



Manual Battery Charger



TOWER OF POWER

Wheel Charger Owner's Manual

Model: WC-7028

Warning: Failure to follow instructions may result in damage or explosion. **READ ENTIRE MANUAL BEFORE USE.**



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You have purchased the Tower Of Power wheel charger. This high performance manual battery charger is tall, thin, and has large diameter wheels for easy maneuvering around the shop. The charge cables are made of 100% fine strand copper conductors to efficiently transfer the charging power to the battery while maintaining good cable flexibility. If you should have any questions about your charger or the charging procedures, please see the back cover for contact information.

SPECIFICATIONS

Model Number	WC-7028
Charger Type	Manual
Battery Voltages	6, 12
12 V Charge Output Current (Amps)	70, 30, 4
12 V Engine Start Current (Amps)	280
6 V Charge Output Current (Amps)	40
6 V Engine Start Current (Amps)	150
Charger Timer w/ Hold	0 to 120 Minutes
Charge Current Ammeter	Yes
Voltmeter	Yes
Power Cord	6 ft., 14 AWG
Leads	6 ft., 6 AWG
DC Circuit Breaker	Self-Resetting
Wheels	Hard Rubber, 7"
Handle	Tubular, Fixed
Size (Assembled over all size)	14" W x 38" H x 14 D
Weight	47 lbs



- Carefully read all operating instructions before using the Battery Charger.
- Wear eye protection when working around batteries.
- The Battery Charger is equipped with a power cord. Never use an extension cord that is more than 50ft and it must not be smaller than 12 gauge. Make sure the extension cord and receptacle are properly grounded.
- Be sure to switch the power off before removing the clamps to prevent arcing and potential explosion from battery gases. Never remove the clamps while the unit is on.
- Keep sparks, flames, or cigarettes away from batteries.
- Provide adequate ventilation to remove car exhaust.
- In extremely cold temperatures, check for frozen electrolytic fluid before connecting the Battery Charger. Do not attempt to Charge a battery under 20°F. Allow the battery to warm to room temperature before connecting the Battery Charger.
- Never connect the clamps to more than one 12 volt battery at a time. Connection to 24 volts will dangerously overload the circuitry.
- Do not expose the Battery Charger to rain or snow.

**Wear
Safety
Glasses**



Warning! Never attach the Battery Charger to a battery that is connected to any other tester or charging unit. Damage may result.

WARNING!

FOR HYBRID VEHICLES

DO NOT charge the starting battery while it is in the vehicle

DO NOT remove, service or test the hybrid battery pack under any circumstances.

Remove the 12 volt starting battery from the vehicle prior to charging.

CAUSE OF BATTERY FAILURE

- **Incorrect Application:** Wrong size battery may have inadequate cold cranking Amp rating for original vehicle specifications.
- **Incorrect Installation:** Loose battery hold-downs cause excessive vibration, which can result in damage to the plates.
- **Improper Maintenance:** Low electrolytic fluid and corrosion on battery connections, can greatly reduce battery life and affect battery performance.
- **Age of Battery:** If the date code on the battery indicates it is fairly old, the failure may be due to natural causes.
- **Overcharging:** Overcharging caused by a high voltage regulator setting or incorrect battery charging can cause excessive gassing, heat and water loss.
- **Undercharging:** Undercharging caused by a faulty charging system or low voltage regulator setting can cause lead sulfate to gradually build up and crystallize on the plates greatly reducing the battery's capacity and ability to be recharge.

12 MONTHS FROM DATE OF PURCHASE

The manufacturer warrants to the consumer that this product will be free from defects in material or workmanship for a period of twelve (12) months from the date of original purchase.

Products that fail within this 12 month warranty period will be repaired or replaced at the manufacturer's option to the consumer, when determined by the manufacturer that the product failed due to defects in material or workmanship. This warranty is limited to the repair or replacement of parts and the necessary labor by the manufacturer to effect the repair or replacement of the product. In no event shall the manufacturer be responsible for special, incidental or consequential damages or costs incurred due to the failure of this product.

Improper use, accident, water damage, abuse, unauthorized repairs or alterations voids this warranty. The manufacturer disclaims any liability or consequential damages due to breach of any written or implied warranty on its test equipment.

