



OWNER'S MANUAL

POSITIVE PRESSURE VENTILATION FANS

By Ventry Solutions, Inc.

(888) 257-8967

Ventry.com



Photo courtesy: Eugenio Martinez Carrasco, C.E.I.S. Guadalajara



**FOR POSITIVE PRESSURE VENTILATION
BY**



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Thank you for purchasing a VENTRY® POSITIVE PRESSURE VENTILATION FAN made by Ventry Solutions, Inc. Our experience as volunteer fire fighters, coupled with feedback from fire fighters across the country, has helped make this fan the best on the market. If you have any comments, ideas, observations or creative uses, please contact us by phone, email, or mail, so that we may continue to improve our product.

Fan Serial Number: _____

Fan Size/Model: _____

Engine Serial Number: _____

Invoice Number: _____

Invoice Date: _____

Patent 5,503,526

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If your VENTRY® FAN is damaged in any way, *immediately* take it out of service and give us a call so we can help get it fixed and back in service quickly.

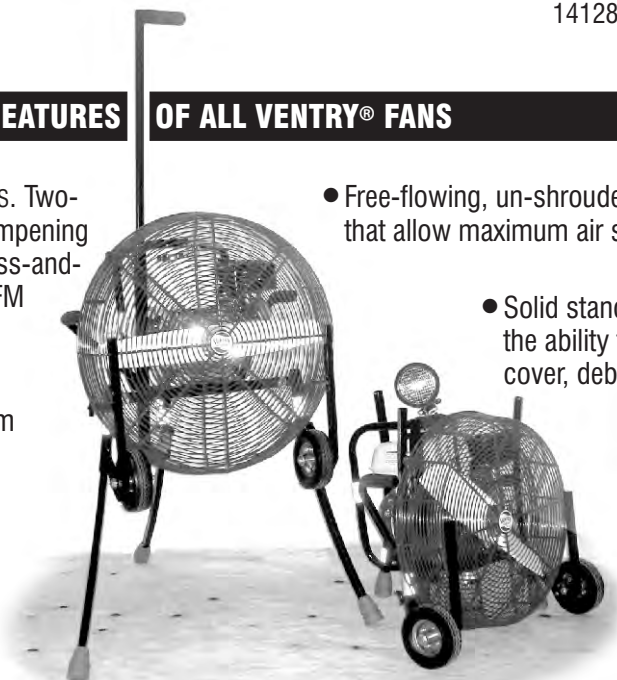
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Some of the pictures within this VENTRY FAN manual show older VENTRY FANS, before the vertical handles and Solid Rubber / Medium Flat-Free Wheels with Stair Skids.

Should you have questions or need parts for you VENTRY FAN, no matter the age, please contact us.

FEATURES OF ALL VENTRY® FANS

- Smoke-busting VENTRY® SAFETY PROPELLERS. Two-blade, aircraft propellers with vibration-dampening wood cores and pressure-bonded fiberglass-and-Kevlar® outer structures for safety, high CFM and longevity.
- Robust, powder-coated steel frames with three individually adjustable solid aluminum legs that provide three-point stability, all-terrain versatility, and unlimited tilt/aiming.
- Capable of rising at least 14 inches above the ground, allowing aiming of the air stream over obstacles such as residential entry steps.



Patent 5,503,526

- Free-flowing, un-shrouded, double reinforced wire guards that allow maximum air supply to propellers.
- Solid stance on stairs or uneven ground and the ability to straddle 12-inch high ground cover, debris and equipment.
- Dual side handles for one- or two-person transport.
- Manufactured in our Hauser, Idaho, USA facility using only grade 8 hardware.

Table 1

MODEL	TYPE	PROP	MOTOR/ENG.	HP*	VOLUME (CFM)	THRUST (LBS)	CO (PPM)	FUEL CAPACITY	RUN TIME /TANK	ENGINE/MOTOR WARRANTY Commercial/Institutional Use
20EM3550	Electric	20	Baldor® EM3550	1.5	10,500	8.1	0	N/A	N/A	Motor 18 mos; Drive 18 mos
20GX120	Gas	20	Honda® GX120	3.5	16,500	12.7	17	2.1 qts	1.8 hrs	Engine: 3 years
20GX160	Gas	20	Honda GX160	4.8	17,300	14.4	⌚	3.3 qts	2.0 hrs	Engine: 3 years
24GX120	Gas	24	Honda GX120	3.5	20,000	17.6	16	2.1 qts	1.8 hrs	Engine: 3 years
24GX160	Gas	24	Honda GX160	4.8	24,000	19.8	32	3.3 qts	2.0 hrs	Engine: 3 years
24GX200	Gas	24	Honda GX200	5.5	29,500	24.4	19	3.3 qts	1.7 hrs	Engine: 3 years

⌚ Measurement not yet available

***HP (HORSEPOWER).** VENTRY FAN specs show correct HP ratings, but many other PPV fan manufacturers continue to publish pre-2007 values. Long ago, litigation changed the way Honda and other small engine manufacturers rated HP (*Table 2*). When comparing fans, if the fans' engines are equal in make and model, then the engines are equal in power, even if the HP ratings shown do not match.

VOLUME. Air volume, in cubic feet per minute (CFM), is measured on VENTRY FANS with the legs extended. Multiply by 1.69875 to convert this to meters cubed per hour (m³/h).

Air volume (**output**) is a much better indicator of fan performance than engine horsepower (**input**). However, because air volume is measured inconsistently in the industry, comparing published CFM values is largely meaningless and in many cases misleading. We encourage hands-on and side-by-side testing in order to truly compare CFM ratings.

Table 2

MOTOR MAKE & MODEL	HP RATINGS	
	Pre-2007	Now
Honda GX120	4 hp	→ 3.5 hp
Honda GX160	5.5 hp	→ 4.8 hp
Honda GX200	6.5 hp	→ 5.5 hp

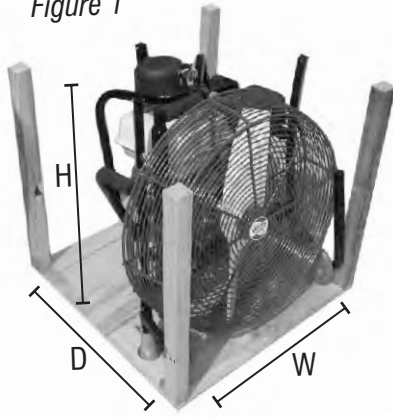
THRUST. Based on Newton's third law of motion, thrust is a measure of fan performance that allows easy comparison of fans, with far fewer variables than direct measure of CFM. Simple instructions available upon request.

CARBON MONOXIDE. All VENTRY FAN models' CO output at equilibrium are well below OSHA standards of 50 PPM.



VENTRY FAN Specifications, Continued

Figure 1



DIMENSIONS (W x D x H, Inches)			
MODEL	Fan with no wheels	Fan with wheels, Small Solid Rubber	Fan with wheels, Medium Flat-Free
20EM3550	23.5 x 20.5 x 23.5	23.5 x 21 x 23.5	27.5 x 22.5 x 23.5
20GX120	23.5 x 20.5 x 23.5	23.5 x 21 x 23.5	27.5 x 22.5 x 23.5
20GX160	23.5 x 20.5 x 23.5	23.5 x 21 x 23.5	27.5 x 22.5 x 23.5
24GX120	27 x 22 x 28	27 x 23 x 28	27 x 24 x 28
24GX160	27 x 22 x 28	27 x 23 x 28	27 x 24 x 28
24GX200	~	27 x 23 x 28	27 x 24 x 28

WEIGHT (Lbs)			
MODEL	Fan with No Wheels	Fan with Solid Rubber Wheels	Fan with Medium Flat Free Wheels
20EM3550	78	84	87.5
20GX120	60 - 64	66 - 70	69.5 - 73.5
20GX160	66 - 72	72 - 78	75.5 - 81.5
24GX120	78 - 82	84 - 88	87.5 - 91.5
24GX160	73 - 79	79 - 85	82.5 - 88.5
24GX200	~	88 - 94	90.5 - 96.5

DIMENSIONS. Listed measurements were taken with the fans' legs retracted for storage, as shown in Figure 1. Actual measurements may vary $\pm 1/2$ inch in manufacturing.

WEIGHT. The weight of each fan can vary, depending if it is "dry" (without fuel or oil) or "wet" (with fuel and oil). Accessories (other than wheels) do not add any measurable weight.

ACCESSORIES BY MODEL							
MODEL	Small Solid Rubber	Medium Flat-Free	Entry Point Halogen	Spark Point LED	Tachometer	Misting Ring	Ultimate Door Stop
20EM3550	●	●	~	~	~	●	☑
20GX120	●	●	~	~	●	●	☑
20GX160	●	●	●	●	●	●	☑
24GX120	●	●	~	~	●	●	☑
24GX160	●	●	●	●	●	●	☑
24GX200	☑	●	~	~	●	●	☑

ELECTRIC FAN MODEL 20EM3550
Motor: 1.5 hp / 1.1 kW
Wattage: 1800 watts
Input: Single phase, 100-115V, 50-60 Hz
Output to Motor: Three phase (lowers weight)
Amps: 15 Amp or less, even at start-up (no initial spike)
Controller: Variable speed from 0 to 3000 RPM
Listed: All electrical components are UL and CSA listed
NEMA 15A Plugs: Locking plug L5-15 (recommended) or straight/non-locking 5-15 (by request). Advise upon order.
GFCI-compatible. Please note that older GFCI breakers may have sensitivity conflicts with modern GFCI-compatible equipment.

ELECTRIC VENTRY FANS, model 20EM3550, shown with legs retracted, legs partially extended, and legs fully extended. All three fans shown have optional Small Solid Rubber Wheels and Skids.

