Sentria™

Service Manual

MODEL G10D
120 V
50-60 Hz.
7A

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THE SERVICE CENTER/DEPARTMENT OPERATION

2.3 TOOLS AND METERS

Tools required include:

Screwdrivers – Flat and Phillips – Assorted Sizes
Pliers – Assorted
Impact Screwdriver
Bench Vise
File – Round Rattail – 8" long
File – ¼" pillar – 6" long
Tap Wrench
Threading Taps 6 x 32, 8 x 32, 10 x 24, and 10 x 32

In addition, certain special tools and supplies available from the factory are:

Tools:

Fan Locking Pin P/N T104 S
Torque Screwdriver Set P/N T151 S
No. 0200 Snap Ring Expander Pliers P/N T154
No. 0300 Snap Ring Compressor Pliers P/N T155
Open End/Box Wrench 11/32" P/N T156
Bearing/Slide Centering Gage P/N TT-150
Rear Bearing Puller – Universal P/N T127 A
TX20 Torx Bit ¼" x 1" P/N T157 and TX25 Torx Bit ¼" x 1" P/N TT176
Torx Bit Set – P/N T166 S (TX10 ¼" x 1", TX15 ¼" x 1", TX20 ¼" x 1 15/16")

Supplies:

Touch Up Paint P/N 309206
Silicone Sealant P/N T117 4.7 oz. Tube
Bearing Plate Eyelet and Ratchet Lock/Ratchet Pedal Grease P/N T159 S
Rear Axle Grease P/N T160 S
Gasket Silicone Lubricant P/N 289094S (6/case)
Flitz Polishing Paste P/N 243604 150 gram tube and P/N 243504 960 gram can
Flitz Polishing Cloth P/N 243203 each and P/N 243203S (24/case)
Static Mat with ground wire, Wrist Strap with cable P/N 166906 ESD Kit

Meters required for analysis and electrical safety testing are:

Watt Meter – with range to 5000 watts
Ohmmeter or Battery – Powered Test Light
Ohmmeter – 0.001 Ohm accuracy
High Voltage Insulation Tester – Capable of 3750 Volts, AC

These meters should be available through electrical equipment or motor service supply companies in your area. Follow the manufacturer's operating instructions when using these meters. Practice safe working habits at all times.

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TROUBLESHOOTING

4.1 USE OF THIS SECTION

4.1.1 Warnings, Cautions, and Notes

Observe all Warnings, Cautions, and Notes in this section as well as those sections to which you will be referred.

4.1.2 Arrangement of the Troubleshooting Section

The troubleshooting section is arranged in two parts; first, a matrix which deals primarily with mechanical problems, and second, an extensive electrical resistance test.

The user will look up the problem in the table. This table lists the problem, provides probable causes(s) and a solution for each probable cause. Each solution is followed with a reference in parentheses. This reference is made to the service sections of this manual (Sections 5, 6, 7, and 8).

When the problem appears to be electrical in nature, and the solution(s) provided in the troubleshooting matrix do not alleviate the problem, the user is to proceed to the Open Circuit Isolation Sequence (Section 4.4.1).

Whenever a cleaner has experienced an electrical problem, the unit must undergo a high potential test (see Section 4.5) prior to being returned to service.

SECTION 4 – 120 V

TROUBLESHOOTING

4.2 TROUBLESHOOTING GUIDE

4.2.1 TroubleShooting Matrix

The following matrix guides the user to the probable cause and a solution to problems which may occur with use. When the problem appears electrical in nature, and the information contained in the following table does not correct the problem, proceed to Section 4.4 for information on conducting an electrical resistance check.

TROUBLESHOOTING TABLE

PROBLEM	PROBABLE CAUSE	SOLUTION
1. Motor does not run	1. No power supply 2. Power cord failure 3. Nozzle and Mini Emtor connection 4. Power switch failure 5. Carbon brush stuck in holder 6. Brush lead wire failure 7. Armature or field coil failure 8. Electrical short	1. Check household current 2. Replace power cord (5.2 E-K) 3. Verify nozzle and Mini Emtor lugs actuate the switch levers (5.2 A-C) 4. Replace power switch (5.6.4) 5. Replace carbon brush assembly (5.6.3) 6. Replace brush lead wire (5.6.3) 7. Replace armature (5.6.5) or field coil (5.6.6) 8. Conduct electronic resistance (4.4.2 & 4.4.3) and repair short
2. Motor runs on one speed	1. Actuator lug broken off of floor nozzle or hose 2. Power switch failure 3. Field coil failure	1. Replace floor nozzle or hose suction blower connector 2. Replace power switch (5.6.4) 3. Replace field coil (5.6.5)
3. Motor continues to run with nozzle or Mini Emtor removed	1. Power Switch failure	1. Replace power switch (5.6.4)
4. Motor runs briefly and stops or motor runs intermittently	1. Power cord failure or loose at the power switch 2. Power switch failure 3. Carbon brush sticks in holder	1. Replace power cord (5.2 E-K) or power switch (5.6.4) 2. Replace power switch (5.6.4) 3. Replace carbon brush assembly (5.6.3)

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TROUBLESHOOTING TABLE		
PROBLEM	**PROBABLE CAUSE**	**SOLUTION**
5. Armature/carbon brushes spark	1. Motor binds 2. Carbon brush stuck in holder 3. Armature or field coil failure 4. Power switch failure 5. Broken or cracked fan blade	1. Replace motor (5.6.1) or failed motor component (5.6.2 – 5.6.7) 2. Replace carbon brush assembly (5.6.3) 3. Replace armature (5.6.5) or field coil (5.6.6) 4. Replace power switch (5.6.4) 5. Replace fan assembly (5.6.2)
6. Motor Vibrates	1. Fan blade chipped or worn 2. Fan pulley worn 3. Motor bearing(s) failure	1. Replace fan assembly (5.6.2) 2. Replace fan assembly (5.6.2) 3. Replace motor bearings (5.6.5 E & 5.6.5 G)
7. Motor runs hot	1. Blocked exhaust duct 2. Armature or field coil failure	1. Clear exhaust duct (5.6.1 D) 2. Replace armature (5.6.5) or field coil (5.6.6)
8. Motor bearing noise	1. Motor bearing(s) failure	1. Replace front bearing (5.6.5 E) or rear bearing (5.6.5 G)
9. Squeal noise from motor on wind down	1. Rubber seal creeps on bearing plate eyelet	1. Apply thin coat of T159 S grease to eyelet under rubber seal (5.6.2 F)
10. Clicking sound from motor area	1. Foreign object in fan chamber 2. Excess fan case sealant 3. Damage to armature commutator bar 4. Motor bearing(s) failure 5. Motor runs backwards	1. Remove fan case then remove foreign object (5.3.2 A) 2. Remove fan case then scrape off excess fan case sealant and reseal fan case (5.3.2 A) 3. Replace armature (5.6.5) 4. Replace front motor bearing (5.6.5 E) or rear bearing (5.6.5 G) 5. Brush leads reversed. Correct brush lead routing (Fig. 30, 5.6.8 F)

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TROUBLESHOOTING TABLE		
PROBLEM	**PROBABLE CAUSE**	**SOLUTION**
11. Base pan dirty inside	1. Motor seal pinched/leaking 2. Horn gasket torn	1. Reset or replace motor seal (5.6.8 A) 2. Replace horn gasket (5.3.3)
12. Headlight bulb does not work	1. Bulb failure 2. Loose wiring or incorrect connection 3. Break in wiring 4. Field coil failure	1. Replace circuit board (8.3) 2. Reconnect wiring correctly (Fig. 30) 3. Replace failed wire (Fig. 30) 4. Replace field coil (5.6.6)
13. Drive system assembly has weak assist in forward and/or reverse	1. Tread worn on rear wheels 2. Slide sticks 3. N/D pedal and/or rear axle failure 4. Internal drive system assembly failure 5. Handle pivot spring assembly rivet disengaged from drive system yoke arm	1. Replace rear wheels (5.4) 2. Replace or clean failed slide components (6.1.1) 3. Rebuild or replace N/D pedal (5.4.2) and/or axle (5.4.3) 4. Replace drive system assembly (5.4.1 & 5.4.4) 5. Reinstall handle pivot spring assembly with rivet into drive system yoke (5.4.4 D & 6.1.2 E)
14. Unit creeps in forward and/or reverse	1. Slide sticks 2. Paper bag/filter bag overfilled 3. Handle pivot spring assembly sticks 4. Excessive dirt build up inside cloth bag	1. Replace or clean failed slide components (6.1.1) 2. Replace paper or filter bag 3. Determine cause and repair 4. Determine cause of dirt leakage. Clean or replace outer bag
15. Drive system assembly operates in opposite direction handle fork is pushed	1. Motor wired backwards at power switch	1. Reconnect brush lead wires correctly (Fig. 30, 5.6.7 L)
16. Unit hops, jumps, skips, or chatters	1. Brush roll belt stretched or oversized 2. Rug plate clamped improperly or bent 3. Brush roll out of alignment 4. Improper slide adjustment 5. Drive system assembly failure	1. Replace belt 2. Reattach, repair or replace rug plate (8.1 F) 3. Reposition brush roll (8.1 E) 4. Readjust slide (6.1.1) 5. Replace drive system assembly (5.4.1 & 5.4.4)

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TROUBLESHOOTING TABLE		
PROBLEM	**PROBABLE CAUSE**	**SOLUTION**
17. Drive system assembly rattles on wind down	1. Primary drive belt tight 2. Primary drive sprocket gear loose	1. Adjust primary drive belt (5.4.4 F 1 and F 2) 2. Remove clip and sprocket gear on drive system shaft and replace
18. Drive system assembly grinds when pedal is in NEUTRAL	1. Cam cracked on N/D pedal 2. Bracket/lever assembly worn or bent 3. Overload clutch hangs up on rear axle 4. Bevel gear vibrates on rear axle	1. Replace N/D pedal (5.4.2 A-E) 2. Repair or replace bracket/lever assembly (5.4.2 A-E) 3. Clean or replace rear axle components (5.4.3 A-O) 4. Replace clutch overload gear set and/or rear axle (5.4.3)
19. Drive system assembly squeaks when rolling unit on floor in neutral with motor off	1. Lack of lubrication on rear axle	1. Apply thin coat of T160S grease to rear axle (5.4.3 G)
20. Clicking noise when unit changes direction	1. Slide strikes the slide casting 2. Drive ball missing from rear axle 3. Worn rear axle end or rear wheel hub	1. Adjust slide assembly (6.1.1 E 3 to E 7) 2. Rebuild rear axle assembly and install two new drive balls (5.4.3 D and E) 3. Replace rear axle or rear wheel assembly (5.4.3 C-K)
21. Unit pulls to right or left	1. Rear wheels unevenly worn 2. Rug plate improperly installed or bent 3. Brush roll improperly installed 4. Front wheel shaft bent or broken 5. Base pan twisted 6. Fan case or nozzle failure 7. Only three wheels touch floor	1. Replace rear wheels (5.4 A-C) 2. Repair, reattach or replace rug plate (8.1 F) 3. Reposition brush roll (8.1 E) 4. Replace front wheel shaft assembly (5.3.2 B) 5. Replace base pan (entails entire disassembly of unit) 6. Replace fan case (5.3.2 A) or nozzle (5.3.1) 7. Loosen fan case and realign to base pan (5.3.2)

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TROUBLESHOOTING TABLE		
PROBLEM	**PROBABLE CAUSE**	**SOLUTION**
22. Brush roll belt breaks	1. Brush roll binds 2. Motor runs backwards	1. Remove brush roll ends to clean, or replace brush roll (8.1 E) 2. Motor brush leads reversed. Correct brush lead routing (Fig. 30, 5.6.7 L)
23. Does not pick up dirt, little or no suction	1. Stretched or broken belt 2. Brush roll out of adjustment 3. Brush roll binds 4. Fan blade broken or worn 5. Paper or filter bag overfilled 6. Fill tube clogged 7. Fan chamber clogged 8. Nozzle clogged 9. Motor wired backwards	1. Remove brush roll to replace belt 2. Reposition brush roll (8.1 E) 3. Remove brush roll ends to clean, or replace brush roll (8.1 E) 4. Replace fan assembly (5.6.2) 5. Replace paper or filter bag 6. Remove paper or filter bag and unclog fill tube 7. Clean fan chamber (5.2 B) 8. Clean nozzle 9. Motor brush leads reversed. Correct brush lead routing (Fig. 30, 5.6.7 L)
24. Handle fork leans too far forward	1. Latch plate bent 2. Handle pivot spring assembly bent	1. Replace handle fork latch plate 2. Replace handle pivot spring assembly (6.1.2 B)
25. Handle fork falls down	1. Paper or filter bag overfilled 2. Handle pivot spring assembly weak	1. Replace paper or filter bag 2. Replace handle pivot spring assembly (6.1.2 B)
26. Tilt latch lever failure	1. Tilt latch lever broken	1. Unscrew tilt latch shafts of handle pivot spring assembly and replace lever
27. Bag latch failure	1. Bag latch broken	1. Cut off latch on cloth bag (**do not cut strap**) and slide new latch onto strap (7.1.1)
28. Suction/blower connector or swivel tube failure	1. Broken connector or swivel tube	1. Replace failed suction/blower or swivel tube (8.2)

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TROUBLESHOOTING

4.2.2 Assembly of Unit Section References

Once the problem has been serviced, assemble the unit. Repair assembly references are given below.

1. Motor assembly (5.6.7).
2. Motor and exhaust installation (5.6.8).
3. Slide bracket casting installation (6.1.1 E).
4. Axle and Neutral/Drive pedal assembly (5.4.3 P-R).
5. Drive system assembly installation (5.4.4).
6. Cover shell (6.1.3 A) and scuff plate installation (6.1.3 B).
7. Power cord installation (6.1.3 B).

4.2.3 Micron Magic HEPA Filtration System

The Micron Magic HEPA filtration system is comprised of the disposable paper bag or **filter bag,** the outer cloth bag, and the fill tube/Mini Emtor assembly.

4.3 Electrical Guide 120 V Kirby Unit

The following guide is intended to aid in the diagnosis of common electrical problems. This guide assumes that service is performed by qualified service people familiar with electrical service procedures and who follow safe practices.

4.3.1 Basic Electrical Design

The Kirby unit is powered by a two speed universal motor. Basic circuit elements include a motor field, armature, main power switch, and motor speed selector switch. The head light is powered by a motor field tap. Figure 1 is a schematic diagram of the cleaner in the low speed mode and Figure 2 represents a block diagram of the same circuit. **Reference page 19.**

The Kirby unit has two safety interlock switches that prevent the cleaner from operating in an unsafe condition.

For the motor to run:

1. There must be a floor nozzle, carpet shampoo system nozzle, floor care system nozzle, air intake guard, or attachment hose attached to the front of the machine to activate the front switch plunger.

2. There must be a Mini Emtor, attachment hose, shampoo tank, or dirt meter attached to the exhaust port to activate the side switch lever.

! NOTE
Both front switch plunger and side switch lever must be activated simultaneously for the motor to run when the on/off foot pedal is depressed.

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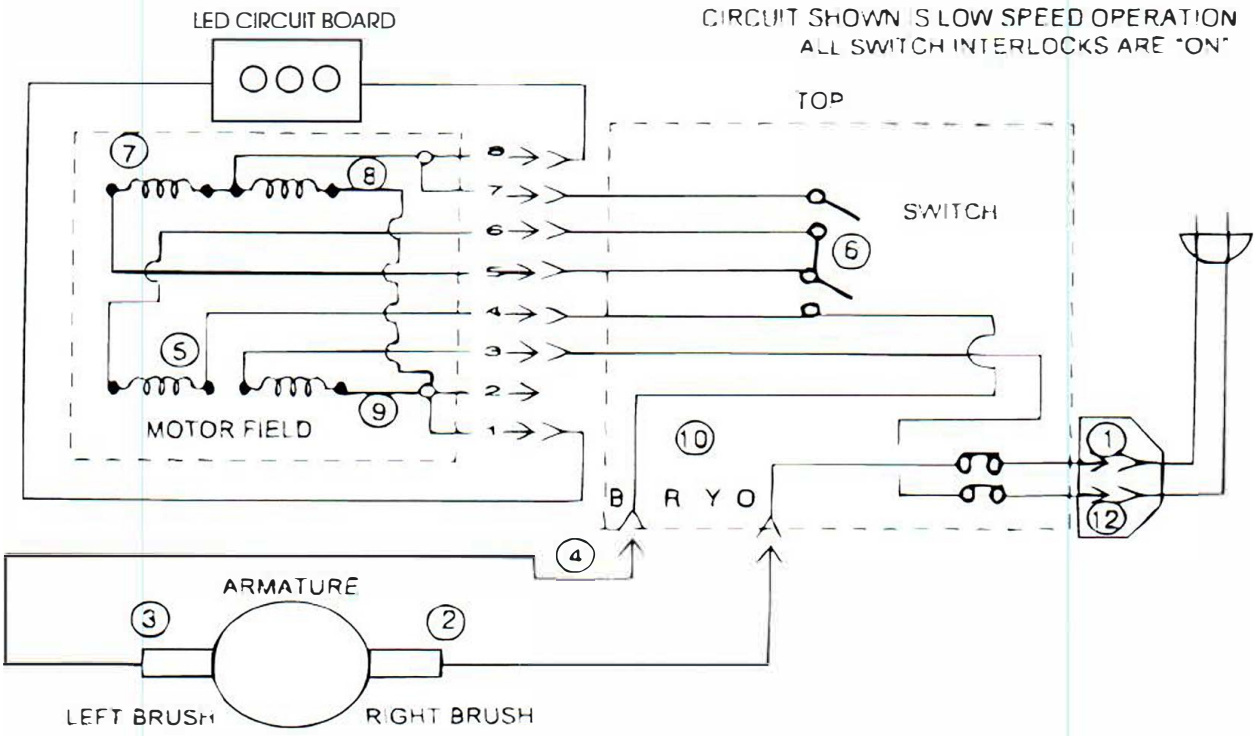

Figure 1 Schematic Diagram

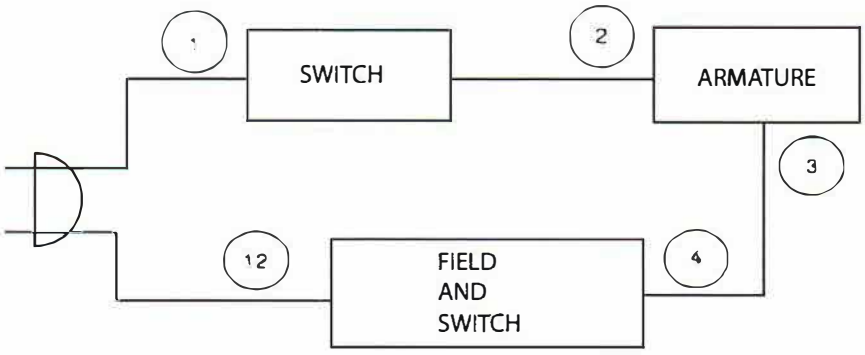

Figure 2 Block Diagram

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4.4 Common Electrical Failures – Cause and Troubleshooting Guide

This service manual is available through the Kirby Distributor Service Center or the International Warehouse in your location.

4.4.1 Motor Will Not Run

The most common electrical failure is that the motor will not run. In most cases, this condition is caused by an open circuit in the cleaner's electrical system. Check for an open circuit after the power supply and power cord have been eliminated as a cause of the problem.

1. Unplug the cleaner and remove the top cover.

2. Visually inspect the cleaner. Look for loose or missing wires, loose motor brushes, or brushes that are jammed in the holder and not making good contact with the armature.

3. In the following sequence; place the cleaner in neutral, carefully plug in the cord, attach the floor nozzle to the front and attach the Mini Emtor bag assembly to the exhaust port. Depress the rear on-off switch one time only.

The cleaner should come on. If it does not come on, do not depress the rear on-off switch and do not remove the floor nozzle or Mini Emtor bag assembly.

Unplug the cord. The cleaner should be in the on condition and ready for the Open Circuit Isolation Check.

Equipment
Ohm-meter 0.001 ohm resolution or better (Fluke Model 34401 A digital multi-meter).

Definition
Continuity is defined as an ohm-meter reading less than 50 ohms.

Procedure
Refer to Figure 1 and Figure 2 for a schematic pictorial views or the block diagrams of the circuit. When the motor works properly, the circuit should show continuity from point 1 to point 12. The most probable reason for a motor that will not run is an incomplete circuit (open circuit) which will test as no continuity at the failure point.

The following Chart 4.4.1 gives a sequence for locating this open circuit point.

