BH-20 PPV Fan

OPERATIONS MANUAL

WARNING

The following information is important to the proper and safe use of your BlowHard BH20 Positive Pressure Ventilation (PPV) Fan. Be sure to READ and UNDERSTAND completely the Operating Manual BEFORE operating the fan. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD CAUSE PROPERTY DAMAGE or PERSONAL INJURY.

SAFETY INSTRUCTIONS

It is the responsibility of the user to provide proper PPV/PPA Training and provide adequate Personal Protective Equipment (PPE) i.e. gloves and eye protection for handling this and other electrical equipment.

This electrical equipment utilizes 110/220V-AC which can cause serious electrical shock if not properly operated or maintained.

Use Rated and Approved Outdoor Electrical Extension Cord only with this equipment. Do not submerge this equipment under water. Avoid getting electrical connection wet. Do not come in contact with wet electrical connections without proper personal protective equipment.

The operating fan is a high speed rotating mechanical device that can cause serious injury if body parts come into contact with rotating surfaces or material thrown into moving parts. Although safety grills are installed, they do not block all objects from coming in contact with the rotating surfaces. Do not push body parts or foreign objects through the grill slots. Do not allow any object, material, or fluid into the intake or outlet of the fan, or to come into contact with the fan blade.

Pinch Hazards. The fan is made to fold in and out for storage and operation. Care must be taken when setting up the equipment for operation, and for storing the unit. Pinch points are at the hinged sections of the fan. Do not put body parts in the space between opposing parts that are coming together upon closure or opening of the fan.

Toe Hazards. This equipment may be stowed in elevated compartments and shelves. Safety handles and shoulder strap are provided for lifting and transporting the equipment. Appropriate footwear and gloves should be worn when handling equipment.

Please observe the above warnings which are symbolized and displayed on the yellow Warning Label on the fan enclosure. Practice Common Sense.

WARRANTY STATEMENT

Please fill out the enclosed Warranty Registration with your information and return to The BlowHard Company for our records. The BH-20 has a 2-year warranty covering all parts from the date of purchase under normal operating conditions.

Any intentional misuse or abuse to the unit, accidental damages and anything outside "normal wear and tear" to the unit will is not covered under this general warranty policy.

Keep your fan Blowing Hard!!

Regular battery maintenance is imperative. BlowHard recommends completely discharging the battery and recharging it every month or two, preferably during a regularly scheduled monthly maintenance process. Foregoing this maintenance could result in permanent damage to the battery, which then must be replaced.

UNPACKING PROCEDURES

Unpack and remove the fan from the cardboard boxes.

If possible, keep the box and molded package braces. If the fan needs to be returned for any reason, these items will help prevent damage during transit.

Visually check to ensure nothing is loose or broken during shipping. Lay the fan flat on the ground. Lift the shroud part of the fan upright. Once the shroud is vertical, take note of the location of the Power Knob and Battery Indicator LED on the top right of the enclosure and the AC Plug on the left side. If anything appears to be damaged, notify us immediately.

CHARGING PROCEDURES

Keep the unit plugged into the truck or wall socket when not in use. This will ensure the fan is always charged. Remember, there is no charge memory as in NiCad batteries, so simply plug it in after each use regardless of existing battery capacity.

STEP 1: Make sure the Power Knob is turned to the left and clicked OFF. NOTE: If the LED is Steady GREEN, then the Fan is in ON Position regardless of whether or not the blades are moving and must be completely switched off. It will not charge otherwise.

STEP 2: Plug in the AC Power cord to an approved 120V-AC extension cord. The LED will start Blinking Slow GREEN during pre-charge, and then switch to either RED/GREEN alternating (recovery mode), Fast GREEN during fast charge, or Slow GREEN during trickle charge and maintenance. When the battery is fully charged and maintenance complete, the LED will stop blinking and go OFF.

Charge Time: Expected charge times are 0% - 80% fast charge (fast blink) completed in 1 ½ hours. Slow charge (Slow blink) can take 1 ½ hours longer, 80% - 100%. Battery maintenance can take a long time, depending upon if cell balancing needs to occur. The fan will continue to slow blink during this process, but if it has been plugged in for 3 hours, it is fully charged. Leave the fan plugged in as often as possible to take advantage of the automated cell maintenance. Unplugging it at any point to use it will not damage the fan or battery.