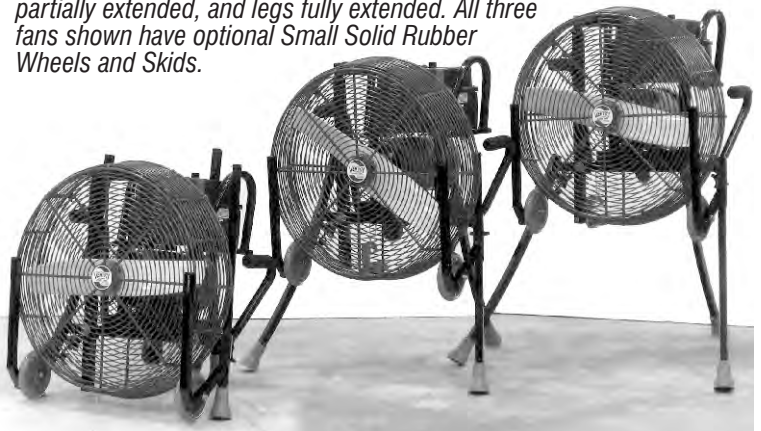


Figure 2. Two Wheel Choices

Medium Flat-Free Wheels

Small Solid Rubber Wheels



WARRANTY. VENTRY FANS come with lifetime factory support. Also, workmanship and materials are covered on all VENTRY FANS for five years. Our customers have deemed this our "No BS" warranty. No matter your fan's age or origin, if you ever have questions, please contact us and we will help!

OUT OF THE BOX

After unpacking your fan, there are a couple of things you will need to do.

1. Attach wheel option (if added) per included instructions.
2. Add fuel and oil. Oil amounts and specifications are listed in the engine manual under servicing. All models use 0.63 quart of 10W-30 oil.

FAN TRANSPORT

One Person Carry

Face the propeller, grip side handles with both hands and lift, pressing guard against body. (Figure 1)



Figure 1. One Person Carry

Two Person Carry

Left and right persons grasp corresponding side handles. (Figure 2)



Figure 2. Two Person Carry

LEG ADJUSTMENT

Please note that these are suggested ways of raising and lowering the fan. Each person finds a way to set the fan up that works best for them.

How to raise the fan with one person

Step 1: Loosen all three leg adjustment knobs.

Step 2: Rock the fan on two legs (one front and one rear), allowing the other front leg to extend, then tighten the leg lock handle on the extended leg.

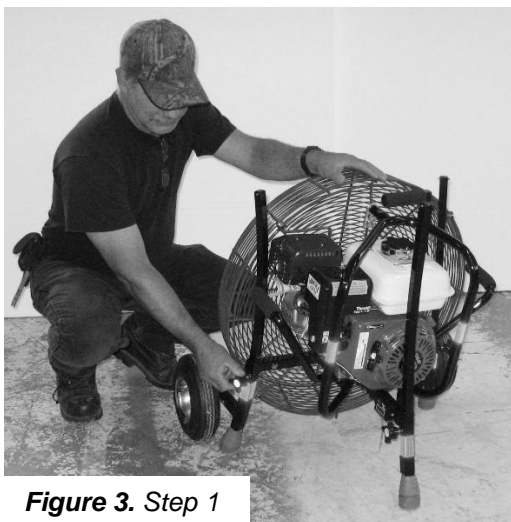


Figure 3. Step 1



Figure 4. Step 2

Step 3: Rock fan onto rear and extended front legs, allowing the other front leg to extend, then tighten the leg lock handle on the second extended leg.

Step 4: Rock the fan on the two extended front legs, allowing the rear leg to extended, then tighten the leg lock handle on the rear extended leg.



Figure 5. Step 3



Figure 6. Step 4

Step 5. Start fan and check stability. Adjust legs as needed.



Figure 7. Step

How to lower the fan with one person

- Step 1. Rock the fan onto the front two legs & loosen the leg lock handle of the rear leg.
- Step 2. Retract the rear leg and tighten the leg lock handle. To assist with tightening the leg lock handle, it may help to lower the fan onto the retracted rear leg.
- Step 3: Rock the fan onto the retracted rear leg and one extended front leg.
- Step 4: Loosen the leg lock handle of the leg not touching the ground, retract the leg, and then retighten the leg lock handle.



- Step 5: Rock the fan onto the two retracted legs.
- Step 6: Loosen the leg lock handle on the extended leg, retract the leg, and the retighten the leg lock handle.



Videos showing how to extend and retract the legs on a VENTRY FAN can be seen on ventry.com.

HOW TO USE POSITIVE PRESSURE VENTILATION

PPV The Basics

Positive pressure ventilation (PPV) is a powerful tool for firefighting but, like a double-edged sword, it can cut both ways. Training and careful planning are essential if PPV is going to work to its full potential. Remember the basic fire triangle (heat, air, fuel). PPV reduces the temperature by displacing the hot flammable gasses, but it also provides the fire with an abundant source of oxygen. Timing is the key: have everything ready for the initial attack before positive pressure is used. The size-up needs to be done, incident command needs to develop a plan which uses an aggressive initial attack, lines need to be setup and charged, and firefighters in SBA's need to be ready to attack the fire seat.

Use PPV to blow the heat and smoke out of the structure, then get in and put the fire out before the increase in oxygen has a chance to let the fire flair up. Figure 16 is a simple example of the fan's proper use.

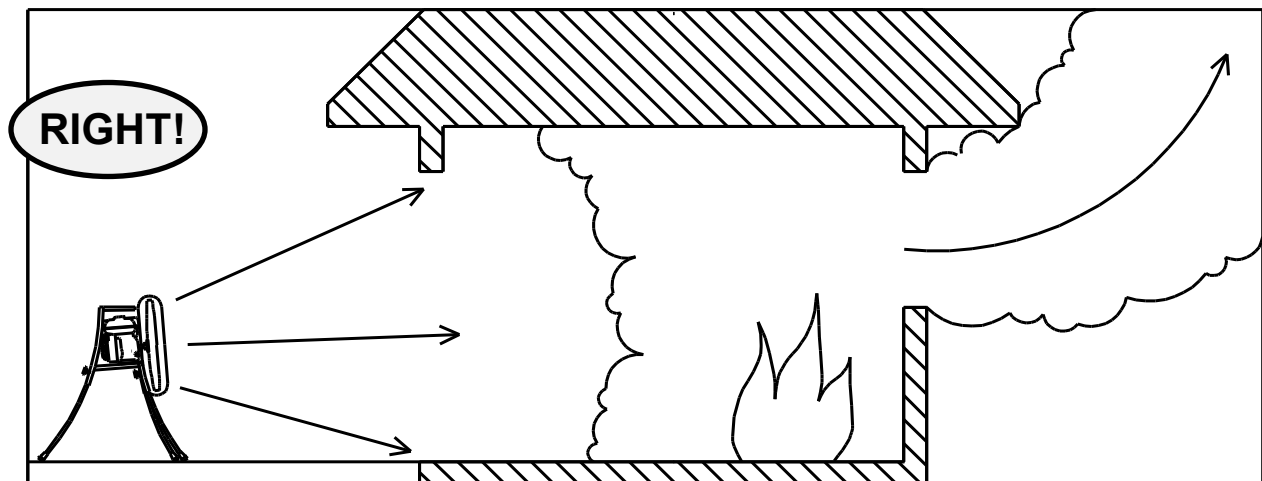


Figure 12. Proper Fan Operation

The size-up should look for exterior signs that indicate the fire seat's probable location. Use that information to develop an initial attack plan that ventilates by pushing the heat and combustible gases out of the structure near the seat of the fire.

In actual practice, it is not always possible to locate the seat of the fire during the initial size-up. In such cases, we've found that using positive pressure at the most convenient point of entry and venting on the opposite end of the structure works well. If possible, take into consideration which way the atmospheric wind is blowing, especially a strong wind, because working with the wind is more effective than trying to overpower it.

After the initial attack, positive pressure can be used to minimize smoke damage. Pressurize the structure starting at an upwind room. Open a window and let the room completely clear of smoke. Then close the window and entrance to that room. Proceed in a downwind direction to clear the rest of the rooms in the structure. The downwind technique prevents smoke from leaking back into rooms that have already been cleared and allows you to check for other fire seats; if an upwind room refills with smoke, you've got another fire seat to deal with.

Placement

Avoid operating the fan too close to a structure's opening. Position the fan 8 to 15 feet from an average 3' x 7' door. It is best to err on the side of placing the fan too far from the door to prevent the situation shown in Figure 13. Sufficient air volume is needed to achieve positive pressure ventilation even without a perfect door seal.

If the fan is properly positioned to optimize positive pressure ventilation, access to the structure will not be restricted.

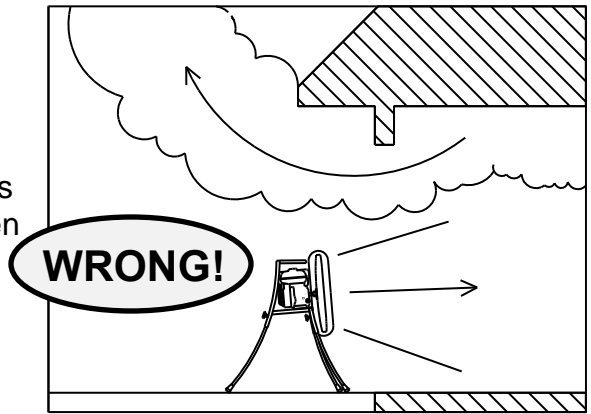


Figure 13. Fan too close to the door.

