



YAMAHA GOLF-CAR COMPANY

**Owner's/Operator's  
Manual**

# **YDRE**

## **48-Volt Battery Charger**

LIT-19628-06-01

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Read and understand this manual completely before operating or using this charger.

### SAFETY PRECAUTIONS

There is no substitute for common sense and careful practices. Improper practices or carelessness can cause burns, cuts, mutilation, asphyxiation, other bodily injury, or death. This information contains general safety precautions and guidelines that must be followed to reduce risk to personal safety. Special safety precautions are listed in specific procedures. Read and understand all of the safety precautions before operation or performing repairs or maintenance.



This safety alert symbol appears with most safety statements. It means attention, become alert, your safety is involved! Please read and abide by the message that follows the safety alert symbol.

#### **⚠ WARNING**

**Indicates a hazardous situation which, if not avoided, could result in death or serious injury.**

#### **CAUTION**

**This message describes special precautions that must be taken to avoid damage to the charger and vehicle.**

#### **NOTE:**

**This message provides additional key information.**

#### Prepare for Emergencies

Be prepared for possible injury or fire. Keep the following items handy: First aid kit. Fire extinguisher. Emergency phone numbers.

Read the following label located on the top of the charger before operating or using the charger, and promptly replace the label if it becomes damaged

**DANGER** RISK OF ELECTRIC SHOCK. DO NOT TOUCH UNINSULATED PORTION OF OUTPUT BATTERY CONNECTOR OR UNINSULATED BATTERY TERMINAL.  
**CAUTION** RISK OF ELECTRIC SHOCK. DO NOT REMOVE COVER. NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.  
**CAUTION** RISK OF ELECTRIC SHOCK. CAPACITOR STORES HAZARDOUS ENERGY. DO NOT REMOVE COVER UNTIL 5 MINUTES AFTER DISCONNECTING ALL SOURCES OF SUPPLY.  
 EXPLOSIVE GASES ARE PRODUCED BY BATTERIES. DO NOT SMOKE. CAUSE SPARKING OR USE OPEN FLAME NEAR BATTERY.  
 ONLY QUALIFIED PERSONNEL SHOULD INSTALL, USE OR SERVICE THIS CHARGER. READ AND UNDERSTAND THESE MANUFACTURE'S INSTRUCTIONS AND YOUR EMPLOYER'S SAFETY PRACTICES.

**DANGER** RISQUE DE DÉCHARGE ÉLECTRIQUE. NE PAS TOUCHER LA PARTIE NON ISOLÉE DU CONNECTEUR DE SORTIE DE LA BATTERIE OU DE LA BORNE DE BATTERIE.  
**AVERTISSEMENT** RISQUE DE DÉCHARGE ÉLECTRIQUE. NE PAS RETIRER LE CACHE. NE CONTIENT AUCUNE PIÈCE RÉPARABLE PAR L'UTILISATEUR. CONFIER TOUTE MAINTENANCE À UN TECHNICIEN QUALIFIÉ.  
**AVERTISSEMENT** RISQUE DE DÉCHARGE ÉLECTRIQUE. LE CONDENSATEUR EMMAGASINE DE L'ÉNERGIE ÉLECTRIQUE DANGEREUSE. NE RETIRER LE CACHE QUE 5 MINUTES APRÈS AVOIR DÉCONNECTÉ TOUTES LES SOURCES D'ALIMENTATION.  
 LES BATTERIES PRODUISENT DES GAZ EXPLOSIFS. NE PAS FUMER. NE PAS PROVOQUER DES ÉTINCELLES NI UTILISER DE FLAMME NUE À PROXIMITÉ DE LA BATTERIE.  
 CE CHARGEUR DOIT ÊTRE EXCLUSIVEMENT MONTÉ, UTILISÉ ET ENTRETENU PAR UN TECHNICIEN QUALIFIÉ.  
 LIRE ET VEILLER À COMPRENDRE LES INSTRUCTIONS DU FABRICANT AINSI QUE LES RÉGLEMENTS DE SÛRETÉ DE SON ENTREPRISE.