BATTERY MAINTENANCE

The following are good maintenance practice:

- The battery has an integrated charging system. The integrated charging system will fully manage the battery when the fan is plugged in and the power switch is **off**.
- To charge your fan, simply plug it in and turn the power switch counterclockwise to the **off** position. The power switch must be in the **off** position for charging to take place.
- Quick Charge – A quick charge will charge your battery to about 80% of full capacity. A fully discharged battery takes approximately 90 minutes to Quick Charge.
- Trickle (Slow) Charge –Trickle charge takes place from 80% to 100% capacity, and takes approximately 90 minutes. Best practice is to complete a full charge during maintenance.
- Battery Maintenance – Once the charging process is complete, the battery management system will perform maintenance on the battery if the fan remains plugged in. This includes balancing all cells for optimized performance.
- Charge Battery after each and every use even for a short period. The early recharging and constant charging does not damage the LiFePO4 battery as they do not develop memory.
- Always keep the battery in charged condition through constant charging or regular maintenance. This will ensure the readiness operation of the fan and the full capacity of each operation. If possible, leave fan plugged into shore-lined truck.

The battery maintenance process once charging is complete may take several hours, depending on the condition and characteristic of each individual battery cell. It can also restart during extended periods of nonuse. The LED does not have to be OFF before using the fully charged battery.

Battery Life:

- If you have problems with your battery please contact BlowHard at 541-967-0063.
- The typical estimated life of the LiFePO4 battery supplied with BH-20 fans ordered with battery is up to 2,000 full discharge cycles.
- When your battery reaches its life cycle the run time of the fan will begin to decrease and the battery pack will need to be replaced.
- Periodically check your run time. After Full Charge your fan should be capable of running on battery for approximately 30 – 38 minutes under full load. As battery begins to reach the end of its life cycle, full charge runtime will drop to about 80% of the original time.
- Replace batteries with BlowHard battery pack only. Please contact factory with your fan serial number for assistance.

BlowHards want to Blow Hard!

Discharge and recharge every 1 to 2 months. Turn it on and let it blow. When it stops blowing, plug it in and let it fully charge.

A happy BlowHard Blows Hard, a dead BlowHard sucks!

OPERATING PROCEDURES

STEP 1 - BATTERY OPERATION:

The LED should be OFF and the battery CHARGED. Turn the Power Knob to the right until it clicks ON. The LED should turn to Steady GREEN.

NOTE: If the LED turns Steady RED, then the battery is BAD and must be replaced. The fan can still be used in AC Mode if no damage has been done to the BMS. If the BMS is BAD then the fan will not work at all. See TROUBLESHOOTING and call for service.

Continue to turn the Power Knob to vertical position and the fan will start when passed the dead-band. The dead-band is the position of the Power Knob designed to check the GREEN LED power status without turning on the fan; it is inherent in the variable-speed control.

The following are conditions for Variable Speed settings:

- The fan can be started at maximum speed for PPV Operation by directly turning the Power Knob fully clockwise. The Electronic Speed Controller (ESC) will ramp-up the fan to maximum speed without causing any power surge.

- To set the fan at speed other than maximum, the fan can be started at maximum speed, and then dialed down, or start at minimum speed and quickly dialed up. The ESC will control and prevent any power surge.

- The minimum speed is factory preset to provide light ventilation, is useful for rehab situations, and will significantly extend the battery usage.

STEP 2 - AC OPERATION: Plug in the AC cord. Three conditions exist:

- While the Power Knob is in OFF position: The BMS will automatically charge the battery with available power from the AC power supply. The LED will show a GREEN blink sequence.

- Turn the Power Knob to ON and start the Fan. The BMS will shut down the charging and redirect the AC power to run the fan. The LED will show Steady GREEN.

- While the fan is running in Battery Mode as in STEP 1: The BMS will automatically switch the power to AC and conserve battery power.

NOTE: If the power cord is disconnected while the fan is running on AC, the BMS will automatically switch back to Battery Power and fan continues to run until the battery is discharged and fan stops.

Operating Environment

The BH-20 has an ingress rating of IP-66 (No ingress of dust, complete protection against contact. Water projected in powerful jets against the enclosure from any direction shall have no harmful effects.) Ensure electrical extension cords are not operating in standing water.

The surface temperature will generally get 40ºF (4.5ºC) higher than the ambient temperature. The BH-20 should operate "normally" in ambient temperatures ranging from -40º F (-40º C) to 110º F (43º C). The internal temperature will operate at 150º F (65ºC).

The following is a quick reference chart of Operating Modes, LED Status, and Performance Specs

OPERATING MODES			
BATTERY	While Fan is OFF	While AC Unplugged	Power Knob ON to Variable
AC	While Fan is OFF	Plug in AC Outlet	Power Knob ON to Variable
AUTO SWITCH	While Fan is ON	Plug in or Unplug AC	Power Knob ON to Variable
CHARGING	While Fan is OFF	Plug in AC Outlet	Power Knob OFF

