

# PULSE CHARGER®

WORLD VERSION

## 12-VOLT BATTERY CHARGER MODELS 20490 AND 21920

### Specifications

<b>AC Input:</b>	100-125 / 200-250 VAC 5.0 / 2.5 Amps AC maximum, 50-60 Hertz, Single-Phase
<b>DC Output:</b>	12 Volts DC, 20 Amps DC
<b>Battery Specifications:</b>	Charge only 6-cell, 12-volt, gel cell and sealed "maintenance-free" or conventional replaceable electrolyte lead-acid batteries with a capacity of 80-250 amp-hours (20 hr. rate) and 2.35-2.50 volts per cell maximum voltage

### PLEASE SAVE THESE IMPORTANT SAFETY AND OPERATING INSTRUCTIONS

For correct operation of the equipment, it is important to read and be familiar with this entire manual before installing and operating the charger.  
**DO NOT DISCARD THIS MANUAL AFTER READING.**



**LOOK FOR THIS SYMBOL TO POINT OUT SAFETY PRECAUTIONS. IT MEANS: BECOME ALERT—YOUR SAFETY IS INVOLVED. IF YOU DO NOT FOLLOW THESE SAFETY INSTRUCTIONS, INJURY OR PROPERTY DAMAGE CAN OCCUR.**

### INTRODUCTION

Congratulations, you've just purchased the most efficient battery charging system anywhere: the **Pulse Charger**, from PulseTech Products Corporation, *the World Leader in Battery Maintenance Technology*.

This patented system combines a state-of-the-art charger with *pulse technology*, the most effective method for battery maintenance. The charging system is the most advanced available and is specifically designed to:

- Monitor battery state of charge and automatically turn off charger for an efficient charge while protecting your battery from damage;
- Compensate for line voltage changes to produce a consistent charger output for AC supply voltage variations from nominal;
- Protect against reverse polarity connection and terminate output when disconnected from battery;
- Produce maximum reliability and minimum maintenance with its convection cooled design.

At the same time, the *pulse technology* helps ensure battery reliability by reducing the main cause of battery problems and failure: crystallized sulfur build-up on your battery's lead plates.

This patented technology helps you save time, money, and effort by reducing battery related downtime, maintenance, and replacement. It actually re-energizes the crystallized sulfur molecules on the plates, removes them, and then returns them to the battery acid as active sulfur molecules. By cleaning the plates, *pulse technology*:

- increases battery efficiency,
- extends battery life,
- reduces recharge time,
- increases battery capacity so batteries last longer between recharges,
- helps protect the environment by reducing the number of batteries discarded every year.

## IMPORTANT SAFETY INSTRUCTIONS

### **INSTRUCTIONS IMPORTANTES CONCERNANT LA SÉCURITÉ.**

Before using battery charger, read all instructions and cautionary markings on battery charger and battery.

1. **SAVE THESE INSTRUCTIONS.** This manual contains important safety and operating instructions for battery charger Models 20490 and 21920.

*CONSERVER CES INSTRUCTIONS. CE MANUAL CONTIENT DES INSTRUCTIONS IMPORTANTES CONCERNANT LA SECURITE ET LE FONCTIONNEMENT.*

**⚠ CAUTION: TO REDUCE RISK OF INJURY, CHARGE ONLY LEAD-ACID TYPE RECHARGEABLE BATTERIES. OTHER TYPES OF BATTERIES MAY BURST CAUSING PERSONAL INJURY AND DAMAGE.**

2. Keep dry; DO NOT expose charger to rain or snow. For storage, keep in a building.
3. 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.
4. To reduce risk of damage to electric plug and cord, pull by plug rather than cord when disconnecting charger.
5. Make sure cord is located so that it will not be stepped on, tripped over or otherwise subjected to damage or stress.

6. 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:

- a. Pins on the plug of the extension cord are the same number, size, and shape as those on the charger (refer to Grounding Instructions);
- b. Extension cord is properly wired and in good electrical condition; and
- c. Wire size is No. 12 AWG or larger.