Smoke Ejection

VENTRY FANS are designed to push air, as used for positive pressure ventilation techniques. It is not designed to handle the environment in which a smoke ejection fan operates, where air is pulled out of the structure (Figure 14). The propeller, gas tank, and many components of the engine are made out of materials that will not withstand high temperatures. If the fan is used as a smoke ejector, damage will not be covered by the manufacturer's warranty.

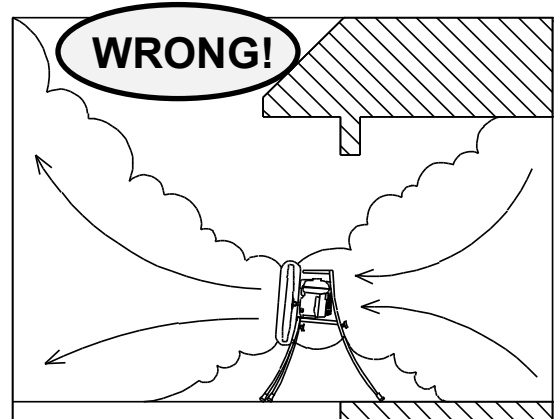


Figure 14. Never Use as a Smoke Ejector

FAN SAFETY

Many years of research and development have gone into creating VENTRY FANS. Still, if used incorrectly, the fan can be detrimental to the operation of a fire scene. Our experience shows the following techniques to be helpful in preventing unnecessary damage to the structure or injury to fire fighters. Always remember that **ACTUAL FIRE SCENES VARY DRASTICALLY WITH EACH SITUATION**, so the ideas and techniques presented here are not always practical and may need to be modified to fit a specific situation.

Safety Guidelines

1. Stop and think! What is going on here? What effect will this have? Each individual fire scene presents special problems that can't be anticipated in advance.
2. Fire fighters should enter the structure from where the fan is set up so they follow the fresh air into the structure. This procedure allows the initial attack team to find victims or start extinguishing the fire. Do not set up the fan in a manner that will blow fire onto the fire fighters. Remember, have the wind at your back.
3. Position the fan so that it blows the fire back on itself and out of the structure rather than into unaffected areas of the structure. For example, if the fire started burning near the front door, set the fan up at a back door to blow the fire out the front door rather than all the way through the structure.

4. Open a minimum of windows and doors for ventilation. Having too many vents open will reduce the pressure inside the house and make positive pressure ventilation less effective. The air will take the path of least resistance. If you have a lot of windows and doors open, the air will most likely take a path that isn't the one you want to remove the smoke.

Ground Debris Pickup / Maximum Air Volume

VENTRY FANS are designed to run with the legs extended. By extending the legs a minimum of six (6) inches, two important things are accomplished.

1. Ground debris pickup and ejection, which causes propeller damage, is eliminated.
2. Efficiency (air volume) is increased.

Operating the fan close to the ground can reduce the air volume significantly. Raising the fan allows it to draw air from completely around the guard, rather than trying to "suck air out of the ground".

Ideally, the legs should be fully extended. This maximizes the fan performance and makes it easier to start. With the controls up where they are easy to reach, the firefighter doesn't have to bend way over or kneel to start the fan, minimizing firefighter fatigue.

Stability

After placing the fan in the desired position, check the fan's stability. Start the fan while stabilizing it with one hand. Open the throttle all the way and rock the fan from side to side. This will let you determine how stable the fan is. If necessary, adjust leg lengths to achieve a stable position.

At this time, inspect the placement of the VENTRY FAN and confirm that it is not walking. Some wooden decks and stairways will vibrate and cause the fan to walk. A simple change of the throttle setting can eliminate this problem. Decreasing the throttle also works on slick surfaces.

Filling the Gas Tank

Never fill the gas tank with the fan in operation. Turn off the engine and allow it to cool before refueling. A small spill or miscalculation while filling a running fan can introduce gas into the air stream, causing a cloud of vaporized fuel to enter a burning structure. Your imagination can picture the result.

Backdraft Situations

Alternate ventilation techniques are necessary in the case of a backdraft situation, in which the use of a VENTRY FAN is not recommended. After the backdraft situation has been rectified, the VENTRY FAN can be used.

COMMON QUESTIONS ABOUT POSITIVE PRESSURE

Why positive instead of negative pressure ventilation?

Stand on the suction side of a fan -- there's not much happening. Now stand downwind and note the difference. The same thing happens in a structure just as dramatically: with positive pressure, smoke and heat come blasting out of the structure and visibility improves in a matter of seconds. Additionally, positive pressure is much faster to set up. Since a VENTRY FAN sits 8 to 15 feet from the entrance point, unlike a negative pressure set-up, it doesn't block access points.

When should positive pressure not be used?

Never use positive pressure ventilation when a victim is hanging out of a window. The use of positive pressure ventilation could push hot gases out of that window, placing the person in an environment that could do great harm.

Never use positive pressure ventilation in a back draft situation, since that condition involves super-heated gases that will ignite explosively when oxygen is introduced. Some of the warning signs are dark puffing smoke, heavy soot on windows, and rapid air intake when an opening is made. Beware of tight structures for possible back draft!

What is the door seal and how important is it?

Proper fan placement lets the VENTRY FAN'S cone of air cover the entry opening so that air doesn't leak out of the opening. This provides a seal and delivers the most pressure and air volume to the structure. Experience has taught us that a high output fan, such as a VENTRY FAN, puts out enough air that a perfect seal is not very important. On an air-tight structure, a tight seal is actually impossible to establish since the air forced into the structure has to come out somewhere. An effective technique on large structures, where a lot of air is needed, involves using at least two fans set up side-by-side.

A useful training exercise involves taping toilet paper around a door opening and then locating the fan in such a fashion that all the toilet paper blows into the structure. Note: don't overemphasize the importance of creating a perfect air seal on every fire scene; there are a lot more important things to worry about in real situations.

What are some examples of positive pressure ventilation?

Occasionally, our fire department will respond to a call where an innocent homeowner has just emptied their stove's ashes into a plastic bucket without realizing they were still hot. In a situation like this, the fan gets rid of the accumulated smoke fast so we can determine its source. The fan becomes a good public relations tool because we've cleared the smoke and located the problem quickly. Since these fires usually occur late in the evening, we're happy to get back to bed promptly with a minimum of excitement.

Another favorite of ours is a smoldering attic fire caused by a faulty chimney or the old dime-behind-a-fuse trick. Without creating a vent opening, we use the fan to pressurize the house. Enough air will leak into the attic to clear the smoke so that we can locate the individual curls of smoke that mark the hot spots. We then use a bucket to scoop up the smoldering insulation thereby avoiding any water damage.

Positive pressure is also very useful to pressurize areas of a structure to prevent or slow down fire spread into uninvolved areas. We stopped a fire in a 6 unit apartment building using this technique with three fans pressurizing the central foyer. We just opened the door to the apartments that we wanted pressurized.

The heavy, smoldering smoke that usually accompanies pack rat conditions just begs for positive pressure; the smoke must be cleared or it will take forever to find the fire seat.

Recently we ran mutual aid to a cabin roof fire. The roof was constructed using plank and beam techniques. Fire had followed the cracks between the planks and could be seen from inside the cabin. We pressurized the cabin enough that the water we sprayed on the roof didn't come through the seams in the ceiling; we watched the water pour into the burning seams and get blown right back out by the escaping pressurized air. The house incurred no water damage even though the roof had started to burn through!

These stories illustrate situations in which positive pressure ventilation has been used successfully. With a little imagination and training, your department is sure to discover many more creative uses. Good luck, and remember, luck favors a prepared mind!

FAN COMPARISON METHODS

Ribbon Test

Several departments have described a simple test that you can use to compare the output of two fans. These departments took two blowing fans and aimed them at each other, approximately 12 feet apart. A ribbon was held half-way between to determine which way the air was blowing.

Volume Test

We found a culvert 4 feet in diameter. A fan was placed far enough away from the opening of the culvert to obtain a complete air seal. Soap bubbles were released into the air stream and moved through the culvert. By timing how long the bubbles (air) took to pass completely through the culvert, we were able to calculate the volume of air flow the fan produced. This analytical technique has allowed us to optimize the propeller design so that the maximum amount of air is moved.

Thrust Test

Basic physics states "For every action there is an equal but opposite reaction". It follows that measuring thrust is an easy way to compare fan performance.

You will need the following to perform a thrust test.

- A flat board strong enough to hold the fan (plywood works great).
- Two dowels (any long rounded pole--even broomsticks will do).
- A fish scale, preferably digital, with which to measure thrust.

Find a smooth, flat surface (like a shop floor) with lots of room around it. Place the two dowels on the surface parallel to each other. Upon these, place the flat board. Check to make sure that the board rolls freely. Place the fan on the board. Attach one end of the fish scale to the front of the fan (or the board near the front of the fan) and the other end attach to a stationary object on the ground. What this accomplishes is that when the fan is started up, the fan and the board will try to roll backwards, pulling on the fish scale. The thrust of the fan will be what the fish scale is measuring.

WARRANTY

Propeller / Frame / Guard

Ventry Solution's Inc. offers a five year warranty on workmanship and materials, plus Lifetime Factory Support. Prop erosion caused by operating a fan over loose materials without elevating the fan high enough to avoid picking up loose materials is not covered under warranty.

Engine

For the engine manufacturer's warranty, see engine manual. Contact your local Honda or Baldor dealer for further details.

MAINTENANCE

Engine Maintenance

Refer to the engine manufacturer's manual.

Kevlar & Fiberglass-Coated Propeller

Propellers coated with Kevlar and Fiberglass are extremely resistant to wear and tear, and require little to no maintenance other than occasional cleaning to maintain balance. Some wear of the paint on the leading edge should be expected. If touch-up painting is required, use a white polyurethane enamel. Be sure to balance the propeller before placing it back on the fan to ensure that the fan does not walk (see "Out-of-Balance Propeller" in the Trouble Shooting section for more details). Significant damage, which penetrates the fiberglass/Kevlar coating, may require evaluation by Ventry Solutions.