## FEATURES AND BENEFITS

Yamaha Golf-Car Company (YGC) has developed a state of the art battery/charger combination. The YDRE battery charger is designed to recharge deep-cycle, lead-acid batteries, and delivers maximum performance through the use of "Smart Charger" technology. The charger runs diagnostic testing on the vehicle's electrical system to ensure optimized charging and battery performance. Additionally, built in charge protection delays charging a battery in a fully charged state, and initiates a new charge cycle after a completed charge cycle in the event of a power interruption. These features coupled with the multi-step charge cycle and the other features and benefits listed below have enabled YGC to offer an industry leading battery warranty.

- **Switching Mode Design:** High efficiency operation with smooth DC output.
- **5-L.E.D. Display:** Displays state of charge and charge error conditions.
- **Charge Protection:** Protects from improper connection, overload and excessive temperatures. Programmed safety features include charge time monitoring and over temperature protection.
- **Charge Algorithm:** I-E-I - constant current/constant voltage/constant current charge profile.
- **Pre-Test:** Performs several diagnostic tests before charging begins.
- **Multi-Charge Steps:** Ensures a consistent and repeatable charge.
  - **Step 1: Pre-test:** Tests several conditions before charging begins. If a problem is detected, charging is terminated.
  - **Step 2: Constant Current Step:** Battery is charged with full rated output current, restoring up to 80% of charge.
  - **Step 3: Constant Voltage Step:** Regulated voltage "equalizes" individual battery cells resulting in full charge delivered to the battery.
  - **Step 4: Topping Off Step:** Battery pack is brought slowly to full charge without excess gassing.
  - **Step 5: Storage:** Every 14th day and if voltage becomes less than 48V, charger restarts cycle to refresh batteries in storage.
- **Automatic battery equalization ( Boosting ) :** Automatically boosts battery pack when individual cell-voltages are not balanced and restores pack capacity.

## • INSTALLATION

The AC line connected to the charger must be capable of supplying 12 amperes to the charger.

### CAUTION

**To reduce the risk of fire, use this charger only on circuits provided with a maximum of 20 amp branch circuit protection (circuit breaker or fuse), in accordance with the national electrical code, ANSI/NFPA 70, and all local codes and ordinances.**

The use of an extension cord with the charger should be avoided. The use of an improper extension cord could result in a risk of a fire or electric shock.

Provide adequate ventilation for the batteries and charger. The convection and fan-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. Keep clothing, plastic, canvas, etc. away from charger at all times.

### ⚠ WARNING

**Chargers can ignite flammable materials and vapors. Do not use near fuels, grain dust, solvents, or other flammables.**

### ⚠ WARNING

**To reduce the risk of an electric shock, keep the charger dry. Do not expose it to rain. For storage, keep the charger indoors.**

### NOTE:

**This charger is not designed for on-board use.**

### NOTE:

**This charger is not designed for use with an electric generator.**

## GROUNDING

The battery charger must be grounded to reduce the risk of electric shock. The charger is equipped with an AC cord set having an equipment-grounding conductor. The AC cord set must be connected to an appropriate receptacle that is properly installed and grounded in accordance with the National Electrical Code and all local codes and ordinances.

### ⚠ WARNING

**Improper connection of the equipment-grounding conductor can result in a risk of an electric shock.**

The conductor with insulation having an outer surface that is green, with or without yellow stripe(s), is the equipment-grounding conductor. If repair or replacement of the charger's AC cord set is necessary, do not connect the equipment-grounding connector to a live terminal.

## CHARGING

### ⚠ WARNING

To reduce the risk of an electric shock, connect only to a properly grounded, single-phase (3-wire) outlet. Also, refer to grounding instructions.

### ⚠ WARNING

Risk of electric shock! Do not touch any uninsulated parts of the charger output plug, battery charging receptacle, or battery terminals.