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Chart 4.4.1 Open Circuit Isolation Sequence (120 Volt)		
Procedure	**Continuity** *(Yes/No)*	**Comments**
Step 1: Attach one of the multi-meter probes to point 1 (upper switch prong) and the other to point 12 (lower switch prong).	yes	Unit functions properly. Problem is in supply voltage, power cord, or an intermittent open circuit.
	no	There is an open circuit in the unit. Go to Step 2.
Step 2: Attach one of the multi-meter probes to point 1 (upper switch prong) and the other to point 2 (brass brush holder by switch).	yes	Problem is between point 2 and point 12. Go to Step 3.
	no	Problem is in power switch or the connecting wire, see Section 4.4.5.
Step 3: Attach one of the multi-meter probes to point 1 (upper switch prong) and to point 3 (brush holder away from switch).	yes	Problem is between point 3 and point 12. Go to Step 4.
	no	Problem is in the armature, brush holder assembly, or brush contact to armature. See Section 4.4.4 for armature test.
Step 4: Attach one of the multi-meter probes to point 1 (upper switch prong) and the other to wire terminal, point 4 (remove wire from switch terminal marked B).	yes	Problem is between point 4 and point 12. Go to Step 5.
	no	Problem is in the wiring from point 3 to point 4.
Step 5: With the B switch wire still removed, place one probe on the switch exposed B terminal and the other probe on point 12 (the lower switch prong).	yes	Problem is intermittent, or the open circuit was missed. Retest from Step 1.
	no	Problem is either the motor field or switch. See Section 4.4.3 and Section 4.4.5.

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4.4.2 Failure in the Motor Field

A high resolution ohm-meter can be used to help find a motor field problem.

Equipment
Ohm-meter, 0.001 ohm resolution or better.

Procedure
Field resistance measurements are made at the field terminals. Figure 3 provides a form for recording readings and comparing these readings to establish limits.

Perform these checks making sure all parts are kept at a temperature of 65-75 degrees F (18-24 C) for several hours before and during the check.

4.4.3 Failure in the Motor Armature

If it is suspected that the motor armature has a failure, a resistance check with a high resolution ohm-meter can be used to help find the problem.

Equipment
Ohm-meter, 0.001 ohm resolution or better. A four wire bridge circuit (usually expensive) can be used in place of the meter.

Procedure
Armature ohm readings are performed by measuring the resistance of the commutator bars 180 degrees apart.

The ohm readings are performed by measuring the resistance of the commutator bars 180 degrees apart. The ohm value for the 11 bar to bar readings, transverse 180 degrees (measuring opposite bars) is from .09 to 1.25 ohm.

Check for the following resistance:

Motor Field

Terminals	Winding	Resistance	Reading
5 and 7	B	.426/.490	_____
7 and 8		0	
8 and 2	C	.200/.230	
2 and 1		0	_____
1 and 3	D	.200/.230	
3 and 4		open	
4 and 6	A	.426/.490	
6 and 5		open	
1 and 6 with 3 and 4 connected		.627/.721	_____
3 and 4 with 5 and 6 connected		1.254/1.443	_____

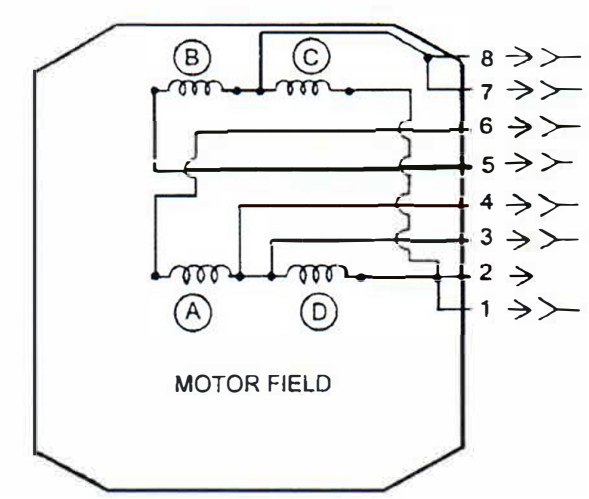

Figure 3. 120 Volt Motor Field Resistance

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4.4.5 Failure in the Switch

See Figure 4. If it is suspected that the switch has a failure, a resistance check with a regular ohm-meter can be used to help find the problem.

Equipment
Ohm-meter, 0.001 ohm resolution or better, such as Fluke model 34401 A.

Procedure
For the switch to be on, the two safety interlocks must be in the proper position. In front of the switch are two movable plungers. The lower plunger must be pressed in to allow the on condition (continuity between field terminal #3 and point 12) of the switch. In a similar fashion, the side activation lever from the exhaust port safety interlock must be in the forward position to allow the switch to be on. Finally, the foot pedal activates the orange plunger in the back of the switch which switches the main contacts (between points 1 and 2) to the on position.

Main Contacts on Check
To test for the on condition, move the two interlocks to the on position noted above, then push the rear plunger once. Place a jumper wire between the switch prongs (points 1 and 12). With the ohm-meter across terminal O and field terminal #3 the ohm-meter should read continuity. If either of the safety interlocks are moved to the off position (rest condition), the ohm-meter should read an open circuit. Movement of the rear plunger should not allow the switch to come back on until both safety interlocks are in the on position. In addition to the main contacts, there are field contact terminals and a speed blade contact that could cause the lack of continuity.

Speed Selection Contacts On Check

To check the speed blade contact, use the following sequence:

1. Remove the switch. Attach one ohm-meter probe to switch field terminal #5 and the other probe to switch field terminal #6. The field terminals are located on the back side, enclosed in a plastic cover. Mounted on the cleaner, the top switch terminal mates with field terminal #7. In the off (rest) position, or with the lower front plunger pushed in, the ohm-meter should read continuity between field terminals #5 and #6.

2. Push in the upper front plunger (high speed activation). There should be no continuity between field terminals #5 and #6.

3. Measure between fields #4 and #5. There should be no continuity between field terminals #4 and #5 when the high speed plunger is out (rest), and the ohm-meter should read continuity with the upper plunger in.

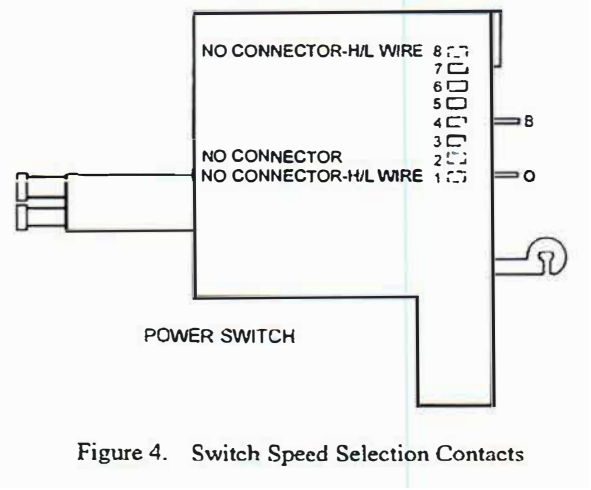

Figure 4. Switch Speed Selection Contacts

4. Measure between field terminals #6 and #7. There should be no continuity with the high speed plunger out, and there should be continuity with the plunger in.

4.5 High Potential Test of Finished Units

Purpose:
The high potential test is one method of checking the electrical insulation characteristics of finished units. A high voltage potential is provided from the internal wiring of the cleaner and the exposed metallic case of the cleaner. Current that passes from the live internal wiring to the case is measured, and if the current is above a specified trip value, a fail indication is given by the test instrument. A pass reading indicates that the insulation is limiting the current to a safe value.

The high potential test might be performed on a cleaner in the shipping box or on the test table but if the cover is removed for any reason, the high potential test should be done after the unit is assembled and prepared for the customer.

The following procedure should be used to high potential test the finished units.

1. Record the following information:
   a. date
   b. location
   c. signature of person making the check.
   d. serial number of the cleaner being checked.
   e. special comments regarding the particular test conditions or reasons.
   f. results of check (to be recorded later in the procedure).
2. To perform the high potential test the cleaner must be in the on condition. There must be an accessory on the front mounting (floor nozzle) and an accessory on the side exhaust port (Mini Emtor) for the cleaner to be on. One way to ensure the cleaner is on is to run the cleaner, and while running, pull the plug.
3. With the cleaner in the on mode, the plug removed from the wall outlet, and the high potential tester off, attach one of the probes from the high potential tester to the cord prongs and the other probe to the exposed metal surface of the cleaner. The cleaner should pass with either cord prong or both prongs connected to the test probe.
4. **NOTE:** The Generation series cleaners contain a circuit board with some elements that can be damaged by the sudden application of high voltage. When the high voltage for this test is applied, the voltage should be a zero volts initially, and then brought up to the test voltage in approximately three seconds.
5. The test voltage should remain on for 60 seconds, and there should be no indication of a failure. The present standards indicate that the test voltage should be 3750 volts, A.C.
6. Record the results and turn the high potential tester down to zero voltage for the next test unit.

NOTES

SECTION 5 – 120 V

SERVICE DETAILS AND INSTRUCTIONS

5.1 USE OF THIS SECTION

5.1.1 Warnings, Cautions, and Notes

Observe all Warnings, Cautions, and Notes.

5.1.2 Arrangement of Illustrated Parts Lists and Exploded Views

The parts list and related exploded views are provided in Section 9.

Item numbers on the exploded views relate to the parts list contained in Tables 1 through 12.

5.1.3 Relationship of Text to Theory Illustrations and Exploded Views

Two types of illustrations are provided for clarifications of the procedural text contained within this Section.

Theory Illustrations
Throughout the test, line drawings appear that associate accompanying procedural steps with the unit. Test references, the location or the illustration and its title clarify its use.

Exploded Views
An item number on the exploded views can be used to locate a part in the appropriate parts list. Using the item number, additional information, such as the part number, nomenclature, and assembly relationship can be found in the parts list and exploded views contained in Tables 1 through 12 in Section 9.

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SERVICE DETAILS AND INSTRUCTIONS

5.2 Power Unit Checkout

If the Kirby Unit requires service, checkout as follows:

A. *See Figure 5.* Remove rug nozzle (or hose if attached) and Mini Emtor.

! CAUTION
Ensure cord is disconnected before disassembling unit.

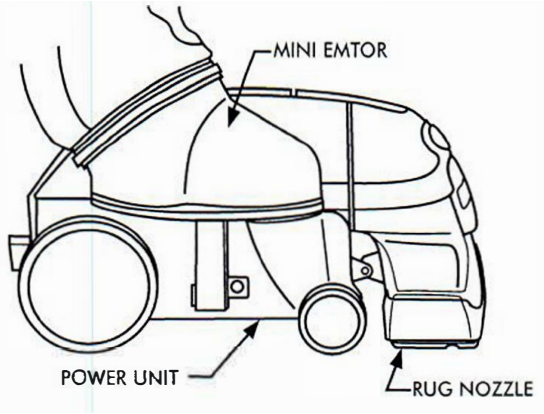

Figure 5. Power Unit

B. Inspect fan, fan chamber and hose for breaking or foreign material that could prevent fan rotation or interrupt air flow into bag.

! WARNING
Do not attempt to operate the motor without rug nozzle or hose and Mini Emtor properly installed. Interlock features of the switch will not permit motor operation unless the inlet and outlet are properly engaged to their mating parts. Any attempt to override the interlock could result in physical injury.

C. Install rug nozzle or hose and Mini Emtor.

D. Operate switch pedal and observe power unit operation.

E. If the power unit does not operate properly, inspect the power cord for damage or evidence of shorts or opens.

F. If the power cord is frayed or damaged, test unit with a known good power cord.

G. Check power unit operation as described above.

H. If the power unit does not operate properly, see power unit disassembly Section 5.3.

I. The unit will require removal of the cord cover and cover screw prior to power cord disconnect. Remove the cover hold down screw. Push the cover forward toward the front of the unit, then pull down to allow tab of cover to clear base pan.

J. Installation is the reverse of removal. Tighten cover screw to 5-8 in-lbs.

K. A T157 torx screw bit is required to remove and install the cord cover screw.

5.3 Power Unit Disassembly General

Access to the internal components of the power unit can be gained by using the following procedures. Disassemble only as required to identify a component that requires service or replacement.

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SERVICE DETAILS AND INSTRUCTIONS

5.3.1 Cover Assembly Removal

A. Remove rug nozzle, Mini Emtor, and handle with bag from power unit.

B. *See Figure 6.* Remove scuff plate by:
   1. Remove screw at the bottom of the scuff plate.

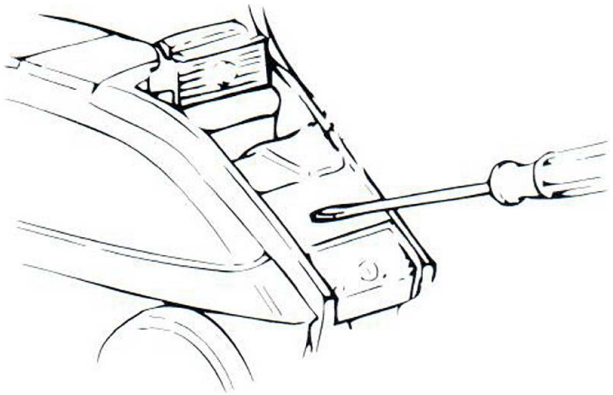

Figure 6. Scuff Plate Removal

   2. Insert flat blade screwdriver in slot and lift.
   3. Apply downward pressure to top of scuff plate and carefully slide to rear to disengage clips.

C. Remove cover casting by:
   1. Raise headlight cap and remove two flat head screws at front of cover casting.
   2. Remove two screws from both sides of the on/off switch on the back of cover. (These screws are exposed after the scuff plate is removed.)
   3. Lift cover off and slide to rear to clear slide bracket assembly and headlight cap.

5.3.2 Fan Case Assembly and Wheel Shaft Main Assembly Removal

! NOTE
Removal of the fan case is necessary only if replacement of the fan, nozzle lock, or fan case is required. For fan replacement see Section 5.6.2.

A. Fan Case Assembly:
   1. *See Figure 7.* Remove one flat head screw from front of fan case assembly. This screw is located just below the power switch interlock.

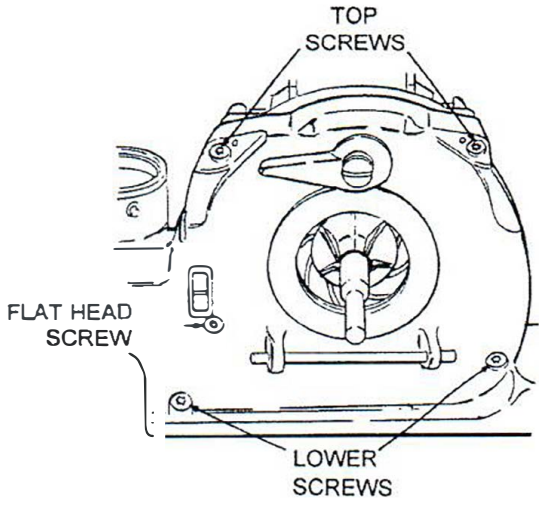

Figure 7. Fan Case Assembly Screw Removal

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2. Remove two screws from top of fan case.
3. Remove two remaining screws from lower end of the fan case.
4. *See Figure 8 and 9.* Using one of the two methods shown, break seal between fan case and base pan and remove fan case.

! NOTE
Screwdriver method may be used with motor installed.

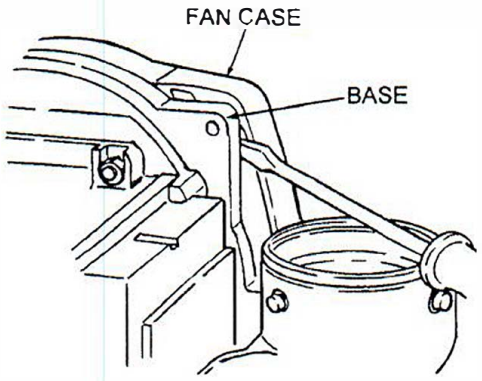

Figure 8. Insert flat bladed screwdriver in opening between fan case and base pan, then pry to break seal.

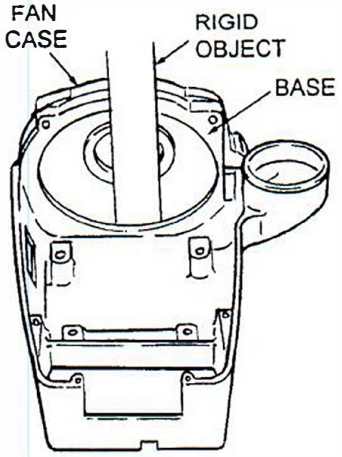

Figure 9. Place rigid object between fan case and base pan, then pry to break seal.

5. If the fan blade requires replacement, refer to Section 5.6.2.
6. Prior to the reassembly of fan case, clean old sealant from joining surfaces and apply new silicone sealant, P/N T117 as shown in Figure 10.
7. Assemble fan case assembly to base pan with screws and hand tighten.
8. Place fan case and base pan assembly with wheels on a flat surface.
9. Verify all wheels are touching flat surface and tighten screws to 24-32 in-lbs.

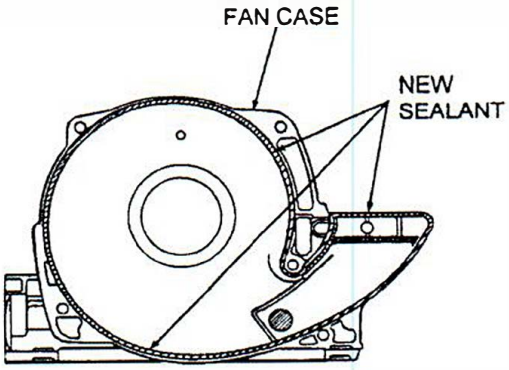

Figure 10. Fan Case Sealant Application

B. Wheel Shaft Main Assembly:
   1. *See Figure 11.* Remove two screws and shaft clamps from bottom of fan case.
   2. Remove wheel shaft main assembly, ratchet lock and spring from fan case.

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C. Wheel Shaft and Ratchet Lock Service:

1. Inspect wheel shaft components for breaks or cracks and center shaft for distortion. Replace wheel shaft assembly if any of these conditions exist.
2. Inspect teeth area of ratchet lock and ratchet pedal for wear. Replace the ratchet lock or wheel shaft assembly or both components if height adjustment slippage occurs.

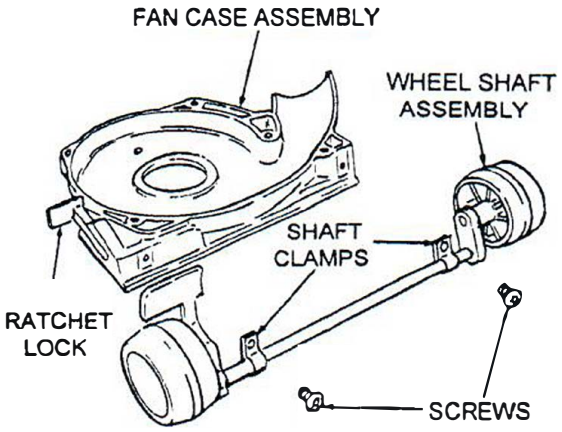

Figure 11. Ratchet Lock and Wheel Shaft Removal

3. Remove all debris from the fan case ratchet box, ratchet lock, spring and ratchet pedal teeth before installation to fan case.
4. Apply thin layer of T159S grease to all inside surfaces of ratchet box and teeth area of ratchet pedal.
5. Insert spring into hole of ratchet lock. Then install both into ratchet box and compress.
6. While ratchet lock and spring are compressed, install wheel shaft to fan case by inserting teeth of ratchet pedal onto teeth of ratchet lock.
7. Align wheel shaft on fan case and install shaft clamps and screws. Tighten screws to 18-24 in.-lbs.

5.3.3 Base Pan

If the O-ring horn adapter requires replacement:

A. *See Figure 12.* Remove the o-ring horn adapter using a flat blade screwdriver between the gasket and base pan. Twist the blade while prying the adapter upward.

! NOTE

Do Not remove or grind the rivets.

B. Remove all debris from the exhaust horn area of base pan. Check horn adapter rivets for excessive movement. Replace if necessary.

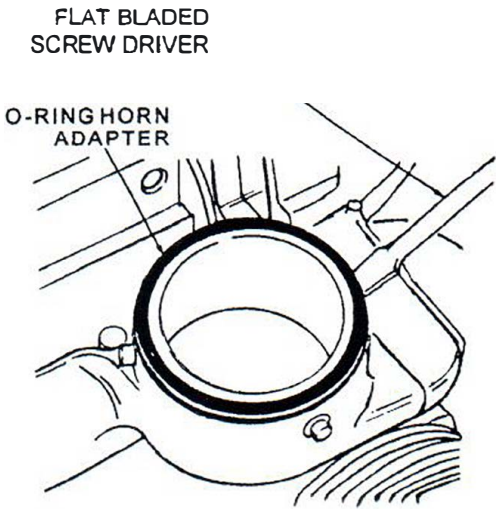

Figure 12. O-ring Horn Adapter Removal

C. Place o-ring adapter assembly into base pan, keeping assembly centered in horn. Apply force evenly (by hand) to top of assembly until it snaps into place. If assembly by hand is difficult place a smooth protective surface (preferably plastic) over entire assembly and tap until o-ring horn adapter assembly snaps into place.