TROUBLE SHOOTING

No reading on Ammeter:

1. Make sure the AC power cord is plugged in to a live 120 VAC circuit.
2. Make sure the charge current selector switch is set properly. Please note that when the 4 Amp charge setting is selected, there may be no current displayed on the Ammeter, even though a small amount of charge current is flowing. The Ammeter may not have enough resolution to display this small charge current.
3. The battery may not be capable of accepting a charge. Have the battery checked.
4. Make sure the clamps are clean and making a good connection to the battery terminal and/or vehicle chassis.
5. Battery clamp connections are reversed. Red clamps should be connected to positive, and the black clamp should be connected to negative.

Ammeter shows reading, but the battery does not charge up:

1. Battery may be defective. Have the battery checked.
2. Make sure you are using enough charge time as calculated in the Calculating Charge Time section of this manual.

Vehicle will not start when using the engine start setting:

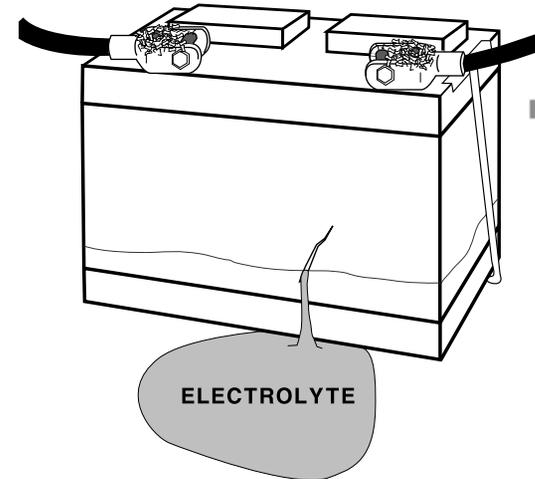
1. Make sure the 120 VAC circuit is live. Make sure the building AC circuit breaker has not tripped.
2. If no amperage is being indicated on the ammeter, the protection thermal protection switch may have tripped. Allow the charger to cool for 5 minutes and retry.
3. The clamps are not making a good connection. Clean clamps and connections.
4. The battery may be deeply discharged. Charge the battery for 5 minutes at the appropriate charge rate setting before using the engine start feature.
5. If the engine cranks, but still does not start, the issue is with the vehicle and not the charger. Repair the vehicle issue.



INSPECTION

VISUAL CHECK

Carefully perform the following before attempting any battery charging electrical diagnosis.



- **Inspect Battery** for terminal corrosion, loose or broken posts, cracks in the case, loose hold-downs, low electrolyte level, moisture, and dirt around the terminals.

- **Important Note:** A damaged battery must be replaced before proceeding.



INTRODUCTION

The Tower of Power chargers are designed to handle most of your charging and starting needs on both 6 V and 12 V systems.



- Multiple charge rate settings.
- High current engine start boost for when the battery is too weak to do the job on its own.
- Large diameter wheels for easy maneuvering.
- Tall design for easy control access and gauge viewing.
- Thin design to easily move between vehicles.
- Ammeter to monitor the charge current and charge progress.
- Voltmeter to test the batteries state of charge.

How Batteries Charge:

The charger does not force current into the battery. The charger makes available a limited amount of charge current available to the battery. The battery itself determines how much charge current it needs.

Typically the lower the state of charge of the battery, the higher the charge current will be. As the battery charges up, the charge current will taper off. Once the battery is fully charged, it still accepts a small amount of current. This small amount of current is converted into heat inside the battery. If the battery is not removed from charger once it is fully charged, it can cause the battery to over heat, boil over the electrolyte, and cause damage to the battery. The ammeter will display the amount of current the battery is accepting during the charge cycle. The ammeter reading at the beginning of the charge cycle will read high amperage towards the right side of the gauge and gradually move towards 0 Amps as the battery charges up.

