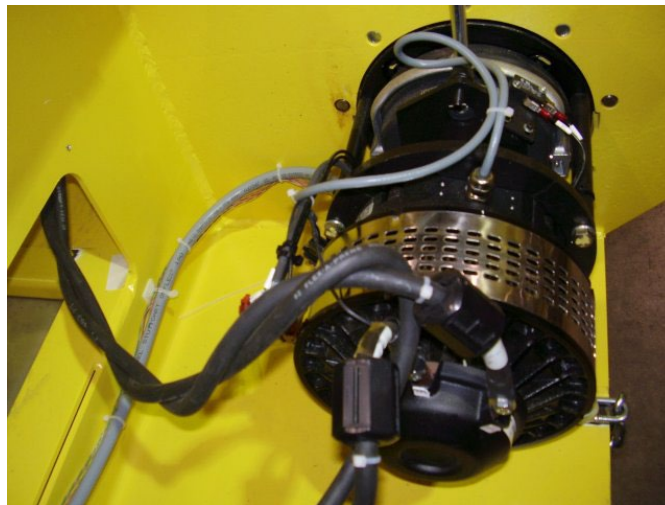


## **SUBJECT: LEMCO MOTOR BRUSH SERVICE**

### **Applicable to AGV Drive Motor #1084586-0**

- Brush length must be checked every six (6) months or 1500 hours of operation, whichever occurs first.
- Failure to properly check and maintain the motor brushes will void the JB Webb warranty and the manufacturers' warranties. If the motor brush base contacts the commutator surface (causing surface wear), the motor will not be covered under warranty and may be irreparable.



**TYPICAL AGV MOTOR INSTALLATION**

## INSPECTING MOTOR BRUSHES

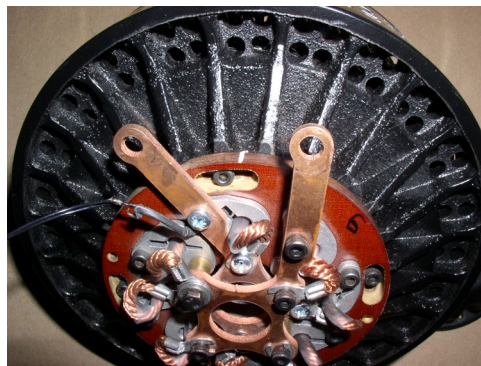
**Note:** This procedure is shown with the drive motor removed from the drive assembly. Although service may be easier with the motor removed, it is not absolutely necessary.

**Note:** Two procedures have been detailed to check motor brush condition. The first procedure does not require brush assembly removal but does require a special measuring device. The second requires removal of the brush assembly but does not require special tooling.

### Brush Measurement without Disassembly



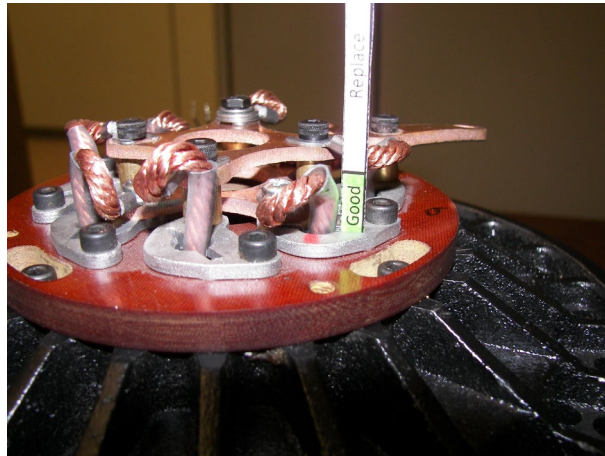
1. Remove the motor leads and tie back for unobstructed access.
2. Remove the brush assembly cover to expose the brush assembly.