7. Make sure all electrical connectors are in good working condition. DO NOT operate charger with a worn, cut, or damaged cord or plug; replace the cord or plug immediately. Use of a damaged cord or plug may result in a risk of fire, electric shock, or injury to persons. Take to a qualified service agent for repairs.
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 service agent.
9. Do not disassemble charger; take it to a qualified service agent when service or repair is required. Incorrect reassembly may result in a risk of electric shock or fire.
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.
11. Provide adequate ventilation for both batteries and charger. The convection cooled design requires an unobstructed flow of cooling air for proper operation. Keep all charger ventilation openings at least two inches (2") (5cm) away from walls and other objects.

**⚠ WARNING: CHARGERS CAN IGNITE FLAMMABLE MATERIALS AND VAPORS. DO NOT USE NEAR FUELS, GRAIN DUST, SOLVENTS, THINNERS, OR OTHER FLAMMABLES.**

### **WARNING: RISK OF EXPLOSIVE GASES**

1. 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 EACH TIME BEFORE USING YOUR CHARGER, YOU READ THIS MANUAL AND FOLLOW THE INSTRUCTIONS EXACTLY.

*IL EST DANGEREUX DE TRAVAILLER À PROXIMITÉ D'UNE BATERIE AU PLOMB. LES BATTERIES PRODUISENT DES GAZ*

*EXPLOSIFS EN SERVICE NORMAL. IL EST AUSSI IMPORTANT DE TOUJOURS RELIRE LES INSTRUCTIONS AVANT D'UTILISER LE CHARGEUR ET DE LES SUIVRE À LA LETTRE.*

2. 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.

*POUR REDUIRE LE RISQUE D'EXPLOSION, LIRE CES INSTRUCTIONS ET CELLES QUI FIGURENT SUR LA BATTERIE.*

### PERSONAL PRECAUTIONS

1. Someone should be within range of your voice or close enough to come to your aid when you work near a lead-acid battery.
2. Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing, or eyes.
3. Wear complete eye protection and clothing protection. Avoid touching eyes while working near battery.
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.
5. NEVER smoke or allow a spark or flame in vicinity of battery or engine.

*NE JAMAIS FUMER PRÈS DE LA BATTERIE OU DU MOTEUR ET VITER TOUTE TINCELLE OU FLAMME NUE À PROXIMITÉ DE CES DERNIERS.*

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.
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.
8. Use charger for charging a LEAD-ACID battery only. 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.

*UTILISER LE CHARGEUR POUR CHARGER UNE BATTERIE AU PLOMB UNIQUEMENT. CE CHARGEUR N'EST PAS CONU POUR ALIMENTER UN RESEAU ELECTRIQUE TRÈS BASSE TENSION NI POUR CHARGER DES PILES SÈCHES. LE FAIT D'UTILISER LE CHARGEUR POUR CHARGER DES PILES SÈCHES POURRAIT ENTRAÎNER L'ÉCLATEMENT DES PILES ET CAUSER DES BLESSURES OU DES DOMMAGES.*

9. NEVER charge a frozen battery.

*NE JAMAIS CHARGER UNE BATTERIE GELE.*

**⚠ CAUTION: DO NOT OPERATE THE CHARGER IF IT IS DAMAGED OR APPEARS TO BE MALFUNCTIONING. PERSONAL INJURY OR DAMAGE TO THE CHARGER AND BATTERIES MAY RESULT.**

### PREPARING TO CHARGE

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.

*S'IL EST NECESSAIRE DE RETIRER LA BATTERIE DU VEHICULE POUR LA CHARGER, TOUJOURS DEBRANCHER LA BORNE DE MISE À LA MASSE EN PREMIER. S'ASSURER QUE LE COURANT AUX ACCESSOIRES DU VEHICULE EST COUPÉ AFIN D'ÉVITER LA FORMATION D'UN ARC.*

2. Be sure area around battery is well ventilated while battery is being charged. Gas can be forcefully blown away by using a piece of cardboard or other nonmetallic material as a fan.
3. Clean battery terminals. Be careful to keep corrosion from coming in contact with eyes.
4. Add distilled water in each cell until battery reaches level specified by battery manufacturer. This helps purge excessive gas from cells. Do not overfill. For a battery without cell caps, carefully follow manufacturer's recharging instructions.
5. Study all battery manufacturer's specific precautions such as removing or not removing cell caps while charging and recommended rates of charge.

