MODEL

SC1352

Automatic Battery Charger

OWNERS MANUAL

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 – have the cord or plug replaced by an authorized service provider.

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, GEL or deep-cycle) rechargeable batteries. 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.

2.10 WARNING: This product contains one or more chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

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 the clips of charger to touch each other. Clips may be energized and they may spark.

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 and has a grounded plug. The charger must be grounded, to reduce the risk of electric shock. 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	10	10	10	8

*AWG-American Wire Gauge

9. ASSEMBLY INSTRUCTIONS

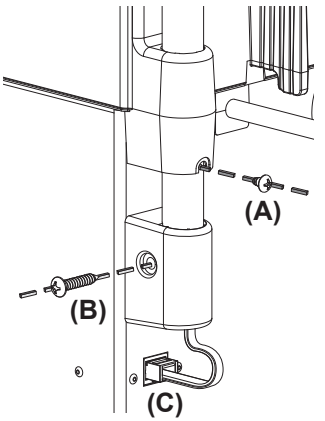
9.1 It is important to fully assemble your charger before use. Remove all cord wraps and uncoil the cables prior to using the battery charger. Follow these instructions for assembly.

Parts Included
(2) #8 x 0.25" screws **(A)** (2) #10 x 1.0" screws **(B)** (1) handle
Tools Needed
Phillips-head screwdriver (not included)

9.2 **Attach the handle:** Place each end of handle into its bracket, aligning with the screw holes. Insert screws as shown. Plug the cable into the port, as shown **(C)**.

IMPORTANT: Port is ONLY for plugging in the charger handle. It is not compatible with any other equipment.

CAUTION: Take care not to pinch or damage cable during handle installation. Charger will not function properly if this cable is damaged.



10. CONTROL PANEL

DIGITAL DISPLAY
The digital display indicates the status of the battery and charger. See the *Display Messages* section for a complete list of messages.

NOTE: During charging, the display will go into sleep mode and will not show the battery percentage, alternator percentage or voltage. To turn the display back on, press the Display button.

DISPLAY MODE BUTTON
Use this button to set the function of the digital display to one of the following:

(Battery %) – The digital display shows an estimated charge percentage of the battery connected to the charger's battery clamps, when charging.

A (Alternator %) – The digital display shows an estimated output percentage of the vehicle's charging system connected to the charger's battery clamps, compared to a properly functioning system. The alternator percent range is from 0 to 100%. Readings below 0 (13.2 volts) will read ***LOW*** and readings above 100% (14.6 volts) will read ***HIGH***. If you get a ***HIGH*** or ***LOW*** reading, have the electrical system checked by a qualified technician.

NOTE: The "**A**" selection is not available for 24V batteries.

V (Voltage) – The Digital Display shows the voltage at the charger battery clamps, in DC volts.

START/STOP BUTTON
Use this button to start or stop the charging or boosting process, after the battery is properly connected and an output or rate has been selected.

RATE SELECTION BUTTON
Use this button to select one of the following:

6<>2A CHARGE/MAINTAIN (12V only) – For charging small and large batteries. Not recommended for industrial applications.

40A/12V or 20A (24V) BOOST – For quickly adding energy to a severely discharged or large capacity battery prior to ENGINE START.

250A/12V or 125A/24V ENGINE START – Provides high amperage for cranking an engine with a weak or run-down battery. Always use in combination with a battery.

NOTE: Once the charger has started charging the battery, if you press the START/STOP button, the output current is shut off and the display will show ***OFF*** and then the battery voltage. If you press the START/STOP button again, the current will go back on at the same setting it was when it was turned off.

LED INDICATORS

REVERSED CLAMPS (red) LED flashing: The connections are reversed.

ON (yellow/orange) LED lit:
The charger has detected that a battery is connected, and is performing the selected operation.

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.

BATTERY TYPE BUTTON
Use this button to set the type of battery.

STD – 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 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 those for other styles of lead-acid battery. This is probably the most sensitive cell in terms of adverse reactions to overvoltage charging. Gel batteries are best used in VERY DEEP cycle application and may last a bit longer in hot weather applications. If the wrong battery charger is used on a gel cell battery, poor performance and premature failure will result.

TOGGLE SWITCHES
These are found on the base of the unit.

ON/OFF SWITCH – Use this switch to select between 12V Charge/Maintain, Boost and Engine Start or 24V Boost and Engine Start.

