

A black and white photograph of a Black & Decker Smart Battery Charger. The device is a rectangular unit with a carrying handle on top. The top panel features a digital LCD display showing '12.8'. To the right of the display are five circular icons representing different charging modes: 'WATER', 'TRUCK', 'CAR', 'BOAT', and 'MOTORCYCLE'. Below these icons, the text 'BATTERY ENERGY' is visible. The front of the charger has a large black label with the 'BLACK & DECKER' logo in white, followed by 'Smart BATTERY CHARGER' in a stylized font. Below this, it lists charging capabilities: '110 AMP ENGINE START' and '40 AMP / 20 AMP / 10 AMP / 5 AMP CHARGE RATES'. At the bottom of the label, it specifies 'For 12 Volt Lead Acid Battery Types' and lists compatible battery types: 'DEEP CYCLE • GEL • AGM • AGM • MARINE • TRUCK • FLAM PROOFING & MORE!'. A pair of jumper cables is partially visible on the left side of the charger.



IMPORTANT SAFETY INSTRUCTIONS

VE GAS MIXTURES — WORKING IN VICINITY OF A LEAD-ACID BATTERIES GENERATE EXPLOSIVE GASES DURING OPERATION. FOR THIS REASON, IT IS OF UTMOST IMPORTANCE BEFORE USING YOUR CHARGER, YOU READ THIS MANUAL AND INSTRUCTIONS EXACTLY.

attery explosion, follow these instructions and those published by acturer and manufacturer of any equipment you intend to use in Review cautionary markings on these products and on engine. employs parts (switches, relays, etc.) that produce arcs or sparks. in a garage or enclosed area, the unit **MUST** be placed not less ove the floor.

not recommended or sold by the battery charger manufacturer may result in shock, or injury to persons.

amage to electric plug and cord, pull by plug rather than cord when r.

ould not be used unless absolutely necessary. Use of an improper extension risk of fire and electric shock, and will void warranty.

rd must be used, make sure:

of extension cord are the same number, size, and shape as those of plug on

is properly wired and in good electrical condition; and

VG#10 (10 gauge) for 100 feet and AWG#8 for distances over 100 feet.

arger with damaged cord or plug — take to a qualified technician for ug or cord immediately.

er if it has received a sharp blow, been dropped, or otherwise damaged in qualified service technician.

charger; take it to a qualified service technician when service or repair is assembly may result in a risk of electric shock or fire, and will void warranty.

tric shock, unplug charger from outlet before attempting any maintenance or controls without unplugging will not reduce this risk.

er to rain, snow or use when wet.

d be within range of your voice or close enough to come to your aid when acid battery.

o should be nearby in case battery acid contacts skin, clothing, or eyes.

rotection and clothing protection. Avoid touching eyes while working with a articles or corrosion may get into eyes. Immediately flood eye with cold water or at least 15 minutes and seek medical attention immediately.

ts skin or clothing, wash immediately with soap and water. If redness, pain or immediate medical attention.

w a spark or flame in vicinity of battery or engine.

educe the risk of dropping a metal tool onto battery. This might cause sparks tery or other electrical part, which can cause an explosion.

al items such as rings, bracelets, necklaces and watches when working with lead-acid battery can produce a short-circuit current high enough to cause a

ging a LEAD-ACID battery only. It is not intended to supply power to a low-em other than in a starter-motor application. Do not use the battery charger batteries that are commonly used with home appliances. These batteries may y to persons and damage property.

CHARGE A FROZEN BATTERY.

ed to reduce risk of electric shock. Charger is equipped with an AC cord having actor and a grounding plug. The plug must be plugged into a properly installed lt AC outlet in accordance with all local codes and ordinances (see Figure 1A).

Figure 1A

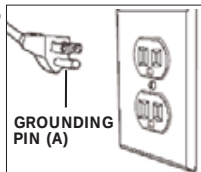
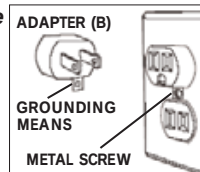


Figure 1B



If a properly grounded outlet is not available, a temporary adapter (like the adapter shown in Figure 1B) may be used to connect this plug to a two-pole receptacle. The temporary adapter should be used **ONLY** until a properly grounded outlet can be installed by a qualified electrician.