Frame Maintenance

Wipe down the frame to remove dirt and grease buildup

The rubber leg ends (feet) will need to be inspected for wear. Damage, such as missing pieces, may allow the fan to walk. Replacements may be obtained through Ventry Solutions or at a local medical supply outlet.

Tachometer

Refer to the Tiny-Tach literature that came with the fan for general information. For installation, refer to the diagram on page 20.

TROUBLE SHOOTING

Fan walks during operation

- **Worn out Rubber Leg Ends:** Look to see if the leg ends (feet) are worn out. If they have a lot of wear, you may be able to rotate them on the end of the legs. This will place a new section of rubber into service. Otherwise contact Ventry Solutions for a new pair or you can pick up a new set at your local medical supply outlet.
- **Out-of-Balance Propeller:** An imbalance in the propeller can be caused by impact or by abrasion. Light abrasion is considered normal wear and can be repaired by light sanding and re-painting.

Propeller balance can be checked by inserting a 5/16 inch steel rod through the propeller center hole. Roll the rod across two level parallel edges, making sure that there is no breeze present while doing this procedure. The light portion of the propeller will rotate to the top, which can be a tip, side, or anywhere in-between. Add paint to the light portion or sand the heavy portion to balance the propeller. If you have problems, contract Ventry Solutions.

- **Bent Frame:** VENTRY FANS are by no means symmetrical. If you position yourself facing the front of the fan, the front leg on the left should be angled several degrees ahead of the front leg on the right. The front left leg also leans out more than the front right leg does. These are design aspects engineered into the fan to increase the stability and to prevent walking. Figure 19 gives you an idea of how it should look. If the legs do not resemble the picture, the frame or legs may be bent and will need to be straightened or replaced.



Figure 15. Ventry Fan legs are not symmetrical.

- **Operating Surface:** Some surfaces such as wooden decks or stairways vibrate causing the fan to walk. Adjusting the throttle will sometimes eliminate this problem. Some fans will move backwards if placed on extremely smooth surfaces. Because the fan produces up to 17 pounds of thrust, surface friction may not be great enough to keep the fan stationary. In this case, reduce the throttle until the fan quits moving.

Leg movement obstructed

Several things may occur that will impede the adjustable legs from sliding freely. The following are steps to take if any of the legs stick when trying to extend or retract.

1. Verify the leg adjustment handles are completely loosened.
2. Check along the legs path to see if obstructions are present.
3. Clean and file the leg/frame.
 - a. Remove the roll pin from the top of the leg, then slide the leg out of the frame.
 - b. Remove any dirt and grease that might be clogging the openings in the frame where the leg slides through. If needed, lightly file this area to remove any roughness.
 - c. File the inside of the frame where the leg adjustment handle is inserted.
 - d. Reinsert the leg into the frame, followed by the roll pin into the top of the leg.
4. Check the frame and leg for any abnormal bends.

If the adjustable leg still does not slide freely, replacement may be necessary.

Fan too large to fit compartment

Contact Ventry Solutions, Inc. for possible solutions.

PARTS ORDERS

This is the information we need to make sure that we send correct parts for your fan.

Fan # (3- or 4-digit number stamped into the engine block, next to the oil drain plug):

Engine Serial #: _____

Options: _____

We keep a record of every fan we sell. To help us give you the best service and send the correct parts, should they be needed, please register your VENTRY FAN. A registration form was included in the packet with your new VENTRY FAN or you can simply call us and we will enter the information into our system. There are many good reasons to register your products, including that it helps ensure you receive all applicable free upgrades and that you can be reached in case of a recall or other safety concern.

All nuts, bolts and washers are grade 5 or 8, national fine, zinc coated or better.

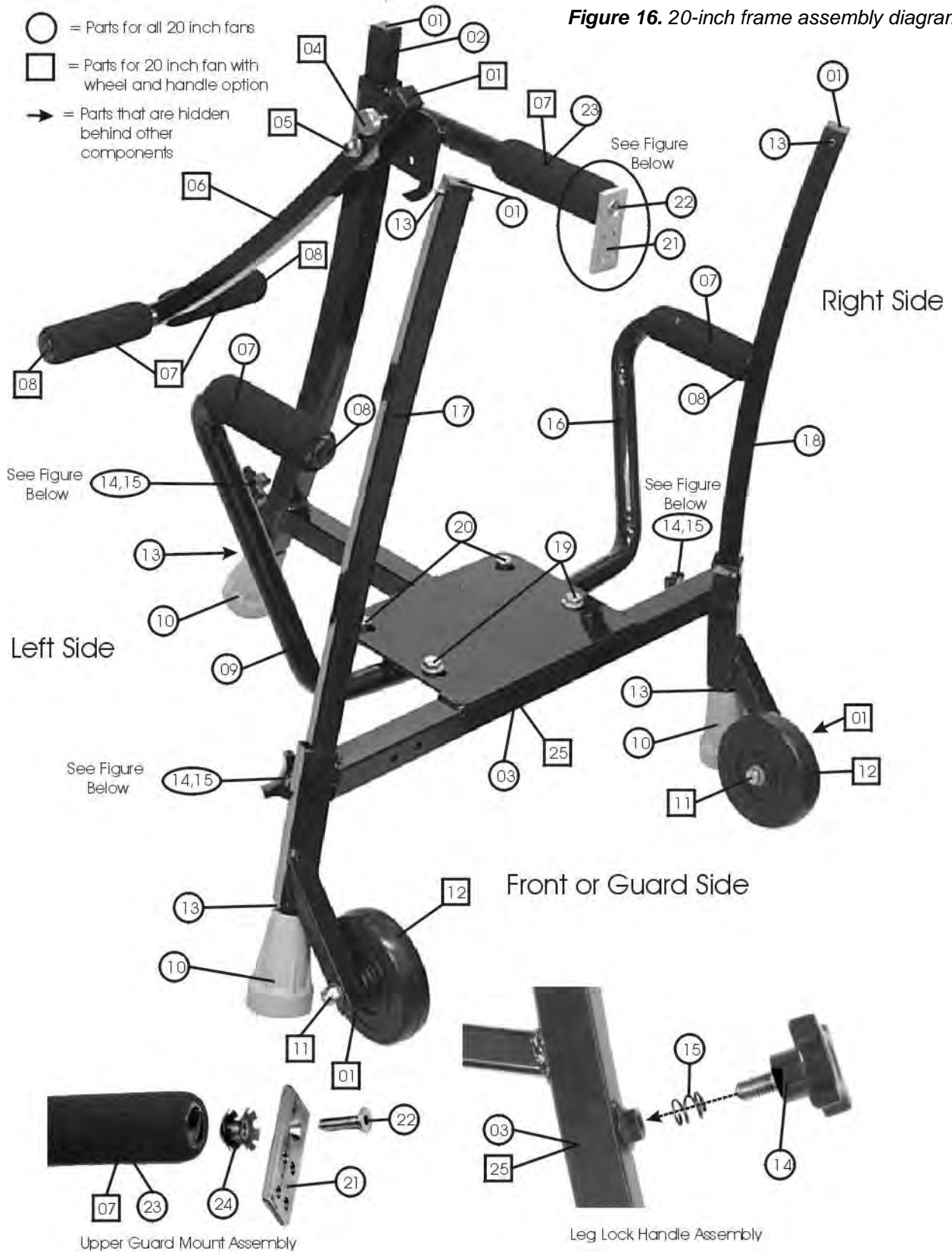
PARTS LIST FOR 20-INCH FRAME

Reference Number	Part Number		Quantity
01	F-1009	Leg cap, 3/4-inch	3
02	F-1004S	20-inch Leg, rear.....	1
03	F-1001A	20-inch Frame without wheel option.....	1
07	F-1010	Short foam handle	2
08	F-1018	7/8 Round cap	2
09	F-1012	20-inch "seven" handle, left	1
10	942SB	Rubber leg ends (feet)	3
13	F-1008	Roll pins, 1 1/4-inch x 3/16-inch	6
14	F-1007	Leg adjustment handles.....	3
15	F-1006	Leg adjustment springs.....	3
16	F-1013	20-inch "seven" handle, right	1
17	F-1002S	20-inch Leg, left (when looking at front of the fan)	1
18	F-1003S	20-inch Leg, right (when looking at front of the fan)	1
19	F-1019	Motor mount bolts front with washers and nuts	2
20	F-1020	Motor mount bolts rear with washers and nuts.....	2
21	G-1024	Guard mount bracket aluminum	1
22	F-94225	Flat socket cap screw	1
23	F-1005	Long foam handle	1
24	F-7N04C	Tubing nut.....	1

PARTS LIST, 20 INCH-FRAME WITH WHEEL AND HANDLE OPTION

Reference Number	Part Number		Quantity
01	F-1009	Leg cap, 3/4-inch	6
02	F-1004S	20-inch Leg, rear.....	1
04	F-33827	Hand activated plunger.....	1
05	F-1021	Towing handle lock nut, washer & spring.....	1
06	F-1022	Towing handle	1
07	F-1010	Short foam handle	5
08	F-1018	7/8 Round cap	4
09	F-1012	20-inch "seven" handle, left	1
10	942SB	Rubber leg ends (feet)	3
11	F-1023	5/16 Wheel mounting hardware (bolts, washers, nuts)	2
12	W-2001	Solid Rubber Wheels & Skids.....	2
12	MFF	Medium Flat-Free Wheels & Skids.....	2
13	F-1008	Roll pins, 1 1/4-inch x 3/16-inch	6
14	F-1007	Leg adjustment handles.....	3
15	F-1006	Leg adjustment springs.....	3
16	F-1013	20-inch "seven" handle, right	1
17	F-1002S	20-inch Leg, left (when looking at front of the fan)	1
18	F-1003S	20-inch Leg, right (when looking at front of the fan)	1
19	F-1019	Motor mount bolts front with washers and nuts	2
20	F-1020	Motor mount bolts rear with washers and nuts.....	2
21	G-1024	Guard mount bracket aluminum	1
22	F-94225	Flat socket cap screw	1
24	F-7N04C	Tubing nut.....	1
25	F-1001W	20-inch frame with wheel option	1

20 Inch Frame Assembly Diagram (this is for the original wheel & handle option design on VENTRY FANS. Please contact Ventry Solutions, Inc. if your fan as the vertical handle and stair skids).