Some battery types require an activation period when they are deeply discharged before they will accept charge current. The time may take 4 to 8 hours before the battery begins to accept charge current. If your battery has been sitting in a discharged state for a long period of time, it can become sulfated. Sulfated batteries exhibit the characteristic of not accepting any charge current for a long period of time. This may also take 4 to 8 hours. When charging a battery with these conditions, set the charge rate selector to Medium, and monitor the battery often. Once the sulfate barrier breaks down, the battery will begin accepting charge current. The amount of time it takes to charge the battery (as found in the "Calculating Charge Time" section) begins when the battery starts to accept charge current. Severely sulfated batteries may never accept charge current and should be replaced. When a battery charges, the electrolyte will bubble slowly. This is normal when charging a battery. The gases given off while charging a battery can be very explosive. Make sure there are no flames or sparks near a charging battery. Always turn the charger off before connecting or disconnecting the clamps to the battery to prevent sparks.

CHARGER MAINTENANCE



1. Unplug the AC power cord before performing any cleaning or maintenance.
2. To clean the charger, it can be wiped down using a dry soft cloth.
3. To prevent corrosion, wipe away any battery acid that comes into contact with the battery clamps. A solution of water and baking soda can be used to neutralize any battery acid residue.
4. Keep the cables and power cord neatly wound up on the cable storage hooks on the back of the charger. Doing so will increase the life of the cables, clamps, and power cord.
5. There are no user-serviceable parts inside the charger. All other service should be performed by qualified service personnel.

CALCULATING CHARGE TIME (cont)

Step 3.

Determining the charge current setting to be used on the charger:

Review the below recommended charge setting for your battery application and battery type.

- 4 Amp Slow Charge: Use for charging smaller batteries that are commonly used in lawn and garden tractors, motorcycles, ATV's, and snow mobiles.
- 30 Amp Medium Charge: Use for charging batteries used in automobiles, trucks, marine, and deep-cycle.
- 70 Amp Fast Charge: Use for charging batteries used in automobiles, trucks, marine, and deep-cycle. Use when a short charge time is desired. **(Not recommended for AGM battery)**

NOTE: AGM batteries are sealed and can more easily be damaged by over charging than conventional flooded batteries. It is recommended that AGM batteries be monitored more closely during the charge process so that they can be removed from the charger when they are fully charged. Always follow the battery manufacturer's specific charging instructions.

(Record this value for use later in the charge time calculation.)

Step 4.

Calculating the charge time:

Use the below equation to calculate the charge time:

$$\frac{(\text{Percent of Charge Needed}) \times (\text{Battery AH Rating}) \times (1.25)}{(\text{Charge Current Setting Selected on Charger})} = \text{Hours to Charge}$$

Multiply the following values together: The Percent of Charge Needed from Step 1. with Battery AH Rating from Step 2. with 1.25. Then divide by the Charge Current Setting from Step 3. This equals the charge time needed in hours.

Example:

Percent Charge Needed = 50% (Use decimal = 0.50)

Battery AH Rating = 66

Charge Current Setting on Charger = 30 Amps

$$\frac{0.50 \times 66 \times 1.25}{30} = \text{Hours to Charge}$$

$$\frac{41.25}{30} = \text{Hours to Charge}$$

1.38 = Hours to Charge

It will require a little more than 1-¹/₃ hours to fully charge this 66 Ah battery that is 50% discharged using the 30 Amp charge current setting.



ASSEMBLING THE HANDLE & CABLE BRACKET

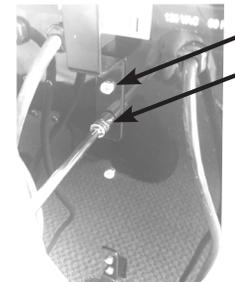
1. Insert the handle into the square hole at the top of the charger with the 3 screw holes in the handle facing the back of the charger as shown.



2. Line up the holes in the back panel of the charge with the holes on the handle. Install the bottom screw into the handle, but do not fully tighten the screw.



3. Align the cable bracket mounting holes with the upper two handle mounting holes as shown. Install the two screws and fully tighten all three handle mounting screws.



CONTROL PANEL

Charge Rate Selector Switch is a rotary switch used to select the battery charge rate and engine starting settings.