DANGER — Before using an adapter as illustrated, make certain that the center screw of outlet plate is grounded.

The green-colored rigid ear or tab extending from adapter must be connected to a properly grounded outlet. **MAKE CERTAIN IT IS GROUNDED.** If necessary, replace original outlet cover plate screw with a longer screw that will secure adapter ground tab to outlet cover plate and connect to grounded outlet.

WARNING

NEVER alter AC cord or plug. If it will not fit, have a proper outlet installed by a qualified electrician. Improper connection may result in an electric shock.

Note: Use of an adapter is not allowed in Canada. If a grounding type receptacle is not available, do not use this appliance until the proper outlet has been installed by a qualified electrician.

Preparing to Charge

1. Determine voltage of battery to be charged by referring to the owner's manual.
2. If it is necessary to remove battery from vehicle to charge, or to clean terminals, always remove grounded terminal from battery first. Make sure all accessories in the vehicle are off, so as not to cause an arc.
3. Clean battery terminals. Do not allow corrosion to come in contact with eyes.
4. Add distilled water in each cell until battery acid reaches level specified by battery manufacturer. This helps purge excessive gas from cells. Do not overfill. For a battery without cell caps (maintenance free), carefully follow manufacturer's charging instructions.
5. Study all battery manufacturer's specific precautions, such as removing or not removing cell caps while charging, and recommended rates of charge.
6. Area around battery should be 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.
7. Make sure the initial charging rate does not exceed battery manufacturer's requirement.

Charger Location

1. Locate charger as far away from battery as cables permit.
2. NEVER place charger directly above battery being charged; gases from battery will corrode and damage charger.
3. NEVER allow battery acid to drip on charger when reading gravity or filling battery.
4. NEVER operate charger in a closed-in area or restrict ventilation in any way.
5. Marine batteries must be removed and charged on shore.
6. Do not set a battery on top of charger.

DC Connection Precautions

1. Connect and disconnect DC output clamps only after removing AC cord from electric outlet.
2. Never allow clamps to touch each other.
3. Attach clamps to battery chassis as indicated in "Battery Installed in Vehicle" steps 5 and 6, and in "Battery Outside of Vehicle" steps 2, 4 and 5.

Follow these steps when the battery is installed in a vehicle. A spark near the battery may cause an explosion. To reduce risk of a spark near the battery:

1. Position AC and DC cords to reduce risk of damage by hood, door, or moving engine part.
2. Stay clear of fan blades, belts, pulleys, and other parts that can cause injury to persons.
3. Check polarity of battery posts. POSITIVE (POS, P, +) battery post usually has larger diameter than NEGATIVE (NEG, N, -) post.
4. Determine which post of battery is grounded (connected) to the chassis. If NEGATIVE post is grounded to chassis (as in most vehicles), see 5. If POSITIVE post is grounded to the chassis, see 6.

nd vehicle, connect POSITIVE (RED) clamp from battery charger to POSITIVE
ed post of battery. Connect NEGATIVE (BLACK) clamp to vehicle chassis or
om battery. Do not connect clip to carburetor, fuel lines, or sheet-metal body
vy gauge metal part of the frame or engine block.

nd vehicle, connect NEGATIVE (BLACK) clamp from battery charger to
-) ungrounded post of battery. Connect POSITIVE (RED) clamp to vehicle
ck away from battery. Do not connect clip to carburetor, fuel lines or sheet-
nnect to a heavy gauge metal part of the frame or engine block.

harger, disconnect AC cord, remove clamp from vehicle chassis, and then
attery terminal.

attery while the engine is operating.

ions for length of charge information.

**When the battery has been removed from a vehicle. A spark near
s an explosion. To reduce risk of a spark near the battery:**

ery posts. The POSITIVE post (marked POS, P, +) usually has a larger diameter
attery post (marked NEG, N, -).