### CAUTION

Charge only 48v battery systems manufactured by Trojan Battery Company. Damage to the charger and batteries may result if this charger is used on the wrong battery type.

### ⚠ WARNING

Visually and manually inspect to verify that the DC output cord, plug and battery charging receptacle are in good working condition before each and every use and do not use the charger if:

The DC charging receptacle does not grip the DC cord set plug tightly, is loose or does not make a good electrical connection.

The DC cord set plug or charging receptacle feels hotter than normal.

The DC cord set plug or charging receptacle contacts are bent, corroded or are dark or bluish in appearance.

The DC cord set plug, cords, receptacle or equipment charging wiring are cut, worn, broken or have any exposed conductors.

The DC cord plug, cords, charger or receptacles are damaged or distressed in any way.

Using the charger with any of the above symptoms could result in a fire, property damage or personal injury.

### ⚠ WARNING

Do not disconnect the DC cord set plug from the charging receptacle when the charger is on. If the charger must be stopped, first disconnect the AC power supply cord from its AC outlet, and then disconnect the charger DC cord set plug from the charging receptacle.

### ⚠ WARNING

Whenever removing AC or DC cord set plugs from receptacles, pull from the plugs' body and not from their respective cords. Be sure area around battery is well ventilated while battery is being charged.

The instructions printed on the charger (as depicted below) are for daily reference. The charger is factory preset to use with Trojan 48-volt golf car batteries

Connect charger's AC cord set to AC power. Then, connect the DC cord set plug to the vehicle charging-receptacle by grasping the plug handle and pushing the plug straight into the receptacle. The charger will start automatically.

Upon connection to AC power source, all five LED blink for a second, then power LED turns on. Upon connection to Battery Pack, all five LED blink for once, then power and charging indicators blink for 10 seconds.

### OPERATING INSTRUCTIONS

1. PLUG AC CORD INTO A GROUNDED RECEPTACLE
2. PLUG DC CORD INTO A VEHICLE RECEPTACLE
3. WHEN CHARGING IS COMPLETED, DISCONNECT DC CORD FROM VEHICLE

Under normal charge circumstances, the L.E.D.s operate as follows:

**Power On (Red):** Illuminates continuously when AC power is present. Refer to the section 'TROUBLESHOOTING'

**Error 1 (Red):** Normally not illuminated. Refer to 'TROUBLESHOOTING' if blinking.

**Error 2 (Red):** Normally not illuminated. Refer to 'TROUBLESHOOTING' if blinking.

**Charging (Yellow):** Charge Status Indicator – it blinks or illuminates during the 5-Step Charge Process. Refer to multi-Step charge cycle.

**Charged (Green):** Illuminates continuously after the 4<sup>th</sup> step of the charge process. Refer to multi-Step charge cycle.

### 5-Step Charging Cycle

During operation, the charge algorithm controls both voltage and current for precise charging. The LED's will illuminate during the five step charging cycle to indicate the state of charge as described below:

#### Step 1 – Pre-Test

The Yellow LED (charging) blinks on and off during this step. This step applies tests to the battery pack. Further charging is prohibited if unsuitable conditions are found such as reversed battery polarity or over/under voltage. Refer to 'Troubleshooting' for understanding faults.

The duration of this step is dependent on the condition of your battery - approximately 10 seconds under average circumstances. If your battery pack was allowed to severely discharge to less than 42v, then this step can last several hours while the charger tries to revive the battery pack.

#### Step 2 - Constant Current Charge

Yellow L.E.D. (charging) illuminates continuously indicating that the charger is charging the battery at the full rated output.

#### Step 3 - Constant Voltage Charge

The charger now regulates voltage instead of current. While the charger maintains a constant voltage, the charge current gradually decreases. During this phase the Yellow L.E.D. (charging) illuminates and the Green L.E.D. (charged) blinks.

#### Step 4 – Topping Off

Yellow and Green L.E.D.s light when the charger has determined that the battery pack has reached 90% capacity.