- **OFF –** When the switch is in this position (middle), the charger is turned off.
- **12V CHARGE/MAINTAIN, BOOST AND ENGINE START –** When the switch is in this position, the Rate Selection button can be set to either the 6<>2A Charge/Maintain, 40A Boost or 250A Engine Start.
- **24V BOOST AND ENGINE START –** When the switch is in this position, the Rate Selection button can be set to either the 20A Boost or 125A Engine Start.

11. OPERATING INSTRUCTIONS

WARNING: A spark near battery may cause an explosion.

IMPORTANT: Do not start the vehicle with the charger connected to the AC outlet, or it could damage the charger.

NOTE: This charger is equipped with an auto-start feature. Current will not be supplied to the battery clamps until a battery is properly connected. The clamps will not spark if touched together.

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. Make sure the ON/OFF switch is set to OFF.
7. Connect the battery, following the precautions listed in sections 6 and 7.
8. Connect the charger to an electrical outlet.
9. With the charger plugged in and connected to the battery of the vehicle, set the ON/OFF switch to the 12V Charge/Maintain/Boost/Engine Start or 24V Boost/Engine Start position.
10. Select the battery type and the desired rate.
11. Press the START button. The yellow/orange ⏻ON LED will light, and the display will show ***ANALYZING BATTERY*** while the charger determines that the battery is properly connected and the condition of the battery. See section 12 for display message details.
12. When charging is complete, press the ON/OFF switch to turn OFF, 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. Make sure the ON/OFF switch is set to OFF.
4. Connect the battery, following the precautions listed in sections 6 and 7.
5. Connect the charger to the electrical outlet.
6. With the charger plugged in and connected to the battery of the vehicle, set the ON/OFF switch to the 12V Charge/Maintain/Boost/Engine Start or 24V Boost/Engine Start position.
7. Select the battery type and the desired rate.
8. Press the START button. The yellow/orange ⏻ON LED will light, and the display will show ***ANALYZING BATTERY*** while the charger determines that the battery is properly connected and the condition of the battery. See section 12 for display message details.
9. When charging is complete press the ON/OFF switch to turn OFF, disconnect the charger from the AC power, disconnect the negative clamp, and finally the positive clamp.
10. A marine (boat) battery must be removed and charged on shore.

AUTOMATIC CHARGING MODE
When 12V Automatic Charge is performed, the charger switches to the maintain mode automatically after the battery is charged.

BATTERY CONNECTION INDICATOR
If the charger does not detect a properly connected battery, charging will not start and the digital display will show one of two messages. If the display shows ***CONNECT CLAMPS***, make sure the charger is connected to the battery and the connection points are clean and making a good connection. If the display shows ***WARNING CLAMPS REVERSED***, unplug the charger from the AC outlet and reverse the connections at the battery.

BATTERY CHARGING TIMES

APPLICATION	BATTERY SIZE	CHARGING TIME (Hours) 2A	6A	8A	10A
POWERSPORTS	6Ah	6	2	1.75	1.5
	32Ah	15	5	4.5	4
AUTOMOTIVE	300 CCA	12	4	3.5	3
	1000 CCA	30	10	8.5	7
MARINE	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.

CHARGE COMPLETION AND MAINTAIN MODE (FLOAT MODE MONITORING)

Charge completion is indicated by the green LED and the digital display showing ***FULLY CHARGED AUTO MAINTAINING***. 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 SC1352 maintains 12 volt batteries, keeping them at full charge. **It is not recommended for industrial applications.**

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.

DESULFATION MODE

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. If successful, normal charging will resume after the battery is desulfated. Desulfation could take up to 8 hours. If desulfation fails, charging will abort and the display will show ***CHARGING ABORTED BAD BATTERY***.

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 ***CHARGING ABORTED BAD BATTERY***. Do not continue attempting to charge this battery. Check the battery and replace, if necessary.

USING THE ENGINE START SETTING

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 the ENGINE START setting 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 the Engine Start setting, or it could damage the vehicle's electrical system. Have the battery checked.

1. Set the ON/OFF switch to the OFF position.
2. With the charger unplugged from the AC outlet, connect the charger to the battery, following the instructions given in sections 6 and 7.
3. With the charger plugged in and connected to the battery and chassis, set the ON/OFF switch to either the 12V or 24V position, press the Rate Selection button until the Engine Start LED is lit, and then press the START button.
4. If the battery is properly connected the Engine Start LED will light solid and the display will show ***ENGINE STARTING ON***. If display shows ***CONNECT CLAMPS***, check the battery connections. When the Engine Start output is enabled, the display will show ***READY***.
5. Crank the engine until it starts or 5 seconds pass. If the engine does not start, wait a few minutes before cranking again. This allows the charger and battery to cool down.

