



an ISO 9001:2015 Registered Company

# **1973-79 Ford F-Series/ 1978-79 Bronco**

**19" 850W Brushless Fan Kit  
(280480)**



**18865 Goll St. San Antonio, TX 78266**  
**Phone: 800-862-6658**  
**Sales: [sales@vintageair.com](mailto:sales@vintageair.com)**  
**Tech Support: [tech@vintageair.com](mailto:tech@vintageair.com)**  
**[www.vintageair.com](http://www.vintageair.com)**



www.vintageair.com

# Table of Contents

Cover.....	1
Table of Contents.....	2
Packing List/Parts Disclaimer.....	3
Theory of Operation, Special Tools Required, Features.....	4
Fan Assembly Installation.....	5
Fan Assembly Installation (Cont.).....	6
Fan Assembly Installation (Cont.).....	7
Fan Assembly Installation (Final).....	8
Power Harness Installation.....	9
Power Harness Installation (Cont.).....	10
Operation.....	11
Troubleshooting.....	12
Wiring Schematic.....	13
Packing List.....	14



**A detailed tech video outlining the installation process is available on Vintage Air's YouTube channel at <https://bit.ly/3jAWHQq>.**

**The applications may vary depending on the fan kit received. Wiring installation showcased in the video will be similar on all fan kits.**

**Viewing the tech video along with the written instructions will provide the installer the most detailed installation procedure.**



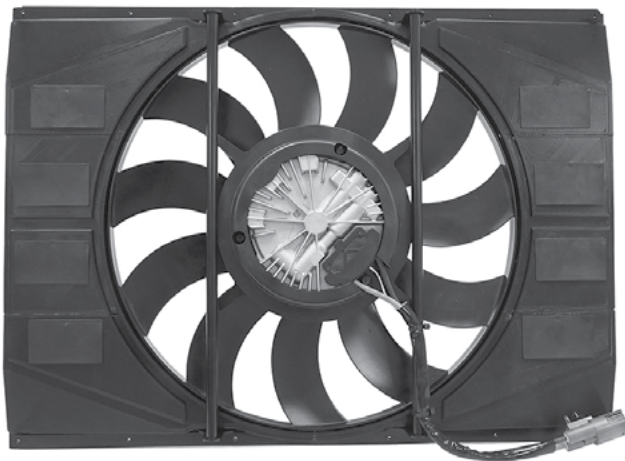
www.vintageair.com

## Packing List: Brushless Fan Kit (280480)

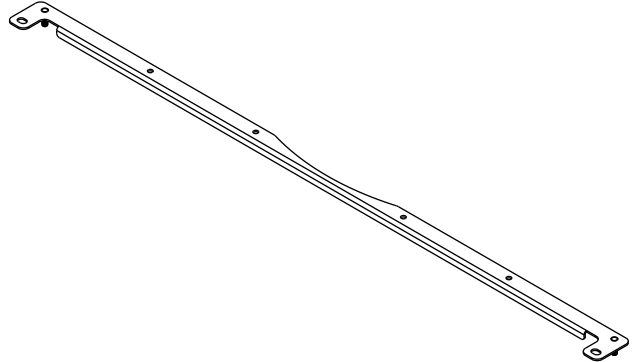
No.	Qty.	Part No.	Description
1.	1	371261	19" Brushless Fan Assembly
2.	2	647143	Bracket, Fan Adapter Assembly
3.	1	231088	Kit, Brushless Fan Power Wiring 6GA
4.	1	191107	Hardware Kit

**\*\* Before beginning installation, open all packages and check contents of shipment. Please report any shortages directly to Vintage Air within 15 days. After 15 days, Vintage Air will not be responsible for missing or damaged items.**

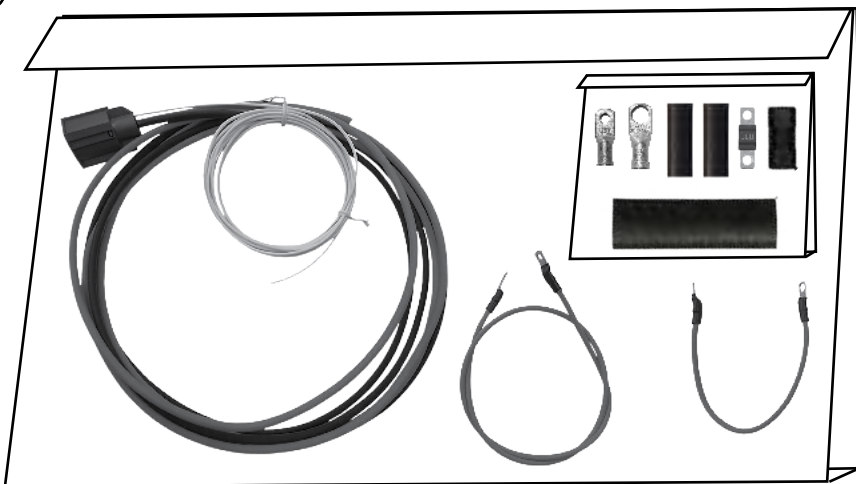
1



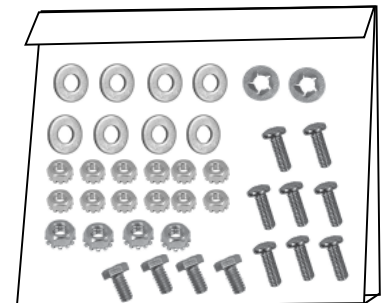
2



3



4



**NOTE: Images may not depict actual parts and quantities.  
Refer to packing list for actual parts and quantities.**



[www.vintageair.com](http://www.vintageair.com)