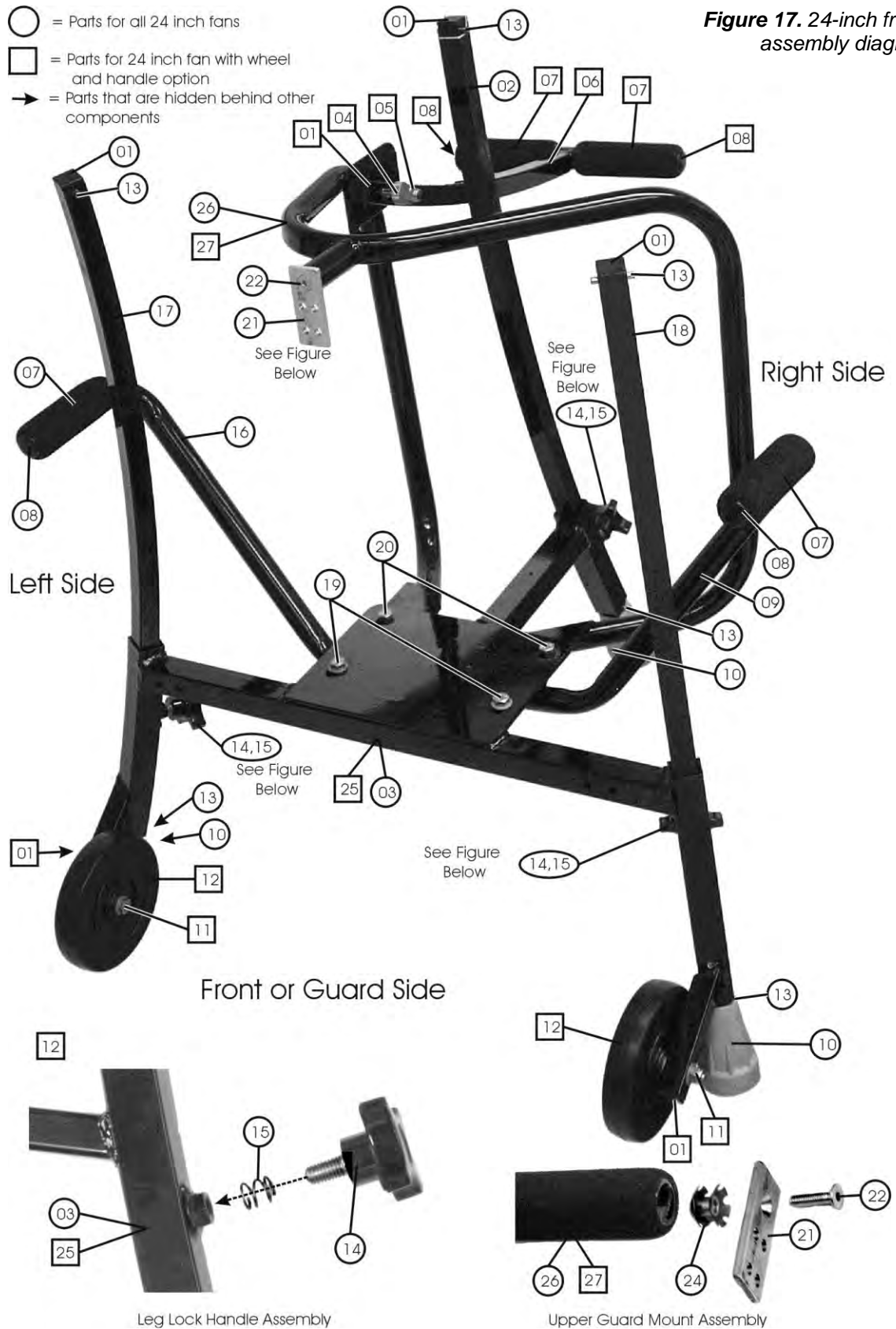
PARTS LIST 24-INCH FRAME

Reference Number	Part Number		Quantity
01	F-1009	Leg cap, 3/4-inch	3
02	F-1004L	24-inch Leg, rear.....	1
03	F-1001B	24-inch Frame without wheel option.....	1
07	F-1010	Short foam handle	2
08	F-1018	7/8 Round cap	2
09	F-1015	24-inch "seven" handle, right.....	1
10	942SB	Rubber leg ends (feet).....	3
13	F-1008	Roll pins, 1 1/4-inch x 3/16-inch	6
14	F-1007	Leg adjustment handles.....	3
15	F-1006	Leg adjustment springs.....	3
16	F-1014	24-inch "seven" handle, left	1
17	F-1002L	24-inch Leg, left (when looking at front of the fan)	1
18	F-1003L	24-inch Leg, right (when looking at front of the fan)	1
19	F-1019	Motor mount bolts front with washers and nuts	2
20	F-1022	Motor mount bolts rear with washers and nuts.....	2
21	G-1024	Aluminum guard mount.....	1
22	F-94225	Flat socket cap screw	1
24	F-7N04C	Tubing nut.....	1
26	F-1024	Role bar	1

PARTS LIST, 24-INCH FRAME WITH WHEEL AND HANDLE OPTION

Reference Number	Part Number		Quantity
01	F-1009	Leg cap, 3/4-inch	6
02	F-1004L	24-inch Leg, rear.....	1
04	F-33827	Hand activated plunger.....	1
05	F-1021	Lock nut washer & spring for towing handle.....	1
06	F-1022	Towing handle	1
07	F-1010	Short foam handle	4
08	F-1018	7/8 Round cap	4
09	F-1015	24-inch "seven" handle, right.....	1
10	942SB	Rubber leg ends (feet).....	3
11	F-1023	5/16 Wheel mounting hardware (bolts, washers, nuts)	2
12	W-2001	Solid Rubber Wheels & Skids.....	2
12	MFF	Medium Flat-Free Wheels & Skids	2
12	10-029-12BB	Large Pneumatic Wheels.....	2
13	F-1008	Roll pins, 1 1/4-inch x 3/16-inch	6
14	F-1007	Leg adjustment handles.....	3
15	F-1006	Leg adjustment springs.....	3
16	F-1014	24-inch "seven" handle, left	1
17	F-1002L	24-inch Leg, left (when looking at front of the fan)	1
18	F-1003L	24-inch Leg, right (when looking at front of the fan)	1
19	F-1019	Motor mount bolts front with washers and nuts	2
20	F-1020	Motor mount bolts rear with washers and nuts.....	2
21	G-1024	Aluminum guard mount.....	1
22	F-94225	Flat socket cap screw	1
24	F-7N04C	Tubing nut.....	1
25	F-1004W	24-inch frame with wheel option	1
27	F-1025	Roll bar.....	1

24 Inch Frame Assembly Diagram (this is for the original wheel & handle option design on VENTRY FANS. Please contact Ventry Solutions, Inc. if your fan as the vertical handle and stair skids).



PARTS LIST FOR ENGINE, TACH, AND SPARK

Spark Arrester, Stickers, and, Honda GX Series Engines

Reference Number	Part Number		Quantity
01	S-1034	Spark arrester (Honda GX series engines) w/screw	1
02	E-DA14	Address decal	1
03	E-DC13	Caution decal.....	1
04	E-DC13	Throttle decal.....	1
05		Engine (one of the following):	
	E-GX120	Honda, 3.5 HP	1
	E-GX160QX2	Honda, 4.8 HP	1
	E-GX160QXS2	Honda, 4.8 HP with alternator.....	1
	E-GX200QX2	Honda, 5.5 HP	1
	E-GX200QG2	Honda, 5.5 HP with alternator.....	1

Figure 18.
Honda GX Series
Engine, Spark
Arrester & stickers.



Spark Arrester, Stickers, and, Honda GC160 Engine

Reference Number	Part Number		Quantity
02	E-DA14	Address decal	1
03	E-DC13	Caution decal.....	1
06	E-GC160	Honda, 4.6 HP	1
07	S-1036	Spark arrester (Honda GC160 engines) w/screw.....	1

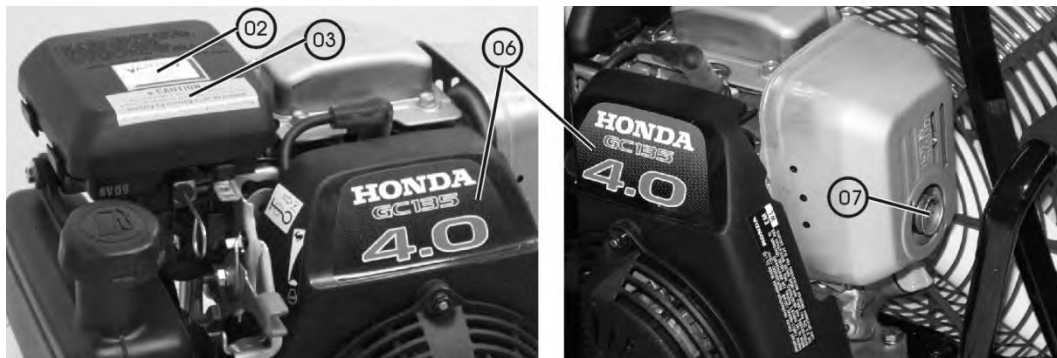


Figure 19. Honda GC160 Engine, Spark Arrester, and stickers.