- **Off Position:** Always move the switch to the “Off Position” before connecting and disconnecting the charge clamps to reduce the risk of sparking and possible ignition of explosive battery gasses.
- **4 Amp Slow Charge:** Intended for charging smaller batteries that are commonly used in lawn and garden tractors, motorcycles, ATV's, & snow mobiles.
- **30 Amp Medium Charge:** Intended for charging batteries used in automobiles, trucks, marine, and deep-cycle.
- **70 Amp Fast Charge:** Intended for charging batteries used in automobiles, trucks, marine, and deep-cycle. Use when a short charge time is desired. **(Not recommended for AGM Batteries)**

Timer Switch is used to set the charge time.

- **Timer Settings:** The timer switch allows the user to set the required charge time up to 120 minutes. After the charge time has expired, the charger will automatically turn off. To properly set the charge time, you need to know the state of charge of the battery, and the battery capacity, and charge current. To calculate the charge time, please refer to “Calculating Charge Time” section of this manual. It is important to properly set the charge time to prevent over charging and damage to the battery or personal property damage, or personal injury.
- **Hold position:** This position defeats the charge timer function. The charger will remain on indefinitely. When using this position, it is important to closely monitor the charge process and stop the charger when the battery is fully charged. Not doing so could cause damage to the battery, personal property damage, or personal injury.

Ammeter is used to monitor the charge current being drawn from the battery. As the battery charges up, the charge current will decrease. When the charge current being drawing from the battery stops decreasing, the battery is charged up. When using the engine start feature, the Ammeter will read all the way to the right side. When using the 4 Amp Slow charge setting, the Ammeter may not read any current, as the resolution on the Ammeter is not high enough.

Voltmeter is used to indicate the voltage at the battery clamps when they are connected to a battery. When the battery charger is on, the voltmeter reads the combined voltage of the battery and the charger. When the charger is off, the voltmeter reads the battery voltage.

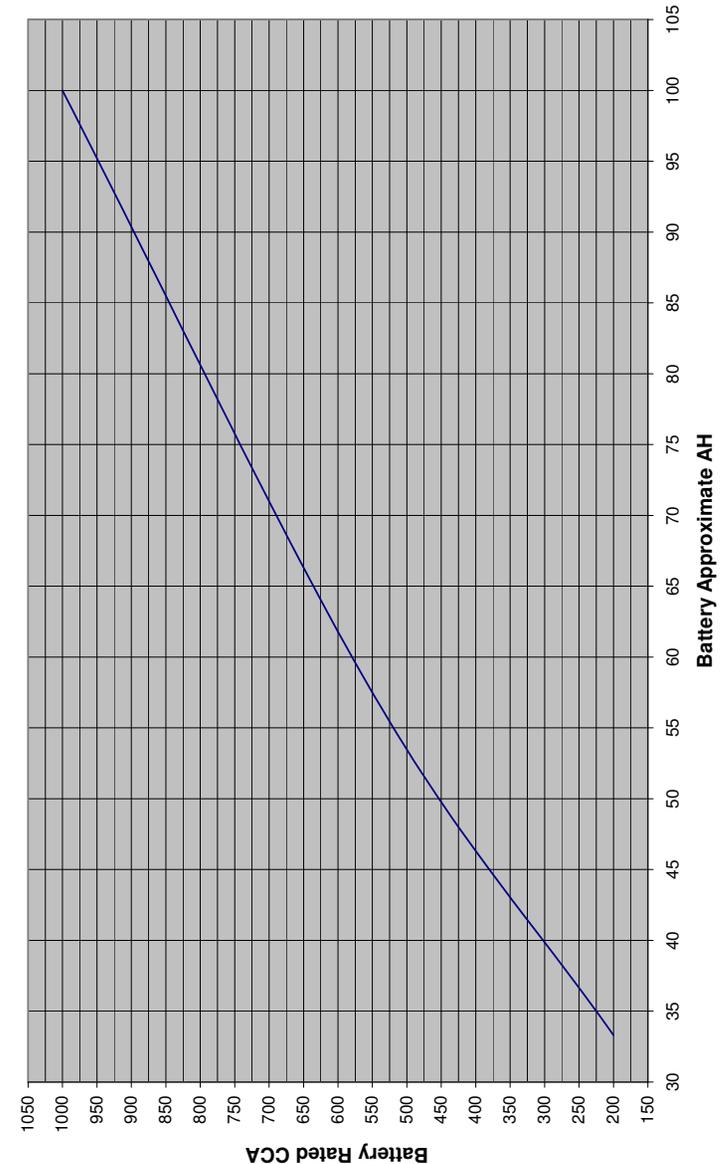
Volt Selector allows selection of 6 and 12 Volt charging to match the battery being charged. Note: This switch does not change the output voltage of the charger.