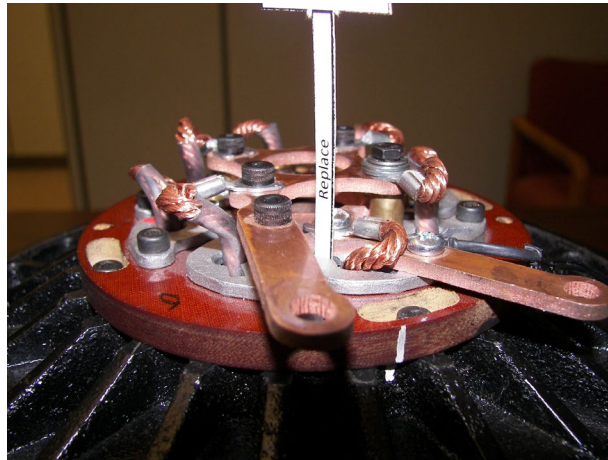
3. Verify that each brush moves freely inside its holder cylinder. Pinch brush wire between your thumb and finger and pull up gently. The brush is spring loaded and should return easily onto the motor commutator face.
  - Assembly must be removed and serviced if any brush does not move freely or is stuck in the holder cylinder.
4. Insert measuring device into each brush cylinder to check brush depth. The following diagrams show the tool inserted into brush holder, from the top. Each holder has a key hole type slot that will permit the tool insertion on either side of the brush wire.
5. Utilizing the JB Webb brush gage (C1096833), check each brush to verify the brush wear indicator shows "good".

**Warning:** Be sure power leads are removed from the motor prior to checking brush depth with any metal instruments.

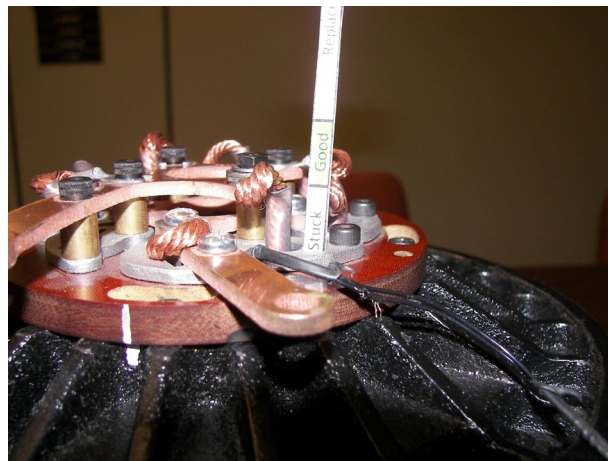
6. The following diagrams show brush wear in one of three conditions:
  - Brush condition is "good". See illustration below.



- Brush condition is worn. See illustration below. The assembly must be removed for proper servicing and the brush must be replaced.



- Brush is “stuck” in the holder cylinder or is obstructed. See illustration below. The assembly must be removed for proper servicing.

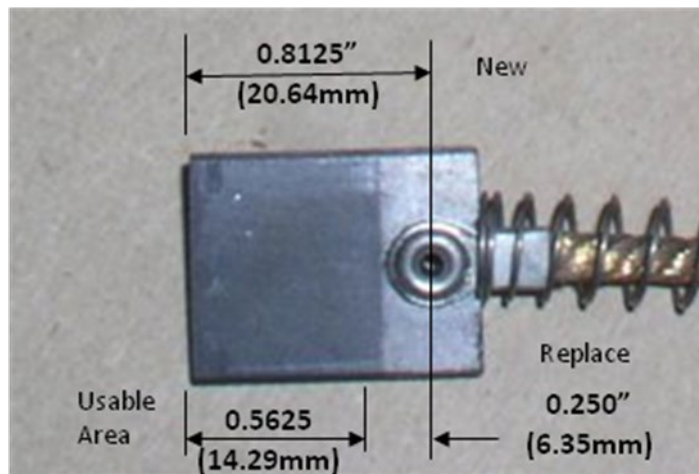


7. If all brushes check “good”, reinstall the assembly cover and reconnect the motor leads.
8. If ALL brushes do not check “good”, refer to the next section regarding assembly removal for proper servicing of the motor brushes.