NOTE: After 3 minutes in Engine Start mode, the charger will enter into a cool-down period of 180 seconds, to allow the charger and the battery to cool down.

NOTE: During extremely cold weather, or if the battery is under 2 volts, use the Boost setting for 5 minutes before cranking the engine.

6. If the engine fails to start, use the Boost rate for 5 minutes before attempting to crank the engine again.
7. After the engine starts, press the ON/OFF switch to turn OFF, 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.

ENGINE STARTING NOTES

Cool Down – After cranking, the charger enters a mandatory 3 minute (180 second) cool down state. The digital display will show ***COOL DOWN XXX SECONDS REMAINING***. It starts at 180 and counts down to 0. After 3 minutes, the digital display will change to ***READY***. The ON (yellow/orange) LED will then be lit.

USING THE BATTERY VOLTAGE TESTER

1. With the charger unplugged from the AC outlet, connect the charger to the battery, following the instructions given in previous sections.
2. Plug the charger's AC power cord into the AC outlet.
3. Set the ON/OFF switch to the 12V or 24V position. DO NOT choose a rate with the Rate Selection button.
4. If necessary, press the Battery Type button until the correct type is indicated.
5. Read the voltage on the digital display. Keep in mind that this reading is only a battery voltage reading; a false surface charge may mislead you. Compare the reading to the following chart.

12V Battery Voltage Reading	24V Battery Voltage Reading	Battery Condition
12.8 or more	25.6 or more	Charged
12.2 to 12.7	24.4 to 25.4	Needs charging
Less than 12.2	Less than 24.4	Discharged

TESTER AND CHARGER

When first plugged in and the ON/OFF switch set to the 12V or 24V position, the unit operates only as a tester, not as a charger. Selecting a charge rate and pressing the START button activates the battery charger and deactivates the tester.

POWER-UP IDLE TIME LIMIT

If no button is pressed within 10 minutes after the battery charger is first powered up, the charger will automatically switch from tester to charger if a battery is connected. In that case, the charger will be set to the Boost rate and Gel battery type.

TESTER WITHOUT TIME LIMIT

If either the 0000 Display Mode or Battery Type button is pressed within the first 10 minutes after the battery charger is powered up, the unit will remain a tester (not a charger) indefinitely, unless a charge rate is selected and the START button is pressed.

TESTING AFTER CHARGING

After the unit has been changed from tester to charger (by selecting a charge rate and pressing the START button), it remains a charger. To change the battery charger back to a tester, press the START button.

NOTE: The battery tester is only designed to test batteries. Testing a device with a rapidly changing voltage could yield unexpected or inaccurate results.

USING THE ALTERNATOR PERFORMANCE TESTER (12V only)

1. With the charger unplugged from the AC outlet, connect the charger to the battery, following the instructions given in previous sections.
2. Plug the charger AC power cord into the AC outlet.
3. Set the ON/OFF switch to the 12V position. DO NOT choose a rate with the Rate Selection button.
4. Start the vehicle, rev the engine at 2000 rpm for 30 seconds and turn on the vehicle's headlights or other accessories.
5. Read the alternator percentage on the digital display. Readings below 0 (13.2 volts) will read ***LOW*** and readings above 100% (14.6 volts) will read ***HIGH***. If you get a ***HIGH*** or ***LOW*** reading, have the electrical system checked by a qualified technician.

NOTE: Refer to your vehicle owner's manual for appropriate voltage numbers for your alternator.

FAN OPERATION

It is normal for the fan to start and stop when maintaining a fully charged battery. The fan does not run in Tester Mode. Keep the area near the charger clear of obstructions, to allow the fan to operate efficiently.

12. DISPLAY MESSAGES

CONNECT CLAMPS (**V** LED lit) – Plugged into the AC outlet without the clamps connected to a battery.

WARNING CLAMPS REVERSED (Red LED flashing) – Plugged into the AC outlet and the clamps are connected backwards to a battery. Scrolls until condition is corrected.

ANALYZING BATTERY (Yellow/orange ON LED lit) – Plugged into the AC outlet, and when first connected to a 12 or 24V battery correctly.