This step ends when the charge is replenished to 100% capacity. Charging is completed when only the Green L.E.D. (charged) remains illuminated.

If charger detects that battery needs to be boosted at the end of this stage, then the charger keeps operating for an extra four hours. This additional function is called "boosting" and only the Power L.E.D. blinks

Upon charge completion, the charger's DC cord set can now be disconnected from the charging receptacle by grasping the plug body or handle and pulling the plug straight out of the receptacle.

#### Step 5 - Storage

Only after the completion of Step 4, and after 14 days of time has elapsed, AND if the battery voltage falls below 48Vdc, the charger will restart a new charge cycle routine (Step 1-4 above), and restore battery to full capacity.

If the charger is left connected to AC Power, and then the DC cord set plug is re-connected to another battery pack, the charger will restart a new charge cycle from the beginning (Step 1-4 above).

If, during any part of the 5-Step Charge process, AC power should happen to be disconnected and reconnected, the charger will restart a new charge cycle.

If the charger finds an abnormal charge condition while charging, it will attempt to shutdown and indicate the 'Condition' by blinking one or all of its RED L.E.D.s. Refer to the 'Troubleshooting' section for a description of the Charge Error Condition, if you encounter a blinking RED L.E.D.

### TROUBLESHOOTING

#### 1. LED Error Codes (For battery condition)

##### ⚠ WARNING

Incorrect reassembly may result in a risk of electric shock or fire. The following procedures are intended only to determine if a malfunction may exist in the charger.

##### ⚠ WARNING

To reduce the risk of electric shock, always disconnect the charger's AC cord set from AC power and its DC cord set plug from batteries before attempting any maintenance or cleaning.

##### ⚠ WARNING

Do not operate the charger if it is malfunctioning. Personal injury or property damage could result.

If any of the three red L.E.D.s blink, the charge cycle has terminated prematurely. An abnormal charging condition was detected and charging was stopped due to a Charge Error Condition.

Refer to the following Charge Error Table for a description of the possible failure or condition.

Condition	Power On	Error 1	Error 2
Battery Voltage High	OFF	OFF	BLINK
Battery Polarity Reversed	ON	OFF	OFF
Output Overload & Overheat	OFF	BLINK	BLINK
Excessive Charging Time	ON	OFF	ON
Excessive Discharge	ON	ON	ON

**⚠ WARNING**

Have qualified service technician inspect if problems persist.

- Battery Voltage High.** Charger detect charging voltage is surging. DC cord set may be connected to a battery pack with voltage higher than the output rating of the charger, or charging system internal failure.  
Remedy: Confirm battery is 48V system, or specified battery. Check battery condition. Check DC plug is engaged to receptacle securely. Check terminals for power wire are tightened correctly through battery, MCU, and Motor.
- Battery Polarity Reversed.** Battery or wire connections may be incorrect.  
Remedy: Confirm that the polarity for wiring is correct from charger receptacle in the vehicle to all battery terminals.
- Output Overload & Overheat.** Charger may shut down if the current output exceeds rated capacity or the charger temperature is too high.  
Remedy: Confirm that no external load is connected to battery, or lower the ambient temperature of the charging location.
- Excessive Charging Time.** Charging time has reached the safety timer. Possible causes include: a battery load that is draining energy from the battery while charging, charging battery with highly discharged capacity, aged or unbalanced batteries.  
Remedy: Confirm that no external load is connected to battery, or check battery condition and battery wiring.
- Excessive Discharged.** This error is generated by a condition found during the Pre-Test Step. This error occurs if a severely discharged battery pack did not recharge to 42v within 5 hours.  
Remedy: Confirm that no external load is connected to battery, or check battery condition and battery wiring.

