OWNER'S MANUAL
MANUAL DEL USUARIO

Models / Modelos: SE-2254, SE-2352, SE-3000, SE-3612, SE-4020, SE-4022, SE-5025, SE-6030, SE-8050

Manual Battery Charger
Cargador de Batería Manual

DO NOT RETURN THIS PRODUCT TO THE STORE!
Call Customer Service for assistance: 800-621-5485

¡NO LO DEVUELVA ESTE PRODUCTO A LA TIENDA!
Llame a Servicios al Cliente para asistencia: 800-621-5485

⚠WARNING **READ THE ENTIRE MANUAL BEFORE USING THIS PRODUCT. FAILURE TO DO SO COULD RESULT IN SERIOUS INJURY OR DEATH.**

⚠ADVERTENCIA **LEA EL MANUAL COMPLETO ANTES DE UTILIZAR ESTE PRODUCTO. CUALQUIER FALLA PODRÍA RESULTAR EN SERIAS LESIONES O PODRÍA SER MORTAL.**

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IMPORTANT: READ AND SAVE THIS SAFETY AND INSTRUCTION MANUAL.

SAVE THESE INSTRUCTIONS – This manual will show you how to use your charger safely and effectively. Please read, understand and follow these instructions and precautions carefully, as this manual contains important safety and operating instructions. The safety messages used throughout this manual contain a signal word, a message and an icon.

The signal word indicates the level of the hazard in a situation.

⚠DANGER Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury to the operator or bystanders.

⚠WARNING Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury to the operator or bystanders.

⚠CAUTION Indicates a potentially hazardous situation which, if not avoided, could result in moderate or minor injury to the operator or bystanders.

IMPORTANT Indicates a potentially hazardous situation which, if not avoided, could result in damage to the equipment or vehicle or property damage.

⚠WARNING

Pursuant to California Proposition 65, this product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling.

1. IMPORTANT SAFETY INSTRUCTIONS – SAVE THESE INSTRUCTIONS.

This manual contains important safety and operating instructions.

⚠WARNING **⚠WARNING**

RISK OF ELECTRIC SHOCK OR FIRE.

1.1 Keep out of reach of children.

1.2 Do not expose the charger to rain or snow.

1.3 Use only recommended attachments. Use of an attachment not recommended or sold by Schumacher® Electric Corporation may result in a risk of fire, electric shock or injury to persons or damage to property.

1.4 To reduce the risk of damage to the electric plug or cord, pull by the plug rather than the cord when disconnecting the charger.

1.5 An extension cord should not be used unless absolutely necessary. Use of an improper extension cord could result in a risk of fire and electric shock. If an extension cord must be used, make sure:

- That the pins on the plug of the extension cord are the same number, size and shape as those of the plug on the charger.
- That the extension cord is properly wired and in good electrical condition.
- That the wire size is large enough for the AC ampere rating of the charger as specified in section 8.

1.6 To reduce the risk of electric shock, unplug the charger from the outlet before attempting any maintenance or cleaning. Simply turning off the controls will not reduce this risk.

1.7 Do not operate the charger with a damaged cord or plug; have the cord or plug replaced immediately by a qualified service person. (Call customer service at 1-800-621-5485.)

1.8 Do not operate the charger if it has received a sharp blow, been dropped or otherwise damaged in any way; take it to a qualified service person. (Call customer service at 1-800-621-5485.)

1.9 Do not disassemble the charger; take it to a qualified service person when service or repair is required. Incorrect reassembly may result in a risk of fire or electric shock. (Call customer service at 1-800-621-5485.)

⚠WARNING

RISK OF EXPLOSIVE GASES.

1.10 WORKING IN THE 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.

1.11 To reduce the risk of a battery explosion, follow these instructions and those published by the battery manufacturer and the manufacturer of any equipment you intend to use in the vicinity of the battery. Review the cautionary markings on these products and on the engine.

2. PERSONAL PRECAUTIONS

RISK OF EXPLOSIVE GASES.

2.1 NEVER smoke or allow a spark or flame in the vicinity of a battery or engine.

2.2 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.

2.3 Be extra cautious, to reduce the risk of dropping a metal tool onto the battery. It might spark or short-circuit the battery or other electrical part that may cause an explosion.

2.4 Use this charger for charging LEAD-ACID batteries only. It is not intended to supply power to a low voltage electrical system other than in a starter-motor application. Do not use this 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.