CHARGING 12V – XX% (Yellow/orange ON LED lit) – Plugged into the AC outlet and correctly connected to a discharged 12V battery.

BOOST ON – 12V (Yellow/orange ON LED lit) – Plugged into the AC outlet and correctly connected to a discharged 12V battery.

BOOST ON – 24V (Yellow/orange ON LED lit) – Plugged into the AC outlet and correctly connected to a discharged 24V battery.

FULLY CHARGED AUTO MAINTAINING (Green **Charged/Maintaining** LED lit) – Plugged into the AC outlet and correctly connected to a fully charged 12 or 24V battery.

CHARGING ABORTED BAD BATTERY – Circumstances that could cause an Abort situation during charging:

- The battery is severely sulfated or has a shorted cell and can't reach a full charge.
- The battery is too large or there is a bank of batteries and it doesn't reach full charge within a set time period.

Circumstances that could cause an Abort situation during maintaining:

- The battery is severely sulfated or has a weak cell and will not hold a charge.
- There is a large draw on the battery and the charger has to supply its maximum maintain current for a 12 hour period to keep the battery at full charge.

ENGINE STARTING ON (Yellow/orange ON LED lit) – The battery is properly connected and Engine Start mode has been selected.

READY (Yellow/orange ON LED lit) – The charger's output is enabled and the charger is ready to perform engine start.

COOL DOWN XXX SECONDS REMAINING (**Battery Type** LED lit) – The charger is in a mandatory 3 minute (180 second) cool down state.

13. 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.

14. TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	SOLUTION
The charger will not turn on when properly connected.	AC outlet is dead. Poor electrical connection. Battery is defective.	Check for open fuse or circuit breaker supplying AC outlet. Check power cord and extension cord for loose fitting plug. Have battery checked.
Battery clamps do not spark when touched together.	The charger is equipped with an auto-start feature. It will not supply current to the battery clamps until a battery is properly connected. The clamps will not spark if touched together.	No problem; this is a normal condition.
The battery is connected and the charger is on, but is not charging.	The charger is in tester mode, not charge mode.	Selecting a charge rate and pressing the START button activates the battery charger and deactivates the tester.
No reading on the digital display.	Display Assembly not connected to base. Charger is not plugged in. No power at receptacle.	See Section 9, *Assembly Instructions*. Plug the charger into an AC outlet. Check for open fuse or circuit breaker supplying AC outlet.
Digital Display reads ***LOW*** when testing the alternator.	The alternator output is 13.2 volts or less.	Have the electrical system checked by a qualified technician.
Digital Display reads ***HIGH*** when testing the alternator.	The alternator output is 14.6 volts or more.	Have the electrical system checked by a qualified technician.
Yellow/orange ⏻ LED is lit and the display shows ***ANALYZING BATTERY***.	The charger needs to check the condition of the battery.	The yellow/orange LED will be lit when the charger is checking the condition of the battery.
The display shows ***CHARGE ABORTED BAD BATTERY***.	The battery is sulfated; desulfation failed. The battery is too large for the charger.	Do not continue attempting to charge this battery. Check the battery and replace, if necessary. You need a charger with a higher amp rate.
The display shows ***CONNECT CLAMPS***.	The clamps are not making a good connection.	Check for poor connection at battery and frame.

PROBLEM	POSSIBLE CAUSE	SOLUTION
Short or no start cycle when cranking engine.	No power at receptacle.	Check for open fuse or circuit breaker supplying AC outlet.
	AC cord and/or extension cord is loose.	Check power cord and extension cord for loose fitting plug.
	The clamps are not making a good connection.	Check for poor connection at battery and frame.
	Failure to wait 3 minutes between cranks.	Wait 3 minutes of rest time before the next crank.
	The battery may be severely discharged.	On a severely discharged battery, use the 40A Boost rate for 10 to 15 minutes, to assist in cranking.
	The battery is drawing more than the engine start rate.	Crank time varies with the amount of current drawn. If cranking draws more than the engine start rate, crank time may be less than 5 seconds.
	The charger may be overheated.	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.

15. SPECIFICATIONS

Input ..... 120V AC @ 60Hz, 10A cont., 57A max. int.

Output .....12V DC, 6A int.

12V/24V DC, 40A/20A int., 120 sec. max. on, 60 sec. min. off

12V/24V DC, 250A/125A int., 5 sec. max on, 180 sec. min. off