(minimum length) 6 AWG insulated battery cable to the NEGATIVE battery post

(RED) battery clamp to the POSITIVE battery post (marked POS, P, + or red).
om the battery as possible, and do not face battery when making final

NEGATIVE (BLACK) charger clamp to the free end of the battery cable
ATIVE terminal.

appropriate setting according to battery size.

harger, always do so in reverse sequence of connecting procedure and break
as far away from battery as practical.

**!) battery must be removed and charged on shore. To charge it
quires equipment specially designed for marine use. This unit is
for such use.**

SAVE THESE INSTRUCTIONS

with part 15 of the FCC rules. Operation is subject to the following two
vice may not cause harmful interference, and (2) this device must accept
ved, including interference that may cause undesired operation.

ven tested and found to comply with the limits for a Class B digital device,
the FCC Rules. These limits are designed to provide reasonable protection
erence in a residential installation. This equipment generates, uses and can
ncy energy and, if not installed and used in accordance with the
se harmful interference to radio communications. However, there is no
erence will not occur in a particular installation. If equipment does cause
o radio or television reception, which can be determined by turning the
t, the user is encouraged to try to correct the interference by one or more
ures:

the receiving antenna.

tion between equipment and receiver.

ment into an outlet on a circuit different from that to which the receiver is

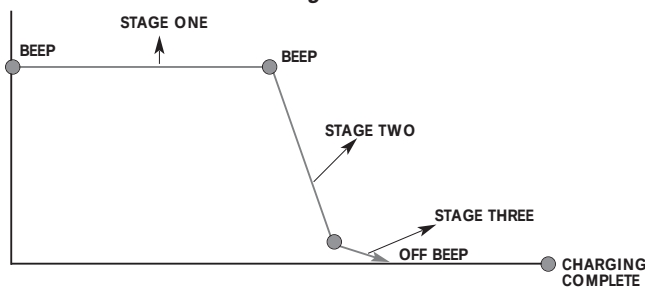
or an experienced radio/TV technician for help.

INTRODUCTION

Thank you for selecting the **40/20/10/4 Amp Smart Battery Charger**. With
proper care and use, it will give you years of dependable service. This battery
charger has a high charge rate of up to 40 amps, a low charge rate of 4 amps and
110 amps of engine starting power. It is designed for charging only
12 volt lead-acid batteries — conventional automotive, maintenance-free, marine
deep cycle and gel — used in cars, trucks, farm equipment, boats, RVs and SUVs,
lawn mowers/garden tractors, motorcycles, personal watercraft, snowmobiles, ATVs
and various applications.

Smart Battery Chargers feature 3-stage high-efficiency charging technology built-in
microprocessor control that ensures fast, safe and complete charging of serviceable
batteries.

Charge Curve



Stage One — Rapid Start Charge at 40 amps delivers maximum charging
amperage to “wake up” any serviceable 12 volt battery and allows for quick engine
starting in just 1 minute (based on a midsize vehicle battery at 50% charge level).
When battery reaches a maximum safe predetermined voltage, the charger will
automatically signal a “beep” and move into Stage 2 of the charging process.

orption Charge maintains the maximum possible charge at a
etermined voltage. During this phase, the charging voltage remains
ual charging current is reduced to allow for the maximum proper
y transfer. At the end of Stage 2, the charger will automatically
arge mode.

op-Off Charge — voltage is automatically maintained and
etermined level while current is adjusted for a safe, effective battery
sion of Stage 3, the unit will BEEP signaling the completion of

harge feature is ideal for maintaining a battery. It automatically
eded to keep battery fully charged all the time.

harge rate settings, accessed by the 4/10/20/40 AMP button:
batteries, as in lawn mowers, snowmobiles, motorcycles, etc.

ized batteries, as in small cars

obiles and light trucks

truck batteries, banks of RV batteries

art

ture Compensation

on

and battery voltage check

ws charge rate, operating mode, fault codes and FUL when

rt

ncy switch mode automatic rapid charging

erse polarity and short circuit protection for user

nditioning (desulfate)

iciency design

protection

self-stored

ication

ontrol (Digital Smart Control) high frequency power

w AC from extension cord use

n

function

Controls and Indicators

CONTROL PANEL



DIGITAL READOUT CIRCULATING PATTERN



FUNCTION BUTTONS (FROM LEFT TO RIGHT):

Battery Type (Step 1) — allows the user to select Wet, Gel or AGM type of battery for efficient and safe charge. Most automotive batteries are Wet batteries. Refer to the battery manufacturer's specifications for battery type.