2.5 NEVER charge a frozen battery.

2.6 NEVER overcharge a battery.

2.7 Consider having someone nearby to come to your aid when you work near a lead-acid battery.

2.8 Have plenty of fresh water and soap nearby in case battery acid contacts your skin, clothing or eyes.

2.9 Wear complete eye and body protection, including safety goggles and protective clothing. Avoid touching your eyes while working near the battery.

2.10 If battery acid contacts your skin or clothing, immediately wash the area with soap and water. If acid enters your eye, immediately flood the eye with cold running water for at least 10 minutes and get medical attention right away.

2.11 If battery acid is accidentally swallowed, drink milk, the whites of eggs or water. DO NOT induce vomiting. Seek medical attention immediately.

3. PREPARING TO CHARGE

RISK OF CONTACT WITH BATTERY ACID. BATTERY ACID IS A HIGHLY CORROSIVE SULFURIC ACID.

3.1 If it is necessary to remove the battery from the vehicle to charge it, always remove the grounded terminal first. Make sure all of the accessories in the vehicle are off to prevent arcing.

3.2 Be sure the area around the battery is well ventilated while the battery is being charged.

3.3 Clean the battery terminals before charging the battery. During cleaning, keep airborne corrosion from coming into contact with your eyes, nose and mouth. Use baking soda and water to neutralize the battery acid and help eliminate airborne corrosion. Do not touch your eyes, nose or mouth.

3.4 Add distilled water to each cell until the battery acid reaches the level specified by the battery manufacturer. Do not overfill. For a battery without removable cell caps, such as valve regulated lead acid batteries (VRLA), carefully follow the manufacturer's recharging instructions.

3.5 Read, understand and follow all instructions for the charger, battery, vehicle and any equipment used near the battery and charger. Study all of the battery manufacturer's specific precautions while charging and recommended rates of charge.

3.6 Determine the voltage of the battery by referring to the vehicle owner's manual and make sure that the output voltage selector switch is set to the correct voltage. If the charger has an adjustable charge rate, charge the battery in the lowest rate first.

3.7 Make sure that the charger cable clips make tight connections.

4. CHARGER LOCATION

RISK OF EXPLOSION AND CONTACT WITH BATTERY ACID.

4.1 Locate the charger as far away from the battery as the DC cables permit.

4.2 Never place the charger directly above the battery being charged; gases from the battery will corrode and damage the charger.

4.3 Do not set the battery on top of the charger.

4.4 Never allow battery acid to drip onto the charger when reading the electrolyte specific gravity or filling the battery.

4.5 Do not operate the charger in a closed-in area or restrict the ventilation in any way.

5. DC CONNECTION PRECAUTIONS

5.1 Connect and disconnect the DC output clips only after setting all of the charger switches to the “off” position (if applicable) and removing the AC plug from the electrical outlet. Never allow the clips to touch each other.

5.2 Attach the clips to the battery and chassis, as indicated in sections 6 and 7.

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

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

6.1 Position the AC and DC cables to reduce the risk of damage by the hood, door and moving or hot engine parts. NOTE: If it is necessary to close the hood during the charging process, ensure that the hood does not touch the metal part of the battery clips or cut the insulation of the cables.

6.2 Stay clear of fan blades, belts, pulleys and other parts that can cause injury.

6.3 Check the polarity of the battery posts. The POSITIVE (POS, P, +) battery post usually has a larger diameter than the NEGATIVE (NEG, N, -) post.

6.4 Determine which post of the battery is grounded (connected) to the chassis. If the negative post is grounded to the chassis (as in most vehicles), see step 6.5. If the positive post is grounded to the chassis, see step 6.6.

6.5 For a negative-grounded vehicle, connect the POSITIVE (RED) clip from the battery charger to the POSITIVE (POS, P, +) ungrounded post of the battery. Connect the NEGATIVE (BLACK) clip to the vehicle chassis or engine block away from the battery. Do not connect the clip to the carburetor, fuel lines or sheet-metal body parts. Connect to a heavy gauge metal part of the frame or engine block.

6.6 For a positive-grounded vehicle, connect the NEGATIVE (BLACK) clip from the battery charger to the NEGATIVE (NEG, N, -) ungrounded post of the battery. Connect the POSITIVE (RED) clip to the vehicle chassis or engine block away from the battery. Do not connect the clip to the carburetor, fuel lines or sheet-metal body parts. Connect to a heavy gauge metal part of the frame or engine block.

6.7 Connect charger AC supply cord to electrical outlet.

6.8 When disconnecting the charger, turn all switches to off, disconnect the AC cord, remove the clip from the vehicle chassis and then remove the clip from the battery terminal.

