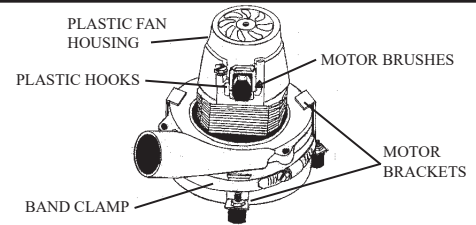


## DIAGNOSING WORN BRUSHES

1. Motor stops running or loses power.

## VAN-I-VAC, STAR & VOYAGER

1. Unplug power cord from the vacuum unit. Turn vacuum unit on its face so that it rests on the cover plate knobs.
2. Using a #2 Phillips screwdriver, remove the (12) screws from the back cover plate. Gentle prying with a blade screwdriver may be required to unstick the gasket.
3. Locate the motor in the lower right compartment. With a large blade screwdriver (or 5/16" nut driver if you have one) loosen the band clamp around the motor until it's almost all the way loose.
4. Set the vacuum unit upright and remove the motor by sliding the band clamp all the way down. While pushing the front motor bracket to one side, lift the motor and pull it toward you. It is not necessary to disconnect the wires. Place the motor on the table. Turn the armature by hand and check for roughness and the motor bearings for looseness before proceeding. If either are bad then the motor **must** be replaced.
5. Locate the plastic brush cases on top of the motor. Complete the replacement procedure one brush at a time so that the other brush may serve as an example. Using a Phillips screwdriver, remove the screws from the metal strap that holds the brush. Remove the metal strap and raise the plastic case slightly so that you can work on it. **Be careful not to break the wire where it connects to the wire contact.** The wire contact must be carefully slid out from between the plastic case and brass case (see the diagrams on page 3). First, try sliding the contact out by **gently** prying, with a flat blade screwdriver, between the wire and plastic case (see TOP VIEW). **Do not force.** If the contact does not readily slide out, the "barb" on the wire contact may be caught in the plastic case. Second, slide a small screwdriver (1/8" wide blade) between the plastic case and the wire contact as shown. Pry up, working the contact out. This action lifts the plastic case to help disengage the barb. Replace with a new brush noting that the tab on the case goes down. Slide the wire contact into the brush case between the brass case and plastic case. Gently push the carbon brush back into the case against the spring pressure. Set the brush case onto the motor directing the tab into the groove in the mounting base. Then slide the brush case back and forth until the tab "locks" into place. Replace the metal strap and fasten in place with the Phillips screws.
6. Replace the motor into the vacuum unit down inside the (3) motor brackets and band clamp. You may have to push the front bracket to one side. Be sure that all the motor brackets lock over the fan housing.
7. Press downward slightly on the top of the motor with one hand to cause good motor contact with the foam motor gasket on the case. While holding the downward pressure, tighten the band clamp with the other hand making sure motor brackets stay locked over the fan housing.
8. Check the motor location to insure that it is suspended above the case and does not make metal to metal contact at any point. If you have disconnected the wires, connect the green wire to the screw on the top of the motor. Connect the two black wires to the two wires from the motor using the wire nuts. Tuck the wires back inside the case.
9. **KEEPING YOUR HANDS OUT OF THE UNIT!** Plug in the power cord and test the unit. Some arcing will result until the brushes break in. Break in on low speed for 30 minutes.
11. Tip the unit forward on its face, replace the back cover, and gently tighten the (12) screws.