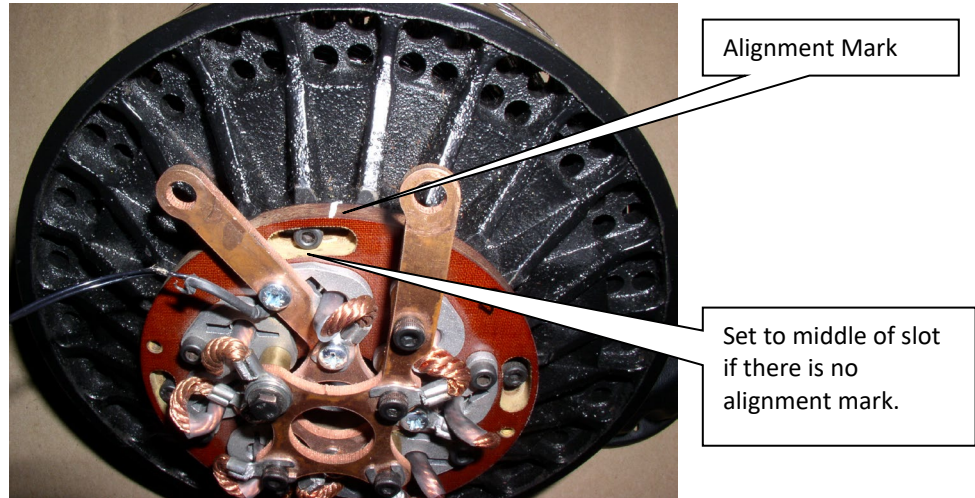


## Brush Measurement after Disassembly

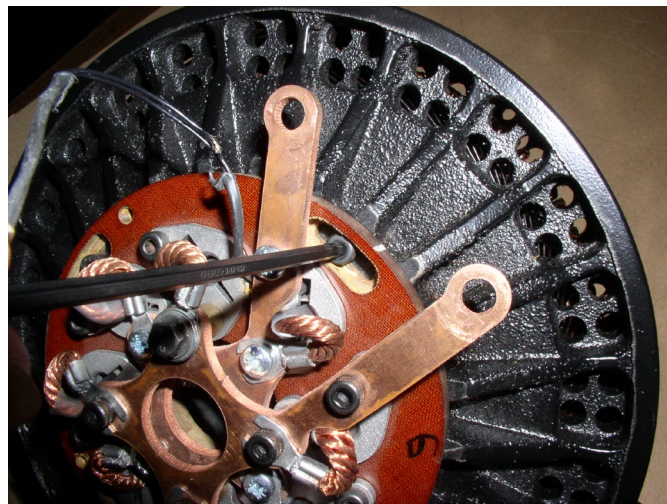
1. Refer to the brush assembly removal procedure in this manual.
2. After the brush assembly has been removed, each brush needs to be measured to verify its wear level.
3. There is approximately 9/16" of usable brush surface on a new brush. Proper measurement on brushes is described below.
4. Measure from the center of the brush-attaching rivet to the end of the brush.
5. A new brush should measure approximately  $\frac{3}{4}$ ".
6. "Good" or an acceptable measurement is between  $\frac{1}{4}$ " and  $\frac{3}{4}$ ".
7. Replace brushes as required and re-assemble the brush assembly as described in this manual.



## Brush Assembly Removal



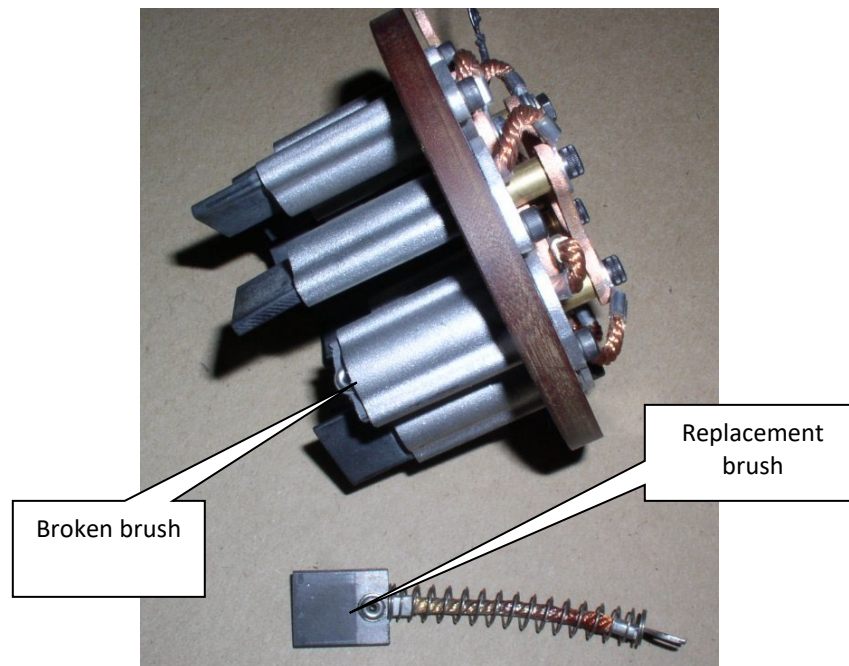
Note the alignment mark on the brush holder and the motor housing, in the illustration above. If there is not an alignment mark, create one with a suitable marker to insure the proper timing of the motor when reassembling the brush holder. When assembling a motor with no alignment mark, adjust the brush holder to align the mounting screws to the middle of the slot. Removal procedure follows.