## Theory of Operation

Vintage Air's new brushless line of engine cooling fans is based on Spal's latest motor and blade technology, ensuring the absolute highest cooling performance available anywhere. While most competitors' fans use 150-250W motors, Vintage Air brushless fans are available with either 500 or 850W motors and feature model-specific mounts and shrouds to ensure an easy, clean and reliable installation.

VA brushless fans have integrated variable speed controllers, which eliminate the need for relays. Variable speed means the fan starts up softly and only runs as hard as is needed to cool the engine, allowing for an extremely powerful motor without putting unnecessary burden on the electrical system. The net result is that the fan will be smoother, quieter and more reliable than conventional single-speed brushed designs.

Due to the extreme performance potential of these fans and the unique way in which they operate, it is **VERY IMPORTANT** that you thoroughly read and understand the installation and operation instructions prior to installation. Unlike most conventional fans currently on the market, Vintage Air's 500 and 850W brushless fans require unique wiring, control signal and troubleshooting strategies.

All VA brushless fans require an external means of supplying a specific PWM control signal to the fan. These fans will not operate by any other means, i.e. "hotwired," which is also a consideration during troubleshooting.

### Special Tools Required:

- High quality crimp tool to crimp 6GA and 18GA butt splices. For the most professional 6GA crimp, Vintage Air recommends MOLEX 19284-0034 Hand Crimp Tool. Vintage Air also stocks a more affordable option suitable for 6GA and 18 GA crimps: Vintage Air PN 424009.
- High quality wire strip tool for 6GA and 18GA wires.
- Heat gun for applying heat shrink tubing.
- Digital volt meter for confirming proper grounding and power connections.

### Features:

- Designed from the ground up for primary engine and AC cooling duty.
- Maximum cooling power available when you need it, automatically dials back when you don't.
- Extremely long life (up to 40,000hr).
- Waterproof (IP68).
- Easy to install and set up, stand-alone controllers available.
- May be controlled by several aftermarket engine controllers (negative logic duty cycle definition@50-500Hz).
- Quiet operation (85dBA at 1 m from the fan module - lateral side).
- Laser-cut, CNC-bent and powder-coated steel bracket with mounting hardware designed for specific vehicle applications.
- Model-specific ABS shroud gathers and directs air flow across the entire radiator face, ensuring maximum cooling performance.



www.vintageair.com

## Important Notice—Please Read

- A trinary switch must be used when installing an electric fan in an A/C equipped vehicle.

### *Fan Assembly Installation*

1. Place the fan assembly on a work surface (See Photo 1, below) and gather all the parts needed from the packing list.
2. Ensure the fan blade is evenly spaced all the way around the shroud, then use (4) clamps to secure it as shown in Photo 2, below.
3. Using a 1/8" drill bit, drill through the shroud on all (4) corners (See Photo 3 and Figure 1, below).
4. Turn the fan assembly over and remove the clamps. Using a 7/32" drill bit, enlarge all of the 1/8" holes (See Photo 4, below).

Place fan assembly  
on work surface



Photo 1

Use (4) clamps  
to secure

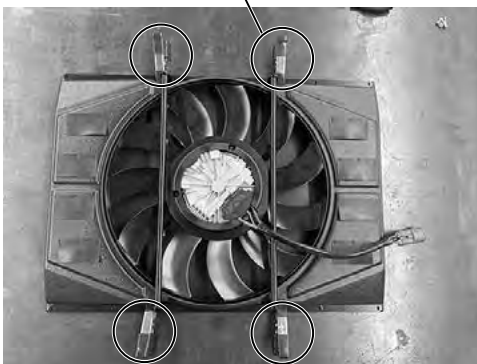


Photo 2



Drill a  
1/8" hole

Photo 3

Drill through shroud on all (4)  
corners using 1/8" drill bit

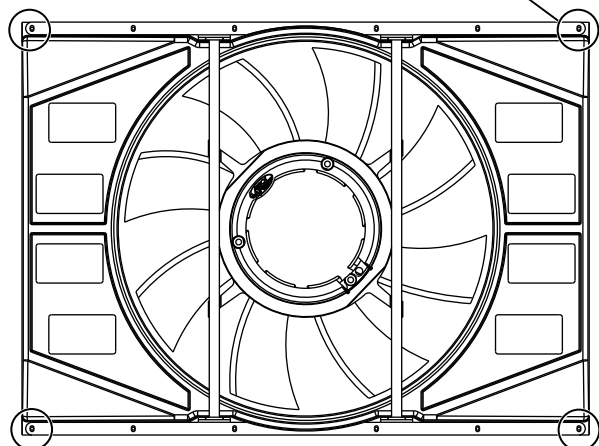


Figure 1



Enlarge (4)  
holes to 7/32"