! CAUTION

Never tap or strike gasket directly.

5.4 Drive System Assembly

The drive system assembly is a sealed unit and should only be serviced at Kirby. However, wheel covers and wheels may be replaced without removing drive system assembly from power unit as follows:

A. *See Figure 13.* Insert a thin flat blade screwdriver through slots in back of wheel and gently twist to release spring tabs of wheel cover. Lift off wheel cover.

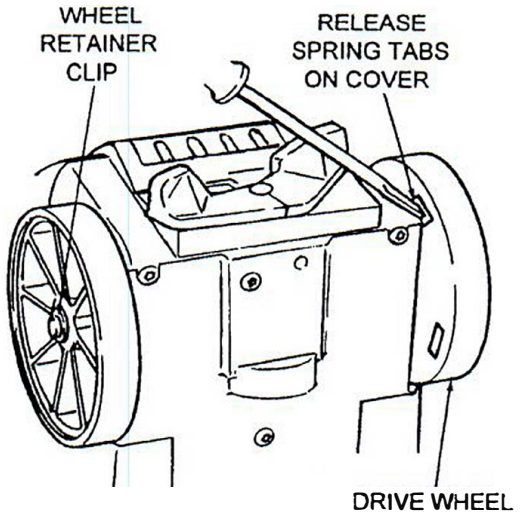

Figure 13. Drive Wheel Cover and Wheel Replacement

B. Use ring expander pliers, TI54, to remove retainer clip from axle.
C. Remove wheel and replace, then install retainer clip.
D. Install hub cap by inserting tabs through slots in wheel. Hub cap may be damaged if tabs are not located in wheel slots.

5.4.1. Drive System Assembly Removal

Remove the drive system assembly as described below. Detailed service information on the drive system assembly is provided in Section 5.4.2.

A. *See Figure 14.* Using a thin flat blade screwdriver, carefully pry the pivot points of the power switch foot pedal off the pivot pins formed in the drive system housing.

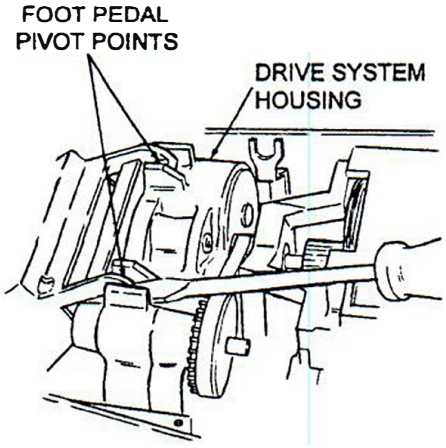

Figure 14. Foot Pedal Removal

B. Carefully lift power switch foot pedal up and out of power unit until sufficient clearance is available to slide power switch actuating rod out of foot pedal. Leave actuating rod connected to power switch.

C. Turn the power unit over as shown in Figure 15.

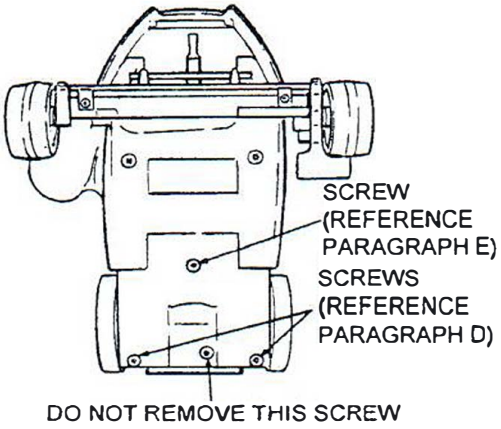

Figure 15. Bottom of Drive System Assembly Housing

D. Remove the two screws closest to the drive wheels.

E. Remove the screw from the center of the drive system assembly. Do not remove the screw at the center rear of the drive system assembly at this time.

F. While supporting drive system assembly, turn the power unit over. Position power unit as shown in Figure 16.

G. Set N/D pedal in drive mode.

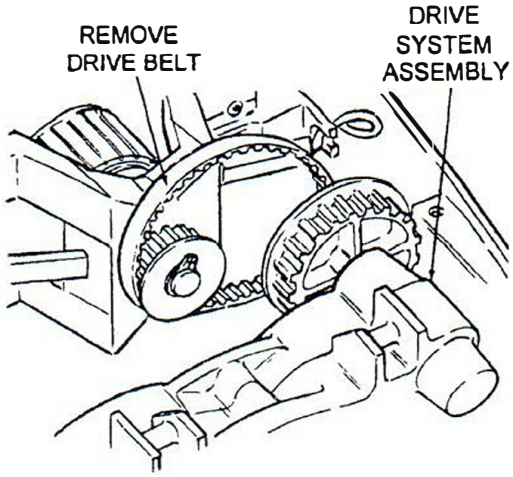

Figure 16. Drive Belt and Drive System Assembly Removal

H. Lower the drive system assembly to get some slack in the drive belt. Then remove belt.

I. Make sure power switch actuating rod is pointing upward, then remove the drive system assembly from the power unit.

5.4.2 Neutral/Drive Pedal Assembly Service

Refer to Section 5.4.1 for drive system assembly removal and Section 9, Figure 44 for exploded view of N/D pedal and rear axle assembly.

A. After drive system removal, test N/D pedal assembly for proper shifting into both neutral and drive modes. Also check the breakaway pedal pivot for freedom of movement. Shifting malfunction or extremely tight break-away pedal requires replacement of N/D pedal, bracket cam or rear axle components.

B. Remove N/D pedal assembly by removing screw in bottom of the drive system assembly, and lifting up and pulling out.

C. Remove bracket cam assembly from N/D pedal assembly shaft by raising bracket cam frame from pedal body, then pulling off.

D. *See Figure 17.* Inspect finger of bracket cam assembly for breaks or wear and for a bent or twisted frame. Finger should move back and forth freely. If these conditions exist, bracket cam assembly needs replacement. These conditions may result from clutch half overload gear hang up on drive balls of rear axle. Refer to Section 5.4.3 for rear axle service.

E. *See Figure 17.* Inspect cam of N/D pedal assembly for cracks or loose fit on shaft knurling. Replace N/D pedal assembly if either condition exists.

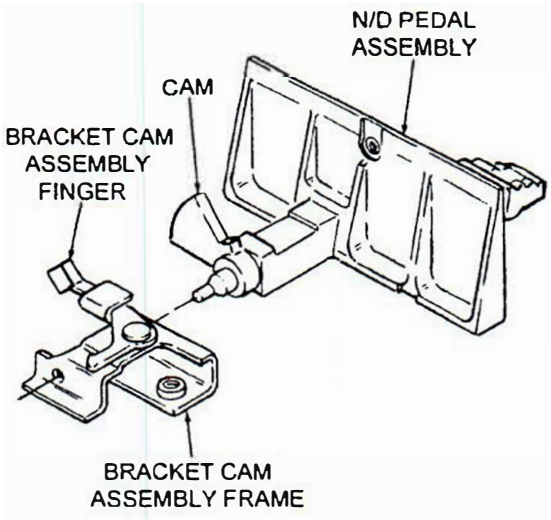

Figure 17. Bracket Cam Assembly and N/D Pedal

5.4.3 Rear Axle Assembly Service

A. After N/D pedal and bracket cam assemblies are removed from drive system, loosen both axle retainer screws and position both left and right axle retainers away from axle bushings.

B. Grasp one or both rear wheels and pull complete axle assembly from back of drive system.

C. Remove both wheel hub caps, wheels and wheel retainer clips as described in Section 5.4.

D. Left side of axle consists of one axle bushing, one bearing, one drive bevel gear and one clutch half overload gear. Right side of axle consists of one axle bushing, one bearing, one spring and one ball drive retainer. One drive ball rests in each of the two recessed holes in axle. Two drive balls are required for proper operation. When removing components, keep in the same order and position as noted.

E. If drive ball recess holes in axle are misaligned, replace axle. Test this condition by sliding clutch half overload gear over the drive balls. If there is any resistance or hang up, replace axle.

F. If drive system assembly makes a ratcheting noise and there is no evidence of gear shavings on inside base of drive system assembly, replace drive bevel gear and clutch half overload gear. If gear shavings are evident, replace drive system assembly.

G. If there is a growling noise in neutral mode, inspect axle surface for wear. If worn, replace rear axle. If there is no evidence of damage or wear, clean off debris and apply a thin layer of T160S grease on axle just to right of drive bevel gear. Slide bevel gear across grease three times to ensure that axle is lubricated where drive bevel gear rides.

H. If there is a bearing noise from the drive system assembly, replace axle bearing(s). If bearing does not spin freely, replace.

I. *See Figure 18.* Position axle so that left side of axle has the greatest distance from the axle drive balls to the end of axle.

J. From the left side of axle, install the clutch half overload gear with the slotted end over the axle drive balls, then install the drive bevel gear with teeth facing teeth of clutch half overload gear. Install bearing with washer side against drive bevel gear. Install axle bushing with longer shoulder toward bearing. Install wheel with flat side toward axle bushing, then install wheel retainer clip and hub cap. *See Figure 18.*

K. From right side of axle, install ball drive retainer against clutch half overload gear with cup side toward gear, install spring against ball drive retainer. Install bearing with washer side against spring. Install axle bushing with longest shoulder toward bearing. Install wheel with flat side toward axle bushing, then install wheel retainer clip and hub cap. *See Figure 18.*

L. *See Figure 18.* After the rear axle is completely assembled, move the left bearing to the right toward the clutch half overload gear assembly.

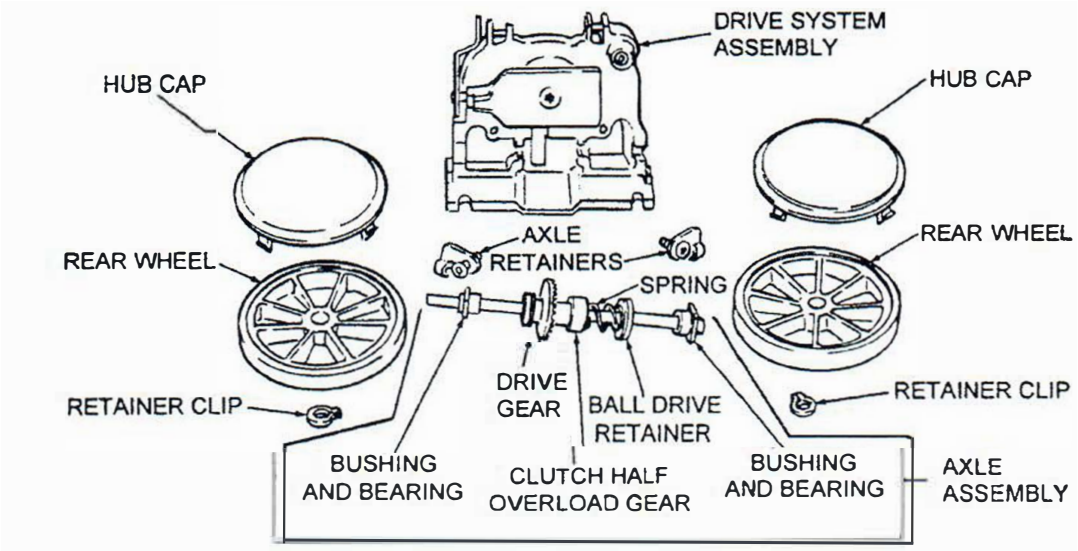

Figure 18. Drive System Assembly and Axle Assembly Components

Insert left axle bushing into the left bushing sleeve of the drive system casting, with tab pointing up, and right side of axle angled away from drive system assembly.

M. Place the left bearing just to the right of the left bearing tabs and the clutch half overload gear assembly aligned with its pocket in rear of drive system casting.

N. With the right side of the axle still angled away from the drive system assembly, compress the spring with the right bearing so that the right bearing is positioned just to the left of the right bearing tabs, then press the axle assembly into the drive system assembly. The right axle bushing must rest in the right bushing sleeve of the drive system casting with tab pointing up.

O. Position the axle retainers so that the curved portion rests over the round surface of the axle bushing and points toward the outside edge of the drive system casting. Tighten screws to 18-24 in-lbs.

P. Install bracket cam assembly to the N/D pedal assembly. Depress the N/D pedal to the drive side. Rotate lever on bracket cam assembly counter-clockwise until it stops, slide the N/D pedal shaft through the hole in the bracket cam frame, then align notch in bracket cam frame on N/D pedal body.

Q. Install the N/D pedal and bracket cam assemblies on the drive system assembly by positioning the bracket cam finger between the drive bevel gear and the clutch half overload gear and placing the tab on the bottom of the N/D pedal body into the hole in the bottom of the drive system casting.

R. Align the threaded hole in the N/D pedal body with the hole in bottom of the drive system casting located to the left of the tab hole, then install the N/D pedal hold down screw with washer attached. Tighten screw to 12-16 in-lbs.

5.4.4 Install Drive System Assembly

A. Place drive belt on the drive system pulley.

B. Put drive system assembly in drive and hold in left hand. Hold switch actuator rod against right side of base pan pointing upward.

C. Insert drive system assembly through the bottom of the base pan.

D. Place rivet on left side of handle pivot spring assembly into yoke of drive system linkage.

E. Install drive belt on motor pulley.

F. Align drive system assembly and secure in the base pan with three screws, tightening the front center screw first. Tighten screws to 22-26 in-lbs.

1. If belt is too tight, loosen screws and shift drive system assembly to left (ratchet side) and re-tighten screws.

2. Using moderate downward pressure, belt should deflect 3/8" to 1/2" between gears.

G. Install on/off pedal.
   1. *See Figure 14.* Apply a thin layer of T159S grease to both tabs at top of housing.

   2. Use a flat blade screwdriver to move actuator rod left to clear slide bracket casting leg.

   3. Place actuating rod in foot pedal hole and firmly press both pedal pivot points onto drive system tabs.

5.5 Headlight Cap/Slide Bracket Assembly, and Handle Pivot Spring Removal

For detailed service information on the components of these assemblies, see Sections 6.1.1, 6.1.2 and 6.1.3. Remove this assembly as follows:

! NOTE
All three of these components are assembled to the slide bracket casting. This casting is attached to the base pan with two screws at its rear legs and two screws through the top front of fan case housing.

A. *See Figure 19.* One of the headlight leads has an in-line connector covered by a clear piece of insulating tubing.

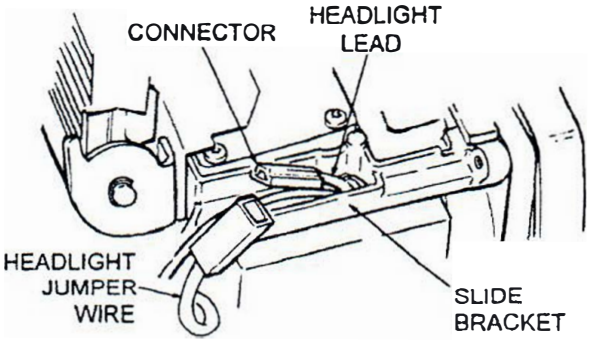

Figure 19. Separation of In-line Connector of Headlight Leads

B. If the light wire assembly, jumper wire or slide bracket casting need to be replaced, cut and remove tie wrap from headlight leads. Slide clear insulated tubing from in-line connector and separate connection. When reinstalling connector, insulated tubing must extend at least 1/8 inch past either end of the connector.

C. Disconnect remaining headlight cap electrical lead from the power switch.

D. Remove two screws from rear legs of the slide bracket casting.

E. *See Figure 20.* Remove two screws at the top of the fan case. These screws pass through the fan case assembly and base pan and thread into the slide bracket casting. Remove headlight cap/slide bracket assembly and handle pivot assembly as a complete unit.

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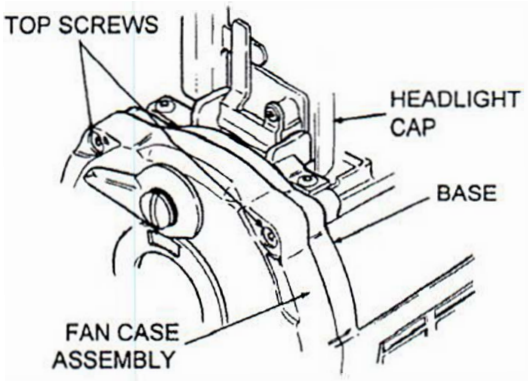


Figure 20. Headlight Cap/Slide Bracket Assembly/Handle Pivot Assembly

F. When installing the slide bracket casting, tighten front screws to 24-32 in.-lbs. and the rear screws to16-20 in.-lbs.

G. Pre-Diamond slide bracket castings only require one black insulation tube positioned around the upper portion of the right rear leg and secured with a tie wrap to prevent chafing of headlight lead wires.

The tube insulation and tie wrap are still available when servicing a pre-Diamond casting. Be sure black insulation does not contact primary drive gear of drive system after slide bracket casting is installed on base pan.

5.6 Motor Unit Assembly Service

5.6.1 Motor Unit Assembly Removal

Remove the motor unit assembly as follows:

A. *See Figure 21.* Turn the power unit over and remove the two screws from the recessed holes in power unit. (See CAUTION at end of this section).

B. *See Figure 22.* Turn the power unit over and remove the two screws from rear of motor unit assembly. (See CAUTION at end of this section).

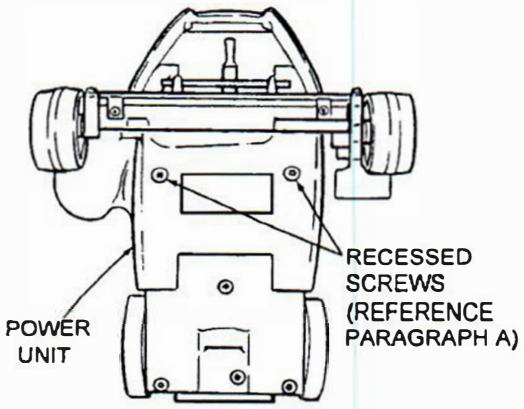
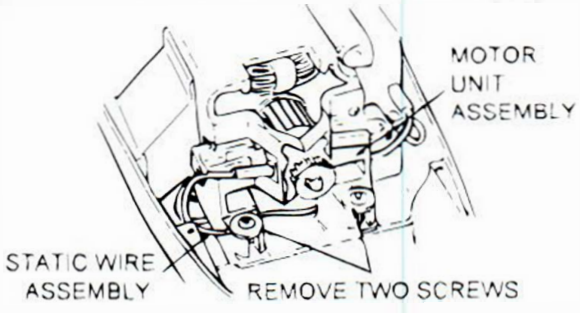


Figure 21. Motor Unit Assembly Removal (Bottom)

Figure 22. Motor Unit Assembly Removal (top)



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C. Remove static wire assembly from the left rear motor hold-down screw.

D. *See Figure 23.* Remove exhaust duct screw. Then place flat blade screw driver in slot. While prying exhaust duct away from motor, lift from underneath to remove.

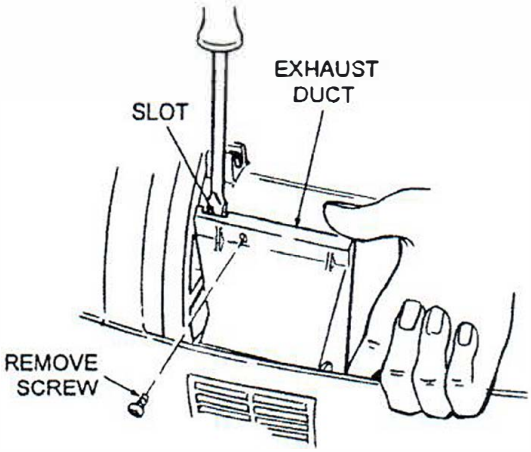

Figure 23. Exhaust Duct and Grill Removal

E. While holding base pan down, remove motor assembly by gently lifting up and out on rear of motor unit assembly.

F. The motor seal must be retained in the bearing plate groove before installing motor into the base pan. Refer to Section 5.6.8 for motor assembly installation.

! CAUTION

When reinstalling motor unit assembly, rear screws (Section 5.6.1 B) must be tightened before front screws (Section 5.6.1 A). Tighten screws to 22-26 in-lbs.

! NOTE

All work conducted on the motor should be done with the switch actuating rod removed.

5.6.2 Fan Replacement

A. *See Figure 24.* Place T156, 11/32 inch open end wrench on flats machined in armature shaft near rear bearing to prevent rotation of armature shaft during fan removal.

B. Insert fan locking tool T104S into hole in fan pulley: remove fan pulley by rotating clockwise.

C. Remove fan washer.

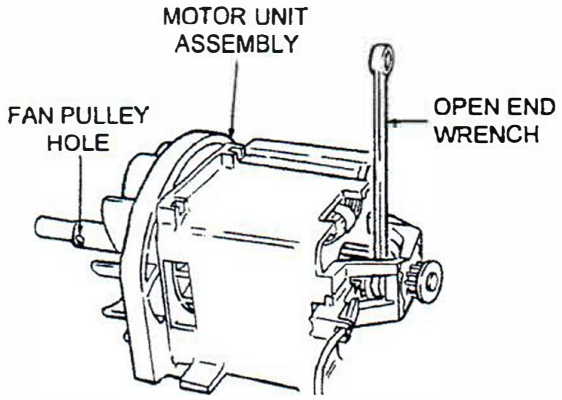

Figure 24 Fan Removal

D. Remove fan blade. Remove mylar washer.

E. Remove spacer/seal assembly.

F. Install fan.

1. After removing all debris from bearing plate top surface, apply a thin, visible layer of T159S grease to bearing plate eyelet.