CALCULATING CHARGE TIME (cont)

If the battery does not have an AH or RC rating, then approximate the battery's AH using the battery's rated CCA using the graph below.



Battery Rated CCA vs. Battery Approximate AH
(Alternate Method)



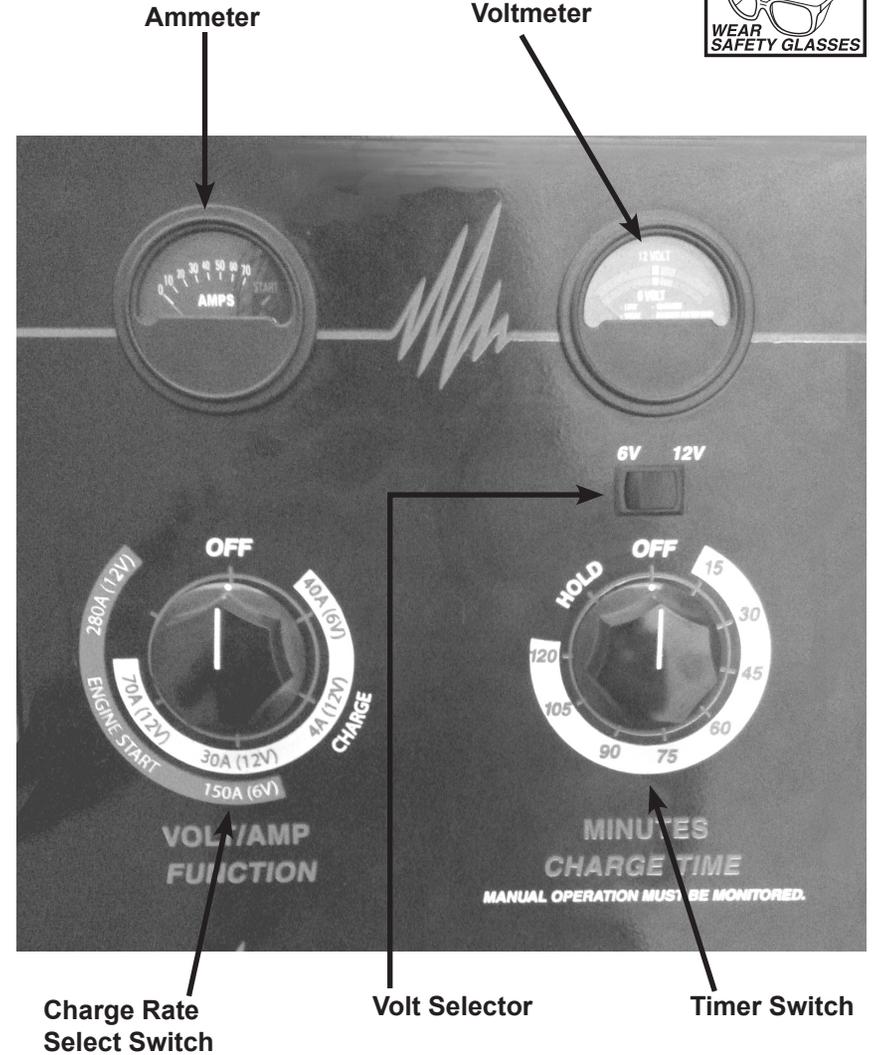
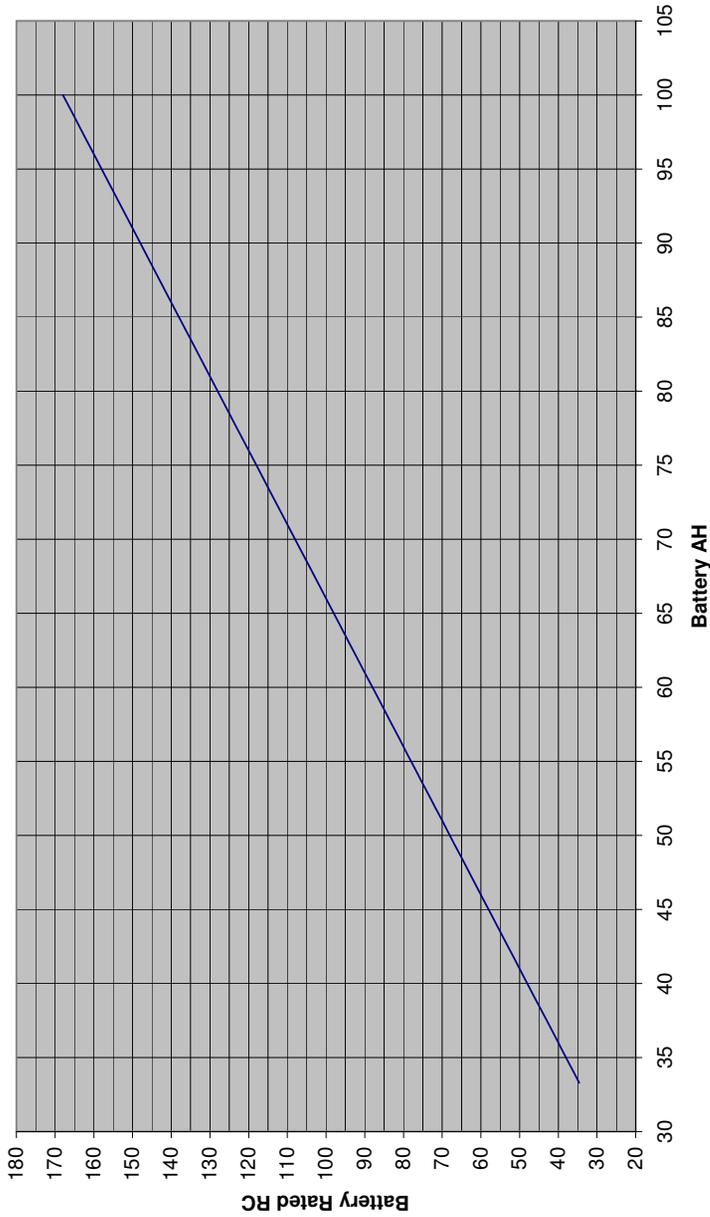
CALCULATING CHARGE TIME (cont)