Photo 4



www.vintageair.com

## Fan Assembly Installation (Cont.)

5. Place the fan adapter assembly bracket onto the back side of the fan assembly, pushing the studs through the shroud and bracket (See Photo 5, below). Secure it using (4) 10-32 nuts with star washers (See Photo 6, below).
6. Using the holes on the fan adapter assembly bracket as a guide, drill (8) 3/16" holes into the shroud (See Photo 7 and Figure 2, below).



Photo 5



Photo 6



Photo 7

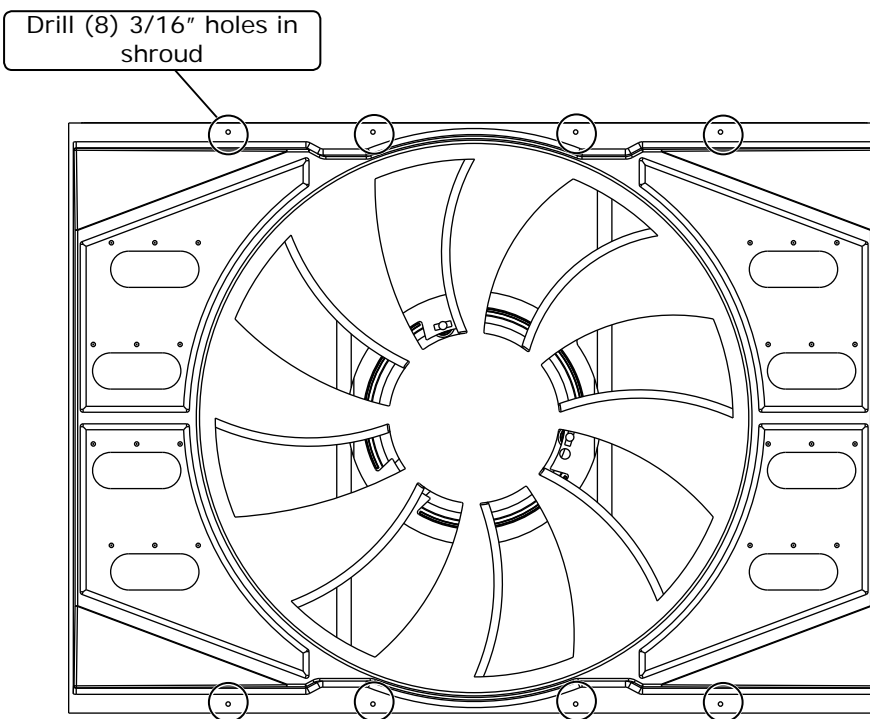


Figure 2





www.vintageair.com

## Fan Assembly Installation (Cont.)

7. Once all (8) holes are drilled, install (8) 10-32 x 5/8" screws into the holes. **NOTE: The screws install through the adapter bracket and shroud.** Secure using (8) 10-32 nuts with star washers (See Photo 8 and Figure 3, below).