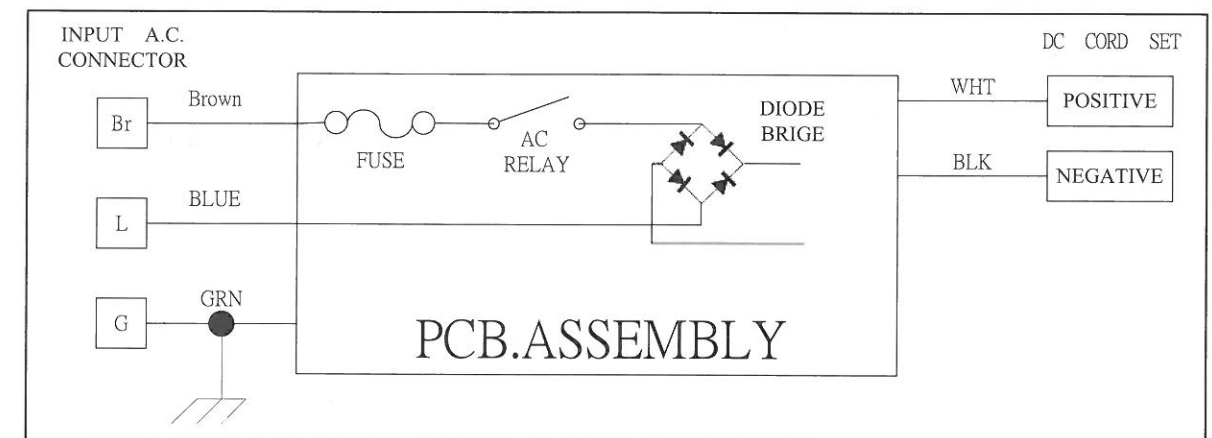
**2. Hardware System Faults**

**⚠ WARNING**

Have qualified service technician inspect if problems persist.

	Problem Description	Cause	Remedy
1	Charger does not start. No LEDs illuminate or blink when AC cord is connected.	No AC power to charger.	Ensure correct voltage at AC outlet. Ensure AC cord connections. Replace AC cord if damaged.
2	Charger does not start charging when DC cord set is plugged into the receptacle and the red power led is on.	Incorrect wiring or disconnection from DC cord, receptacle, and batteries. Battery voltage less than 24 volts.	Ensure polarity for wiring is correct from DC cord, receptacle, and batteries. Check battery pack voltage.
3	Charger runs longer than 20 hours.	Charger may be in "boosting" stage.	Confirm green LED illuminates after power LED is blinking (This indicates "boosting").