*PRENDRE CONNAISSANCE DES MESURES DE PRECAUTION SPECIFIES PAR LE FABRICANT DE LA BATTERIE, P.EX. VÉRIFIER S'IL FAUT ENLEVER LES BOUCHONS DES CELLULES LORS DU CHARGEMENT DE LA BATTERIE, ET LES TAUX DE CHARGEMENT RECOMMANDÉS.*

6. Determine voltage of battery by referring to car owner's manual and make sure it matches output rating of battery charger.

*NE PAS UTILISER LE CHARGEUR À MOINS QUE LA TENSION DE LA BATTERIE NE SOIT IDENTIQUE À LA TENSION DE SORTIE NOMINALE DU CHARGEUR.*

### **CHARGER LOCATION**

1. Locate charger as far away from battery as DC cables permit.

*PLACER LE CHARGEUR AUSSI LOIN DE LA BATTERIE QUE LES CÂBLES C.C. LE PERMETTENT.*

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

*NE JAMAIS LACER LE CHARGEUR DIRECTEMENT SOUS LA BATTERIE À CHARGER OU AU-DESSUS DE CETTE DERNIÈRE. LES GAZ OU LES FLUIDES QUI S'CHAPPENT DE LA BATTERIE PEUVENT ENTRAÎNER LA CORROSION DU CHARGEUR OU L'ENDOMMAGER.*

3. Never allow battery acid to drip on charger when reading gravity or filling battery.
4. Do not operate charger in a closed-in area or restrict ventilation in any way.

*NE PAS FAIRE FONCTIONNER LE CHARGEUR DANS UN ESPACE CLOS ET/OU NE PAS GÊNER LA VENTILATION.*

5. Do not set a battery on top of charger.

### **DC CONNECTION PRECAUTIONS**

1. Connect and disconnect DC output clips only after setting any charger switches to "OFF" position and removing AC cord from electric outlet. Never allow clips to touch each other.

*METTRE LES INTERRUPTEURS DU CHARGEUR HORS CIRCUIT ET RETIRER LE CORDON C.A. DE LA PRISE AVANT DE METTRE ET D'ENLEVER LES PINCES DU CORDON C.C. S'ASSURER QUE LES PINCES NE SE TOUCHENT PAS.*

2. Attach clips to battery posts and twist or rock back and forth several times to make a good connection. This tends to keep clips from slipping off terminals and helps reduce risk of sparking.

**FOLLOW THESE STEPS FOR A BATTERY INSTALLED OUTSIDE A VEHICLE. A SPARK NEAR BATTERY MAY CAUSE BATTERY**

### **EXPLOSION. TO REDUCE RISK OF A SPARK NEAR BATTERY:**

***SUIVRE LES ÉTAPES SUIVANTES LORSQUE LA BATTERIE SE TROUVE DANS LE VÉHICULE. UNE ÉTINCELLE PRÈS DE LA BATTERIE POURRAIT PROVOQUER L'EXPLOSION DE CETTE DERNIÈRE. POUR RÉDUIRE LE RISQUE D'ÉTINCELLE À PROXIMITÉ DE LA BATTERIE:***

1. Position AC and DC cords to reduce risk of damage by hood, door, or moving engine part.

*PLACER LES CORDONS C.A. ET C.C. DE MANIÈRE À VITER QU'ILS SOIENT ENDOMMAGES PAR LE CAPOT, UNE PORTIÈRE OU LES PIÈCES EN MOUVEMENT DU MOTEUR.*

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

*FAIRE ATTENTION AUX PALES, AUX COURROIES ET AUX POULIES DU VENTILATEUR AINSI QU'À TOUTE AUTRE PIÈCE SUSCEPTIBLE DE CAUSER DES BLESSURES.*

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

*VERIFIER LA POLARITE DES BORNES DE LA BATTERIE. LE DIAMÈTRE DE LA BORNE POSITIVE (POS,P,+) EST GÉNÉRALEMENT SUPÉRIEUR À CELUI DE LA BORNE NEGATIVE (NEG, N,-).*

4. Determine which post of battery is grounded (connected) to the chassis. If negative post is grounded to chassis (as in most vehicles), see item 5. If positive post is grounded to the chassis, see item 6.