4/10/20/40 AMP (Charge Rate Selector) (Step 2) — allows the user to select the charge rate based on battery size. This selection and the actual battery charge rate are monitored by the microprocessor. The charger will stop charging if the rate is too fast or too slow for the battery size or condition.

110 AMP Engine Start — places the charger in an engine start sequence. This button will not be activated unless the charger is in the 40 amp charge mode; set the 4/10/20/40 AMP button to 40 amps first to activate this button.

Battery Recond. — is an automatic mode that, once started, continues for 24 hours and then stops. A series of electrical pulses breaks the crystalline form of lead sulfate to return these chemicals into useful battery electrolytes. More than 24 hours may be needed to restore. Periodic reconditioning is recommended to maintain a battery's optimum performance. However, if 5 cycles does not improve battery performance, discontinue and recycle the battery.

Battery Voltage (Alternator Voltage Check) — is a quick check that measures the battery voltage. This check is repeated at various electrical load levels and the tests allow the user to determine if the alternator can keep up with the loads.

INDICATOR - When connected to an AC outlet, digital display shows circulating pattern to indicate normal operation.

CELL BATTERY - Cannot be charged. Have battery checked by certified auto service center.

BATTERY WHILE CHARGING - Check load.

CHARGE - Check battery connection.

CHARGE TOO LOW TO ACCEPT CHARGE - Have battery checked by certified auto service center.

L - Have battery checked by certified auto service center.

N - Battery needs to be reconditioned. See manual.

NO CHARGE - Battery will not accept a charge after 18 hours of continuous charging. Battery may have been damaged or discharged too deeply. Charge by certified auto service center.

RATE IS SET TOO LOW - Set charger to higher charge rate. See manual.

SLEEP - Disconnect charger and allow to cool for 30 min., check for ample ventilation.

TEMPERATURE OUT OF TYPICAL OPERATION RANGE -

TROUBLESHOOTING - (The letters DES will display for the first 3 seconds.)

WATER LEAK CHECK -

WATER LEAK DETECTED -

battery type selector is on WET battery type
battery type selector is on GEL battery type
battery type selector is on AGM battery type.

used button used to start the equalization process.

Ensure that all installation and operating instructions and safety precautions are understood and carefully followed by anyone installing or using the charger. Follow the steps outlined in “Important Safety Instructions” at the front of this manual.

After charger clamps are correctly connected, plug in the charger to a 120 volt AC outlet and the charger will show a circulating pattern on the Digital Display, indicating power has been applied. Select the proper charge current rate based on battery size. Press the 4/10/20/40 AMP button and the charger will begin charging at 4 amps. Pressing the 4/10/20/40 AMP button again will advance the charge rate to 10 amps, again to 20 amps, and again to 40 amps. Pressing the switch again will turn OFF the charger output and the display will show "000."

⚠ WARNING

If Digital Display shows "F06", the Red (POSITIVE) and Black (NEGATIVE) clamps are incorrectly connected to battery terminals. Follow the steps outlined in "Important Safety Instructions" at the front of this manual to disconnect, then reconnect in correct polarity.

1. Press Battery Type selector until desired battery type LED lights.

Note: The default selection is "GEL" type battery.

2. Press 4/10/20/40 AMP button to begin charging at the 4 amp rate; the unit sounds a beep and the charging current LED lights. The charger starts charging at 4 amp rate automatically if 4/10/20/40 AMP button is not pressed within 3 minutes after applying AC power.

If the Display on the charger varies between "F03" and the amp rate, the battery is sulfated and the charger is trying to give it some charge. If after approximately 2 hours the display just shows "F03", then the battery will not charge.

Charger occasionally sounds a beep and displays “0.0” during self-test or charging stage changes.