CONTROL PANEL (cont)



Battery Rated RC vs. Battery AH
(Preferred Method)



OPERATING INSTRUCTIONS

DO NOT ATTEMPT TO USE THE CHARGER UNTIL YOU HAVE READ AND UNDERSTOOD THE "SAFETY SECTION" OF THIS MANUAL.



WARNING: A spark near the battery may cause a battery explosion. To reduce the risk of a spark near the battery, follow the below instructions:

Connecting to Batteries Installed in a Vehicle

1. Make sure the charger's AC power cord is unplugged from the AC receptacle.
2. Make sure the vehicle's engine is turned off.
3. Position the charger's cables so that they do not interfere with any moving parts or hot surfaces under the hood.
4. Check the polarity of the battery. The positive battery post should be marked either POSITIVE, POS, P, +, and will usually be larger than the negative battery post. The negative battery post should be marked either NEGATIVE, NEG, N, -.
5. Determine if the vehicle has a positive or negative grounded battery. (The positive or negative battery cable is connected to the vehicle's chassis.)
 - a. For negative grounded vehicles (Most Common), proceed as follows:
 - i. Connect the positive (Red, +) clamp to the battery's positive terminal (Ungrounded terminal of the battery).
 - ii. Connect the negative (Black, -) clamp to a heavy gauge unpainted part of the chassis or engine block away from the battery. Do not connect the negative cable to the carburetor, fuel lines, air conditioner lines, or sheet metal body parts.
 - b. For positive grounded vehicles, proceed as follows:
 - i. Connect the negative (Black, -) clamp to the battery's negative terminal (Ungrounded terminal of the battery).
 - ii. Connect the positive (Red, +) clamp to a heavy gauge unpainted part of the chassis or engine block away from the battery. Do not connect the negative cable to the carburetor, fuel lines, air conditioner lines, or sheet metal body parts.