*DETERMINER QUELLE BORNE EST MISE À LA MASSE (RACCORDE AU CHASSIS). SI LA BORNE NEGATIVE EST RACCORDE AU CHÂSSIS (COMME DANS LA PLUPART DES CAS), VOIR LE POINT (5). SI LA BORNE POSITIVE EST RACCORDE AU CHÂSSIS, VOIR LE POINT (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.

*SI LA BORNE NEGATIVE EST MISE À LA MASSE, RACCORDER LA PINCE POSITIVE (ROUGE) DU CHARGEUR À LA BORNE POSITIVE (POS,P,+) NON MISE À LA MASSE*

DE LA BATTERIE. RACCORDER LA PINCE NEGATIVE (NOIRE) AU CHÂSSIS DU VEHICULE OU AU MOTEUR, LOIN DE LA BATTERIE. NE PAS RACCORDER LA PINCE AU CARBURATEUR, AUX CANALISATIONS D'ESSENCE NI AUX PIÈCES DE LA CARROSSERIE EN TÔLE. RACCORDER À UNE PIÈCE DU CADRE OU DU MOTEUR EN TÔLE DE FORTE PAISSEUR.

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.

SI LA BORNE POSITIVE EST MISE À LA MASSE, RACCORDER LA PINCE NEGATIVE (NOIRE) DU CHARGEUR À LA BORNE NEGATIVE (NEG,N,-) NON MISE À LA MASSE DE LA BATTERIE. RACCORDER LA PINCE POSITIVE (ROUGE) AU CHÂSSIS DU VEHICULE OU AU MOTEUR, LOIN DE LA BATTERIE. NE PAS RACCORDER LA PINCE AU CARBURATEUR, AUX CANALISATIONS D'ESSENCE NI AUX PIÈCES DE LA CARROSSERIE EN TÔLE. RACCORDER À UNE PIÈCE DU CADRE OU DU MOTEUR EN TÔLE DE FORTE PAISSEUR.

7. Connect charger AC supply cord to electrical outlet.

BRANCHER LE CORDON D'ALIMENTATION C.A. DU CHARGEUR.

8. When disconnecting charger, turn switches to "OFF", disconnect AC cord, remove clip from vehicle chassis, and then remove clip from battery terminal.

POUR INTERROMPRE L'ALIMENTATION DU CHARGEUR, METTRE LES INTERRUPTEURS HORS CIRCUIT, RETIRER LE CORDON C.A. DE LA PRISE, ENLEVER LA PINCE RACCORDE AU CHÂSSIS ET EN DERNIER LIEU CELLE RACCORDE À LA BATTERIE.

9. See operating instructions for length of charge information.

**FOLLOW THESE STEPS FOR A BATTERY INSTALLED IN A VEHICLE. A SPARK NEAR BATTERY MAY CAUSE BATTERY EXPLOSION. TO REDUCE RISK OF A SPARK NEAR BATTERY:**

**SUIVRE LES ÉTAPES SUIVANTES LORSQUE LA BATTERIE EST À L'EXTERIEUR DU VÉHICULE. UNE ÉTINCELLE PRÈS DE LA BATTERIE**

**POURRAIT PROVOQUER L'EXPLOSION DE CETTE DERNIÈRE. POUR RÉDUIRE LE RISQUE D'ÉTINCELLE À PROXIMITÉ DE LA BATTERIE:**

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

VERIFIER LA POLARITE DES BORNES DE LA BATTERIE. LE DIAMÈTRE DE LA BORNE POSITIVE (POS,P,+) EST GÉNÉRALEMENT SUPÉRIEUR À CELUI DE LA BORNE NEGATIVE (NEG,N,-).