6.9 See CALCULATING CHARGE TIME for length of charge information.

7. FOLLOW THESE STEPS WHEN BATTERY IS OUTSIDE VEHICLE.

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

7.1 Check the polarity of the battery posts. The POSITIVE (POS, P, +) battery post usually has a larger diameter than the NEGATIVE (NEG, N, -) post.

7.2 Attach at least a 24-inch (61 cm) long 6-gauge (AWG) insulated battery cable to the NEGATIVE (NEG, N, -) battery post.

7.3 Connect the POSITIVE (RED) charger clip to the POSITIVE (POS, P, +) post of the battery.

7.4 Position yourself and the free end of the cable you previously attached to the NEGATIVE (NEG, N, -) battery post as far away from the battery as possible – then connect the NEGATIVE (BLACK) charger clip to the free end of the cable.

7.5 Do not face the battery when making the final connection. As stated in 7.4, face away from the battery when connecting the negative clip to the cable.

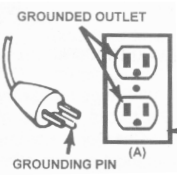
7.6 Connect charger AC supply cord to electrical outlet.

7.7 When disconnecting the charger, always do so in the reverse order of the connecting procedure and break the first connection while as far away from the battery as practical.

7.8 A marine (boat) battery must be removed and charged on shore. To charge it onboard requires equipment specially designed for marine use.

8. GROUNDING AND AC POWER CORD CONNECTIONS

RISK OF ELECTRIC SHOCK OR FIRE.



8.1 This battery charger is for use on a nominal 120-volt circuit and has a grounded plug that looks like the plug illustrated. 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 Recommended minimum AWG size for extension cord:

AC input rating, amperes*		AWG size of cord, Length of cord, feet (m)			
At least	But less than	25 (7.6)	50 (15.2)	100 (30.5)	150 (45.6)
0	2	18	18	18	16
2	3	18	18	16	14
3	4	18	18	16	14
4	5	18	18	14	12
5	6	18	16	14	12
6	8	18	16	12	10
8	10	18	14	12	10
10	12	16	14	10	8
12	14	16	12	10	8
14	16	16	12	10	8
16	18	14	12	8	8
18	20	14	12	8	6

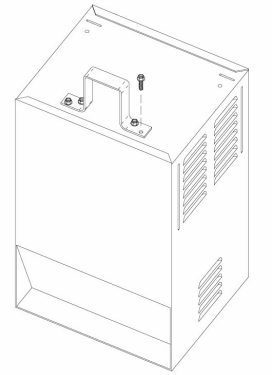
*If the input rating of a charger is given in watts rather than in amperes, the corresponding ampere rating is to be determined by dividing the wattage rating by the voltage rating – for example:

1200 watts/120 volts = 10 amperes

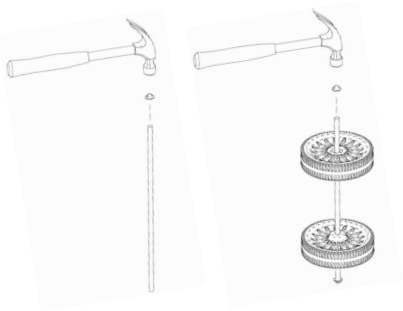
9. ASSEMBLY INSTRUCTIONS

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.

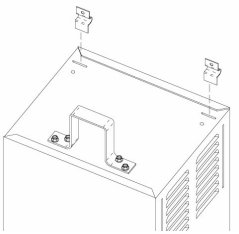
PARTS	TOOLS NEEDED
(2) 10-32, thread cutting screws (4) ¼-20, thread cutting screws (4) Phillips head sheet metal screws (2) wheels (1) axle (2) axle caps (2) axle brackets (1) handle (1) foot	3/8" wrench (for mounting foot) 5/16" wrench (for mounting wheels) 1/4" wrench (for mounting handle) hammer screwdriver (flat blade) screwdriver (Phillips)

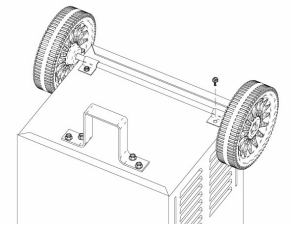


Attach the Foot: Remove the charger from the packing materials and place upside down on a flat surface. Attach the foot and secure it with the four ¼-20 thread cutting screws provided.