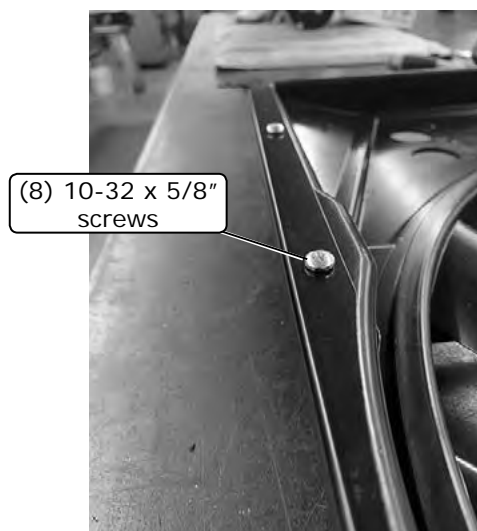


Photo 8

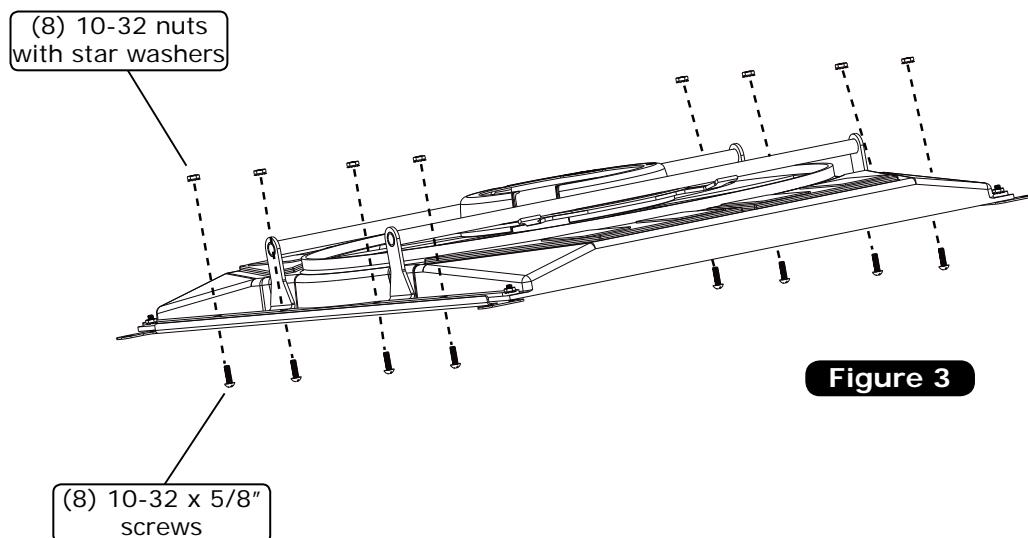


Figure 3



www.vintageair.com

## Fan Assembly Installation (Final)

8. Locate (4) 1/4-20 x 1/2" hex bolts and (4) 9/32" flat washers. Place the 9/32" flat washers onto the hex bolts (See Photo 9, below). Install the bolt and washer into the fan adapter assembly bracket (See Photo 10, below), then use (2) 1/4" pushnut bolt retainers to secure the bolt and washer together on the top (2) bolts (See Photos 11 and 12, below).
9. Install the fan assembly onto the radiator (See Photo 13, below). **NOTE: On some radiators, the bottom (2) OEM holes may be in different locations. Use the top (2) holes as a guide, then mark and drill the bottom holes using a 1/4" drill bit.** Secure the assembly to the radiator using (4) 1/4-20 nuts with star washers (See Photo 14, below).

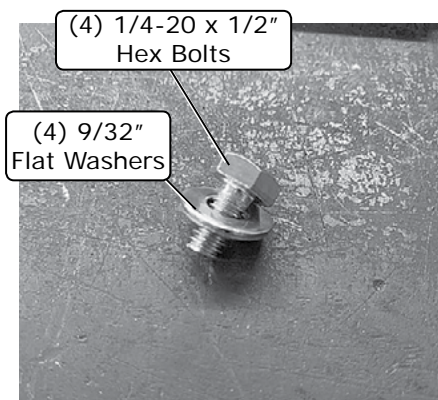


Photo 9



Photo 10

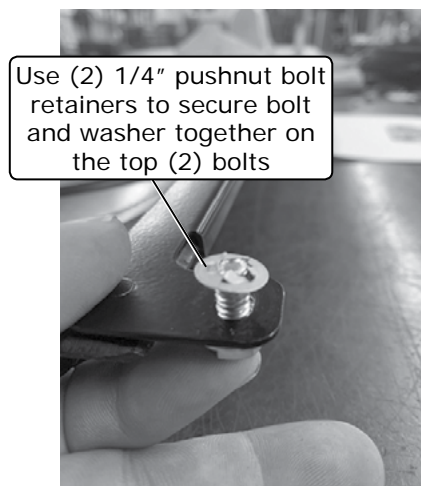


Photo 11



Photo 12



Photo 13

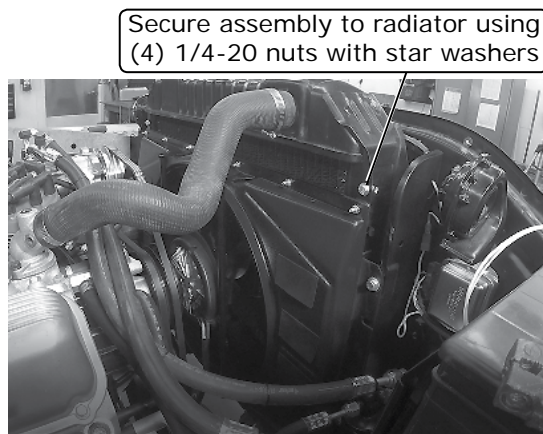


Photo 14





www.vintageair.com

## Power Harness Installation

Refer to the wiring schematic on Page 13.

The power harness is designed to accommodate main power connection to either the battery or the starter solenoid. Two different cables are included in this kit. PN 231084 is for the battery post connection and has a #10 ring terminal on one end and a 5/16" ring on the other. PN 231085 is for the starter solenoid connection and has a #10 ring terminal on one end and a 3/8" ring terminal on the other.

For greater reliability and ease of installation, all but two heavy-gauge ring terminals in this kit are pre-crimped and sealed. This allows the customer to customize wire lengths as necessary and also complete installation by crimping two ring terminals, one on each power wire, and one 18GA butt splice on the control signal wire.