Tachometer/Hour Meter

Reference Number	Part Number		Quantity
01	T-1031	Tiny-Tach.....	1
02	T-1032	Self-tapping screws, 8 x 3/8"	2
03	T-W075	Wire ties, 50# test	2
04		Motor Mount Bolt holding Grounding Clip.....	1

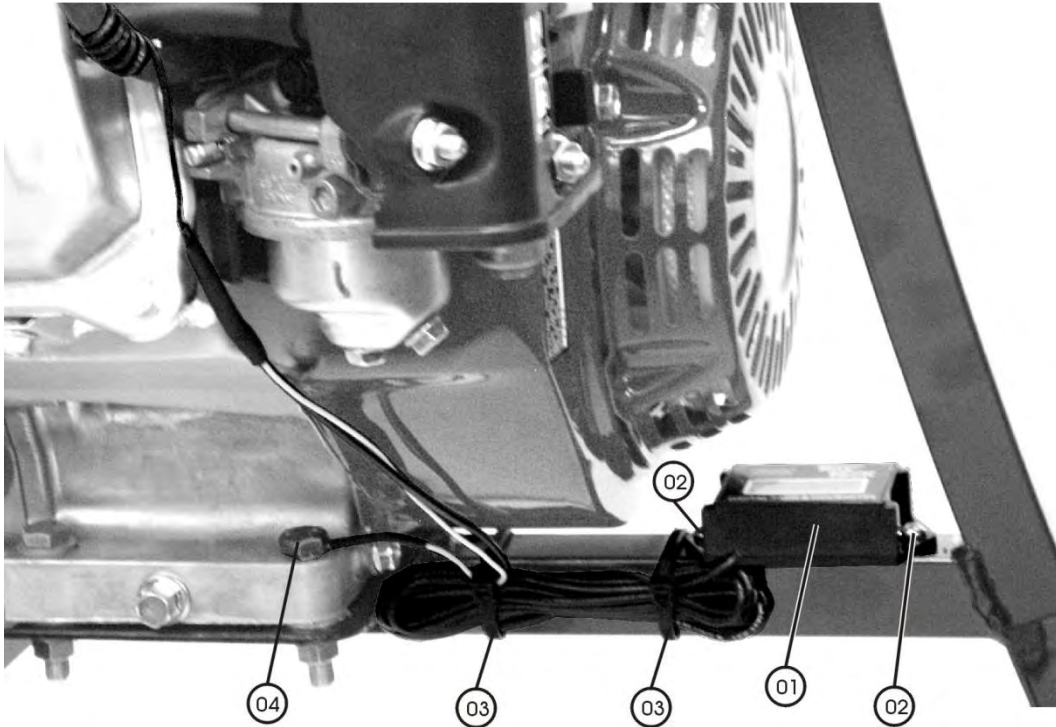


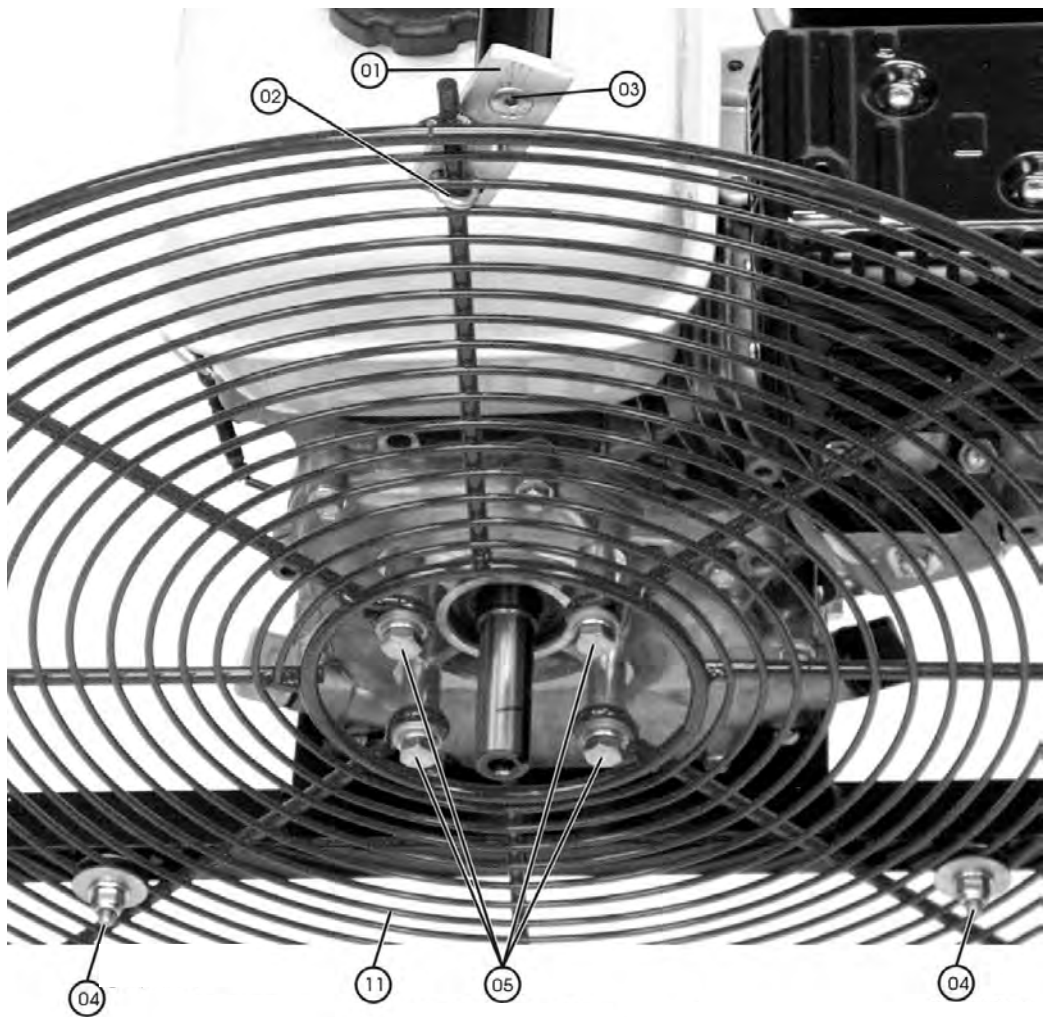
Figure 20. Tachometer/Hour Meter assembly.

PARTS LIST FOR GUARD REAR MOUNT

Reference Number	Part Number		Quantity
01	G-1024	Guard mount bracket.....	1
02	G-1035	1/8 U-bolt with nuts.....	1
03	F94225	¼-inch x 1-inch Flat socket cap screw	1
04	G-1030	Guard mounting hardware, ¼ NF.....	2
05	G-1031	Guard mounting hardware, 5/16 NF.....	4
06		Guard mount spacers one of the following	
	G-1035	Guard mount spacers for Honda GX series motors	4
	G-1036	Guard mount spacers for Honda GC160 motors.....	4
07	G-1021	5/16 SAE washers GD8.....	12
08	G-1020	5/16 Split lock washer GD8	4
09	G-1032	¼ Nylock GD8.....	2
10	G-1037	Neobond washers.....	4
11		Guard, Rear (one of the following):	
	QUABU120R	20-inch fan rear guard.....	1
	QUABU124R	24-inch fan rear guard.....	1
12		Engine (see pages 19 and 20)	1
13		Frame (see pages 15-18)	1
14	G-1027	¼ SAE washers GD8.....	6

Guard Mount Pictures

Figure 21.
Tachometer /
Hour Meter
assembly.



See Figure 27
for a close up.

See Figure 26
for a close up.

See Figure 27 for a close up.

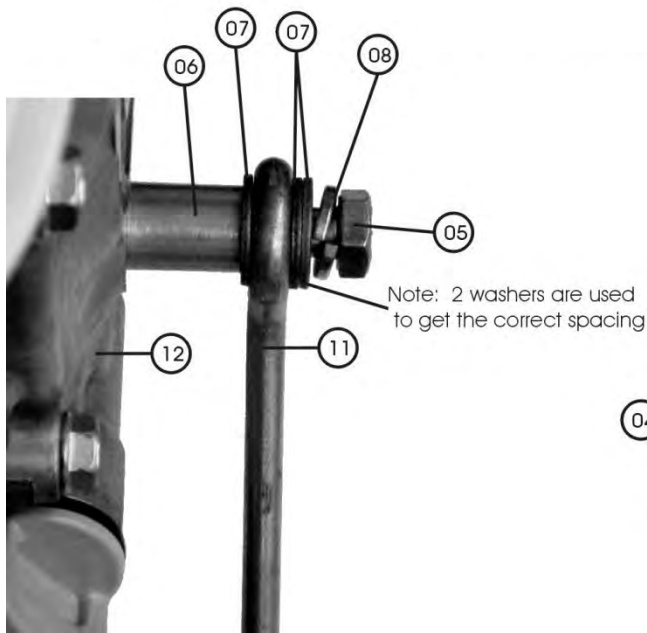


Figure 22. Close-up of guard mount to engine.