Assemble the Wheels and Axle: Hold the axle upright on the floor or work surface. Then, using a hammer, tap one of the axle caps onto the top end of the axle. Be sure to tap the axle cap on straight. Slide both wheels onto the axle with the recessed hubs facing out as shown. Install the second axle cap.

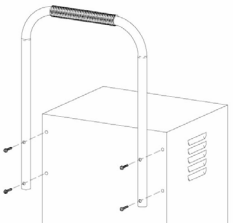




Mount the Axle to the Charger: Place one end of each bracket into the slot on the bottom of the charger. Place the axle assembly under each bracket. Attach the brackets using the two, 10-32 thread cutting screws provided.

NOTE: Be careful not to drop the brackets inside of the charger case.

Attach the Handle: If the charger came with a plastic grip, slide that onto the handle until it is centered at the top. Turn the charger right side up onto its foot and wheels. Align the handle so the screw holes are aligned with the screw holes on the upper back corners of the charger. Attach the handle using the four Phillips head screws provided.



10. CONTROL PANEL

Note: Not all controls are available on all models.

Charge Rate Selector Switch

Use the Charge Rate selector switch to select the charge rate or engine starting setting you require.

- **2A Slow Charge Rate –** Intended for charging small batteries such as those commonly used in garden tractors, snow mobiles and motorcycles.
- **10A, 15A, 20A, 30A Fast and 35A, 40A, 44A, 50A, 60A, 80A Rapid Charge Rate –** Use for charging automotive, marine and deep-cycle batteries. Not intended for industrial applications.
- **100A, 125A, 180A, 200A, 225A, 300A Engine Start –** Provides **100, 125, 180, 200, 225 or 300** amps for cranking an engine with a weak or run down battery. Always use in combination with a battery.

Timer (Not applicable for Model SE-2352)

- **Timer Setting:** The timer allows you to set a specified time for charging. After the timer expires, the charger stops charging your battery. The main function of the timer is to prevent over charging while allowing a battery time to obtain a satisfactory charge. To properly set the timer, you must know the size of the battery in ampere hours or reserve capacity in minutes and the state of charge. It is important that you determine the appropriate state of charge of your battery as specified in Section 12 and set the timer accordingly.
- **Hold:** This position defeats the timer function, allowing for continuous operation. Be sure to monitor the charging progress and stop it when the battery is charged. Not doing so may cause damage to your battery or may cause other personal property damage or personal injury.

Ammeter

The Ammeter indicates the amount of current, measured in amps, that is being drawn by the battery. As a battery takes on a charge, it draws less current from the charger. Correspondingly, the meter will show less current being drawn by the battery. When the current stops decreasing, the battery is charged. The start area of the meter indicates a high rate of current being drawn from the charger. When cranking an engine, the meter needle will be at the extreme right side of the start area. The 2 amp charge rate may indicate some activity on the meter, although the meter does not have the resolution to display this low rate.

- **Percent of Charge**
  The percent of charge scale is intended as a visual aid to help simplify reading the state of charge. The percent of charge is based on the current drawn by the battery. For this reason, accuracy will vary with the size and battery type. This means that the indication for a fully charged large battery may be slightly less than 100%.

Model SE-2352 employs 2 toggle switches:

- Switch #1 – Use this switch to select the 200 Amp Engine Start and the 35 Amp Charge Rate. Switch #2 must be in the down position (Select Position) when using Switch #1.
- Switch #2 – Use this switch to select the 2 amp Charge Rate and the OFF position. Also, use to select use of Switch #1. Note that Switch #1 is only effective when Switch #2 is set to “Select Position.”

Model SE-3612 employs 3 toggle switches:

- Switch #1 (Furthest left) – Use this switch to select the 12 volt 200 amp engine start (down) or the 12 volt 40 amp charge (up) position. The center switch (#2) must be in the (up) position when switch #1 is used.
- Switch #2 (Center) – Use this switch to select use of either switch #1 or switch #3. Down for switch #3 and up for switch #1.
- Switch #3 (Right) – Use this switch to select the 12 volt 2 amp charge (up) or the 6 volt 100 amp engine start (down). The center switch (#2) must be in the down position to use switch #3.

Battery Load Tester Switch (Model SE-8050 only)
When testing a battery, use this switch to apply a load to it.

Battery Tester Switch (Models SE-2254 and SE-4022 only)
When testing a battery, use this switch to select between testing a 6 volt battery and testing a 12 volt battery.

Voltage Selector Switch
Use this switch to set the scale of the voltmeter to either 6 volt and 12 volt DC to match the battery or batteries being charged. NOTE: This does not change the output voltage of the charger.