**NOTE: Properly crimped connections are superior in electrical conductivity and durability compared to a soldered connection. To ensure a reliable crimp, a quality crimper must be used (See Photos 1 and 2 below), and adhesive heatshrink properly sealed.**

Vintage Air recommends direct connection to the battery for vehicles with the battery located in the engine bay. For vehicles with trunk-mounted batteries, we recommend connection to the starter solenoid or battery cable stud in engine bay.



Photo 1

Vintage Air recommends 6GA  
ring terminal crimp tool,  
MOLEX 19284-0034  
(Not included)



Photo 2

Vintage Air recommends 6GA  
ring terminal/18GA butt splice crimp tool,  
VA PN 424009  
(Not included)



www.vintageair.com

## Power Harness Installation (Cont.)

1. Determine desired route from fan connector to your desired power source. **NOTE: Avoid routing close to a heat source such as exhaust manifolds or against heater hoses. Ensure power pigtail from fan is secured to bracket (or other nearby location) to prevent wiring from being caught in blade during operation.**
2. Set the white PWM control signal wire aside.
3. Assemble provided fuse and power branch, either 231084 or 231085 as shown in Photos 3 and 4, below.
4. Cut the red power wire from 231087 to desired length and strip insulation.
5. Using the provided #10 stud ring terminal and one of the recommended Vintage Air crimp tools from Page 7, crimp the ring terminal. If using VA PN 494009 crimper, follow steps shown in Photo 5, below. Cover the ring terminal barrel with provided heat shrink and apply heat until fully sealed (See Photo 6, below).
6. Repeat Steps 4 and 5 using provided 5/16" stud ring terminal and black ground wire.
7. Finish assembling the fuse assembly, and shrink provided non-adhesive heat shrink until fitted to secure the assembly as shown in Photos 7 and 8, below.
8. The remaining white 18GA wire is the PWM control signal wire. It will be connected to either a Vintage Air-supplied brushless fan control kit or your engine controller (if compatible). **Note that few engine controllers are able to supply the required PWM control signal. See Operation and Troubleshooting sections for more detail.**

Clear side facing Up

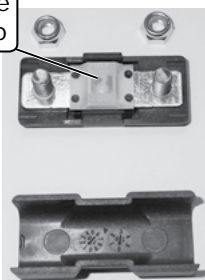


Photo 3

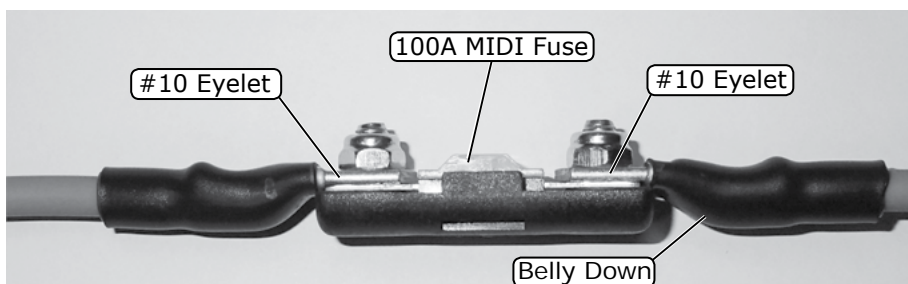


Photo 4

Crimp at 14-16mm<sup>2</sup> position, followed up by crimping at the same location on the ring terminal at the 8-10mm<sup>2</sup> position