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

RACCORDER UN CÂBLE DE BATTERIE ISOL N-6 AWG MESURANT AU MOINS 60 mm DE LONGUEUR À LA BORNE NEGATIVE (NEG,N,-).

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

RACCORDER LA PINCE POSITIVE (ROUGE) À LA BORNE POSITIVE (POS,P,+) DE LA BATTERIE.

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.

SE PLACER ET TENIR L'EXTREMITÉ LIBRE DU CÂBLE AUSSI LOIN QUE POSSIBLE DE LA BATTERIE, PUIS RACCORDER LA PINCE NEGATIVE (NOIRE) DU CHARGEUR À L'EXTREMITÉ LIBRE DU CÂBLE.

5. Do not face battery when making final connection.

NE PAS SE PLACER FACE À LA BATTERIE POUR EFFECTUER LE DERNIER RACCORDEMENT.

6. Connect charger AC supply cord to electrical outlet.

BRANCHER LE CORDON D'ALIMENTATION C.A. DU CHARGEUR.

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

POUR INTERROMPRE L'ALIMENTATION DU CHARGEUR, METTRE LES INTERRUPTEURS HORS CIRCUIT, RETIRER LE CORDON C.A. DE LA PRISE, ENLEVER LA PINCE RACCORDE AU CHÂSSIS ET EN DERNIER LIEU CELLE RACCORDE À LA BATTERIE. SE PLACER AUSSI LOIN QUE POSSIBLE DE LA BATTERIE POUR DÉFAIRE LA PREMIÈRE CONNEXION.

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

### GROUNDING AND AC POWER CORD CONNECTION INSTRUCTIONS

The charger must be connected to a 100-125 or 200-250 VAC, 50 or 60 Hertz, single phase AC power source. This charger is equipped with an AC voltage selector switch which allows you to change the input AC voltage for the application required. The selector switch is located on the back of the charger. To operate in the 100-125 volt AC range, the switch should read "115V" and to operate in the 200-250 volt AC range the switch should read "230V".

Charger is equipped with an IEC 320/C14 AC power inlet receptacle. An AC power cord with a minimum 18 AWG (.75mm<sup>2</sup>) wire size, an IEC 320/C13 molded connector, and an appropriate inlet plug for your application is to be used to connect the charger to the power source. For United States and Canadian applications, the cord jacket must be SJTW or SJOW. The cord must be connected into an outlet that is properly installed and grounded in accordance with all local codes and ordinances.

**⚠ DANGER: NEVER ALTER AC CORD OR PLUG PROVIDED; IF IT WILL NOT FIT OUTLET, HAVE PROPER OUTLET INSTALLED BY A QUALIFIED ELECTRICIAN. IMPROPER CONNECTION CAN RESULT IN A RISK OF AN ELECTRIC SHOCK.**

Charger AC receptacle has an equipment-grounding conductor which must be connected to the ground through the AC cord to the outlet ground.

**⚠ DANGER: IMPROPER CONNECTION OF THE EQUIPMENT-GROUNDING CONDUCTOR CAN RESULT IN A RISK OF AN ELECTRIC SHOCK.**

### NORMAL OPERATING INSTRUCTIONS

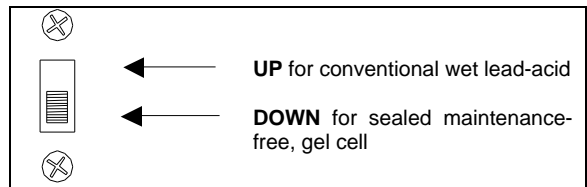
- With AC supply cord disconnected from outlet and power switch in "OFF" position, connect DC output clips to the battery as described previously for either a battery installed in or outside of a vehicle.