Voltmeter
The voltmeter indicates the voltage at the battery clips. The charger need not be plugged into an A.C. outlet. The timer should be in the OFF position. Then connect the charger following the instructions in sections 6 and 7.

11. OPERATING INSTRUCTIONS

⚠WARNING This battery charger must be properly assembled in accordance with the assembly instructions before it is used.

Charging (Model SE-2352)

1. Ensure that all of the charger components are in place and in good working condition, including the plastic boots on the battery clips. Make sure the electrolyte (battery liquid) in each cell is at the correct level.
2. Set the charge rate selector switch (switch #2) to the OFF position.
3. Connect the battery, following the precautions listed in Sections 6 and 7.
4. Connect the A.C. power, following the precautions listed in Section 8.
5. Place the charge rate selector switches (switch #1 and #2) in the preferred position.
   - For the 2A charge rate, switch #1 is not used and switch #2 should be toggled up.
   - For the 35A charge rate, both switches (#1 and #2) should be toggled down.
6. To disconnect the charger, reverse the procedure.

NOTE: This is a manual charger and will overcharge a battery if permitted to operate for extended periods of time. Monitor the charging often.

Charging (Model SE-3612)

1. Ensure that all of the charger components are in place and in good working condition, including the plastic boots on the battery clips. Make sure the electrolyte (battery liquid) in each cell is at the correct level.
2. Set the timer knob to the OFF position.
3. Connect the battery, following the precautions listed in Sections 6 and 7.
4. Connect the A.C. power, following the precautions listed in Section 8.
5. Set the charge rate switch to the desired charge position. See Charge Rate chart.
6. Set the timer from the OFF position to the desired timed charge.
7. To disconnect the charger, reverse the procedure.

NOTE: This is a manual charger and will overcharge a battery if permitted to operate for extended periods of time. Monitor the charging often.

Charging (Models SE-2254, SE-3000, SE-4020, SE-4022, SE-5025, SE-6030 and SE-8050)

1. Ensure that all of the charger components are in place and in good working condition, including the plastic boots on the battery clips. Make sure the electrolyte (battery liquid) in each cell is at the correct level.
2. Connect the battery following the precautions listed in sections 6 and 7.
3. Select the appropriate settings for your battery.
4. Connect the A.C. power following the precautions listed in section 8.
5. Turn the charger on. (If necessary)

Using the Engine Start feature
Your battery charger can be used to jumpstart your car if the battery is low. Follow these instructions on how to use the ENGINE START feature.

⚠WARNING Follow all safety instructions and precautions for charging your battery. Wear complete eye protection and clothing protection. Charge your battery in a well-ventilated area.

IMPORTANT Using the ENGINE START feature 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 feature, or it could damage the vehicle's electrical system.

1. Set the charge rate switch and the timer to the OFF position.
2. With the charger unplugged from the A.C. outlet, connect the charger to the battery following the instructions given in Section 6 (FOLLOW THESE STEPS WHEN THE BATTERY IS INSTALLED IN A VEHICLE).
3. Plug the charger A.C. power cord into the A.C. outlet, and then move the timer switch from OFF to the HOLD position.
4. With the charger plugged in and connected to the battery of the vehicle, set the charge rate selector switch to the engine start position.
5. Crank the engine until it starts or 5 seconds pass. If the engine does not start, wait 3 minutes before cranking again. This allows the charger and battery to cool down.

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

6. If the engine fails to start, charge the battery for 5 more minutes before attempting to crank the engine again.
7. After the engine starts, move the charge rate selector switch and timer to the off position and unplug the A.C. power cord before disconnecting the battery clips from the vehicle.
8. Clean and store the charger in a dry location.

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.

Using the Battery Voltage Tester (Models SE-2254 and SE-4022 only)

1. Set the Voltage Selector switch to the correct setting (6V or 12V) to match the battery to be tested.
2. Set the timer to the OFF position.
3. Connect the battery to the charger as specified in sections 6 and 7. The charger does not need to be plugged into an A.C. outlet.
4. Read the voltmeter.

Keep in mind that this reading is only a battery voltage reading, a false charge may mislead you. We suggest that you turn on the headlights for a couple of minutes and then wait a couple of minutes after you have turned them off before reading the meter. Then, follow the convenient color code shown on the meter.