## DIAGNOSING WORN BRUSHES

1. Motor stops running or loses power.

## ABRASIVE VAC (MATCHES MOTOR BRACKETS ON PICTURE ABOVE.)

1. Unplug power cord from the vacuum unit. Turn vacuum unit on its face so that it rests on the cover plate knobs.
2. Using a #2 phillips screwdriver, remove the (10) screws from the back cover plate. Gentle prying with a blade screwdriver may be required to unstick the gasket.
3. Locate the motor in the lower right compartment. With a large blade screwdriver (or 5/16" nut driver if you have one) loosen the band clamp around the motor until it is almost all the way loose.
4. Set the vacuum unit upright and remove the motor by sliding the band clamp all the way down. To remove the grey tube from the case work it back and forth to break the glue loose (glue was for shipping security). Turn the motor to free the tube from the case. Lift the motor out of the brackets and clamp and pull it toward you. It is not necessary to disconnect the wires. Place the motor on the table. Remove the plastic fan housing from the top of the motor (see diagram above) which is held on by plastic hooks over the motor brush cases. While applying upward pressure on one side of the fan housing, use a screwdriver to unhook the two plastic hooks over the motor brush case. Repeat on the other side of the fan housing. Turn the armature and check for roughness and motor bearings for looseness before proceeding. If either are bad then the motor **must** be replaced.
5. Locate the plastic brush cases on top of the motor. Complete the replacement procedure one brush at a time so that the other brush may serve as an example. Using a Phillips screwdriver, remove the screws from the metal strap that holds the brush. Remove the metal strap and raise the plastic case slightly so that you can work on it. **Be careful not to break the wire where it connects to the wire contact.** The wire contact must be carefully slid out from between the plastic case and brass case (see the diagrams on page 3. First, try sliding the contact out by **gently** prying, with a flat blade screwdriver, between the wire and plastic case (see TOP VIEW). **Do not force.** If the contact does not readily slide out, the "barb" on the wire contact may be caught in the plastic case. Second, slide a small screwdriver (1/8" wide blade) between the plastic case and the wire contact as shown. Pry up, working the contact out. This action lifts the plastic case to help disengage the barb. Replace with a new brush noting that the tab on the case goes down. Slide the wire contact into the brush case between the brass case and plastic case. Gently push the carbon brush back into the case against the spring pressure. Set the brush case onto the motor directing the tab into the groove in the mounting base. Then slide the brush case back and forth until the tab "locks" into place. Replace the metal strap and fasten in place with the Phillips screws. **Replace the fan housing. Failure to do so will cause overheating and damage the motor.**
6. Replace the motor into the vacuum unit sliding it down inside the (3) motor brackets and band clamp. Work the grey hose back into the hole in the case. (Note some motor brackets need to slide over the top of motor).
7. Press downward slightly on the top of the motor with one hand to cause good motor contact with the foam motor gasket on the case. While holding the downward pressure, tighten the band clamp with the other hand.
8. Check the motor location to insure that it is suspended above the case and does not make metal to metal contact at any point. Tuck the wires back inside the case.
9. **KEEPING YOUR HANDS OUT OF THE UNIT!** Plug in the power cord and test the unit. Replace the back cover, and gently tighten the (10) screws.

**DIAGNOSING WORN BRUSHES**

1. Motor stops running or loses power.

**SAND VAC & ABRASIVE VAC (DOES NOT MATCH MOTOR BRACKETS ON PAGE 2 PICTURE)**

1. Unplug power cord from the vacuum unit. Turn vacuum unit on its face so that it rests on the cover plate knobs.
2. Using a #2 phillips screwdriver, remove the (8) screws around the outside from the back cover plate. Gentle prying with a blade screwdriver may be required to unstick the gasket.
3. Motor removal is not necessary for brush replacement on this model.
4. Remove the plastic fan housing from the top of the motor (see diagram on page 2) which is held on by plastic hooks over the motor brush cases. While applying upward pressure on one side of the fan housing, use a screwdriver to unhook the two plastic hooks over the motor brush case. Repeat on the other side of the fan housing. Turn the armature and check for roughness and motor bearings for looseness before proceeding. If either are bad then the motor **must** be replaced.
5. Locate the plastic brush cases on top of the motor. Complete the replacement procedure one brush at a time so that the other brush may serve as an example. Using a Phillips screwdriver, remove the screws from the metal strap that holds the brush. Remove the metal strap and raise the plastic case slightly so that you can work on it. **Be careful not to break the wire where it connects to the wire contact.** The wire contact must be carefully slid out from between the plastic case and brass case (see the diagrams). First, try sliding the contact out by **gently** prying, with a flat blade screwdriver, between the wire and plastic case (see TOP VIEW). **Do not force.** If the contact does not readily slide out, the “barb” on the wire contact may be caught in the plastic case. Second, slide a small screwdriver (1/8” wide blade) between the plastic case and the wire contact as shown. Pry up, working the contact out. This action lifts the plastic case to help disengage the barb. Replace with a new brush noting that the tab on the case goes down. Slide the wire contact into the brush case between the brass case and plastic case. Gently push the carbon brush back into the case against the spring pressure. Set the brush case onto the motor directing the tab into the groove in the mounting base. Then slide the brush case back and forth until the tab “locks” into place. Replace the metal strap and fasten in place with the Phillips screws. **Replace the fan housing. Failure to do so will cause overheating and damage the motor.**
5. **KEEPING YOUR HANDS OUT OF THE UNIT!** Plug in the power cord and test the unit. Replace the back cover, and gently tighten the (8) screws.