LED STATUS			
No LED	Battery is charged, no maintenance needed. (or Nothing Works)	Power Knob OFF	AC/BATT
Steady GREEN	AC or Battery Power is available	Power Knob ON	AC/BATT
Slow Blinking GREEN	Pre-charge, Final Charge, Battery Maintenance.	Power Knob OFF	AC
Fast Blinking GREEN	Fast Charge	Power Knob OFF	AC
Blinking RED	Battery Low, Cell Low – Needs Recharge	Power Knob ON/OFF	BATT
Steady RED	No Battery, Bad Cell, Bad BMS	Power Knob OFF	AC/BATT
Blinking GREEN/RED	BMS attempting to recover weak cells prior to Pre-charge	Power Knob OFF	AC

PERFORMANCE			
PPV MODE	4000 RPM Max Setting	11,000 CFM	30 Min. on Battery Unlimited on AC
VENTILATION MODE	2000 RPM Low Setting	6,000 CFM	180 Min. on Battery Unlimited on AC

PRODUCT SPECIFICATIONS

The BH-20 is a Portable Fully Integrated AC/DC Electric High Speed PPV/Ventilation/Industrial Fan System.

LIFEPO4 BATTERY TECHNOLOGY

38.4V 10Ah LiFePO4 Battery, up to 2000 recharge cycles. It is safe from over charging, over discharging, puncture, or high operating temperature 150° F (65° C). Iron phosphate is safer than other lithium chemistries like Cobalt oxides, Nickel/Cobalt Oxides and Manganese Oxides. No memory effect like NiCad or NiMH (metal hydride). Exceptionally low self-discharge rate.

AC POWER

The Dual-Power BH-20 also runs on standard 110 - 240VAC outlet powering the 1000W 48VDC-20A AC-DC Switching Power Supply with integrated safety features.

Turning the fan on immediately to maximum power consumes no more than 7A from 110VAC outlet. During testing, three fans were turned on maximum power while plugged into one 110VAC-15A circuit with no power surge or additional issues.

BATTERY MANAGEMENT SYSTEM (BMS)

The proprietary BMS automatically protects batteries from over charging and over discharging. Onboard the BMS is an integrated charging circuit which eliminates the need for external battery charger. This will automatically charge the battery when the fan is plugged in and in the OFF position.

Another BMS feature is the Automatic Power Switch. This switches over to AC power operation to conserve battery power when AC is available. Automatically switches over to battery operation when AC power is interrupted. The BMS also does maintenance on the battery while the fan is in the “off” position and plugged in once charging is completed.

FAST CHARGING INTEGRATED CIRCUIT

- No external charger to buy
- Recharges to 80% in just 90 Minutes
- No memory developed from early recharging
- BMS manages Trickle Charge with no negative impact

ELECTRONIC SPEED CONTROLLER (ESC)

The Integrated ESC maintains constant high speed of the Brushless DC (BLDC) motor to provide consistent air flow and pressure. The Software is programmable and upgradeable motor control and protection proprietary firmware.

NEODYMIUM MAGNET BLDC MOTOR

The fan motor is a highly compact and robust 2000W 2.7hp, as used in aerospace and unmanned reconnaissance aerial vehicles (UAV).

ADVANCED PROPELLER DESIGN

Super lightweight, 20 inch two-bladed wood propeller designed for highest efficiency. This narrow propeller is designed to match the very high rotation speed of the BLDC motor and provide an exceptionally higher pressure air flow than conventional fat and slow propellers.

HIGH CAPACITY

10,200 CFM, Tested per AMCA standards. Higher dynamic pressure outperforms 15,000 cfm rated competition fan in independent tests.

VARIABLE SPEED CONTROL

Matching propeller design to motor design allows the fan to operate at high 4,000 RPM PPV Mode and low 2000 RPM in Ventilation mode.

The variable control will allow the fan to operate at the optimum range between 2,000 rpm – 4,000 rpm.

RUN TIME PERFORMANCE

30 - 38 Minutes Battery Run Time on PPV (high) Speed.
180 Minutes Battery Run Time on Ventilation (low) Speed.

Unlimited Run time at any speed when operating on 110-240VAC-48VDC Switching Power Supply 1000W.

LIGHT WEIGHT AND COMPACT IN SIZE

Total system weight including Integrated Battery and Charging Circuit, 59lbs.

MULTI-PURPOSE FAN

- Fire and Rescue PPV Fan
- Smoke and Hazardous Chemical Ventilation
- Confined Space Air Source
- Firefighter heat stress rehabilitation
- Athletics Ventilation
- Commercial and Industrial process and product cooling
- Space Cooling and Air Circulation for Factories and Farms
- Cinematic Special Effects
- Fan Banks and Fan Matrix can be used for dust control
- Commercial Aircraft Brake Cooling

ATTACHMENTS

The center of the fan grill is a metallic hub to which attachments may be connected including the popular multipurpose Misting Ring. See your distributor for details.