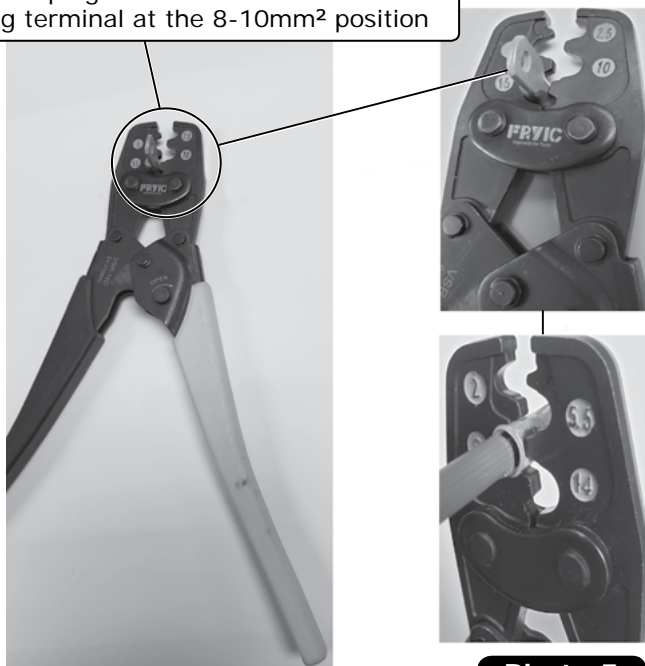


Photo 5

Make sure a good seal is formed around entire insulation

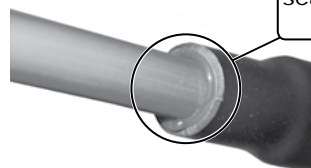


Photo 6

Proper alignment of heat shrink over fuse assembly

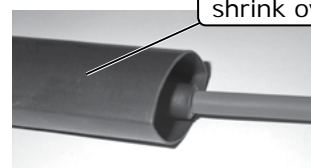


Photo 7

Properly applied heat shrink to fuse assembly

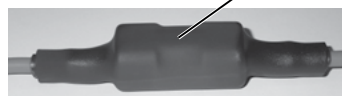


Photo 8



www.vintageair.com

## Operation

Operation of Vintage Air brushless fans is different from conventional brushed fans in several ways. For instance, the brushless system contains no control relays. Instead, the battery powers the motor assembly at all times and an electric controller within the motor housing determines when to operate the motor, based on a control signal that comes in from an external source, such as the Vintage Air Brushless Fan Control Kit, on the white signal wire. This control signal is called Pulse Width Modulation (PWM), and very specific parameters need to be met in order for the fan to operate.

All Vintage Air 850W brushless fans require a PWM signal as described below:

- PWM control is "NEGATIVE logic duty cycle definition" (See Figure 1, below).
- 50-500Hz PWM frequency.
- Duty cycle of 20-90% yields fan speed of 28-100% (See Figure 2, below).
- Ramping up, the fan will turn on at max reverse speed between 9% and 18% duty cycle. Ramping down, the fan will run at max reverse speed between 15% and 6% duty cycle where it will then shut off. Vintage Air Brushless Fan Control kits bypass this reverse condition by providing a 0% duty cycle when off, and on duty cycles between 20% and 80%.

When the fan is configured and operating properly, it will engage with a soft-start at approximately 30% power when the engine reaches approximately its coolant thermostat opening temperature, then gradually ramp up in speed as engine temperature further increases, until reaching maximum speed at approximately 20-25 deg. F (11-14C) higher. Since these fans are very powerful, they typically stabilize somewhere in-between, rarely if ever reaching maximum speed. **NOTE: This control strategy is ideal for cooling system performance, is typical of most modern OEM engine cooling control strategies, and is the strategy employed by all Vintage Air brushless fan controllers.**

Keep in mind, you want the fan to come on at or slightly below the thermostat setting and to be at maximum speed around 20 degrees above that. If you set the span between upper and lower temperature limits too close, or too far below the thermostat opening temperature, the fan will spend most of its time at maximum speed unnecessarily.

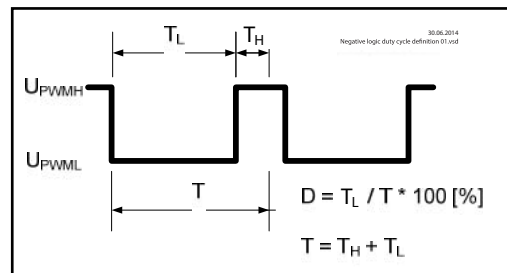


Figure 1

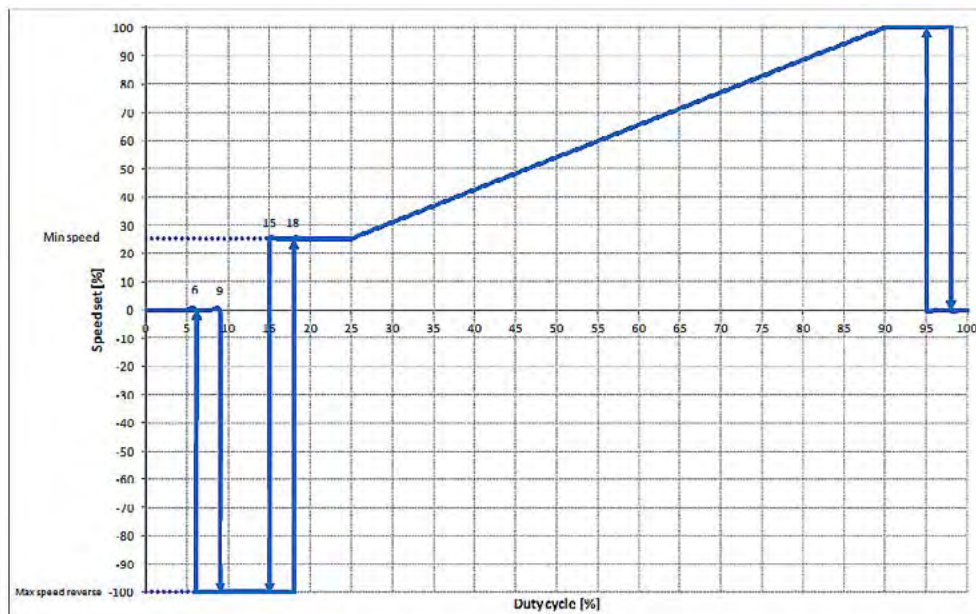


Figure 2



www.vintageair.com

## Troubleshooting

### **WARNING: ALWAYS KEEP HANDS, CLOTHES, TOOLS, ETC. AWAY FROM THE FAN BLADE!**

Brushless fans have proven to be extremely reliable when installed properly. Troubleshooting is limited to determining that the appropriate power and PWM signal is supplied to the motor.