3. Pressing the 4/10/20/40 AMP button again advances charging rate to 10 amps, pressing once more advances charging rate to 20 amps, and again to 40 amps. (Pressing the button again will turn OFF the charger output and the Display will show "000".) This selection and actual battery charge rate are monitored by the microprocessor, and the unit will stop charging if the selected rate is too fast or too slow for battery size or condition.

As the battery nears full charge capacity, the unit's output will automatically drop to a lower charge rate.

0/20/40 AMP button repeatedly advances to standby mode; a beep, displays "000" and stops charging. The charger displays the charge current. To view the battery voltage, press the BATTERY VOLTAGE button. The charger will sound a beep and display the voltage for 3 seconds, then returns to displaying the charge current. The display shows "FUL" when the battery is fully charged. See the section outlined in "Important Safety Instructions" at the front of this manual.

Charging

Charging is ideal for maintaining a fully charged battery. The charger will automatically start charging after the battery is fully charged. The charger will stop the battery and tops it off as needed. The indicator lights; the display shows charge current when topping and returns to "FUL" when completed.

To view the battery voltage, press the Battery Voltage button.

Do not terminate charging by pressing the charge rate selector button at any time while the battery is charging. After AC power interruption, charging restarts at 4 amp rate automatically and the battery type will default to "GEL".

If the battery type is not known, charge at the 4 amp rate. DO NOT charge at 10 or 20 amp rate.

The process by which the fluid in each of a battery's cells is equalized. After charging is complete.

DO NOT EQUALIZE A GEL OR AGM CELL. THE RESULTING DAMAGE COULD CAUSE PROPERTY DAMAGE, SERIOUS INJURY OR DEATH.

Do not connect the vehicle's battery when equalizing.

The equalization process needs to be run depends on the use of the battery is used, the more undercharged it becomes; thus the battery should be equalized.

Do not use the equalization mode on sealed or valve regulated batteries. This mode is only for use on flooded (sealed/vented) batteries.

There are no flammable sources near the recharging sight.

Wear safety glasses, gloves and protective clothing.

Remove the battery from vehicle. MAKE SURE THAT THE BATTERY HAS GOOD ventilation. The equalization process causes the release of hydrogen and oxygen. An accumulation of these gases presents a real danger of explosion.

Remove the battery cap, if removable.

6. Fill the battery with distilled water according to the manufacturer's instructions. Since batteries may rapidly bubble while being charged, remember to refill (only with distilled water) after the equalization process is complete and the voltage is back to normal.
7. Follow the steps in the "Charging the Battery" section on page 5 of this manual.
8. Push the Battery Type Selector Switch until "WET" is displayed. (This mode will only work if a WET battery is selected.)
9. Choose the correct charge rate and start charging. You can check the battery voltage by pushing the Battery Voltage button. This will trigger the Battery Voltage indicator button.
10. Push the Equalize button at any time and the battery will automatically begin to equalize in 4 amp limited current. Note that in order to push the recessed button you will need a small pin or ballpoint pen.
11. Every hour, the temperature should be checked by touching the battery. If the battery is hot to the touch, stop the charging and allow the battery to cool.
12. The voltage rises, but does not go over 15.3v to 16.2v (2.55-2.7v per cell) depending on ambient temperature; it will automatically adjust.
13. The "WET" LED flashes while the charger is in equalize mode.
14. The digital readout will show "FUL" when the equalization process is complete.

Engine Start

The Engine Start function can supply 110 amps for engine starting.

1. Set the 4/10/20/40 AMP button to 40 amp mode and immediately press the 110A button switch to activate the Engine Start mode.
2. The digital display will countdown from "999" to "000."
3. When the "000" count is reached and begins flashing on the Display, the vehicle is ready to start.
4. Crank the engine using manufacturer's guidelines, typically in 3 to 5 second bursts. The high current engine starting function requires a resting/cooling period between tries. The charger will switch back to regular charge mode after 5 seconds and will not allow operation in this mode for 4 minutes. Wait 4 to 5 minutes before a second attempt at starting the engine, if needed.
5. During the rest period, the battery is charging at 40 amps. After engine starts, follow the steps outlined in "Important Safety Instructions" at the front of this manual to disconnect.