Using the Battery Load Tester (Model SE-8050 only)

1. Set the Voltage Selector switch to the correct setting (6V or 12V) to match the battery to be tested.
2. Set the timer to the OFF position.
3. Connect the battery to the charger as specified in sections 6 and 7. The charger does not need to be plugged into an A.C. outlet.
4. Press the Battery Load Test switch to LOAD ON for 10 seconds and read the voltmeter.

Green – Indicates the battery capacity is OK. The battery may or may not be fully charged. Check the specific gravity to determine the state of charge. If the specific gravity shows less than a full charge, check for an electrical drain on the battery or for possible charging system problems. Recharge the battery to full charge.

Yellow or Red, but the needle remains steady – Indicates that the battery capacity is not satisfactory. The battery may be either defective or not fully charged. Check the specific gravity of the battery to see which condition exists. If charging does not bring the battery up to a full charge, the battery should be replaced.

Yellow or Red, but the needle continues to fall – Indicates the battery may be defective or rundown. Release the load switch and note the voltmeter reaction. Voltage recovery into the green or above within seconds indicates a defective battery. A slow recovery indicates a rundown condition. For best results, check the specific gravity of the battery.

General Charging Notes

Fan: It is normal for the fan to be on all the time. Keep the area near the charger clear of obstructions to allow the fan to operate efficiently.

12. CALCULATING CHARGE TIME

Battery Percent and Charge Time: This charger adjusts the charging time in order to charge the battery completely, efficiently and safely. The microprocessor automatically performs the necessary functions. This section includes guidelines that can be used to estimate charging times.

The Hydrometer or Electronic Method

To find the time needed to fully charge your battery, determine the battery's charge level with a hydrometer or electronic Percent-of-Charge Tester. The following table will help you convert hydrometer readings to percent of charge values.

SPECIFIC GRAVITY	PERCENT OF CHARGE	PERCENT OF CHARGE NEEDED
1.265	100%	0%
1.225	75%	25%
1.155	25%	75%
1.120	0%	100%

When you know the percent of charge and the Amp Hour (AH) rating of your battery, you can calculate the approximate time needed to bring your battery to a full charge.

To convert Reserve Capacity to Amp Hours, divide Reserve Capacity by 2, and add 16:

Example:

$$\text{Amp Hour Rating} = \frac{\text{Reserve Capacity}}{2} + 16$$

NOTE: The Reserve Capacity can be obtained from the battery specification sheet or the owner's manual.

To calculate the time needed for a charge:

1. Find the percent of charge needed. (A battery at 50 percent charge that will be charged to 100 percent needs another 50 percent (.50)).
2. Multiply the Amp Hour Rating by the charge needed (.50) and divide by the charge rate setting.
3. Multiply the results by 1.25 and you will have the total time needed, in hours, to bring the battery to full charge.
4. Add an additional hour for a deep-cycle battery.

Example:

$$\frac{\text{Amp Hour Rating} \times \%\text{ of charge needed}}{\text{Charge Rate Setting}} \times 1.25 = \text{hours of charge}$$

$$\frac{100\text{ (AH Rating)} \times 0.50\text{ (charge needed)}}{20\text{ (Charge Rate Setting)}} \times 1.25 = 3.125\text{ hours}$$

$$\frac{100 \times 0.50}{20} \times 1.25 = 3.125$$

You would need to charge your 100-Ampere Hour Battery for a little more than 3 hours at the 20-Amp charge rate using the above example.

The Chart Method

Use the following table to more accurately determine the time it will take to bring a battery to full charge. First, identify where your battery fits into the chart.

CCA = Cold Cranking Amps

RC = Reserve Capacity

Ah = Amp Hour

NR means that the charger setting is NOT RECOMMENDED.

Find your battery's rating on the following chart, and note the charge time given for each charger setting. The times given are for batteries with a 50% charge prior to recharging. Add more time for severely discharged batteries.