1. Remove four screws (using an M4X16-3mm hex wrench) to remove the brush holder assembly from the motor.

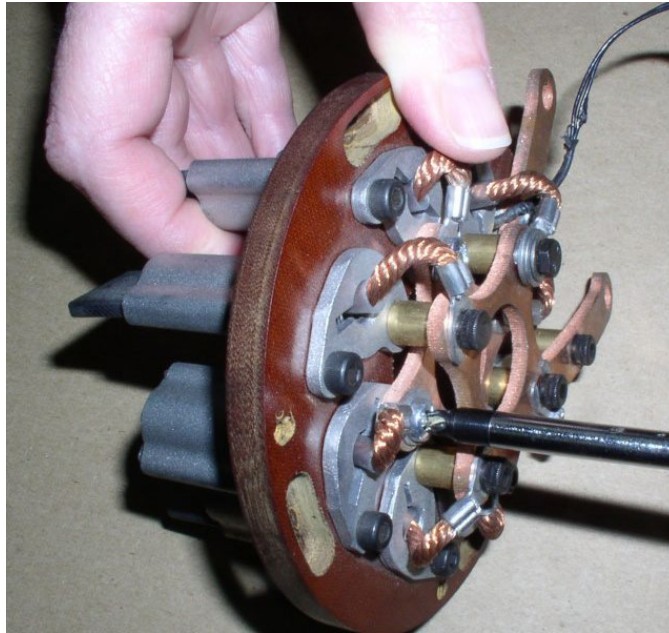


2. The brush assembly will separate from the motor housing as the screws are loosened due to the pressure of the brush springs.