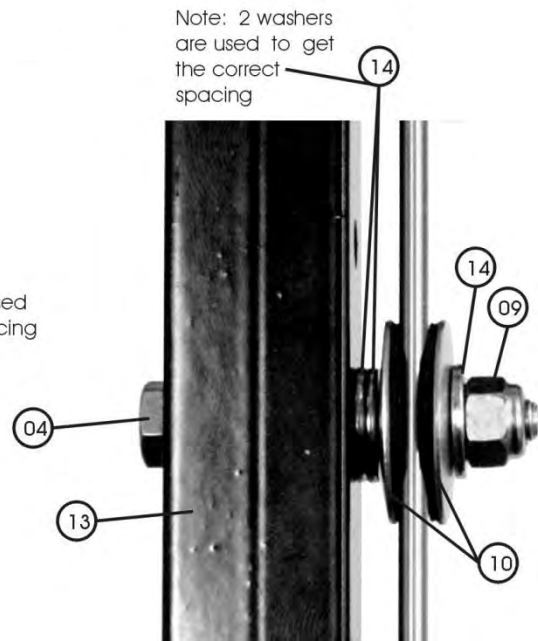
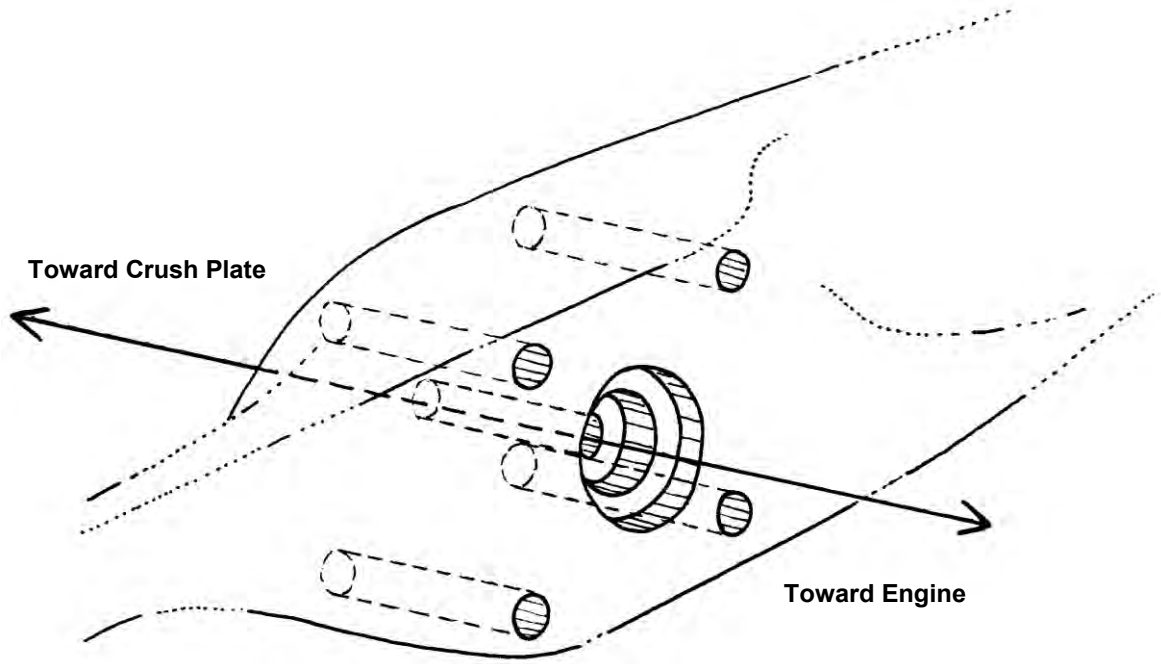


Figure 23. Close-up of guard mount to frame.

Note the number and position of the washers, reference numbers 7 and 14. The placement of these washers is important to keep everything lined up properly, especially for the 5/16 bolts attaching the guard to the motor crank case. If you leave out washers, the 5/16 bolts can go too deep into the blind holes and can break the engine crank case. Please be careful.

PROPELLER ORIENTATION



PARTS LIST FOR PROPELLER MOUNT

Reference Number	Part Number		Quantity
01	P-1026	Stainless set screw	1
02	P-1029	Cap screw, (prop safety bolt), 5/16-inch x 3/4-inch	1
03	P-1028	Internal star washers, 5/16-inch	1
04	P-1027	Fender washer, 5/16-inch.....	1
05	P-1025	Hub, aluminum.....	1
06	E-H002	Engine key	1
07	P-1030	Crush plate	1
08	P-1031	Cap screws, 5/16-inch x 3-inch	4
09	P-1032	Retention washers	4
10		Propellers (one of the following):	
	P20-1.5E	20-inch, EM3550, wood/Kevlar/fiberglass composite	1
	P20-120	20-inch, GX120, wood/Kevlar/fiberglass composite	1
	P20-160	20-inch, GX160/GC160, wood/Kevlar/fiberglass composite... 1	
	P24-120	24-inch, GX120, wood/Kevlar/fiberglass composite	1
	P24-160	24-inch, GX160/GC160, wood/Kevlar/fiberglass composite... 1	
	P24-200	24-inch, GX200, wood/Kevlar/fiberglass composite	1

Propeller Hubs and Tab Washer Pictures

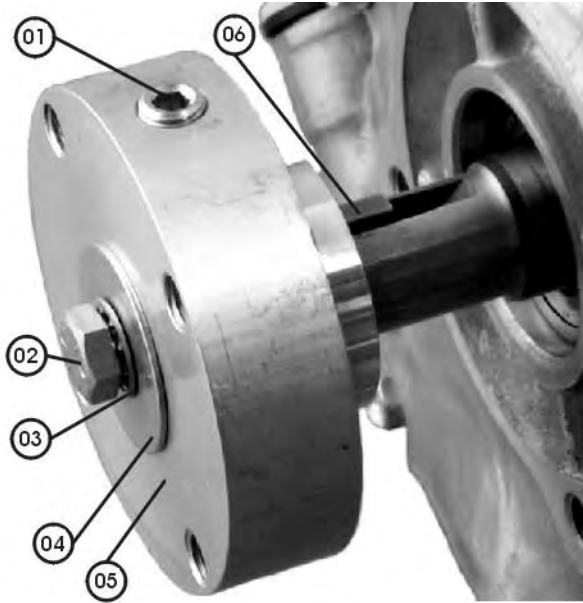


Figure 24. Propeller Hub Assembly for GX Series Honda, Kohler and Briggs & Koolbore Motors

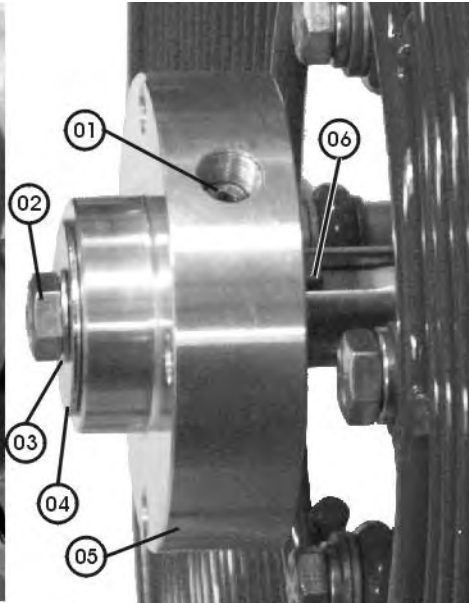


Figure 25. Propeller Hub Assembly for Honda GC Series Motors.

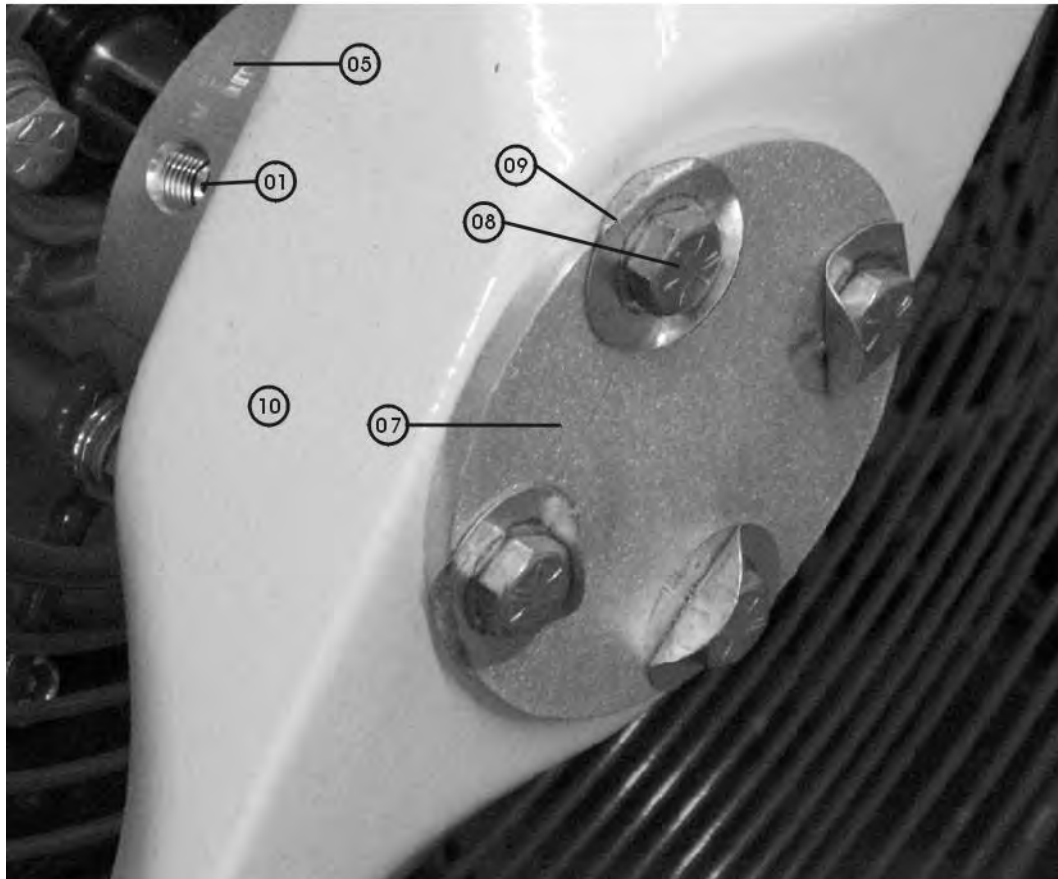


Figure 26. Crush plate

PARTS LIST FOR GUARD FRONT

Reference Number	Part Number		Quantity
01		Guard, Front (one of the following):	
	QUABU120F	20-inch Fan guard front	1
	QUABU124F	24-inch Fan guard front	1
02	G-W075	VENTRY® FAN sticker.....	1
03	G-1040	¼" Nylon lock nut and ¼ SAE washer	4