CALCULATING CHARGE TIME (cont)

Step 2

Determining the battery's capacity in Amp Hours (AH):

Some batteries have an AH rating printed on the battery tag. If the battery has an AH rating, this can be used later in the charge time calculation.

If the battery does not have an AH rating printed on the tag, then look for a Reserve Capacity (RC) rating. The RC capacity rating can accurately be converted to the AH rating for the charge time calculation.

If the battery does not have an AH or an RC rating printed on the battery tag, then look for a Cold Cranking Amp (CCA) rating. The CCA rating can not be exactly converted to AH, as this varies from battery to battery, but it can be used for approximating the battery's AH if the battery's AH or RC is not known.

Follow the steps below to find the AH rating of the battery:

The RC can be converted to AH for use later in the charge time calculation. To convert RC to AH, you can use the following equation, or simply read the AH rating off of the graph below.

$$AH = (RC/2) + 16$$

Example:

Rated Battery RC = 100

$$AH = (100/2) + 16$$

$$AH = 66$$

(Record this value for use later in the charge time calculation.)





Connecting to Batteries Outside of the Vehicle

1. Make sure the charger's AC power cord is unplugged from the AC receptacle.
2. Check the polarity of the battery. The positive battery post should be marked either POSITIVE, POS, P, +, and will usually be larger than the negative battery post. The negative battery post should be marked either NEGATIVE, NEG, N, -.
3. Attach an insulated battery booster cable that is at least 24 inches long and at least 6 gage (AWG) to the negative battery post.
4. Connect the positive (Red, +) clamp to the battery's positive terminal.
5. Position yourself away from the battery as far as the negative booster cable will allow. While facing away from the battery, connect the charger's negative clamp to the free end of the booster cable.

Charging Instructions

1. Determine the length of time needed to charge the battery in the "Calculating Charge Time" section of this manual.
2. Set the charge rate selector switch and the timer switch to the OFF position.
3. Connected the AC power cord to the AC receptacle.
4. Set the charging voltage switch to 12 Volts for 12 Volt batteries and 6 Volts for 6 Volt batteries.
5. Place the charge rate selector in the desired position.
6. Set the timer switch to the desired charge time.
7. When the charging is complete. Turn the charge rate selector switch and the timer switch to the OFF position.
8. Unplug the AC power cord.
9. Remove the cable clamp not directly attached to the battery first, and then remove the cable clamp from the battery post.