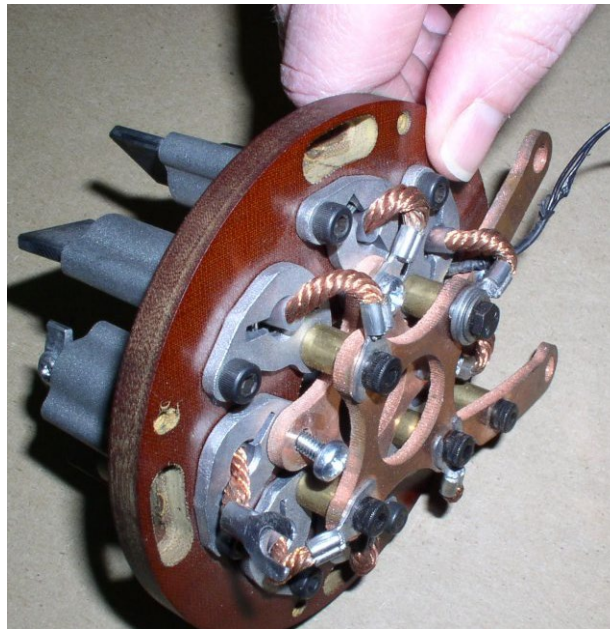


3. The above picture shows a broken brush. The new replacement brush is shown below the assembly.

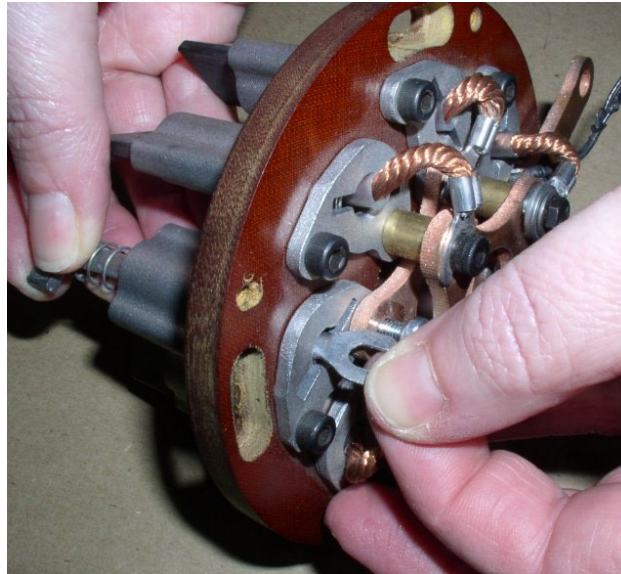




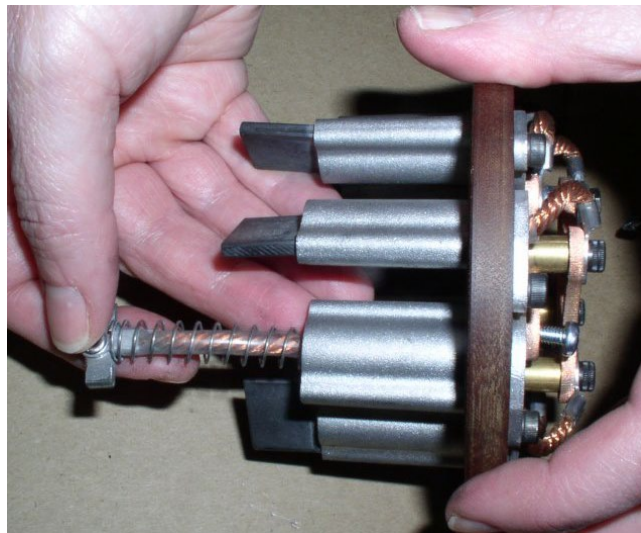
4. Loosen the screw securing the brush wire terminal to the motor power lead plate.
5. Note that the wire terminal is forked so the screw does not need to be removed.





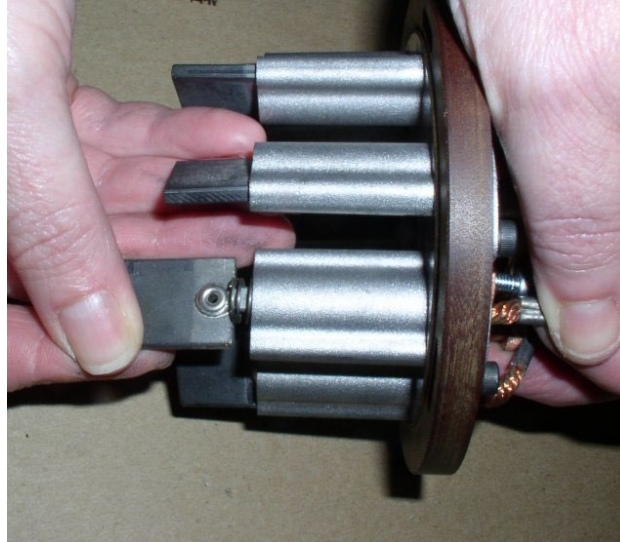


6. Pull the terminal away from the screw. Line up the terminal with the slot in the brush holder and pull on the brush.



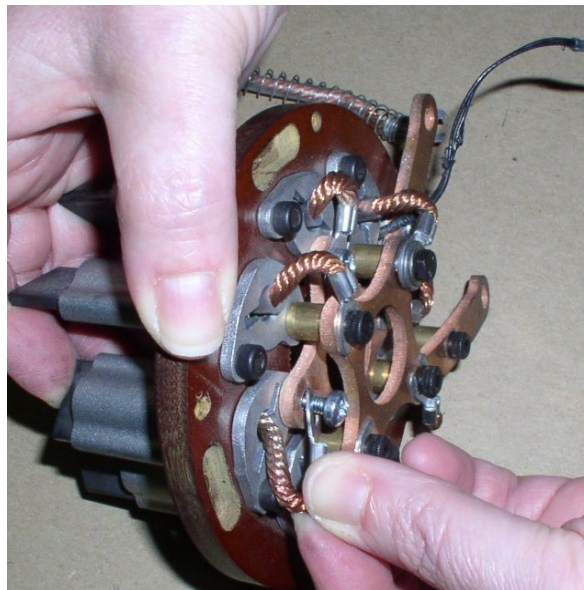
7. Once the terminal goes through the slot the brush will pull free from the brush holder.
8. Verify the brush holder is clean and smooth.
9. Refer to brush installation instructions, following.