SPECS

SIZE:	24” x 24” x 10”
WEIGHT:	59 lbs. (47 lbs. without Battery Pack)
RUN TIME:	30 - 180 minutes
BATTERY LIFE:	up to 2000 cycles
CHARGING TIME:	0%-80% 90 minutes; 3 hours fully charged

VALUE ADDED

Modern Design for Portable Power Equipment. Advanced Battery, Electronics, Motor, and Propeller Technologies.

Light weight, only 59 lbs for heavy-duty fan with battery.

Ergo-Fold design to reduce fatigue and injury.

Compact Collapsible design to be carried with shoulder harness. One person deployment, one hand operation.

Smart and rugged design allows two fans to occupy same space as 1 traditional fan would. Fits in small tool compartments.

IP-66 rating for ingress protection of dust and water.

Portable for easy storage and transport at running pace, up and down stairs, in narrow hall ways.

No Gasoline – Emission-free.

Brushless motor do does not produce sparks and is highly efficient at high speed. Compact and streamlined behind the propeller. The motor does not block the air intake like gas engines or AC motors.

LiFePO4 battery technology providing superb power, long life-expectancy, quick recharge rate, exceptionally low self-discharge rate.

No power surge. Works with AC outlets from buildings or generators on trucks. Unlimited AC operation hours. Common 110/240VAC outlet.

No external battery charger to buy or maintain. Power Base provides stabilizing counter weight while protecting battery, power supply, and integrated electronics.

Low Charge Time: Expected charge times are 0% - 80% capacity fast charge (fast blink) completed in 1 ½ hours. Slow charge (Slow blink) can take up to 1 ½ hours longer, 80% - 100% capacity. Total charge time 2 ½ - 3 hours.

Integrated Self-monitoring Battery: Automatically performs battery maintenance after charging is complete, if needed. Fan must be plugged in for auto-maintenance to occur.

VALUE ADDED (continued)

AC-DC POWER: Automatic Power Switching. Use common household 110-240VAC outlets.

FASTER RESPONSE TIME: Significant reduction in time taken to deploy PPV. Advantage Operational Response Factor.

TROUBLESHOOTING

Do not forcefully over-turn the POWER KNOB too far to the right or left because this will damage the potentiometer and will result in the fan not starting or stopping. The control potentiometer is a robust industrial equipment component, but it is not indestructible.

When turning ON the fan, make sure the Power Knob “clicks” ON and is turned pass the dead-band to start the fan.

When turning OFF the fan, make sure the Power Knob “clicks” OFF to the left after the fan stops and the steady GREEN LED is off.

Do not attempt to repair, replace, or modify motor, propeller, any battery components, any electrical components or any electronic circuit board. Doing so will void the warranty, and possibly result in property damage and personal injury or death.

The following is a guide chart to troubleshoot the operation of the unit only and is not intended for performing repairs to the fan:

SYMPTOM	CAUSE OF PROBLEM	ACTION
Blinking RED LED. No start	Battery is discharged and no AC	Run on AC, or recharge battery
Steady RED LED. No start	Bad battery or BMS	Send out for Service
Steady GREEN LED. No start	Knob is ON but in the dead-band	Turn clockwise slowly until it starts
No LED No start	Dead battery or bad BMS, ESC	Send out for Service
Rattling Noise	Loose fastener/nuts and bolts	Inspect fasteners and tighten
Scraping Noise	Fan Blade touching shroud	Send out for Service
Smoke or smell	Over heat, bad electronics	Send out for Service

SERVICE INFORMATION

For Technical Support, Service Arrangement and Warranty Issues, please contact the following:

Blowhard
1906 Rye Street SE
Albany, Oregon 97322-7069

541-967-0063

support@blowhardfans.com

Please prepare to provide the following information.

Your Name
Fan Serial Number
Name of Distributor/Reseller
Date of Purchase
Your contact information
Company/Department information

BlowHard Fans guarantees you the best Technical Support, Upgrades, Warranty Service, and Out-of-Warranty repair.

We want to know how your fan does. You email address will allow us to send you update information in a timely fashion.

The BH-20 is manufactured in Albany, Oregon by BlowHard Fans.

Recharging Log

Date	Time On	Time Off	Signed by
___________	___________	___________	__________________
___________	___________	___________	__________________
___________	___________	___________	__________________
___________	___________	___________	__________________
___________	___________	___________	__________________
___________	___________	___________	__________________
___________	___________	___________	__________________
___________	___________	___________	__________________
___________	___________	___________	__________________
___________	___________	___________	__________________
___________	___________	___________	__________________
___________	___________	___________	__________________
___________	___________	___________	__________________
___________	___________	___________	__________________
___________	___________	___________	__________________
___________	___________	___________	__________________
___________	___________	___________	__________________
___________	___________	___________	__________________
___________	___________	___________	__________________
___________	___________	___________	__________________
___________	___________	___________	__________________
___________	___________	___________	__________________