2. *See Figure 25.* Install spacer/seal assembly with flat side of seal toward spacer shoulder and tapered side of seal toward bearing plate.

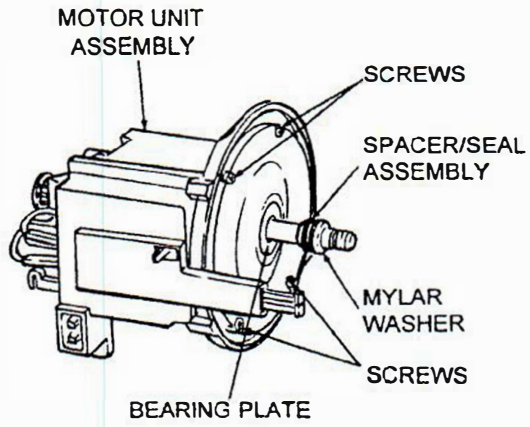

Figure 25. Spacer/Seal Assembly

3. Install mylar fan washer.
4. Install fan blade.
5. Install fan washer.
6. Install pulley and tighten.
   a. Place T156, 11/32 inch open end wrench on armature flats near rear bearing.
   b. Insert fan locking tool T104S into hole in fan pulley; tighten by rotating counter-clockwise.
   c. Do not over tighten pulley.

5.6.3 Carbon Brush Cartridge Replacement

A. *See Figure 26.* If carbon brushes are to be reused, mark the brush holder assembly that is closest to the power switch with an "S". Reinstall brush holder assemblies in same positions from which they were removed.

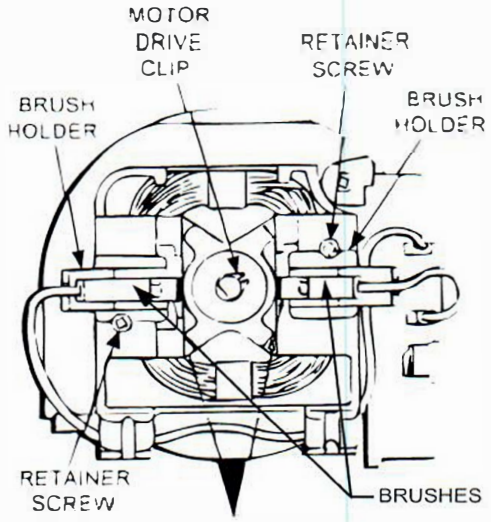

Figure 26. Carbon Brush Cartridge Replacement

B. Remove brush holder retainer screw. With screw removed, tilt brush holder away from screw hole to avoid breaking tab during removal.

C. If carbon brushes are not to be reused, detach leads and discard complete brush holder assemblies.

D. Installation is the reverse of removal. Tighten screws to 4-6 in-lbs.

! CAUTION

Refer to Section 5, Figure 30 for proper electrical wire routing of 120 V motor.

5.6.4 Power Switch Replacement

A. *See Figure 27.* If any leads remain attached to the switch, remove them.

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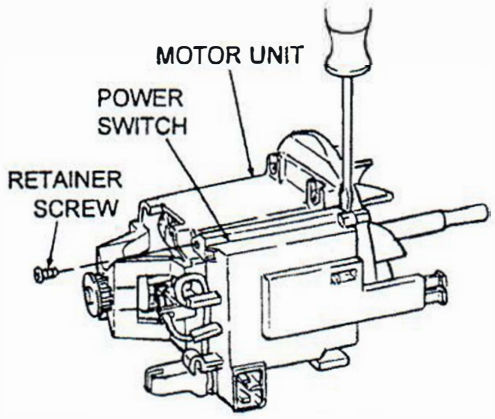


Figure 27. Power Switch Replacement

B. If present, carefully remove switch actuating rod from power switch arm.

C. Remove the retainer screw from rear end of the switch housing.

D. Using a thin flat blade screwdriver, gently pry the switch to the rear in a straight line. This will disengage the terminal block connections from the field terminal block and prevent damage to the field terminals.

E. Check to make sure that all field terminals are present and properly aligned.

F. A non-operating power switch must be replaced since it cannot be repaired.

G. When installing a new power switch, align edge of power switch with edge of motor housing. Press gently in a downward motion, making sure that all field terminals align properly to power switch terminals. Excessive force may cause breakage of field terminals.

H. Tighten power switch screw to 4-6 in-lbs when installing.

5.6.5 Armature Assembly and Front Bearing Replacement

A. *See Figure 26.* Using T154, snap ring expander pliers No. 0200, remove motor drive clip at rear of armature shaft.

B. Remove motor sprocket gear from rear of armature shaft.

C. *See Figure 25.* Remove four bearing plate screws and nuts from motor unit assembly.

D. Remove bearing plate assembly.

E. *See Figure 28.* If required, the retainer ring clip and front bearing can be removed from the bearing plate assembly by using T155 snap ring compressor pliers No. 0300.

F. Remove armature. It is not necessary to remove static washer, finger spring, or tolerance ring from motor housing rear bearing well.

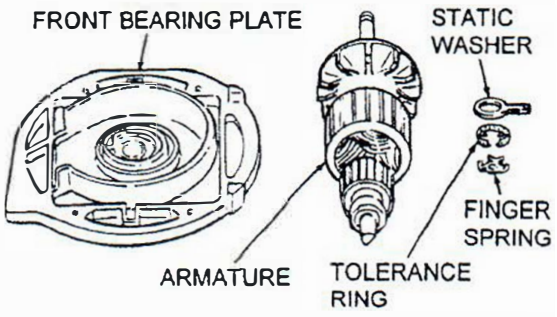


Figure 28. Front Bearing Plate, Armature Assembly, Static Washer, Tolerance Ring, and Finger Spring

G. To replace rear bearing, remove bearing using rear bearing puller, part no T127A. To install bearing, press or lightly tap on the inner bearing race. Bottom end of armature shaft must be flush with bottom end of rear bearing.

5.6.6 Field Assembly Replacement

A. Remove fan, brush holder assemblies power switch, bearing plate assembly, and armature assembly as described in above Sections 5.6.2, 5.6.3, 5.6.4, and 5.6.5.

B. Remove two motor field screws and nuts from motor housing.

C. Remove field assembly from motor housing.

5.6.7 Assembly of Motor

A. Install field coil with terminal block side positioned in open side of motor housing with terminals pointing toward rear bearing well.

B. Install two field screws and nuts. Tighten screws to 16-20 in-lbs.

C. Install static washer in motor housing rear bearing well. **The static washer must be installed before the tolerance ring.**

D. Install tolerance ring in rear bearing well oriented so the tabs are at the bottom of the pocket.

E. Install finger spring in rear bearing well with fingers toward bearing.

F. Install armature assembly.

G. *See Figure 29.* Install bearing plate assembly.

1. Place bearing plate on motor housing with two extruded bosses on under side aligned toward power switch side of motor housing.
2. Rotate until ribs on motor housing align with slots in bearing plate.
3. Install four bearing plate screws and nuts. Tighten screws to 16-20 in-lbs.

H. Install motor sprocket gear with raised lip toward drive system assembly and teeth toward motor.

I. Install retainer clip. Do not over stretch clip.

J. When installing a power switch, align edge of power switch with edge of motor housing. Press gently in a downward motion, making sure that all field terminals align properly to power switch terminals. Excessive force may cause breakage of field terminals.

K. Tighten power switch screw to 4-6 in-lbs. when installing.

! NOTE

All screws threaded into a used motor housing should initially be turned counter-clockwise to find the threads before tightening. This will avoid stripping the threads. Tighten screws to 4-6 in-lbs.

SECTION 5 – 120 V

SERVICE DETAILS AND INSTRUCTIONS

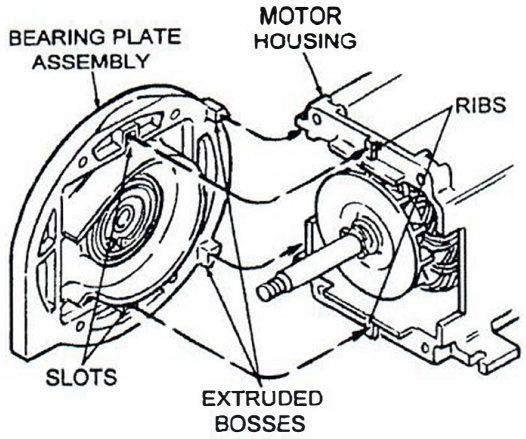


Figure 29 Aligning Bosses On Motor Housing and Slots in Bearing Plate

!NOTE

Refer to Figure 30, pictorial schematic, for proper wire routing, and section 5.6.3. and Figure 26, for carbon brush cartridge assembly positioning and wire routing.

L. Install the left brush cartridge assembly. Tilt brush cartridge and insert cartridge tab into slot in motor housing. Seat cartridge securely in channel. Tighten brush cartridge screw to 4-6 in-lbs.

M. Install long brush lead wire from left brush holder, designated with "B" on the motor housing, around bottom of motor housing to upper switch terminal noted "B" on power switch. Lead wire must be snapped into wire slots on motor housing to secure.

N. Do not install right brush cartridge assembly and lead wire at this time. These parts should be installed after both headlight lead wires have been installed.

O. Install Fan.
   1. Make sure top surface of bearing plate is clean. Apply thin, visible layer of T159S grease to bearing plate eyelet.
   2. *See Figure 25.* Install spacer/seal assembly with flat side of seal toward spacer shoulder and tapered side of seal toward bearing plate.
   3. Install mylar fan washer.
   4. Install fan blade.
   5. Install fan washer.
   6. Install pulley and tighten.
      a. Place T156, 11/32 inch open end wrench on armature flats near rear bearing.
      b. Insert fan locking tool T104S into hole in fan pulley; tighten by rotating counter-clockwise.

5.6.8 Install Motor Assembly

A. Check motor seal for damage. If undamaged, install motor seal in seal channel of front bearing plate. If damaged, install a new motor seal. To reduce risk of improper installation, apply an approved sealant to entire motor seal in channel.
Approved sealants include:
   - ✦ Perma Bond #102
   - ✦ Loctite Superbond #414

B. Install motor assembly unit into base pan.
   1. Position motor unit into base pan. Make sure motor seal is not kinked or twisted and seals completely to base pan surface.

2. Install motor mount screws.
   a. Install rear motor mount screws first. Be sure that static discharge wire is connected to left screw, ahead of wheel well and won't interfere with drive system linkage. Tighten screws to 22-26 in-lbs.
   b. Install the static discharge wire connector end to the static washer tab at bearing well of motor housing.
   c. Install front motor mount screws through bottom of base pan. Tighten to 22-26 in-lbs.

3. Install exhaust duct and grill. Fasten exhaust duct to motor housing with screw. Tighten screw to 4-6 in-lbs.

C. Install power switch actuator rod to power switch.
   1. Raise on/off pedal end of actuator rod to a 90 degree angle and fit switch end of actuator into switch arm.

D. Install headlight lead wires to field coil terminals. Start by resting slide bracket and headlight cap assembly on its right side on top of exhaust horn.

! NOTE
Both headlight lead wires must be routed around outside of slide bracket casting leg.

1. Route the headlight jumper lead wire between the right brush lead wire and switch, through lower hole to field terminal behind the power switch and nearest to the right brush holder.
2. Connect the other headlight lead wire to field terminal through a hole behind the power switch, nearest the switch hold down screw.

E. Now install the right brush cartridge assembly. Tilt brush cartridge and insert cartridge tab into slot in motor housing. Seat cartridge securely in channel. Tighten brush cartridge screw to 4-6 in-lbs.

F. Install right brush lead wire from brush cartridge to lower switch terminal noted "O" on power switch. Refer to Figure 30, pictorial schematic, for proper wire routing, and Section 5.6.3 and Figure 26, for carbon brush cartridge assembly positioning.

G. Lay slide bracket and headlight cap assembly into position on base pan.

H. Test switch connections.
   1. Lubricate o-ring horn adapter. In tall Mini Emtor or dirt meter and rug nozzle.
   2. Install cord to switch.
   3. Plug cord in to power source.
   4. Keep hands clear of motor and rug nozzle and push actuator rod forward to activate switch.
   5. Di connect cord from power source.
      a. Disconnect cord from switch.

I. Install four slide bracket casting screws.
   1. In ert two screws at top of fan case on front of unit. Tighten screw to 24-32 in-lbs.

2. Insert two screws into rear legs of slide bracket ca ting to base pan in front of rear wheel wells. Tighten screws to 16-20 in-lbs.

3. Refer to Section 5.5.F. Install tie wrap around top right lide bracket casting leg to secure headlight lead wires against tube insulation.

4. Refer to Section 5.4.4 for drive system assembly installation.

SECTION 5 – 120 V

SERVICE DETAILS AND INSTRUCTIONS

Sentria™

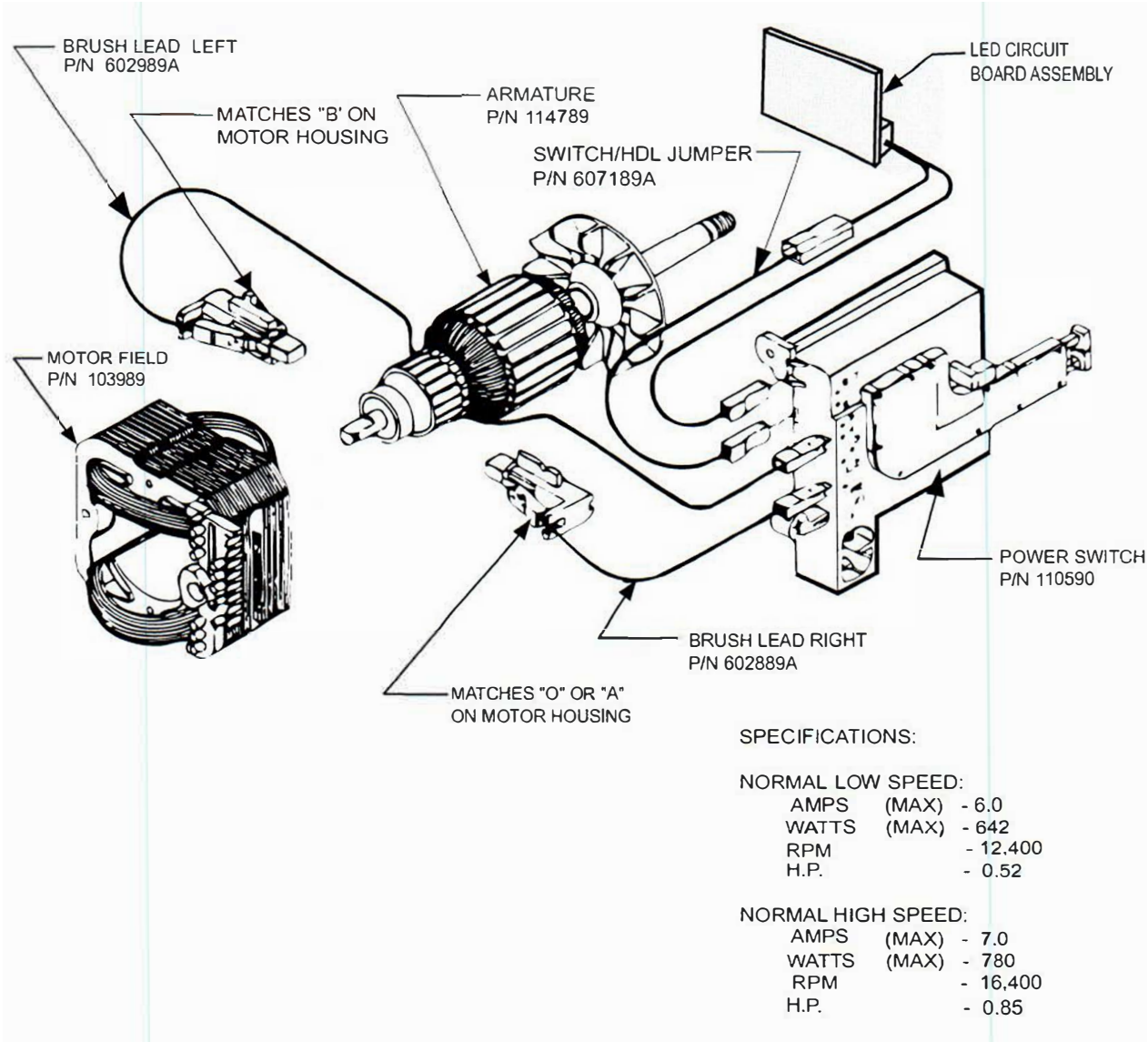


Figure 30. Pictorial Schematic

SECTION 6 – 120 V

SLIDE BRACKET SERVICE INSTRUCTIONS

6.1 Slide Bracket Assembly Service

6.1.1. Slide Bracket Assembly Component Replacement

Service is limited to disassembly and replacement of damaged components.

A. Remove handle pivot spring assembly by removing two screws from bracket tab. Lift handle pivot assembly from slide.

B. Refer to *Figures 31 and 32*. Remove the single screw from the slide adjusting wedge.

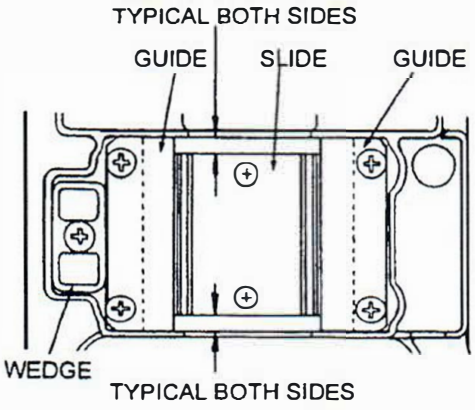


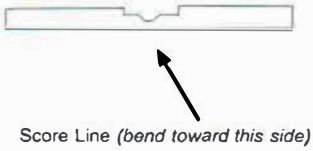
Figure 31. Assembled View of Slide Bracket Assembly

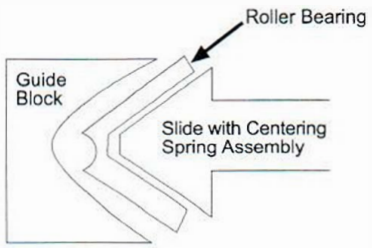
C. Remove four screws from the two guide blocks.

D. Remove guide blocks, slide adjusting wedge, roller bearing assemblies, and slide.

E. *Refer to Figures 31 and 32* as needed to assemble. Assembly is as follows:

1. If new roller bearing assemblies are to be installed, bend along score line so that flat surface of cage will be positioned against the slide.





! NOTE

- The slide adjusting wedge has a tapered side to allow for minor tension adjustments.
- Guide blocks are reversible and interchangeable.

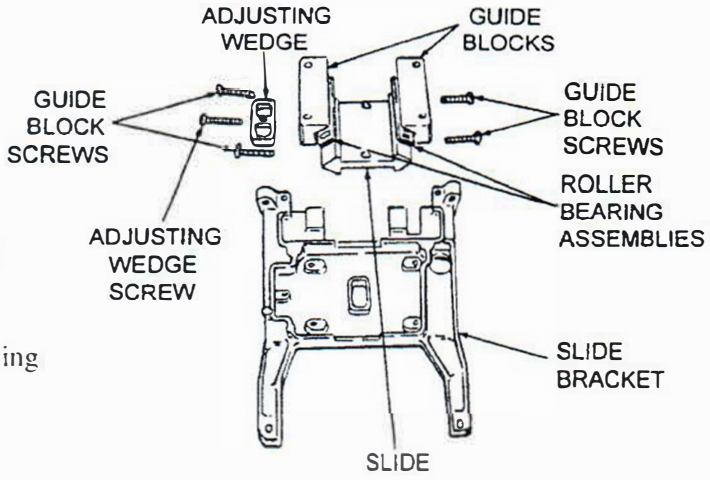


Figure 32. Disassembled View Of Slide Bracket Assembly

SECTION 6 – 120 V

SLIDE BRACKET SERVICE INSTRUCTIONS

- ✦ Slide is equipped with a centering spring. Install with spring facing downward, toward slide bracket casting. When assembled, the spring should rest in the rectangular shaped cut-out in the slide bracket casting.
- ✦ If slide or guide blocks show wear on roller bearing mating surfaces, replace.
- ✦ If needle rollers are worn or loose in cage, replace bearing assembly.