#### **Fan doesn't turn on:**

If the fan does not come on when you expect it to, first confirm that the fan is receiving at least 12V on the red and black main power wires and that the polarity is correct. Red is positive and Black is negative. If the main fuse is determined to be blown, inspect the wiring carefully to determine if there is damage to the insulation, resulting in a short circuit. Once you have confirmed that the motor is being supplied with power, you'll need to confirm proper PWM signal to the white wire. **Note that you cannot turn the fan on by applying either 12V or ground to the white wire.**

#### **Vintage Air Brushless fan controller equipped:**

Please see the troubleshooting section of your specific Vintage Air Brushless Fan Control Kit.

### **IMPORTANT SAFETY MESSAGE**

**THIS FAN CAN TURN ON WITHOUT WARNING. ALWAYS STAY CLEAR OF THE FAN BLADE WHENEVER THE BATTERY IS CONNECTED. KEEP HANDS, CLOTHING, TOOLS, ETC. CLEAR OF THE FAN BLADE AT ALL TIMES!**

#### **Owner-supplied fan controller:**

Re-check your settings within your controller to confirm compliance with the specifications above. Re-check all wiring. To determine whether the signal going to the fan is actually within the specifications, you will need a specialized piece of test equipment called an oscilloscope. In the absence of this equipment, you can still do a simple check to determine the presence of a signal. Most digital multimeters, when connected to a PWM signal, will display a voltage value that is averaged. This allows you to estimate the duty cycle/PWM signal that is being transmitted to the fan. With the engine running and up to operating temperature, connect the positive probe of the multimeter to the signal wire coming from the controller that connects to the white control wire on harness 231087. Connect the negative probe to ground. The displayed voltage is equal to the vehicle system voltage multiplied by the recorded duty cycle. For instance, if system voltage is 14V, and you are recording 7V from the signal wire, then the duty cycle is 50%. If the reading is 3V, then the duty cycle is around 80%. Although this is a good way to determine the presence or absence of a signal, it will not confirm whether the signal is valid. For instance, in the first example above, if the duty cycle is 50%, and the signal is out of the supported frequency range (50-500HZ), then the fan will not operate. This method is still useful though, as no voltage reading tells you definitively that you do not have a signal, and therefore a problem from the controller.

#### **Fan doesn't turn off:**

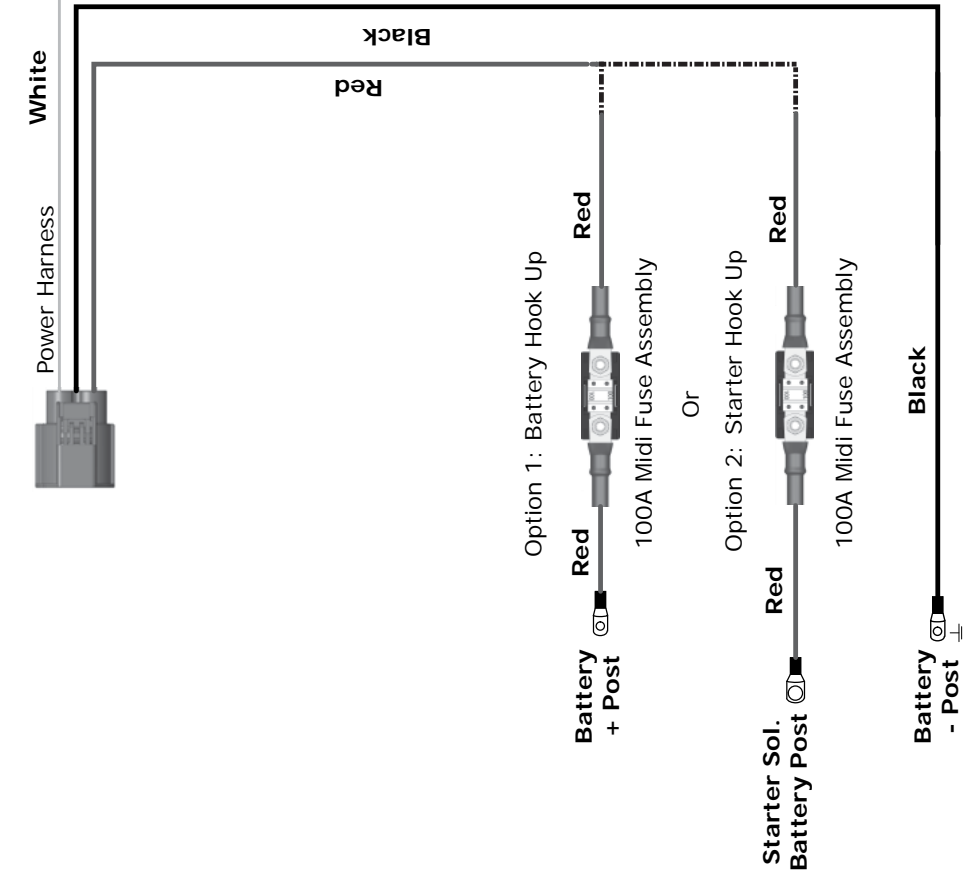
#### **Vintage Air Brushless fan controller equipped:**

Please see the troubleshooting section of your specific Vintage Air Brushless Fan Control Kit.



www.vintageair.com

## 231088 Brushless Fan Power Wiring Kit



NOTE: Fuse cover not shown.