Guard Front Picture

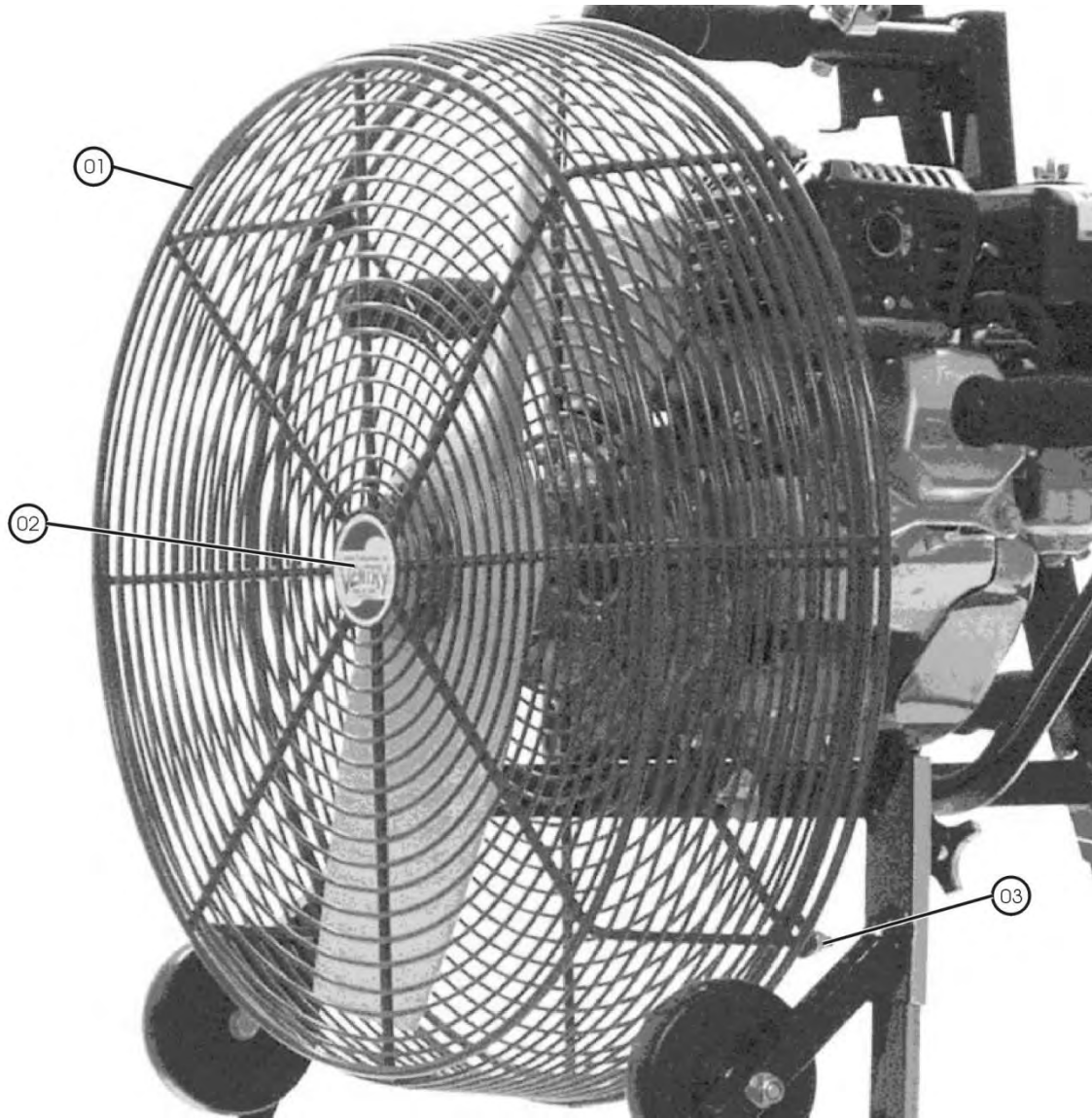


Figure 27. Guard Front picture.

PARTS LIST FOR ENTRY-POINT-LIGHT OPTION

Reference Number	Part Number		Quantity
01	EPL Housing	Light housing with switch	1
02	L-1001	Butt connector	1
03	L-1002	Upper light mounting hardware	1
04	L-1003	Lower light mounting hardware	1
05		Frame (see pages 15-18)	
06	L-1004	Fuse holder	1
07	L-1005	Electrical tape	1
08	T-W079	Wire tie	1
09	L-1006	Wire	1
10	L-1007	Star washer and ring tong terminal	1
11	L-1009	Spade connectors	2
		Light (one of the following):	
12	H-7614	Halogen	1
12	TL-LED	LED	1

Light Option Pictures (Halogen Light shown. Contact Ventry Solutions, Inc. for details on the LED Light)

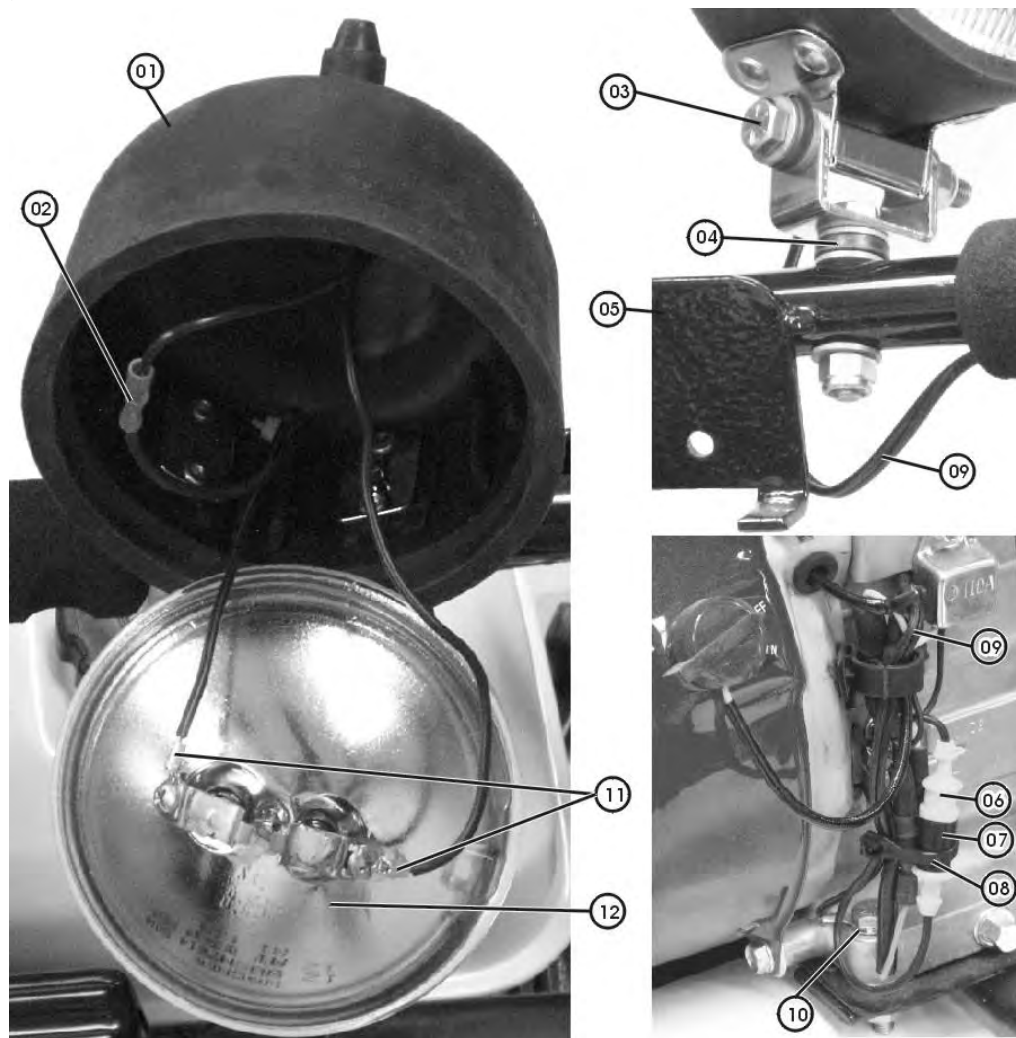


Figure 28. Halogen Entry-Point-Light.

TORQUE VALUES

Fan Component	Torque Values (ft. lbs.)
5/16-inch Cap screw (engine mounting bolts)	17 to 21
¼-inch x ½-inch Cap screw (rear guard to guard mount tubing)	9 to 11
5/16-inch Cap screw (rear guard to aluminum engine block)	8 to 10
Propeller hub set screw	9 to 11
5/16-inch x ¾-inch Cap screw (propeller safety bolt)	17 to 21
5/16-inch x 3-inch Cap screw (propeller bolts)	10 to 12