2. *See Figure 31.* Assemble the two roller bearing assemblies, two guide blocks and slide. Place them, as a unit, into the slide bracket casting.
3. Position slide as shown in Figure 31. Install TT-150 tool with **"FACE UP TO CENTER SLIDE"** (no front or rear orientation) facing up to align bearing assemblies and slide. *See Figure 33 and 34.*
4. Install two screws into right side guide block. Tighten screws to 27-30 in-lbs.

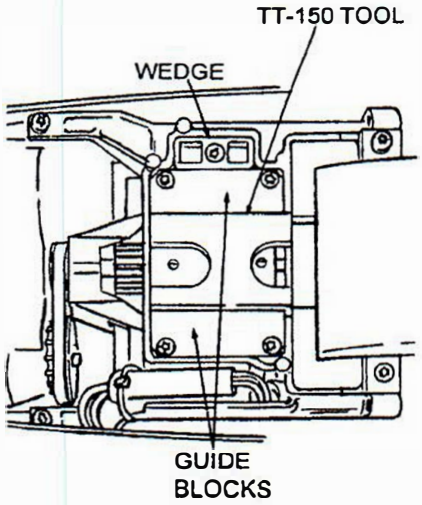


Figure 33. Use of Alignment Tool TT-150 During Slide/Guide Assembly

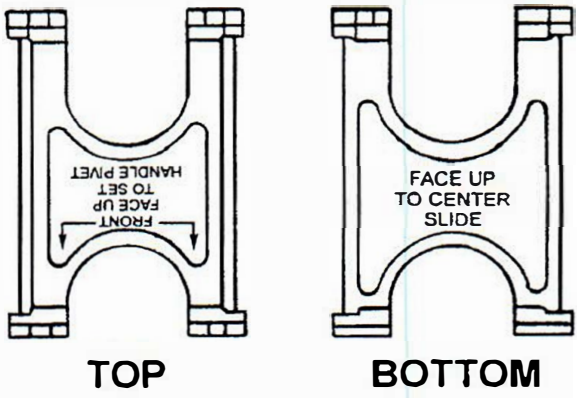


Figure 34. TT-150 Tool

5. Install wedge (tapered side of wedge against taper in casting wall) and single screw into left side of casting pocket. Using a torque screwdriver, tighten screw in wedge to 3-5 in-lbs. Remove TT- 150 tool.
6. Install and tighten two screws on left side guide block to 27-30 in-lbs.
7. Check operation of slide by pushing forward and back with finger. Slide should not stick or hang up.

6.1.2 Handle Pivot Spring Assembly

Service is limited to replacement of the handle pivot assembly only.

A. Do not remove handle boot from handle pivot spring assembly unless replacement is required.

SECTION 6 – 120 V

SLIDE BRACKET SERVICE INSTRUCTIONS

B. *See Figure 35.* Remove two screws from bracket tab. Remove handle pivot assembly.

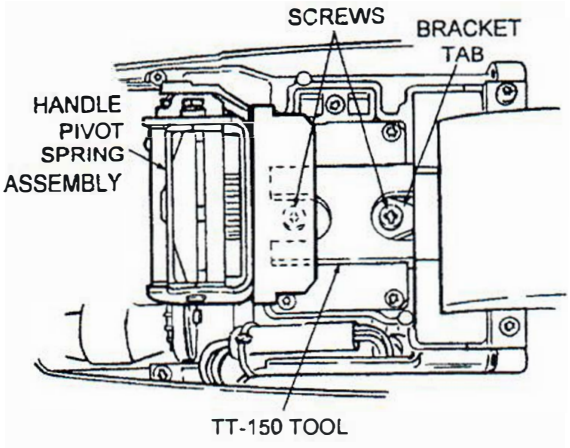


Figure 35. Use of Tool TT-150 During Handle Pivot Spring Assembly

C. Check that bearing cages and slide are centered in casting by inserting TT-150 tool with **"FACE UP TO CENTER SLIDE"** facing up.

D. Remove TT-150 tool. Install handle pivot spring assembly so the tongue lies flat on the slide and the rivet rests in the yoke of the drive system linkage. Linkage should be as far forward as possible without exerting pressure on the linkage.

! CAUTION

Installation of handle pivot spring assembly must be done with slide bracket assembly and drive system assembly mounted in the unit. The following adjustment procedure is required to ensure proper forward and reverse actuation of the drive system.

E. Using other side of the TT-150 tool, install tool to position handle pivot spring assembly with **"FACE UP TO SET HANDLE PIVOT"** facing up. *See Figures 34 and 35.*

! NOTE

Do not put pressure on drive system linkage arm when installing handle pivot spring assembly. Any pressure applied may cause improper forward or reverse operation of drive system.

! CAUTION

No other adjustments should be attempted on the drive system. Internal clearances have been factory set. Any disassembly of the drive system will void warranty.

F. Install handle pivot assembly to slide and tighten screws to 45-55 in-lbs.

G. Remove TT-150 Tool.

H. Check the setting by moving the handle pivot assembly back and forth. The slide should not contact the slide bracket casting when moderate force is applied in both directions.

6.1.3 Final Assembly Unit

A. Install cover shell.
   1. Assure proper assembly of trim strips to cover before installation.

SECTION 6 – 120 V

SLIDE BRACKET SERVICE INSTRUCTIONS

3. Apply inward pressure on trim strips at rear of cover shell while tightening rear crews. Tighten screws to 12-16 in-lbs.
4. Fasten cover to fan case with two flat head screws. Tighten screws to 28-30 in-lbs.

B. Install scuff plate, cord, and cord cover.
1. Place scuff plate over handle pivot spring assembly and push down and forward on front of scuff plate to engage front scuff plate tabs.
2. In tall cord to power switch.
3. Place bottom tab of cord cover in base pan opening.
4. Pu h cord cover toward nozzle until side tab clears base pan.
5. Install cord cover screw. Tighten screw to 5-8 in-lbs.
6. Align holes in cord clip to two holes on right sidewall of cover shell..
7. In tall two cord clip retainer screws through cord retainer into cover. Tighten screws to 7-11 in-lbs.
8. Install scuff plate screw positioned below on/off pedal. Tighten screw to 5-7 in-lbs.

SECTION 7 – 120 V

OUTER BAG SERVICE INSTRUCTIONS

7.1 Outer Bag Assembly Service

7.1.1 Bag Top Assembly Service

A. *See Figure 36.* Remove the bag top cover by lifting it straight up off the bag latch.

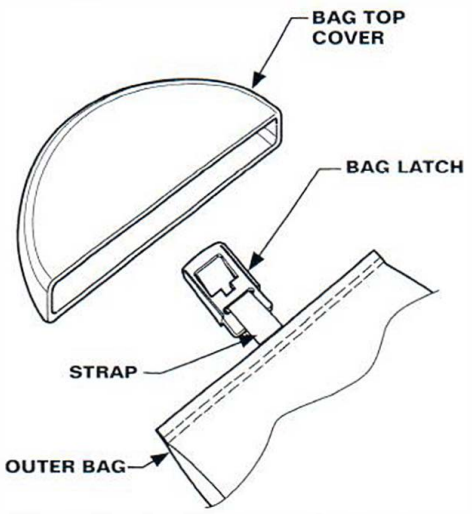


Figure 36. Bag Top Assembly Service

B. To remove the bag top latch, it is necessary to cut the latch from the bag strap. Do not cut the strap.

C. When installing new latch, insert bag strap through the hole in bottom of latch, making sure that the raised tab is facing toward the back of the bag.

D. Insert latch through the top cover with rai ed tab facing toward back of bag. Position top cover with lettering toward the front of bag.

! NOTE
Do not cut the bag strap when replacing a bag latch.

Replacement slotted bag top latches are available as a ervice item.

7.1.2 Removal/Installation of Bag to Mini Emtor

A. To remove outer bag as embly from Mini Emtor, cut through all bars of the lock on bag clamp strap located at the inside wall of the Mini Emtor, then remove the outer bag from the Mini Emtor.

B. To install outer bag to Mini Emtor, unzip the bag, unfold rubber seal at bottom of bag o that wide lip is pointing toward top of bag and stitching ecuring bag to rubber collar is exposed.

C. In tall bag to Mini Emtor with bottom edge of rubber collar extending pa. t ribbed groove in Mini Emtor with narrow groove of rubber collar seated uniformly in ribbed groove of Mini Emtor.

D. Position bag with the front side toward front of Mini Emtor. Align collar parting line with Mini Emtor parting line at back side.

E. Fold wide flap of rubber collar dow n onto Mini Emtor so that top lip of rubber seal fits uniformly into groove of Mini Emtor and covers stitching.

F. Install a bag clamp strap around and into the groove of Mini Emtor at lower edge of rubber collar. Raised cross bar lock of strap must face away from Mini Emtor. Lock connection must be positioned on the inside center wall of Mini Emtor and face right of motor. *See Figure 37.*

SECTION 7 – 120 V

OUTER BAG SERVICE INSTRUCTIONS

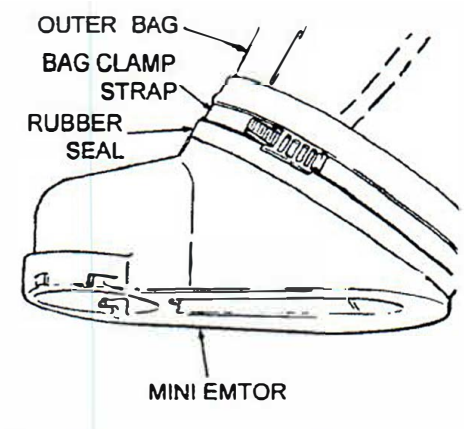


Figure 37. Bag Clamp Strap Position

G. Lock the strap and ensure that all the teeth on the end opposite the cross bar lock are secured by the ribs of the lock. This can be accomplished by using channel lock pliers or a wide flat blade screwdriver while applying pressure behind the raised tab just behind the teeth area.

SECTION 8 – 120 V

BELT LIFTER, ATTACHMENT HOSE AND HEADLIGHT SERVICE

8.1 Belt Lifter Replacement

A. Remove rug nozzle assembly from power unit.

B. Remove rug plate, brush roll and belt from nozzle.

C. Disassemble belt lifter.

1. Remove belt lifter screw.
2. Remove belt lifter body, flat washer, and spring washer from front of nozzle.
3. Remove belt lifter hook and bearing from inside nozzle.

D. Reassemble belt lifter.

1. From inside nozzle, place belt lifter bearing through hole, with tabs toward front of nozzle and flange against inside front of nozzle.
2. Position spring washer over bearing tabs on outside of nozzle.
3. Place flat washer over spring washer.
4. Insert screw into belt lifter body. Place belt lifter body over flat washer. The top side of belt lifter body should be pointing toward the rug plate side of nozzle.
5. Position belt lifter hook inside nozzle with hook pointing to the nine o'clock position when viewed from the rear of the nozzle. Hook will fit into slots in belt lifter body.
6. Install belt lifter screw into center hole of belt lifter body. Tighten screw to 16 in.-lbs.
7. Test assembly to see that position indicators correspond and that the stop rivet functions.
8. Hook should point toward top of nozzle when belt lifter is turned counter-clockwise to its fullest extent.

E. Re-install brush roll and belt.

1. Position belt at the center of the brush roll between brush strips.
2. Slide brush roll into guides in nozzle casting with smaller end cap in left side of casting when viewed from the rear of the nozzle.
3. Turn brush roll end caps so both are at the same setting. Set brush roll so bristles extend 1/8" to 3/16" beyond rug plate.

F. Re-install rug plate.

1. Position rug plate so front tabs fit into slots in nozzle bumper and rest above tabs in nozzle casting. Make sure ends of rug plate fit contour of bumper. Press rear of rug plate down over bumper.
2. Turn the two latch assemblies so they lock the rear tabs of rug plate. If they do not lock the tabs in place, the rug plate or nozzle bumper is not properly positioned. Repeat step 1 and 2.

SECTION 8 – 120 V

BELT LIFTER, ATTACHMENT HOSE AND HEADLIGHT SERVICE

8.2 Attachment Hose Swivel Tube Or Suction Blower Connector Replacement

! NOTE

Repair method described in Section A and B below is the preferred method. If hose is too cold, repair as described in C and D may be improbable. Let hose assembly reach normal room temperature before using methods described in C and D below. Care is required to prevent damage to hose.

A. Heat vinyl cuff with heat lamp or by placing cuff in hot water. When vinyl cuff becomes soft, squeeze, twist and pull to remove swivel tube or uction blower connector.

B. Assemble replacement part in the same manner as in di assembly.

or

C. If heat is not available, carefully place a flat blade screwdriver between suction blower connector and vinyl cuff of hose, at rear of suction blower or between swivel tube and vinyl cuff at rear of swivel tube. Deform vinyl cuff by prying with a screwdriver. Pull suction blower or swivel tube at an angle to remove.

D. To replace both components without heat, apply inward force to a small section of the vinyl cuff until it is deformed sufficiently to allow suction blower connector or swivel tube to slide over vinyl cuff.

8.3 Headlight Lens And LED Service

Materials Needed:

- EL-164306 - Headlight LED circuit board Static Mat with ground wire, Wri t Strap with cable (P/ 166906 ESD Kit)

⚠ CAUTION

Electronic boards are sensitive to static electricity. Therefore, care must be taken during all handling operations, inspections and repair in order to ensure product integrity at all times.

When replacing the Headlight LED circuit board or disconnecting its wires, precautions must be taken to prevent static discharge, which can damage not only the existing circuit board but it replacement at well.

Although the replacement circuit board i furnished in special protective packaging, the use of a grounded wrist strap is required. The wrist strap must be connected to the grounded static mat and worn during removal, handling and reinstallation of the Headlight LED circuit board.

Always be careful not to touch your hand or clothing to any component pin or cable connector on the Headlight LED circuit board.

Attention:

- Prior to disassembly of the Sentria unit, verify that the Static Mat is properly grounded to Earth Ground with the provided ground wire. (Reference ESD Kit instructions)

- Technician must wear the Wrist Strap and have it connected to the Static Mat with the provided cable. (Reference ESD Kit instructions)

SECTION 8 – 120 V

HEADLIGHT SERVICE

Procedure:

1. Place the Sentria Power Unit on the Static Mat.
2. Remove the Nozzle.
3. Rotate the Headlight Cap to the full, upright position.

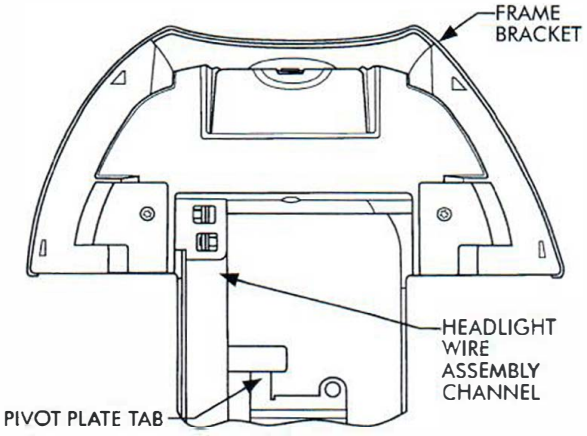


Figure 38. LED Circuit Board

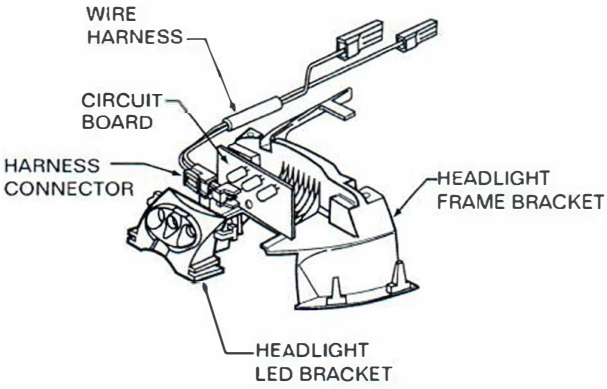


Figure 38a. LED Circuit Board

4. Using the Torx screwdriver, remove the two screws on the underside of the Headlight Cap.
5. Grasp the Headlight Frame Bracket and pull it toward you and down.
6. With the Headlight Frame Bracket removed, slide the Headlight LED Bracket and Circuit Board out of the Frame Bracket.
7. Using the release latch on the harness connector, remove the Board from the wire harness.
8. Gently bend one of the snap latches on the LED Bracket back and remove the Circuit Board from the LED Bracket.
9. Discard the Headlight LED Circuit Board.
10. Unwrap the new Headlight LED circuit board. Bend the outer two LEDs slightly away from the center LED. Carefully snap the Headlight LED Circuit Board into the LED Bracket being sure that each LED goes into one of the holes of the LED Bracket.
11. Plug the Headlight LED Bracket and Circuit Board onto the wire harness.
12. Slide the Headlight LED Bracket and Circuit Board into the Headlight Frame Bracket. Ensure that the wire harness lays flat in the Frame Bracket wire channel.
13. Slide the plastic tab on the Headlight Frame Bracket wire channel under the metal tab on the Headlight Pivot Plate.
14. Rotate the Headlight Frame Bracket up into the Headlight Cap. Hold the outer edges of the Trim Strip against the Cap to ensure that the Headlight Frame Bracket engages the slots in the Trim Strip.
15. Re-install both frame bracket screws. Tighten screws to 16-24 in-lbs.
16. Attach the Nozzle to the Sentria power unit.
17. Rotate the Headlight Cap down.
18. Plug the Sentria power cord into an outlet.
19. Turn on the Sentria unit and verify that all three LEDs in the headlight are illuminated.

NOTES

SECTION 9 – 120 V

ILLUSTRATED PARTS LIST AND EXPLODED VIEWS

SECTION 9 – 120 V

ILLUSTRATED PARTS LIST AND EXPLODED VIEWS

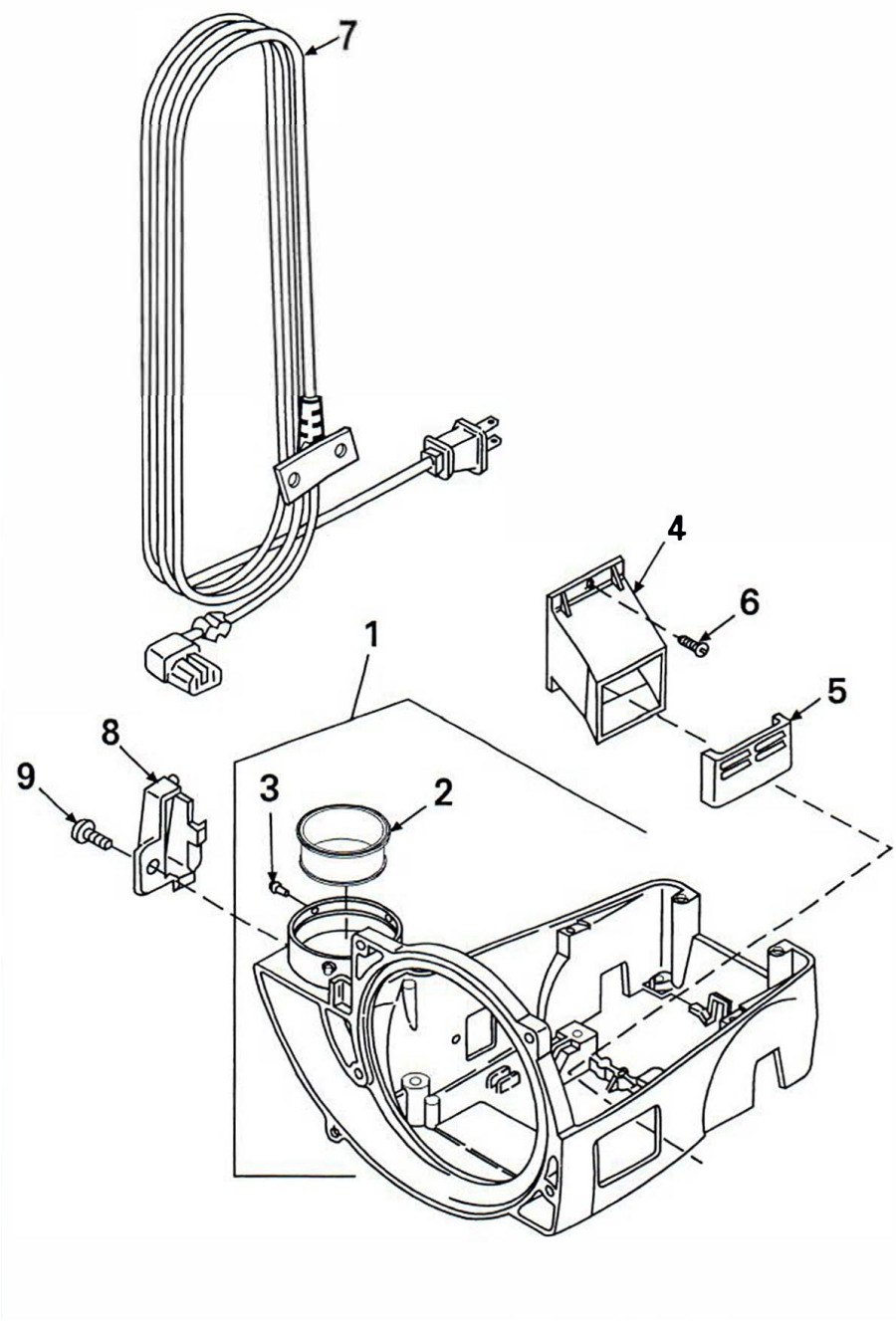


Figure 39. Base Pan Assembly and Cord Set

SECTION 9 – 120 V

ILLUSTRATED PARTS LIST AND EXPLODED VIEWS

Table 1. Base Pan Assembly and Cord Set

1	604306S	Base Pan Assembly
2	601996S	O – Ring - Horn Adapter (5 pack)
3	100689A	Rivet - Horn Adapter (10 pack)
4	106393	Exhaust Duct
5	104106S	Grill - Exhaust Duct (5 pack)
6	605989A	Screw - Exhaust Duct (10 pack)
7	192006	Cord Set - 120 V
8	196006S	Cover - Cord Set (5 pack)
9	232495S	Screw - Cord Cover (10 pack)