**⚠ WARNING: LEAD-ACID BATTERIES GENERATE GASES WHICH CAN BE EXPLOSIVE. TO PREVENT ARCING OR BURNING NEAR BATTERIES, DO NOT DISCONNECT OUTPUT CLIP(S) FROM BATTERY WHEN CHARGER IS OPERATING. IF CHARGE CYCLE MUST BE INTERRUPTED, MOVE THE POWER SWITCH TO "OFF", DISCONNECT THE AC SUPPLY CORD FROM OUTLET, AND THEN DISCONNECT THE OUTPUT CLIPS FROM BATTERY. IF BATTERY IS INSTALLED IN A VEHICLE, DISCONNECT CHASSIS CLIP FIRST.**

**⚠ DANGER: TO PREVENT ELECTRIC SHOCK, DO NOT TOUCH UNINSULATED PARTS OF CHARGER OUTPUT CLIPS OR BATTERY TERMINALS.**

**⚠ CAUTION: THIS CHARGER IS FOR USE ONLY ON 6-CELL, 12-VOLT, 80 TO 250 AMPERE-HOUR CAPACITY (20 HR. RATE), 2.35-2.50 VOLTS PER CELL MAXIMUM VOLTAGE, LEAD-ACID BATTERIES.**

- Determine the type of battery you are about to charge and set the battery type switch accordingly. The switch is located on the back side of the charger just above the DC circuit breaker.



- Select the desired mode of operation for the charger using the switch located on the front side in the lower right corner.

#### Pulse Only Mode

For best results, set the switch to "PULSE ONLY" first and pulse your battery between 2-24 hours (depending on its age and condition). Since all batteries, both new and old, have some level of sulfate build-up, this will help reduce the problem.

#### Pulse & Charge Mode

After you have used the Pulse Only Mode, set the switch to "PULSE & CHARGE". The unit will now charge the battery while continuing to clean the plates. NOTE: If the battery is severely sulfated and still will not accept a charge, set the switch back to "PULSE ONLY", pulse it longer, and then try charging again.

4. Connect AC supply cord to properly grounded outlet which matches the voltage setting on the AC voltage selector switch located on the back side of the charger beside the input receptacle. Refer to grounding instructions.
5. Move power switch to "ON" position. To test functionality of lights, all three will come on. The green "CHARGE COMPLETE" light should go off after about one second. The yellow "AC ON" and the green "PULSING" lights will stay on when the power switch is in the "ON" position.
6. If the "PULSE & CHARGE" mode is selected the charger will start automatically 3 to 5 seconds after the power switch is turned on. Monitor the ammeter for correct charge rate. Initial charge rate should be 19 to 21 amps. As the battery reaches approximately 70% of full charge, the charge rate decreases to a reading determined by the battery type switch selection and the condition of the batteries.

**Replaceable Electrolyte Batteries**

With healthy batteries, the charging current will decrease to between 2 to 4 amps and remain there until the charger turns off. As replaceable electrolyte batteries lose capacity, the charge rate may no longer decrease to this reading. The charger will still determine when the batteries are as charged as they are capable of being and will turn off. When battery capacity has decreased to where the charger is no longer able to taper down to less than 4 amps, or the batteries will no longer perform as desired, they should be replaced.

**Gel Cell and Sealed Batteries**

The charging current will decrease to near zero and remain there until the charger turns off. Gel cell batteries will still taper to near zero charge current even as they wear out and lose capacity and range. As sealed batteries lose capacity and range, the charge current may no longer decrease to this low a reading.

The charger will still determine when the batteries are as charged as they are capable of being and turn off. When the batteries will no longer perform as desired, they should be replaced.

7. The charger is equipped with a temperature sensor which automatically turns charger off if it overheats. Should charger turn off before the batteries are fully charged, check to be sure all ventilation openings are free from obstructions. After charger cools down to a safe temperature, it will automatically restart. If charger repeatedly overheats, refer to a qualified service center.
8. A maximum voltage shutoff for wet batteries is an additional safety feature of the charger.

When the battery potential increases above 2.83 volts per cell, the charge cycle is terminated and the green "CHARGE TERMINATION" light begins to blink, indicating batteries are not able to accept full charge.