**WIRING DIAGRAM**

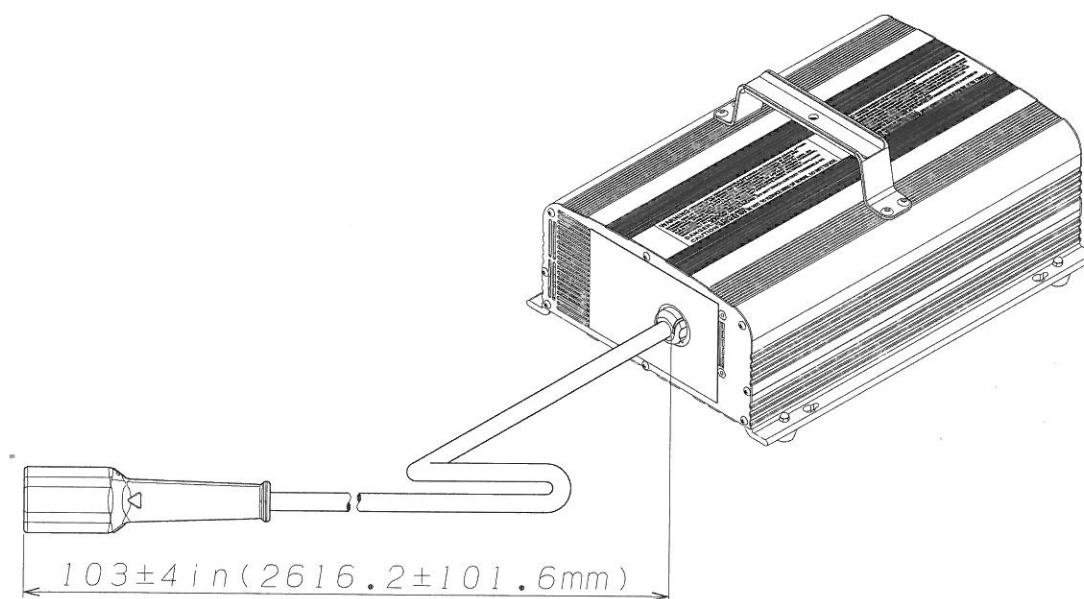
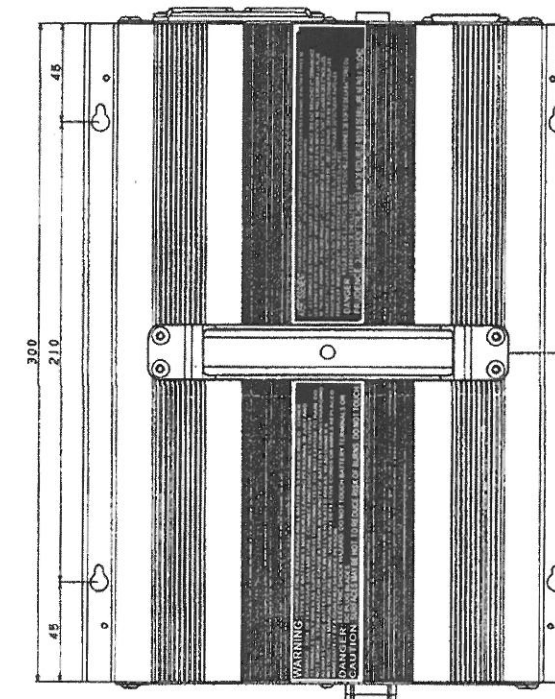
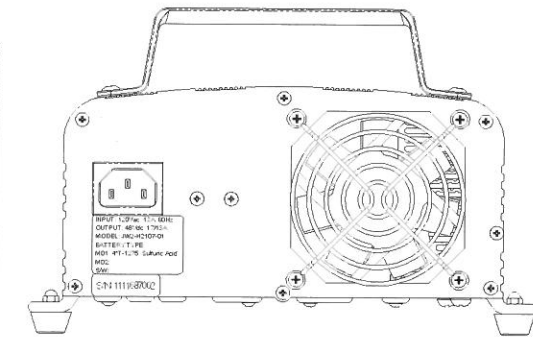
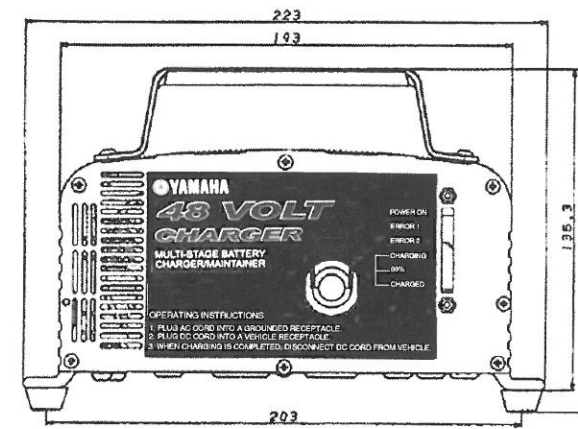


## PARTS LIST

ITEM	P/N	DESCRIPTION
1.	JW2-H1962-00	AC Cord Set
2.	JW2-H7234-00	DC Cord Set

## GENERAL SPECIFICATIONS

Model Number:	JW2-01
Part Number:	JW2-H2107-01
Input V AC	120Vac
Input A AC	12.0A
Frequency:	60Hz
Output V DC:	48V DC
Output A DC:	17/13.0A
Safety Timer:	20 Hours
Weight	10.8 lbs/ 4.9 kg / Including Plug



DRIVE 48 Volt Battery Charger  
Owner's Manual

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