SECTION 9 – 120 V

ILLUSTRATED PARTS LIST AND EXPLODED VIEWS

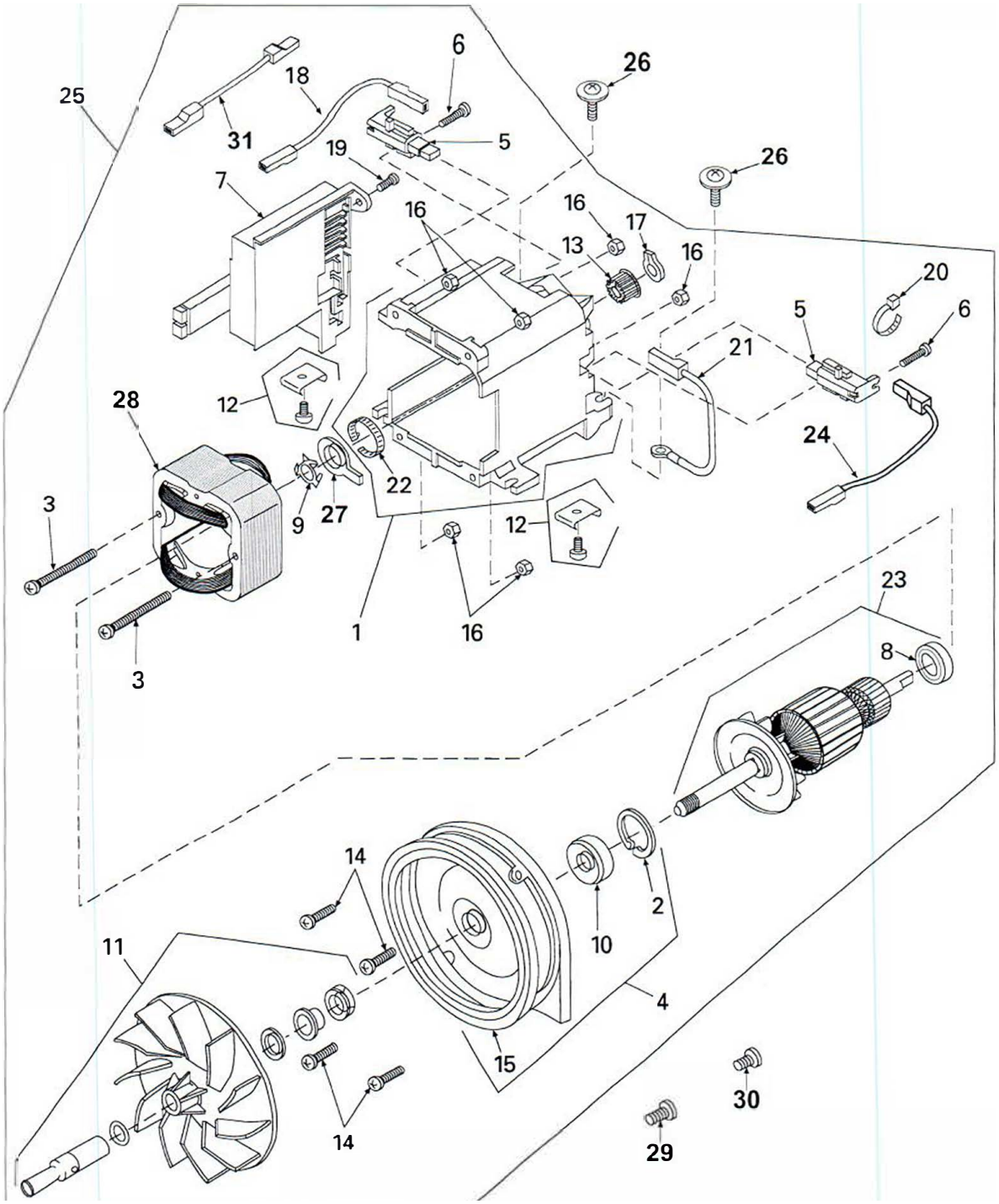


Figure 40. Motor Assembly

SECTION 9 – 120 V

ILLUSTRATED PARTS LIST AND EXPLODED VIEWS

Table 2. Motor Assembly

1	100196S	Motor Housing w/Tolerance Ring
2	101076A	Ring Retainer - Front Bearing (10 pack)
3	104689A	Screw - Motor Field (10 pack)
4	105793S	Bearing Plate Assembly w/Motor Seal
5	107189A	Brush Holder w/Brush (10 pack)
6	107989A	Screw - Brush Cartridge (10 pack)
7	110590	Power Switch -120 V
8	115589	Rear Bearing
9	314990A	Finger Spring (10 pack)
10	116073	Front Bearing
11	119096S	Fan Assembly w/Spacer Seal
12	233100A	Clip and Screw - Front Motor Mount (5 pack)
13	550603	Sprocket Gear
14	600189A	Screw - Bearing Plate (10 Pack)
15	600389S	Motor Seal (5 pack)
16	600589A	Nut - Field Screw and Bearing Plate (10 pack)
17	601689A	Clip - Motor Drive (10 pack)
18	602889A	Brush Lead Assembly - Right - 120 V (5 pack)
19	605989A	Screw - Power Switch to Motor Housing (10 pack)
20	608089A	Tie - Left Brush Lead (10 pack)
21	603589A	Wire Assembly - Static Discharge - 120 V (5 pack)
22	612795S	Tolerance Ring - Bearing Well (5 pack)
23	114789	Armature (with Rear Bearing)
24	602989A	Brush Lead Assembly - Left - 120 V (5 pack)
25	101396G	Motor Assembly w/Motor Seal - 120 V - ***Sentria***
26	231995S	Screw - Rear Motor Mount (10 pack)
27	601889A	Static Washer - 120 V (10 pack)
28	103989	Field Coil - 120 V
29	609390S	Oversized Screw - Power Switch (10 pack)
30	609490S	Oversized Screw - Brush Holder (10 pack)
31	607189A	Headlight Jumper Wire - 120 V (5 pack)

SECTION 9 – 120 V

ILLUSTRATED PARTS LIST AND EXPLODED VIEWS

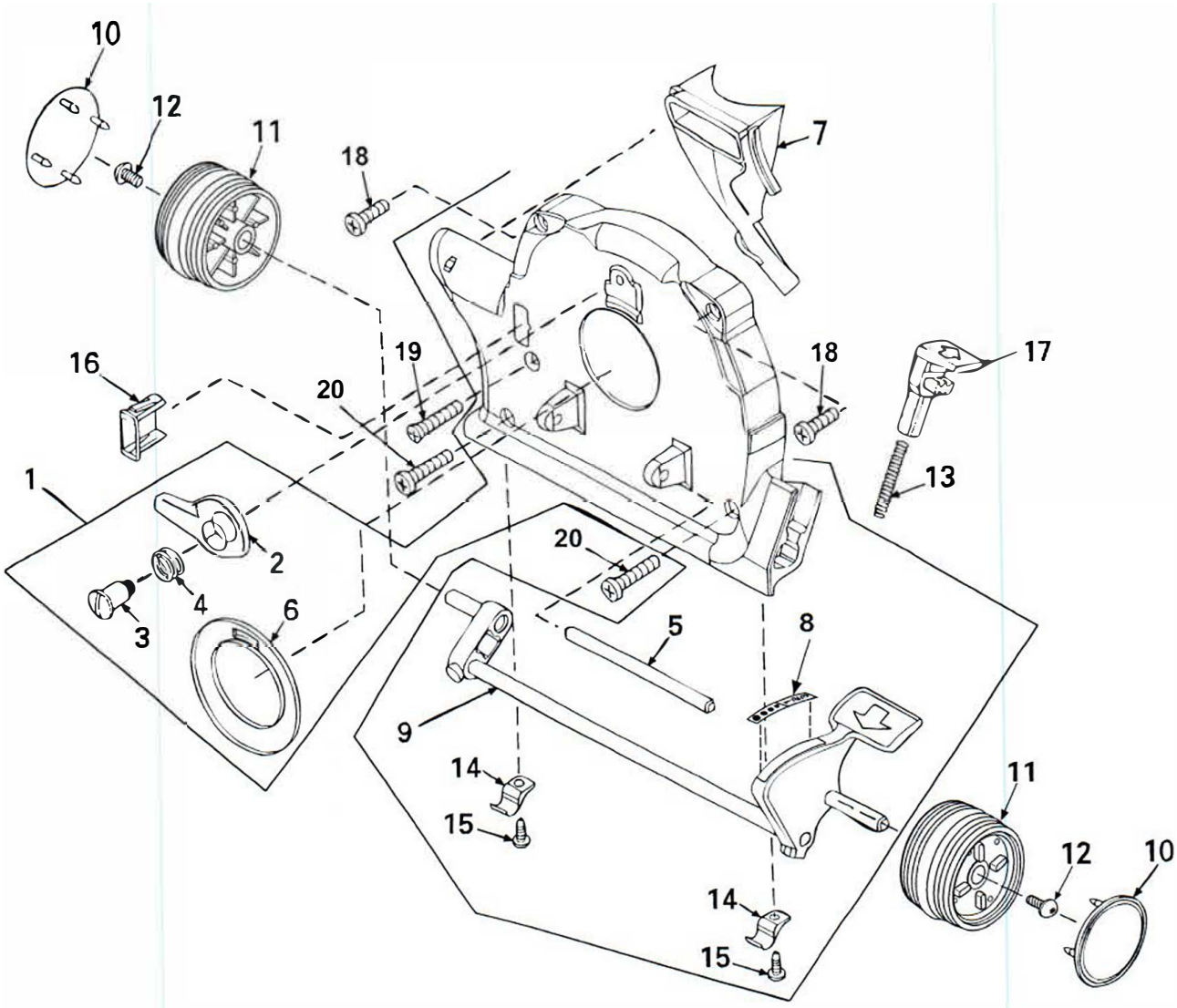


Figure 41. Fan Case Assembly

SECTION 9 – 120 V

ILLUSTRATED PARTS LIST AND EXPLODED VIEWS

Table 3. Fan Case Assembly

1	119797S	Fan Case Assembly
2	125297A	Nozzle Lock Lever Assembly (2 pack)
3	1211S	Screw - Nozzle Lock (10 pack)
4	121297S	Spring - Nozzle Lock (10 pack)
5	121689S	Nozzle Attachment Shaft (5 pack)
6	122097S	Unigasket - Fan Case (5 pack)
7	125489	Volute Deflector - Fan Case
8	633706S	Label Ratchet Pedal (5 pack)
9	131606S	Front Wheel Shaft Assembly
10	131806S	Hub Cap - Front Wheel (10 pack)
11	131906	Front Wheel Assembly
12	231695A	Screw - Front Wheel (10 pack)
13	1331A	Spring - Ratchet Lock (10 pack)
14	134073A	Clamp - Front Wheel Shaft (10 pack)
15	231294A	Screw - Front Wheel Shaft Clamp (10 pack)
16	610006S	Bezel - Power Switch (Fan Case) (5 pack)
17	631589A	Ratchet Lock Assembly (5 pack)
18	231595S	Screw - Fan Case/Slide Bracket Top (10 pack)
19	234998S	Screw - Fan Case/Base Pan Flat Head (10 pack)
20	234898S	Screw - Fan Case/Base Pan - Bottom (10 pack)

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ILLUSTRATED PARTS LIST AND EXPLODED VIEWS

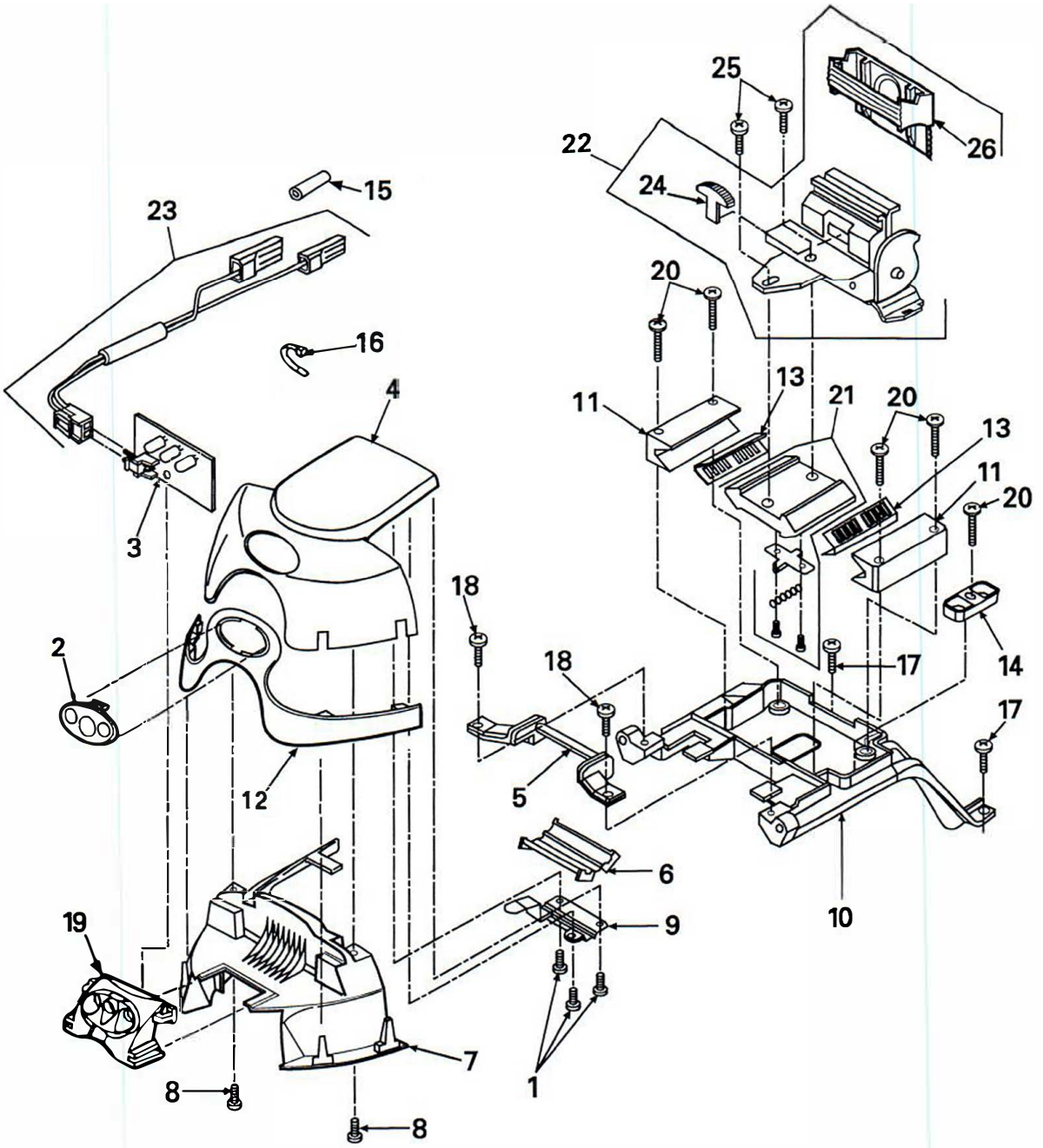

Figure 42. Headlight Cap/Slide Bracket/Handle Pivot Spring Assembly

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ILLUSTRATED PARTS LIST AND EXPLODED VIEWS

Table 4. Headlight Cap/Slide Bracket/Handle Pivot Spring Assembly

1	102168A	Screw - Plate to Pivot Casting/Axle Clamp (10 pack)
2	108506S	Lens - Headlight Cap (5 pack)
3	164306	LED Circuit Board
4	160006	Headlight Cap Casting
5	161389	Headlight Pivot Casting
6	161689S	Bushing - Headlight Pivot (5 pack)
7	161706	Headlight Frame Bracket
8	102168A	Screw - Frame Bracket to Headlight Cap (10 pack)
9	162889S	Plate - Headlight Pivot (5 pack)
10	894003S	Slide Bracket Casting w/Heat Shrink Tube
11	178797S	Guide Block - Slide Bracket (2 pack)
12	163506	Headlight Trim Strip
13	178989S	Roller Bearing Assembly (10 pack)
14	179489S	Wedge - Slide Adjustment (5 pack)
15	606889S	Insulator Sleeve - Clear (5 pack)
16	608089A	Cable Tie - Headlight Lead Wires (10 pack)
17	232495S	Screw - Slide Bracket Casting (Rear) (10 pack)
18	232495S	Screw - Headlight Pivot to Slide Bracket (10 pack)
19	163906	LED Bracket
20	234397S	Screw - Guide and Wedge to Slide Bracket (10 pack)
21	676595S	Slide with Centering Spring Assembly
22	671906G	Handle Pivot Spring Assembly w/ Boot
23	603806S	Headlight Harness Assembly - 120 V (2 pack)
24	677506A	Tilt Latch Knob Kit w/Male and Female Shaft (1 set)
25	233897S	Screw - Handle Pivot/Slide (10 pack)
26	178606S	Boot - Handle Pivot (5 pack)
	230093A	Cable Tie - Insulation Tube/Slide Bracket (10 pack) ***(not shown)***
	611192S	Tube Insulation (Right Leg of Slide Bracket) (5 Pack) ***(not shown)***

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ILLUSTRATED PARTS LIST AND EXPLODED VIEWS

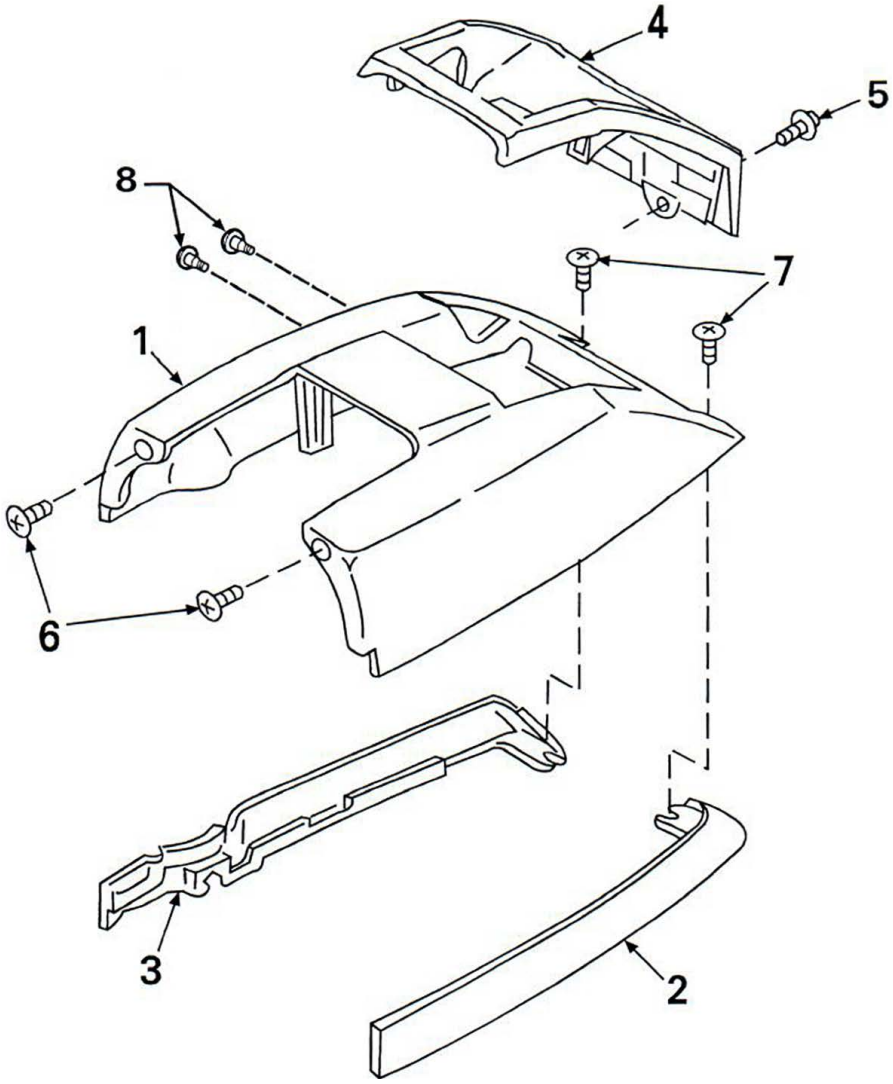

Figure 43. Cover Shell Assembly

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ILLUSTRATED PARTS LIST AND EXPLODED VIEWS

Table 5. Cover Shell Assembly

1	135606A	Cover Casting - Polished - ***Sentria***
2	630906S	Left Trim Strip - Cover Shell (5 pack)
3	630806S	Right Trim Strip - Cover Shell (5 pack)
4	111206	Scuff Plate - 120 V - ***Sentria***
5	233405S	Screw - Scuff Plate - Bottom Rear (10 pack)
6	232395S	Screw - Cover to Fan Case (Front) (10 pack)
7	232495S	Screw - Cover to Base Pan (Rear) (10 pack)
8	233506S	Screw - Cord Clip to Cover (5 pack)