## Installing New Brushes

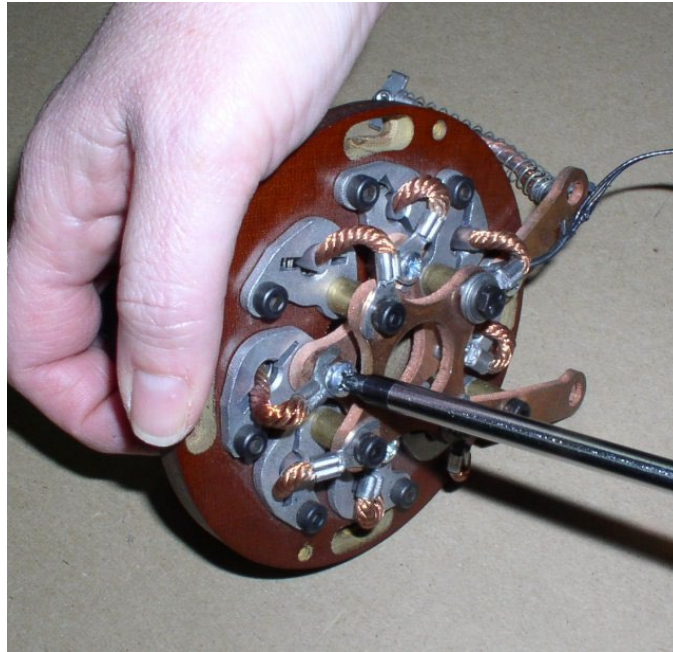


**Note: The brush has tapered sides. Pay particular attention to the orientation of the brush when inserting the new brush into the brush holder.**

1. Push the brush terminal end through the brush holder.



2. Place the terminal under the brush screw.

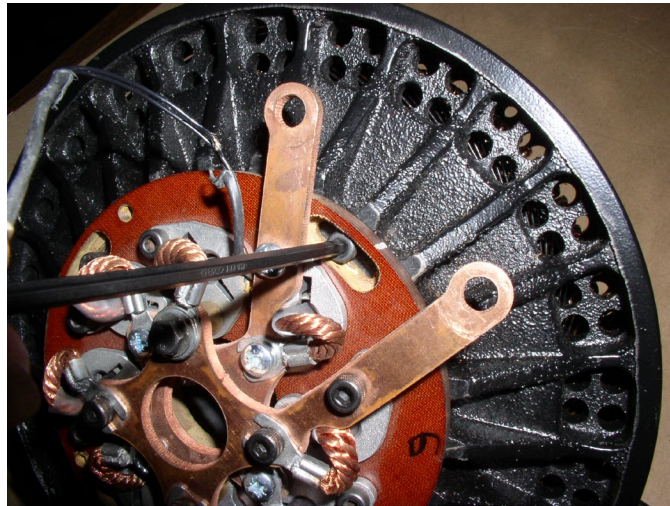


3. Tighten the terminal screw securing the brush lead in place.
4. Verify the brush moves freely inside the holder cylinder.
5. Assure the slack (service loop) of the brush wire does not contact other surfaces throughout its vertical travel.





6. Put the brush assembly back in the motor housing, making sure the alignment mark is lined up.



7. Insert the brush holder screws and tighten securely.



8. Reinstall the brush assembly cover and install the retainer screws.

## Motor Brush Part Numbers

Complete assembly with brushes and temp switch – C1094705

Individual Brush Only (8 needed per motor) - C1086942

JB Webb Brush Gage - [C1096833](#)

## Adjusting the Brush Holder

Correct timing of the brushes is essential for long life and optimum efficiency.

When the center brush holder timing mark is opposite the timing mark on the motor (aligned), the commutator is in the neutral position and the motor will perform equally well when rotating in either direction.

A more accurate setting may be achieved dynamically by the following procedure.

1. Loosen the four M4 x 16 brush holder retaining screws.
2. Connect a positive and negative supply to the terminal studs and tighten.
3. Place a DC clamp meter around the negative supply cable.
4. SECURE THE MOTOR FIRMLY.
5. Switch on the power. **NOTE: Apply no more than 12 volts and 20 amps.**
6. Rotate the brush holder clockwise or counterclockwise until the lowest amp reading is obtained.
7. This is the neutral position.

**Note:** The maximum continuous current in the neutral position should not exceed 170 amps @ 24 volts. Rotation is defined looking at the shaft end of the motor as though it were a clock face. All motors are set at the factory to run in the neutral position unless instructed by the customer.

## JB Webb Brush Gage

This do-it-yourself gage will print to size. Print or transfer these dimensions to stiff card stock paper or thin plastic with measurements scored or drawn.