Recondition Mode

Whenever a lead-acid battery begins to discharge, lead sulfate, an insulator, begins to build up on the battery's internal plates. This reduces the ability of the battery to hold a full charge. When that battery has an immediate charge, most of the lead sulfate is dissolved and the plates are free of this insulation. If a battery remains in a discharged condition over a longer period of time, the lead sulfate changes to a hard crystalline form, making a full charge difficult to achieve. Reconditioning may "save" a sulfated battery.

ON MODE should only be used with 10 Amp Hour (Ah) or acid batteries. Charge the battery to be treated for 20 minutes, RECONDITION Mode. Observe the Digital Display for any codes. This check the battery for shorted cells (F01), open cells (F03) or battery charge (F02), and to ensure the battery can take a charge. If needed, change to the BATTERY RECONDITION MODE.

the vehicle's battery when reconditioning.

charger is in initiation state with a circulating pattern on the charge OFF mode with "000" on the display. If not, press MP button repeatedly until "000" shows on the display.

Recondition button to start the process.

the display for 3 seconds, then it changes to three horizontal

s 24 hours and stops automatically. The display shows "000"

ge Check

F all vehicle's accessories): The battery must be fully charged testing the alternator. Run the engine long enough to achieve idle speed and verify there is a no-load voltage.

Alternator Check to start the check.

alternator Good LED will light to indicate the alternator is good, or F07

display if alternator output voltage is out of typical operation range.

Alternator Check again to stop the test.

ries ON): Next, load the alternator by turning on as many es as possible (except for A/C and DEFROST)

Alternator Check to start the check.

alternator Good LED will light to indicate the alternator is good, or F07

display if alternator output voltage is out of typical operation range.

Alternator Check again to stop the test.

check indicates a good alternator and the second indicates the problem could stem from: loose fan belts, an intermittent diode connections between the battery and alternator and/or ground.

STAGE button is disabled in Alternator Check mode.

play because someone has added a number of accessory loads charging system, thereby increasing current demand from the

TAKE SURE THAT THE ALTERNATOR IS RATED TO SUPPORT THE

ay not be accurate for every make, manufacturer and model of

2 volt systems.

APPROXIMATE CHARGING TIMES

The **4/10/20/40 Amp 12 Volt Smart Battery Charger** will automatically adjust the charge rate as the battery becomes charged and stop when the battery is fully charged. Deep cycle batteries may require longer charging time.

For estimates of the time it takes to charge a battery, refer to the following table.

Percent of charge in battery	75%	50%	25%	0%
at 4 Amp rate	3.5 HRS	7 HRS	10.5 HRS	14 HRS
at 10 amp rate	1.4 HRS	2.8 HRS	4.2 HRS	5.5 HRS
at 20 Amp rate	1 HR	1.5 HRS	2.1 HRS	2.8 HRS
at 40 Amp rate	1 HR*	1 HR*	1 HR*	1-2 HRS*

* Not recommended for charging batteries less than 80 Ah

The times shown in the table above are approximate and refer to a 50 Ah automotive battery. For example, a 50 Ah (12 volt) battery is discharged (50%). How long should it be charged at the 10 amp rate? See the chart above under "50%" and "at 10 amp rate."

In most cases, battery charging times will vary depending on the size, age and condition of the battery. Smaller batteries should be charged at a lower rate (4 amps) and an extra hour added to charge time.

CARE AND MAINTENANCE

With proper care and minimal maintenance, the **4/10/20/40 Amp 12 Volt Smart Battery Charger** will provide years of dependable service. For maximum performance, manufacturer recommends:

- After each use, clean the battery charger clamps — be sure to remove any battery fluid that will cause corrosion of the clamps.
- Clean the outside case of the charger with a soft cloth and, if necessary, mild soap solution.
- Do not allow liquid to enter the charger. Do not operate when charger is wet.
- Keep the charger cords loosely coiled during storage to prevent damage to the cords.