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ILLUSTRATED PARTS LIST AND EXPLODED VIEWS

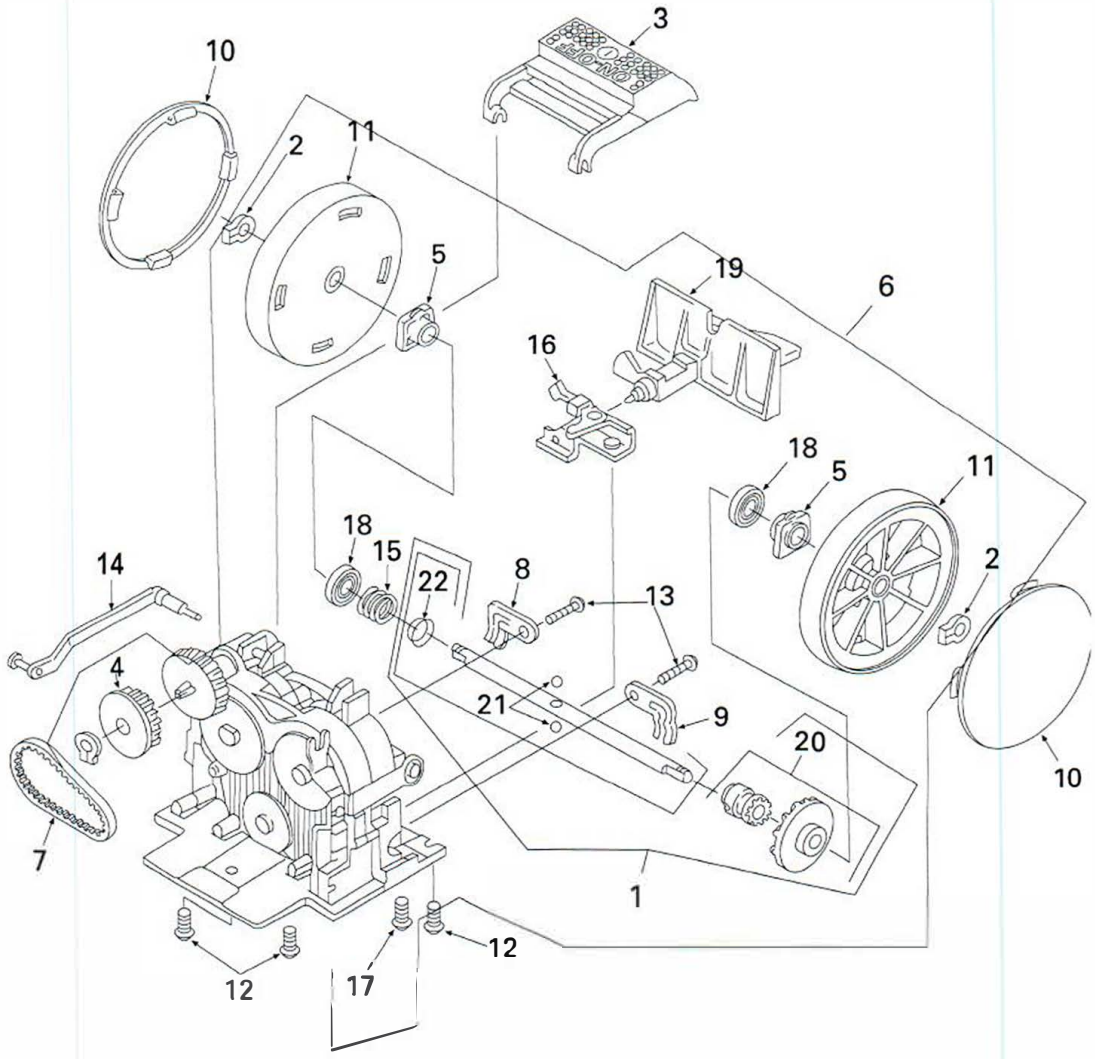

Figure 44. Power Drive Assembly

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ILLUSTRATED PARTS LIST AND EXPLODED VIEWS

Table 6. Power Drive Assembly

1	102095G	Rear Axle Assembly with Overload Gear Assembly
2	601689A	Clip - Rear Wheel & Motor Sprocket Gear (10 pack)
3	110306S	Foot Pedal (5 pack)
4	550505	Primary Gear
5	550889S	Bushing - Rear Axle (10 pack)
6	552306G	Power Drive Assembly
7	554105S	Primary Drive Belt (5 pack)
8	555489S	Right Retainer - Rear Axle (10 pack)
9	555589S	Left Retainer - Rear Axle (10 pack)
10	555906S	Hubcap - Rear Wheel (10 pack)
11	556206	Rear Wheel
12	230693A	Screw - Drive System to Base Pan (10 pack)
13	556592A	Screw - Axle Retainer (10 pack)
14	612400S	Actuating Rod - Foot Pedal to Power Switch (5 pack)
15	556689S	Spring - Rear Axle (10 pack)
16	557689A	Bracket Cam Assembly - Neutral/Drive Pedal (5 pack)
17	234097S	Screw - Neutral/Drive Pedal to Base Pan (10 pack)
18	557889S	Bearing - Rear Axle (2 pack)
19	558406S	Neutral/Drive Pedal Assembly
20	559892S	Clutch Overload Gear Assembly (1 Set)
21	561491A	Rear Axle Ball (10 pack)
22	561892S	Retainer - Axle Ball (10 pack)

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ILLUSTRATED PARTS LIST AND EXPLODED VIEWS

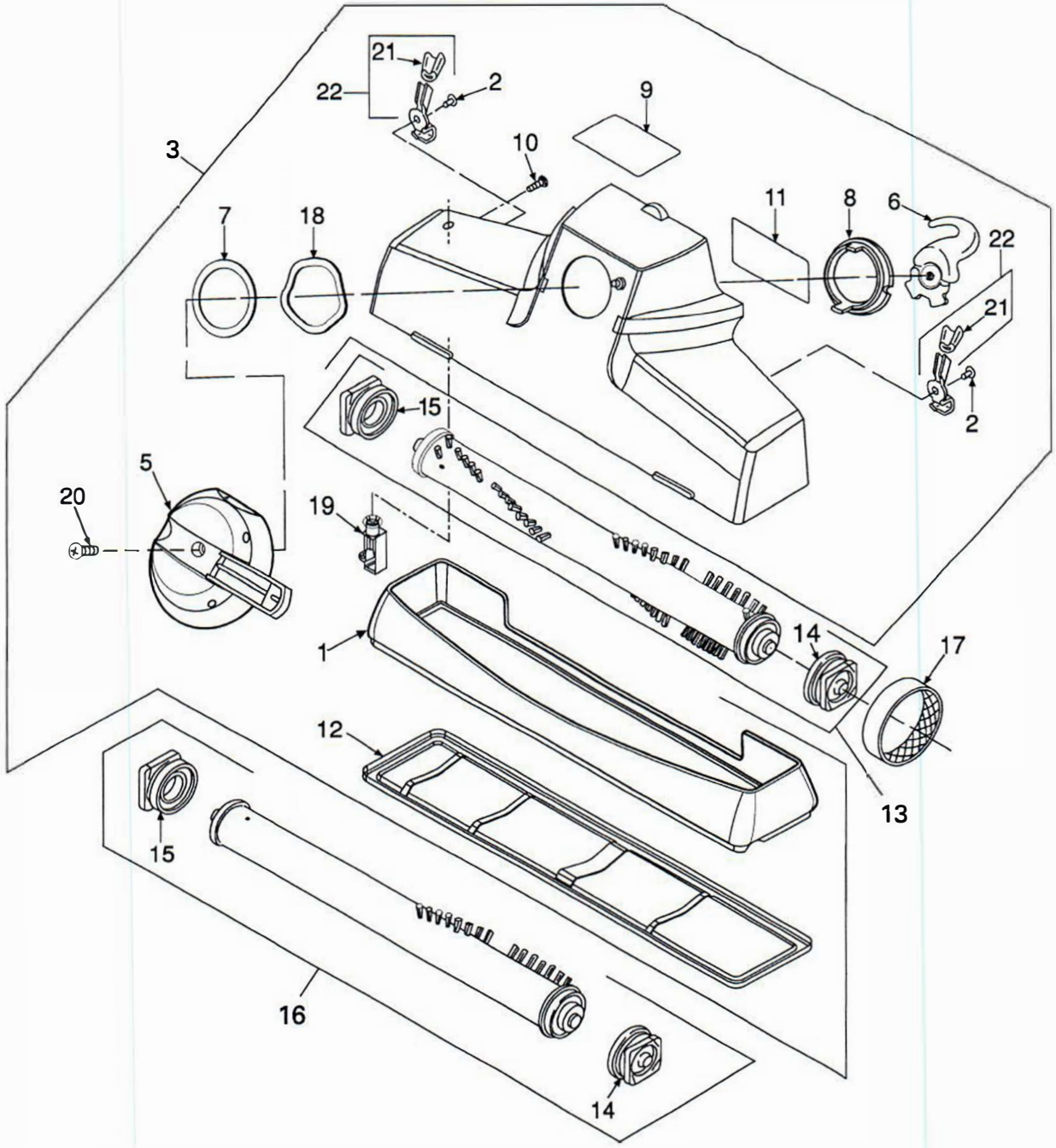

Figure 45. Floor Nozzle Assembly

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ILLUSTRATED PARTS LIST AND EXPLODED VIEWS

Table 7. Floor Nozzle Assembly

1	140406	Nozzle Bumper
2	141381A	Rivet - Latch Assembly (10 pack)
3	141606S	Nozzle Assembly (Less Brush and Belt)
5	159206	Belt Lifter Body Assembly
6	144291	Hook - Belt Lifter
7	144681S	Flat Washer - Belt Lifter (10 pack)
8	145481S	Bearing - Belt Lifter (10 pack)
9	146606S	Label - Belt Lifter Instructions (5 pack)
10	605989A	Screw - BPI/Exhaust Duct/Switch (10 pack)
11	149806S	Label - Brush Adjustment (5 pack)
12	152604	Rug Plate
13	152505	Brush Roll Assembly
14	156393S	Brush End Cap - Small (5 pack)
15	156493S	Brush End Cap - Large (5 pack)
16	159398	Brush Roll - Delicate Carpeting
17	301291A	Belt Knurled - Brush Roll (25 pack)
18	314890S	Spring Washer - Belt Lifter (10 pack)
19	640303	BPI Assembly – Nozzle Assembly
20	232501S	Screw - Belt Lifter (10 pack)
21	640589A	Sleeve - Rug Plate Latch (10 pack)
22	640689A	Latch Assembly - Rug Plate (2 pack)

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ILLUSTRATED PARTS LIST AND EXPLODED VIEWS

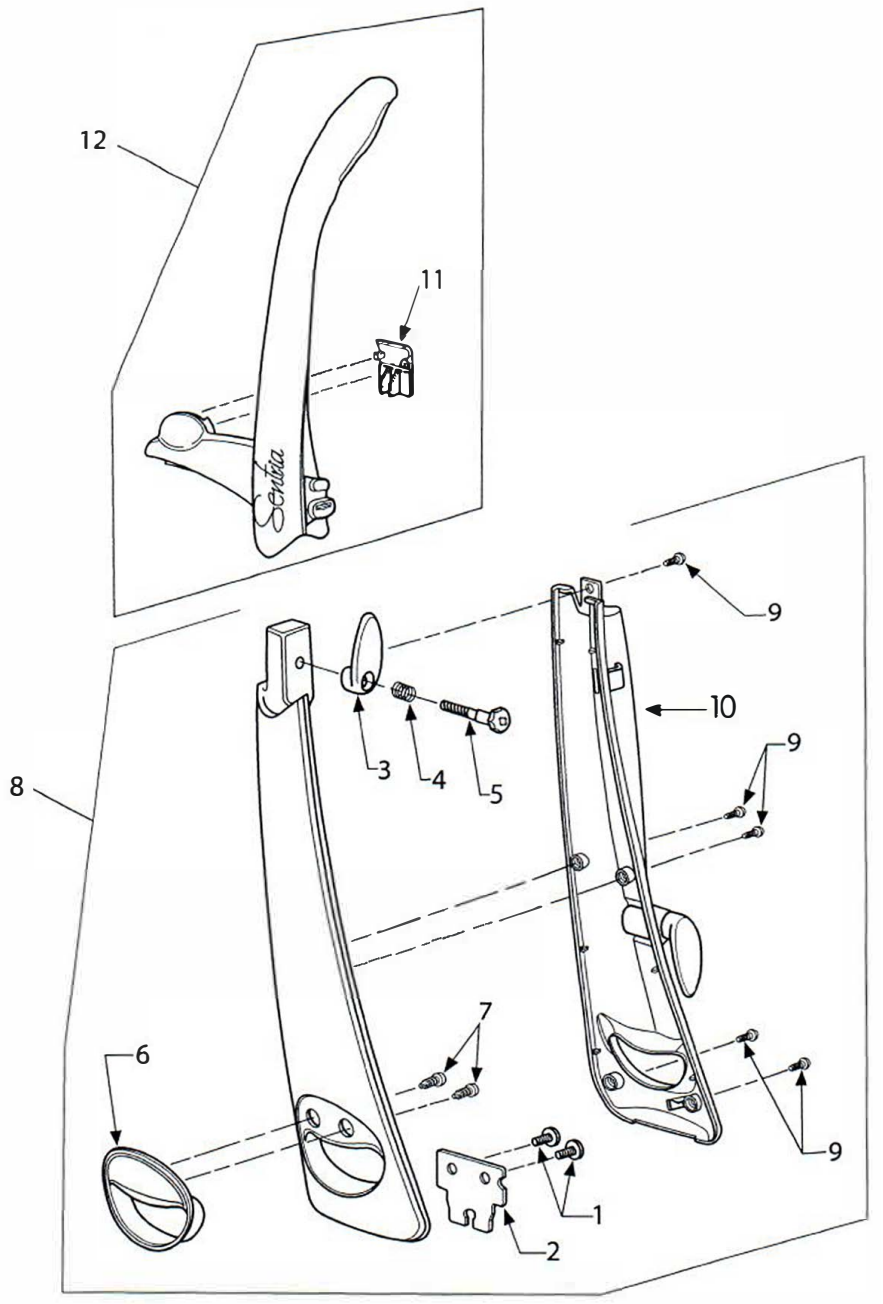

Figure 46. Handle Fork and Grip Assembly

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ILLUSTRATED PARTS LIST AND EXPLODED VIEWS

Table 8. Handle Fork and Grip Assembly

1	233797S	Screw - Latch Plate (10 pack)
2	672189	Latch Plate - Handle Fork
3	173806S	Upper Cord Hook Swivel – (5 pack)
4	174167A	Spring - Cord Hook Swivel (10 pack)
5	174006S	Screw - Cord Hook Swivel (5 pack)
6	289506	Handle Bezel
7	231895S	Screw - Handle Fork Bezel (10 pack)
8	175006G	Handle Fork Assembly - ***Sentria***
9	102168A	Screw - Rear Cover (10 pack)
10	673706	Rear Cover Assembly - Handle Fork
11	672006S	Bag Release Button - Handle Grip (5 pack)
12	675706	Handle Grip Assembly - ***Sentria***

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ILLUSTRATED PARTS LIST AND EXPLODED VIEWS

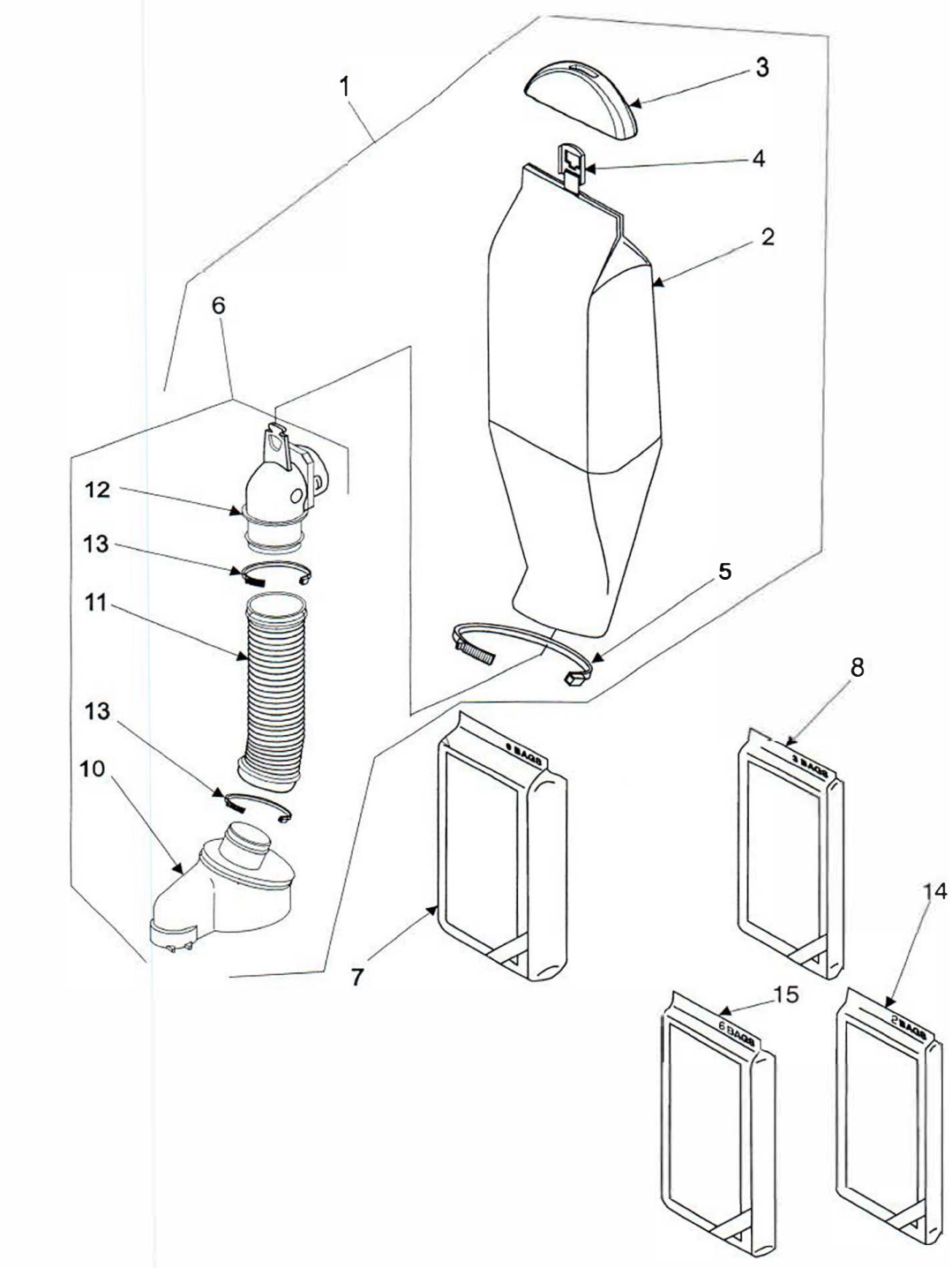

Figure 47. Cloth Bag and Mini Emtor Assembly

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ILLUSTRATED PARTS LIST AND EXPLODED VIEWS

Table 9. Cloth Bag and Mini Emtor Assembly

1	187906G	Bag/Mini Emtor Assembly - ***Sentria***
2	190006	Bag Assembly - (w/Latch Only) - ***Sentria***
3	191806	Bag Top Cover
4	196406S	Latch - Cloth Bag (5 pack)
5	196506S	Bag Clamp Strap (5 pack)
6	185806S	Fill Tube/Mini Emtor Assembly
7	197301A	Micron Magic HEPA Bag - (9 pack) (9 per case)
8	197201S	Micron Magic HEPA Bag - (3 pack) (26 per case)
10	188906	Mini Emtor
11	190399	Fill Tube - Snap
12	190499	Top Adapter - Snap
13	191182S	Fill Tube Tie (25 pack)
14	205803A	White HEPA Filter (2 pack) (25 per case)
15	204803G	White HEPA Filter (6 pack) (9 per case)