BATTERY SIZE/RATING			CHARGE RATE/CHARGING TIME - HOURS										
			2 AMP	5 AMP	10 AMP	15 AMP	20 AMP	30 AMP	35 AMP	40 AMP	50 AMP	60 AMP	80 AMP
SMALL BATTERIES	Motorcycle, garden, tractor, etc.	6 - 12 Ah	2 – 3¾ hrs	¾ – 1½ hrs	NR	NR	NR	NR	NR	NR	NR	NR	NR
		12 - 32 Ah	3¾ – 10 hrs	1½ – 4 hrs	NR	NR	NR	NR	NR	NR	NR	NR	NR
CAR/ TRUCK	200 - 315 CCA	40 - 60 RC	11¼ – 14½ hrs	4½ – 5¾ hrs	2¼ – 3 hrs	1½ - 2 hrs	1 – 1½ hrs	¾ – 1 hr	40 – 50 min	½ - ¾ hrs	25 - 35 min	23 - 29 min	17 - 22 min
	315 - 550 CCA	60 - 85 RC	14½ – 18¼ hrs	5¾ – 7½ hrs	3 – 3¾ hrs	2 - 2½ hrs	1½ – 2 hrs	1 – 1¼ hrs	50 – 60 min	¾ – 1 hr	½. – ¾ hr	29 - 37 min	22 - 28 min
	550 - 1000 CCA	85 - 190 RC	18¼ – 34¾ hrs	7½ – 14 hrs	3¾ – 7 hrs	2½ - 4½ hrs	2 – 3½ hrs	1¼ – 2¼ hrs	1 – 2 hrs	1 – 1¾ hrs	¾ – 1½ hrs	37 - 70 min	28 - 52 min
MARINE/DEEP CYCLE		80 RC	17½ hrs	7 hrs	3½ hrs	2¼ hrs	1¾ hrs	NR	NR	NR	NR	NR	NR
		140 RC	27 hrs	10¾ hrs	5½ hrs	3½ hrs	2¾ hrs	NR	NR	NR	NR	NR	NR
		160 RC	30 hrs	12 hrs	6 hrs	4 hrs	3 hrs	NR	NR	NR	NR	NR	NR
		180 RC	33 hrs	13¼ hrs	6½ hrs	4½ hrs	3¼ hrs	NR	NR	NR	NR	NR	NR

13. MAINTENANCE INSTRUCTIONS

13.1 After use and before performing maintenance, unplug and disconnect the battery charger (see sections 6, 7 and 8).

13.2 Use a dry cloth to wipe all battery corrosion and other dirt or oil from the battery clips, cords, and the charger case.

13.3 Ensure that all of the charger components are in place and in good working condition, for example, the plastic boots on the battery clips.

13.4 Servicing does not require opening the unit, as there are no user-serviceable parts.

13.5 All other servicing should be performed by qualified service personnel.

14. MOVING AND STORAGE INSTRUCTIONS

14.1 Store the charger unplugged, in an upright position. The cord will still conduct electricity until it is unplugged from the outlet.

14.2 Store inside, in a cool, dry place (unless you're using an on-board Marine Charger).

14.3 Do not store the clips on the handle, clipped together, on or around metal, or clipped to cables.

14.4 If the charger is moved around the shop or transported to another location, take care to avoid/prevent damage to the cords, clips and charger. Failure to do so could result in personal injury or property damage.

15. TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	REASON/SOLUTION
No reading on the ammeter.	Charger is not plugged in.	Plug the charger into an A.C. outlet.
	No power at the receptacle.	Check for open fuse or circuit breaker supplying A.C. outlet.
	Clips are not making a good connection to the battery.	Check for poor connection to battery and frame. Make sure connection points are clean. Rock clips back and forth for a better connection.
	Connections are reversed.	Unplug the charger and reverse the clips.
	Battery is defective (will not accept a charge).	Have battery checked.
	2 amp charge rate is being used.	Ammeter may show no activity at the 2A charge rate.
Ammeter reading stays high.	Battery is severely discharged.	Continue charging battery for two more hours. If problem continues have the battery checked.
	Wrong battery voltage.	Verify the voltage settings or output ratings on the charger are correct.
Ammeter reads less than selected charge rate when charging a discharged battery.	Extension cord is too long or wire gauge is too small.	Use a shorter or heavier gauge extension cord.
	Weak cell or sulfated plate in battery.	A sulfated battery will eventually take a normal charge if left connected. If the battery will not take a charge, have it checked.
	Battery is only partially discharged.	Continue to charge the battery.
The charger is making an audible clicking sound.	Circuit breaker is cycling.	The settings may be wrong. Check the charger settings.
	Battery is defective.	Have the battery checked.
	Shorted battery cables or clips.	Circuit breaker cycles when current draw is too high. Check for shorted cables or clips and replace if necessary.
	Severely discharged battery, but otherwise it is a good battery.	The battery may not want to accept a charge due to a run-down state. 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.
	Reverse connections at battery.	Shut the charger off and correct the lead connections.