Vintage Air Brushless Fan Control Kit  
(Sold Separately)

Connect to PWM control  
wire, color varies per kit,  
see Control Kit instructions  
for details.

NOTE: See Vintage Air Brushless Fan Control Kit Instruction  
set for complete control kit wiring instructions.





www.vintageair.com

## Packing List: Brushless Fan Kit (280480)

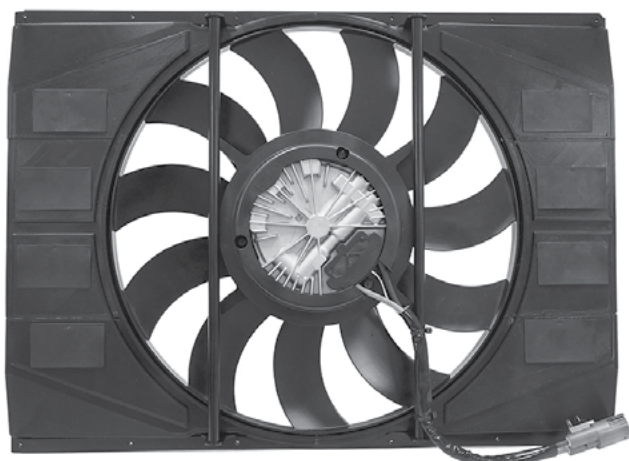
No.	Qty.	Part No.	Description
1.	1	371261	19" Brushless Fan Assembly
2.	2	647143	Bracket, Fan Adapter Assembly
3.	1	231088	Kit, Brushless Fan Power Wiring 6GA
4.	1	191107	Hardware Kit

Checked By: \_\_\_\_\_

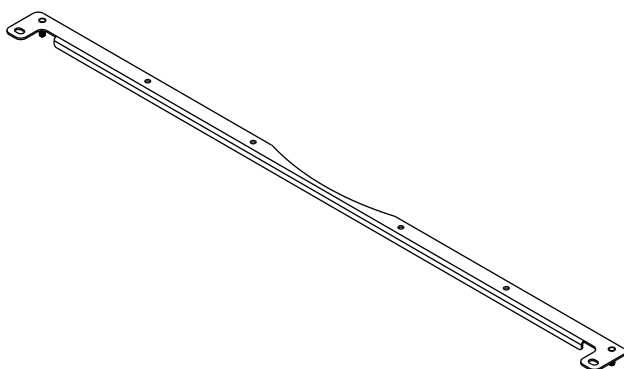
Packed By: \_\_\_\_\_

Date: \_\_\_\_\_

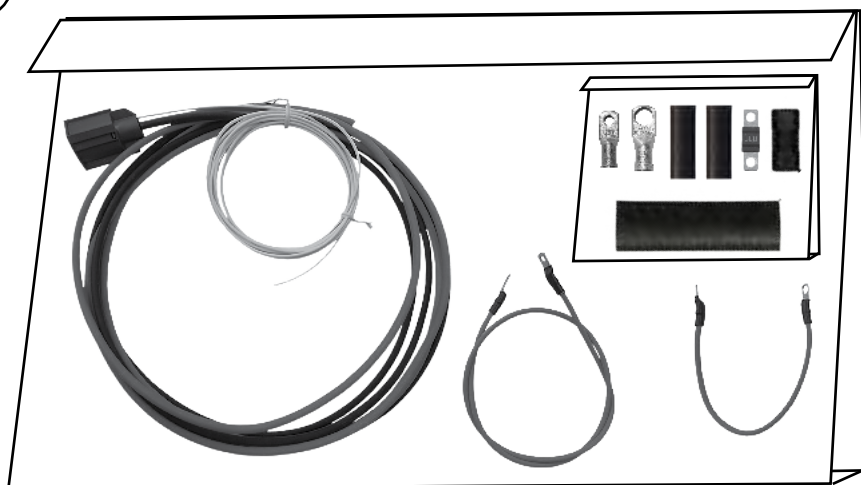
1



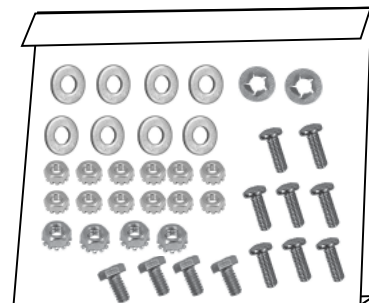
2



3



4



NOTE: Images may not depict actual parts and quantities.  
Refer to packing list for actual parts and quantities.