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ILLUSTRATED PARTS LIST AND EXPLODED VIEWS

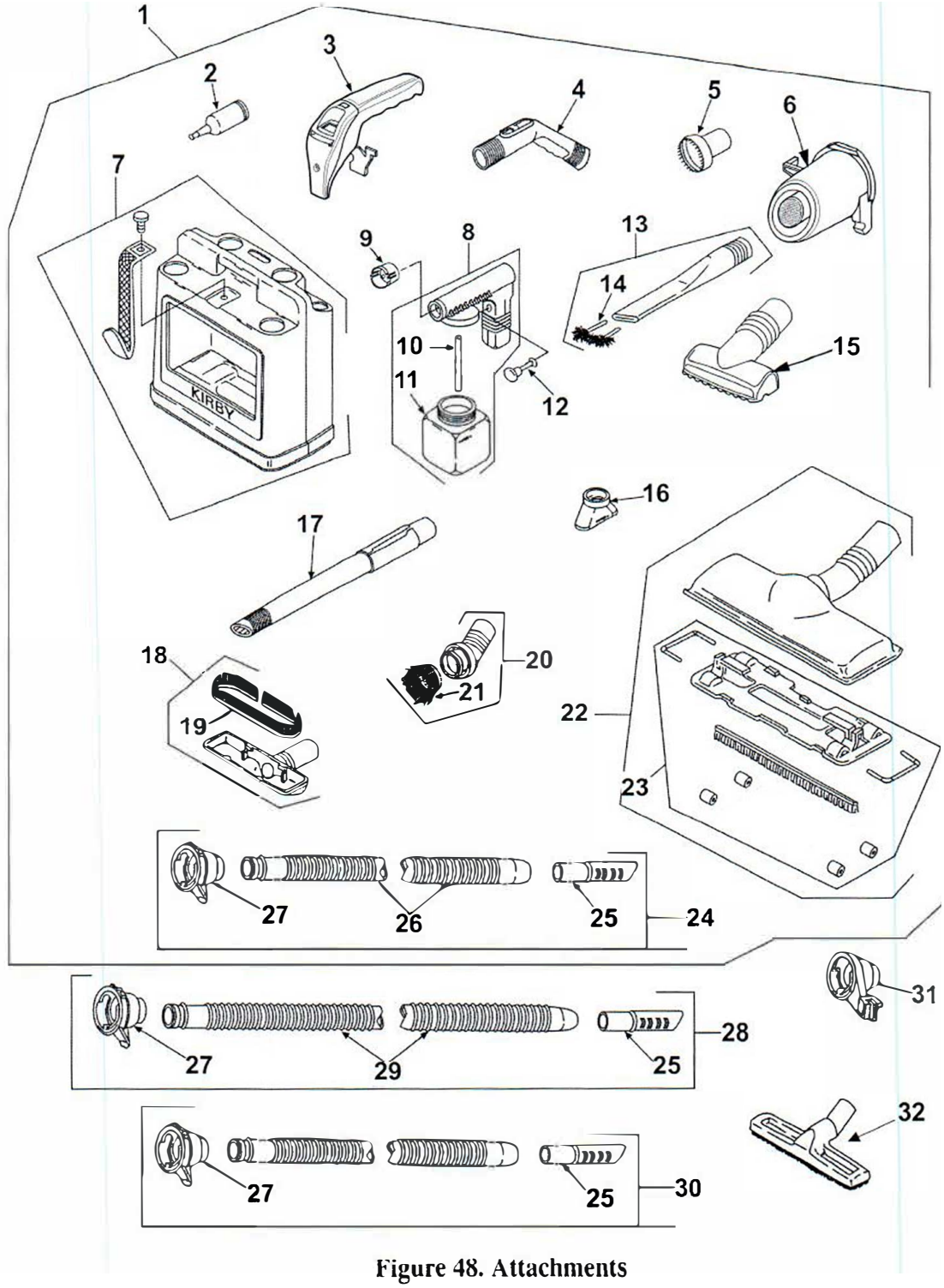

Figure 48. Attachments

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ILLUSTRATED PARTS LIST AND EXPLODED VIEWS

Table 10. Attachments

1	207006S	Attachment Set - Service
2	213806	Inflator/Deflator
3	201306	Portable Handle Assembly
4	225106	Attachment Grip
5	214106	Massage Cup
6	224206	Intake Guard Assembly
7	286906S	Attachment Kaddy Assembly
8	250206S	Spray Gun Assembly
9	256606S	Venturi - Spray Gun (5 pack)
10	250689S	Supply Tube - Spray Gun (10 pack)
11	251089	Jar – Spray Gun
12	251306S	Trigger - Spray Gun (5 pack)
13	225706S	Crevice Tool Assembly
14	226157S	Brush - Crevice Tool (5 pack)
15	212406	Upholstery Tool
16	252006S	Suds Cap - Spray Gun (5 pack)
17	224006	Extension Wand
18	210806S	Wall/Ceiling Brush Assembly
19	218190	Brush Strip - Wall/Ceiling Brush Assembly
20	218406S	Duster Brush Assembly
21	220189	Brush Ring - Duster Brush Assembly
22	215406	Surface Nozzle Assembly
23	216306S	Wheel/Axle/Plate Assembly
24	223606S	Attachment Hose Assembly
25	223306	Tube Swivel Connector
26	223006	Attachment Hose Only
27	210006	Suction/Blower Connector
28	224806G	Attachment Hose Assembly - 12 ft.
29	224806	Attachment Hose Only - 12 ft.
30	225406S	Stretch Hose Assembly - 12 ft.
31	211397S	Speed Selector Slide Lever/SBC
32	932806	Hard Floor Nozzle Assembly

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ILLUSTRATED PARTS LIST AND EXPLODED VIEWS

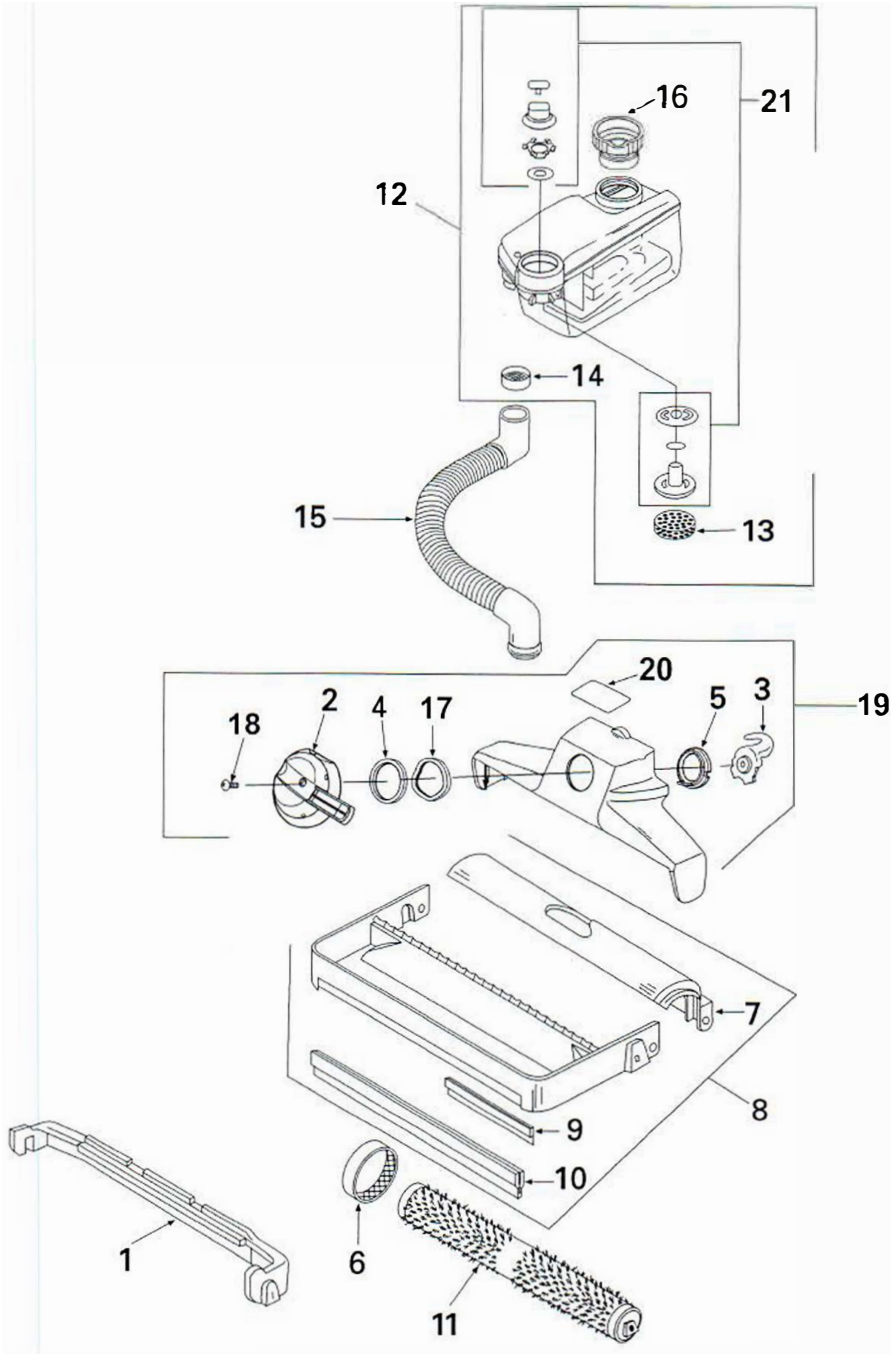

Figure 49. Carpet Shampoo System

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ILLUSTRATED PARTS LIST AND EXPLODED VIEWS

Table 11. Carpet Shampoo System

1	313506	Carpet Fluffer Shield
2	159206	Belt Lifter Body Assembly
3	144291	Belt Lifter Hook
4	144681S	Flat Washer - Belt Lifter (10 pack)
5	145481S	Bearing - Belt Lifter (10 pack)
6	301291A	Belt (25 pack)
7	304406	Shield - CSS Tray
8	304706S	Tray Assembly w/Shield - CSS
9	305206S	Belt Baffle - CSS Tray (5 pack)
10	305406S	Suds Leveler - CSS Tray (5 pack)
11	305702	Brush Roll Assembly – Ball Bearing - CSS
12	306706S	Tank Assembly - CSS
13	307389S	Filter Sponge - CSS Tank (10 pack)
14	316206S	Suds Screen - CSS Tank (5 pack)
15	308006S	Hose Assembly - CSS
16	308906S	Cap - CSS Tank (5 pack)
17	314890S	Spring Washer - Belt Lifter (10 pack)
18	232501S	Screw - Belt Lifter (10 pack)
19	303106S	Nozzle Assembly - Polymer - CSS
20	304206S	Warning Label - CSS Nozzle (5 pack)
21	300306S	Valve Repair Kit - CSS Tank (5 pack)
	316197S	Moisture Tray - CSS (5 pack) ***(not shown)***
	303806A	Carton (includes Moisture Tray) - CSS (20/case) ***(not shown)***

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ILLUSTRATED PARTS LIST AND EXPLODED VIEWS

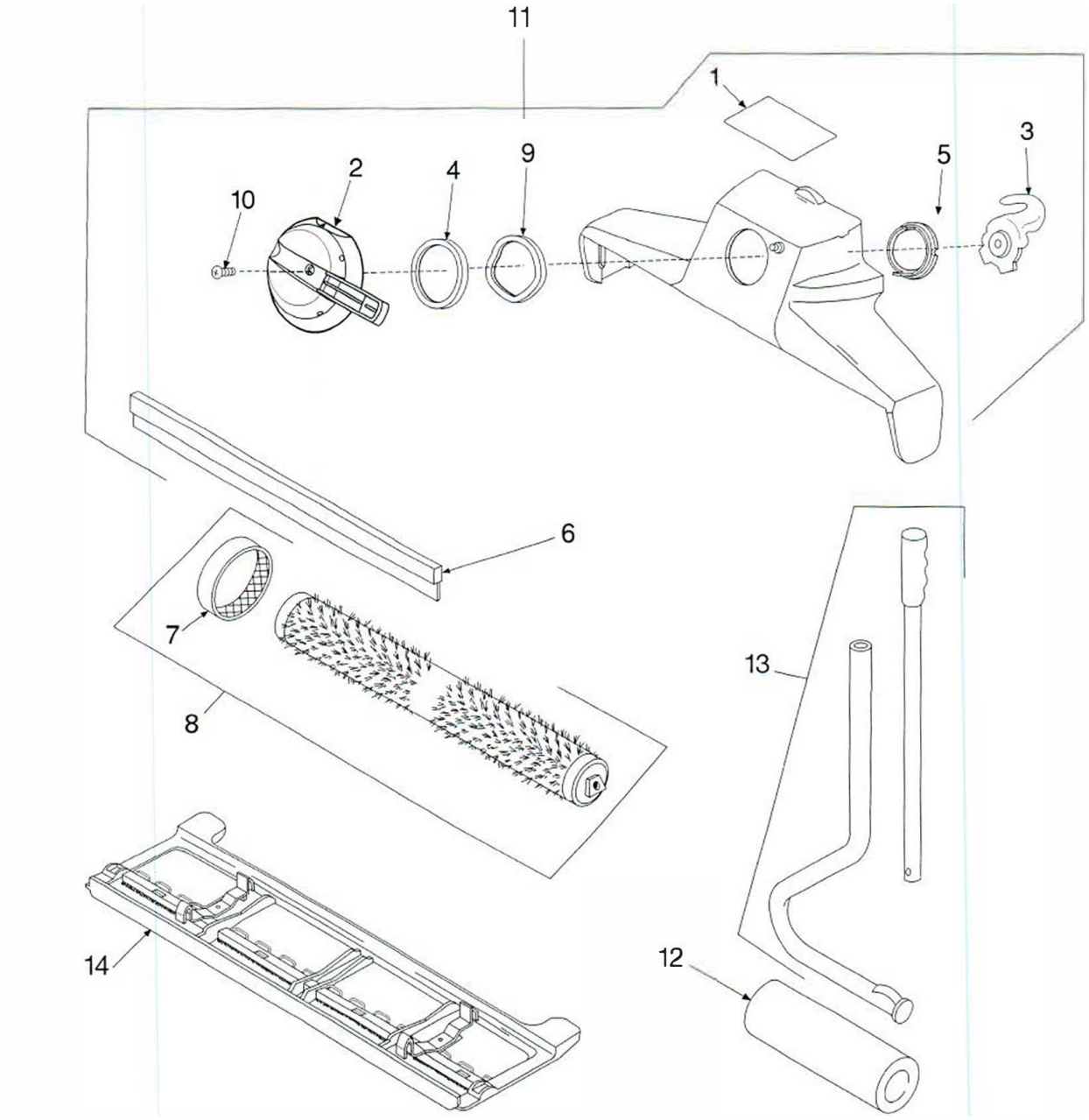

Figure 50. Floor Care System With Miracle Waxer

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ILLUSTRATED PARTS LIST AND EXPLODED VIEWS

Table 12. Floor Care System With Miracle Waxer

1	313406	Warning Label - Floor Care System Nozzle (N/A for Sale)
2	159206	Belt Lifter Body Assembly
3	144291	Belt Lifter Hook
4	144681S	Flat Washer - Belt Lifter (10 pack)
5	145481S	Bearing - Belt Lifter (10 pack)
6	301006S	Baffle Strip – Floor Care System (5 pack)
7	301289A	Brush Belt (25 pack)
8	313292S	Polisher Brush Assembly w/ Belt – Floor Care System
9	314890S	Spring Washer - Belt Lifter (10 pack)
10	232501S	Screw - Belt Lifter (10 pack)
11	312906S	Nozzle Assembly - Polished - Floor Care System
12	480896G	Miracle Waxer Roller - English (12/case)
13	480495S	Miracle Waxer Handle Assembly (6/case)
14	205906S	Bare Floor Duster Pad Assembly
	312106A	Carton w/ Insert- Floor Care System (20/case) ***(not shown)***

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ILLUSTRATED PARTS LIST AND EXPLODED VIEWS

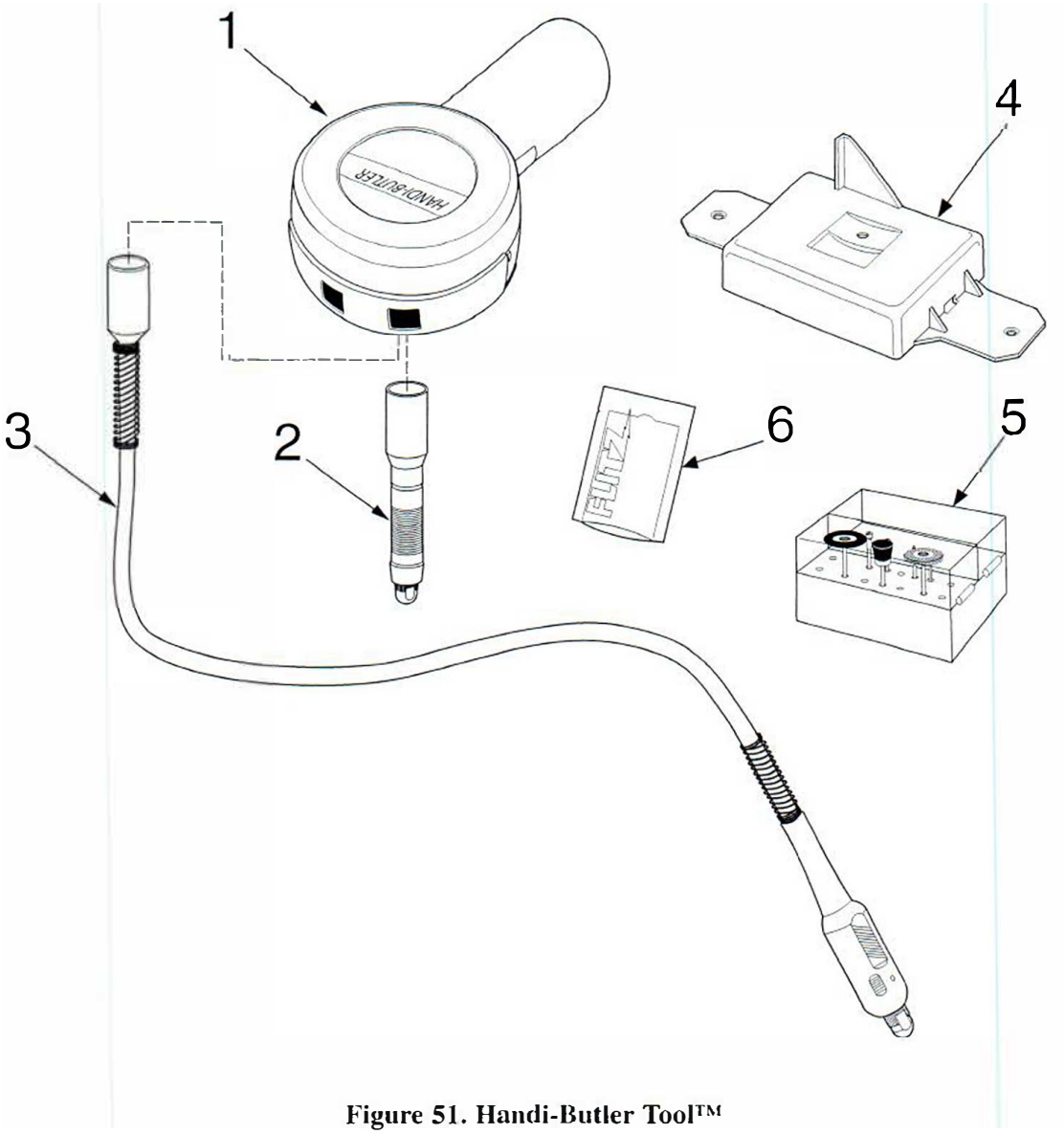

Figure 51. Handi-Butler Tool™

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ILLUSTRATED PARTS LIST AND EXPLODED VIEWS

Table 13. Handi-Butler Tool™

1	409506	Handi-Butler Body Assembly
2	407206	Rigid Shaft Coupling
3	407306	Flexible Shaft Coupling
4	405906	Mounting-Cradle
5	407106	Accessory Kit
6	407406S	Polishing Compound (10 pack)
	255690	Sponge ***(not shown)***
	237306S	Demo Kit Assembly ***(not shown)***
	406806S	Regular Screw Mandrel (10 pack) ***(not shown)***
	406906S	1" Felt Disc (10 pack) ***(not shown)***
	407006	Safety Glasses ***(not shown)***
	407506S	3/8" Felt Conical Point (10 pack) ***(not shown)***
	407606	Mini Wrench ***(not shown)***
	407706	Lockout Bar ***(not shown)***
	407806	Angle Key ***(not shown)***
	407906S	1" Cloth Wheel (5 pack) ***(not shown)***
	402906S	Handi-Butler Carton (10 pack) ***(not shown)***