PROBLEM	POSSIBLE CAUSE	REASON/SOLUTION
Charger makes a loud buzz or hum.	Transformer laminations vibrate (buzz).	No problem; this is a normal condition.
	Shorted Diode Assembly or Output Rectifier Assembly (hum).	Have charger checked by a qualified technician.
Short or no start cycle when cranking engine.	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 3 seconds.
	Failure to wait 3 minutes (180 seconds) between cranks.	Wait 3 minutes of rest time before the next crank.
	Clips are not making a good connection.	Check for poor connection at battery and frame.
	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 A.C. outlet.
	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.
	Battery may be severely discharged.	On a severely discharged battery, charge for 10 to 15 minutes in the manual charge rate to help assist in cranking.
Charger will not turn on when properly connected.	A.C. outlet is dead.	Check for open fuse or circuit breaker supplying A.C. outlet.
	Poor electrical connection.	Check power cord and extension cord for loose fitting plug.
The battery is connected and the charger is on, but is not charging.	Clips are not making a good connection.	Check for poor connection at battery and frame. Make sure connecting points are clean. Rock clips back and forth for a better connection.
The measured current is much lower than what was selected.	The charger reached the maximum voltage and is reducing the current.	No problem; this is a normal condition.

16. BEFORE RETURNING FOR REPAIRS

16.1 When a charging problem arises, make certain that the battery is capable of accepting a normal charge. Use a good battery to double check all connections, the A.C. outlet for a full 120-volts, the charger clips for correct polarity and the quality of the connections from the cables to the clips and from the clips to the battery system. The clips must be clean.

16.2 When a battery is very cold, partially charged or sulfated, it will not draw the full rated amperes from the charger. It is both dangerous and damaging to a battery to force higher amperage into it than it can effectively use in recharging.

16.3 When an UNKNOWN OPERATING PROBLEM arises, please read the complete manual and call the customer service number for information. This will usually eliminate the need for return.

If the above solutions do not eliminate the problem or for information about troubleshooting or replacement parts, call toll-free from anywhere in the U.S.A.
1-800-621-5485
7:00 a.m. to 5:00 p.m. Central Time, Monday – Friday

17. LIMITED WARRANTY

SCHUMACHER ELECTRIC CORPORATION, 801 BUSINESS CENTER DRIVE, MOUNT PROSPECT, IL 60056-2179, MAKES THIS LIMITED WARRANTY TO THE ORIGINAL RETAIL PURCHASER OF THIS PRODUCT. THIS LIMITED WARRANTY IS NOT TRANSFERABLE OR ASSIGNABLE.

Schumacher Electric Corporation (the "Manufacturer") warrants this battery charger for 3 years from the date of purchase at retail against defective material or workmanship that may occur under normal use and care. If your unit is not free from defective material or workmanship, Manufacturer's obligation under this warranty is solely to repair or replace your product with a new or reconditioned unit at the option of the Manufacturer. It is the obligation of the purchaser to forward the unit, along with proof of purchase and mailing charges prepaid to the Manufacturer or its authorized representatives in order for repair or replacement to occur.

Manufacturer does not provide any warranty for any accessories used with this product that are not manufactured by Schumacher Electric Corporation and approved for use with this product. This Limited Warranty is void if the product is misused, subjected to careless handling, repaired, or modified by anyone other than Manufacturer or if this unit is resold through an unauthorized retailer.

Manufacturer makes no other warranties, including, but not limited to, express, implied or statutory warranties, including without limitation, any implied warranty of merchantability or implied warranty of fitness for a particular purpose. Further, Manufacturer shall not be liable for any incidental, special or consequential damage claims incurred by purchasers, users or others associated with this product, including, but not limited to, lost profits, revenues, anticipated sales, business opportunities, goodwill, business interruption and any other injury or damage. Any and all such warranties, other than the limited warranty included herein, are hereby expressly disclaimed and excluded. Some states do not allow the exclusion or limitation of incidental or consequential damages or length of implied warranty, so the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights and it is possible you may have other rights which vary from this warranty.

THIS LIMITED WARRANTY IS THE ONLY EXPRESS LIMITED WARRANTY AND THE MANUFACTURER NEITHER ASSUMES OR AUTHORIZES ANYONE TO ASSUME OR MAKE ANY OTHER OBLIGATION TOWARDS THE PRODUCT OTHER THAN THIS WARRANTY.

Schumacher Electric Corporation Customer Service
1-800-621-5485
Monday – Friday 7:00 a.m. to 5:00 p.m. CST

To activate the warranty, please fill in the warranty registration card on page 15 and mail it in, OR go to **www.batterychargers.com** to register your product online.

DO NOT RETURN THIS PRODUCT TO THE STORE!
Call Customer Service for assistance: 800-621-5485