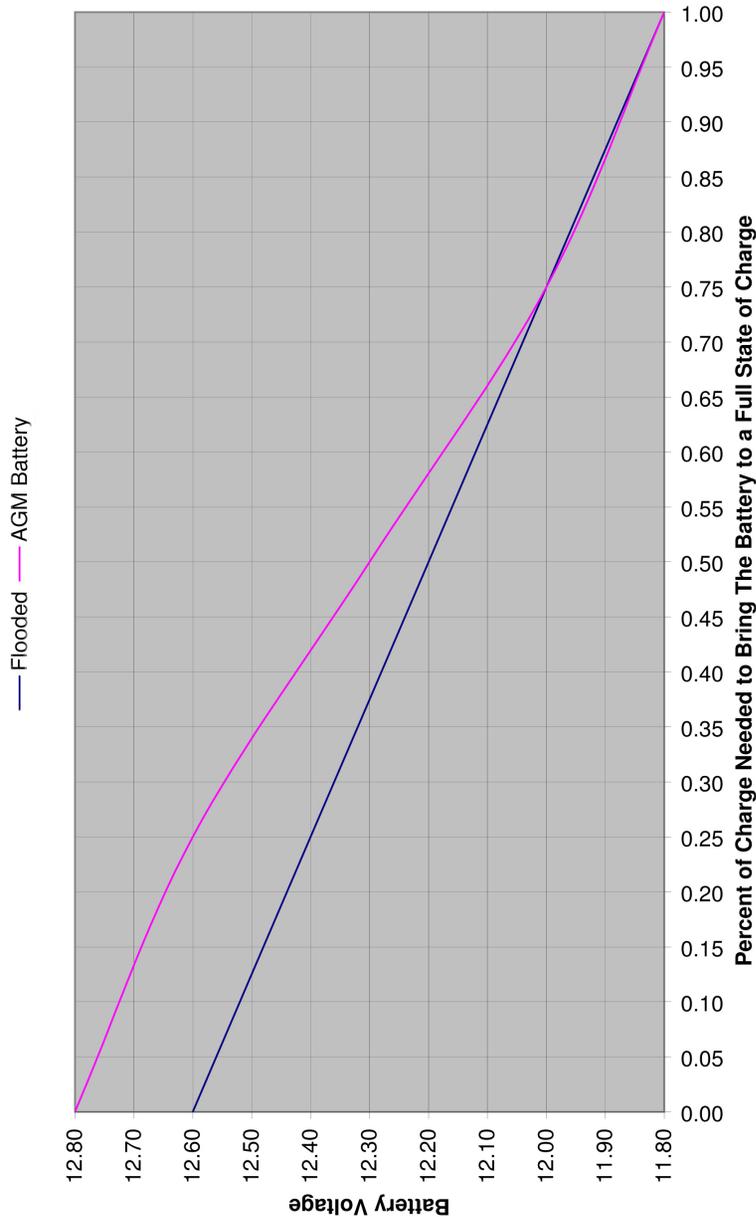
Using the Engine Start Feature

You battery charger can be used to jump start a vehicle with a weak battery.

IMPORTANT NOTES:

- Never use the Engine Start feature without a battery installed in the vehicle. Doing so could cause damage the vehicles electrical system.
- Using the Engine Start feature could damage the on board electronics in some vehicles. Always read the vehicles owner's manual before using the Engine Start feature to determine if jump starting can do damage to the vehicle.

Battery Voltage vs Battery State of Charge



OPERATING INSTRUCTIONS (cont)



1. Connect the charger as described in the operating instructions section of this manual.
2. Charge the battery for 5 minutes with the Charge Rate Selector Switch set to the appropriate setting for the size of the battery in the vehicle.
3. Move the Charge Rate Selector Switch to the Engine Start position that matches the voltage of the vehicles electrical system.
4. Move the Timer Switch to the hold position.
5. Crank the engine until it starts or 5 seconds pass. If the engine does not start after 5 seconds, allow the charger to cool for 3 to 4 minutes before cranking again.
6. After the engine starts, move the Charge Selector Switch and Timer Switch to the OFF position.
7. Unplug the AC power cord.
8. Remove the cable clamp not directly attached to the battery first, and then remove the cable clamp from the battery post.

NOTE: If the engine continues to crank but still does not start after repeated attempts, there is another problem with the vehicle causing the engine not to start. Discontinue cranking the engine until the other problem is found and corrected.

This battery charger has a thermal protection switch that will trip and turn the charger off if the charger gets too hot. Allow the charge to cool for 5 minutes. The thermal protection switch will self reset when the charger cools down.

CALCULATING CHARGE TIME



To accurately calculate the charge time needed to fully charge a battery, you need to know the following information:

1. The percent (%) of charge needed to bring the battery to a full state of charge.
2. Battery capacity rating in Amp Hours (AH).
3. The charge current.

STEP 1

Determining the percent of charge needed to bring the battery to a full state of charge:

1. Measure the battery's voltage using a digital voltmeter.
2. Determine your battery type:
 - a. Flooded batteries have a liquid electrolyte.
 - b. AGM (Absorbent Glass Mat) batteries have the electrolyte suspended in a glass mat. Batteries that have cylindrical shaped cells are AGM batteries. However, some AGM batteries do not have cylindrical cells.
3. Use the chart below to read the percent of charge needed to bring the battery to a full state of charge.

Example:

Battery Type = Flooded

Battery Voltage Reading = 12.20 V

Find voltage on the left side of the graph and follow the horizontal graph line until it intersects the Flooded curve. Follow the vertical line down to learn the percent of charge that will be needed to fully charge the battery.

Percent of charge needed from the graph = 50% (Decimal = .50)

(Record this value for use later in the charge time calculation.)