9. Charger turns off automatically when batteries are fully charged as indicated by the steady green "CHARGE TERMINATION" light. Charge time varies with battery size and depth of discharge. Allow 8 hours for normal charging. A severely discharged battery may require 12 hours or longer to be properly charged and equalized. After charger has turned off, move power switch to "OFF" position, disconnect the AC supply cord from outlet, remove clip from vehicle chassis, and then remove clip from battery terminal.
10. If the charger operates for 14 hours and is unable to fully charge the battery, the charger will turn itself off. The green "CHARGE TERMINATION" light will blink indicating an incomplete charge cycle.

**INDICATOR LIGHT FUNCTIONS**

YELLOW AC ON	OFF - NO AC STEADY - CHARGER POWERED
GREEN  CHARGE TERMINATION	OFF - NO AC LOW GLOW - CHARGER POWERED STEADY - CHARGE COMPLETE OR INITIAL LED TEST (FEW SECONDS) BLINK - INCOMPLETE CHARGE (OVER VOLTAGE OR MAXIMUM TIME TERMINATION)
GREEN PULSING	OFF - CHARGER NOT POWERED STEADY - PULSING CIRCUITRY ON

**DAILY BATTERY MAINTENANCE**

In order to receive the battery enhancing benefits of *pulse technology* even when you are not using the Pulse Charger, we suggest you order a Solargizer Battery Maintenance System and attach it to your battery.

This small, solar-powered system will continue to pulse your plates until all the sulfates are completely gone and your battery is performing at 100% efficiency. When installed permanently, Solargizer will also keep them from crystallizing again.

For more information on the patented Solargizer, and the full line of battery maintenance products offered by PulseTech, call **1-800-580-7554** for the dealer nearest you.

## LIMITED WARRANTY

PulseTech Products Corp. warrants each new Pulse Charger for defects in material and workmanship for a period of two years from the date of manufacture of the complete unit. Repairs can be made at the PulseTech factory. To do so, send the defective unit with transportation charges prepaid to:

**PulseTech Products Corporation  
1100 South Kimball Avenue  
Southlake, Texas 76092 USA  
Attention: Repair Department**

For repairs made at other than the PulseTech factory, PulseTech will provide only the replacement parts. Defective parts should be sent with transportation charges prepaid to the PulseTech factory at the previously mentioned address.

If the unit or parts are found in the reasonable judgment of PulseTech to be defective in material or workmanship, repair, or replacement will be made by PulseTech without charge for parts or labor. Repair or replacement will be at the discretion of PulseTech, with replacements being made using current models or parts performing the equivalent function. Labor charges other than those incurred at the PulseTech factory are not covered under this warranty. All expenses associated with delivering defective items to the PulseTech factory and the expense of returning repaired or replaced items from the PulseTech factory to the owner will be paid for by the owner. All warranty work accomplished at the PulseTech factory will be completed within a reasonable time after receipt of defective items.

This warranty does not cover any semiconductor parts, such as diodes, which are vulnerable to electrical overloads beyond the control of PulseTech. Warranty on parts not manufactured by PulseTech, which include, but are not limited to, timers and ammeters is limited to the period specified in the original manufacturer's warranty.

This warranty does not cover any charger that has been subject to misuse, neglect, negligence, or accident, or operated in any way contrary to instructions specified on the charger case and in the owner's manual. No claim of breach of warranty shall be cause for cancellation of the contract of sale of any PulseTech charger. PulseTech assumes no responsibility for loss of time, inconvenience, or other damage, consequential or otherwise, resulting from a defective charger. All implied warranties (including merchantability) are limited in duration to the two years from date of manufacture warranty period.

Some states do not allow the exclusion or limitation of incidental or consequential damages, or limitations on how long an implied warranty lasts, so the above limitations may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

PulseTech's obligation under this warranty is strictly and exclusively limited to the repair or replacement of defective items. PulseTech issues this warranty in good faith and with full confidence in the workmanship and quality of PulseTech products.



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