud buzz.	Transformer laminations vibrate.	No problem; this is a normal condition.
Battery % stays low during charging.	<p>Battery is severely discharged.</p> <p>Wrong battery voltage selected.</p>	<p>Continue charging battery for two more hours. If problem continues, have the battery checked and replace, if necessary.</p> <p>Make sure Battery Voltage switch is set to the correct voltage for the battery you are charging.</p>
The “Maintain” and “Fast Charge” rates do not work on the 24V setting.	Complete charge of a 24 Volt battery is not a function of this unit.	This charger does not fully charge 24V batteries. It boosts the voltage to 27.3V and holds the voltage at this level.
Clicking noise from charger.	<p>Circuit breaker is cycling.</p> <p>Battery is defective.</p> <p>Shorted battery clamps.</p> <p>Severely discharged battery, but otherwise a good battery.</p> <p>Reversed connections at battery.</p>	<p>Under certain conditions, this unit has a high capacity and the circuit breaker protects the unit under these conditions. If the circuit breaker is cycling often, stop the operation by pressing the START/ STOP button and wait until the unit has cooled, to return to operation.</p> <p>Have the battery checked.</p> <p>Circuit breaker cycles when current draw is too high. Check for shorted cables and replace if necessary.</p> <p>Allow charging to continue until battery has a chance to recover sufficiently to take a charge. If more than 20 minutes, stop charging and have the battery checked.</p> <p>Correct the lead connections.</p>

<b>PROBLEM</b>	<b>POSSIBLE CAUSE</b>	<b>SOLUTION</b>
Display shows "SUL"	The battery is sulfated.	A sulfated battery may eventually take a normal charge if left connected. The charger will continue to charge with a low current for up to 10 hours to recover the battery. If the battery will not take a charge after 10 hours, have it checked.
Engine start does not work.	<p data-bbox="323 269 596 318">Vehicle drawing more than the Engine Start rate.</p> <p data-bbox="323 394 625 443">Failure to wait 3 minutes (180 seconds) between cranks.</p> <p data-bbox="323 496 529 545">The charger may be overheated.</p> <p data-bbox="323 621 572 670">Battery may be severely discharged.</p>	<p data-bbox="642 269 998 367">Crank time varies with the amount of current drawn. If cranking draws more than the Engine Start rate, crank time may be reduced.</p> <p data-bbox="642 394 983 467">When the  Engine Start LED blinks, wait 3 minutes of rest time before the next crank.</p> <p data-bbox="642 496 993 594">The thermal protector may have tripped and needs a little longer to reset. Make sure the charger vents are not blocked. Wait and try again.</p> <p data-bbox="642 621 993 695">On a severely discharged battery, use the  Boost rate for 10 to 15 minutes, to help assist in cranking.</p>

## 14. SPECIFICATIONS

### DSR121

#### UL

Input..... 120V AC 60Hz, 12.5A cont., 50A int.

Output..... 12V DC, 4/15A cont.

50A int. (30 sec. max. ON, 60 sec. min. OFF)

250A int. (5 sec. max. ON, 180 sec. min. OFF)

#### cUL

Input..... 120V AC 60Hz, 12.5A cont., 50A int.

Output..... 12V DC, 4/15A cont.

45A int. (30 sec. max. ON, 60 sec. min. OFF)

250A int. (5 sec. max. ON, 180 sec. min. OFF)

### DSR122

Input..... 120V AC 60Hz, 12.5A cont., 49A int.

Output..... 6/12V DC, 4/15A cont.

60A int. (60 sec. max. ON, 120 sec. min. OFF)

275A int. (5 sec. max. ON, 180 sec. min. OFF)

### DSR123

Input..... 120V AC 60Hz, 12.5A cont., 60A int.

Output..... 12V DC, 4/15A cont.

12V DC: 50A int. (60 sec. max. ON, 120 sec. min. OFF)

250A int. (5 sec. max. ON, 180 sec. min. OFF)

24V DC: 30A int. (60 sec. max. ON, 120 sec. min. OFF)

150A int. (5 sec. max. ON, 180 sec. min. OFF)

### DSR124

Input..... 120V AC 60Hz, 12.5A cont., 66.5A int.

Output..... 6/12V DC, 4/15A cont.

80A int. (120 sec. max. ON, 120 sec. min. OFF)

330A int. (5 sec. max. ON, 180 sec. min. OFF)

24V DC: 30A cont.; 250A int. (5 sec. max. ON, 180 sec. min. OFF)