KitchenAid®
HOME APPLIANCES

KitchenAid® Classic Stand Mixer
Intended for Professional Service Technician Only
Service/Repair Manual

Tilt-Head (4.5 qt. & 5 qt. models)
(Includes International models)

Bowl-Lift (5 qt. models)
(Includes International models)

KitchenAid®

Classic Stand Mixer Service/Repair Manual
Intended for Professional Service Technician Only

- **Covers Domestic Models** – K4SS, K45SS, K5SS, KP50P, KPM5, KPM50, KSM5, KSM50, KSM75, KSM80, KSM85, KSM88, KSM90, KSM95, KSM100, KSM103, KSM105, KSM110, KSM120, KSM150, KSM151, KSM152, KSM153, KSM154, KSM155, KSM158, KSM160, KSM450, KSM455, KSM500, KSMC50
- **Covers International Models** – 4K45SS, 4K5SS, 4KSM105, 5K45, 5K5SS, 5KPM5, 5KPM50, 5KSM45, 5KSM5, 5KSM150, 5KSM156, 5KSM160, 7KSM150, 7KSM155, 9KSM5, 9KSM90, 9KSM95, 9KSM150, 9KSM160

Table of Contents

INTRODUCTION

All KitchenAid Products are well designed. Normally they will give continual use year after year without service attention.

Records have been maintained to determine and correct, through improved design, any troubles that might possibly develop. An effort has been made in preparation of this manual to cover them all.

Your safety and the safety of others are very important.

We have provided many important safety messages in this manual and on your appliance. Always read and obey all safety messages.

This is the safety alert symbol.

This symbol alerts you to potential hazards that can kill or hurt you and others.

All safety messages will follow the safety alert symbol and either the word "DANGER" or "WARNING." These words mean:

⚠DANGER — **You can be killed or seriously injured if you don't immediately follow instructions.**

⚠WARNING — **You can be killed or seriously injured if you don't follow instructions.**

All safety messages will tell you what the potential hazard is, tell you how to reduce the chance of injury, and tell you what can happen if the instructions are not followed.

IMPORTANT SERVICE WORKPLACE SAFETY RECOMMENDATIONS

This Service Manual is written for the Professional Service Technician who has familiarity with the KitchenAid® Stand Mixer.

SERVICE ENVIRONMENT

The following Safety Guidelines should be adhered to when servicing this product.

- The workplace should be dry and sanitary at all times and all units should be inspected for cleanliness before any work is started.
- Visually inspect the unit requiring service in a well illuminated area.
- A mild, non-abrasive dishwashing soap solution and clean towel can be used to clean any unit requiring attention. Clean only with a dampened cloth. Never place the unit into water or cleaning solution!
- The hands of the service technician should be clean at all times during the service procedure.

PERSONAL PROTECTION

- The Service Technician should wear Protective Eyewear at all times when conducting a repair on any appliance.
- Loose fitting sweaters, shirt sleeves or bracelets should not be worn while servicing any product with rotating parts.

ELECTRICAL CONSIDERATIONS

- The workplace for the KitchenAid® Stand Mixer should have properly grounded AC outlets that adhere to all Local Electrical Codes that are applicable at the time of repair.
- The KitchenAid® Stand Mixer Power Cord should always be inspected first before plugging the unit into an energized power outlet. Do Not run the KitchenAid® Stand Mixer if the Power Cord is damaged - replace it.

- ESD (Electro Static Discharge) protection should be used when servicing the electronic components.
- All disassembly and assembly procedures discussed in this manual should be conducted with the unit disconnected from the AC power source.
- Do Not leave the unit unattended while running it for inspection or for any other checks.
- Do Not remove any of the attachments from the KitchenAid® Stand Mixer or remove the work bowl from the stand mixer while the unit is running.
- Always unplug the KitchenAid® Stand Mixer immediately after concluding all electrical tests.

IMPORTANT SAFEGUARDS

Ensure the KitchenAid® service technician is aware of the operating safeguards recommended to the customer:

1. Read all instructions in the KitchenAid® Stand Mixer Service Guide.
2. Close supervision is necessary when any appliance is used by or near children.
3. The stand mixer has been UL listed for household and commercial use.
4. To protect against electrical shock, do not immerse cord, plugs, or stand mixer housing in water or other liquid.
5. Do not operate any appliance with a damaged cord or plug or after the appliance has malfunctioned or has been damaged in any manner.
6. Unplug the appliance from the outlet before cleaning or servicing.
7. Do not let the cord hang over the edge of a table or counter or touch hot surfaces.
8. Do not use an extension cord.
9. The use of accessories not recommended by KitchenAid® may result in fire, shock, or injury to persons.
10. Do not use the appliance outdoors.
11. Do not place the appliance on or near a hot gas or electric burner or on a heated oven.
12. Do not use the Stand Mixer for other than its intended use.

LIST OF TOOLS REQUIRED (see Appendix A)

The following tools are necessary to service the KitchenAid® Stand Mixer.

- Mallet
- Hammer
- RP-209 Ring Pliers (not shown in Appendix A)
- Needle Nose Pliers

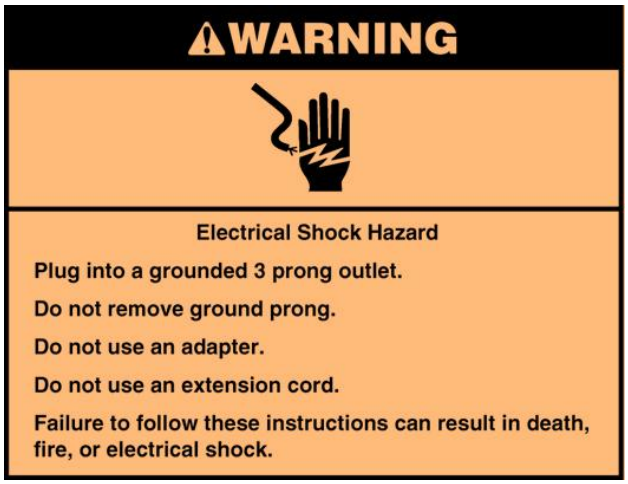
NOTE: Power drivers are not recommended for servicing the KitchenAid® Stand Mixer.

- 11/32” wrench
- Ratchet
- #3 Phillips bit
- R1 square drive bit
- Long flat blade screwdriver
- Short flat blade screwdriver
- #2 Phillips screwdriver (insulated handle)
- 3/8” hollow shank nut driver
- 5/32” drift punch
- Volt/Ohm Meter
- Watt Meter
- Electronic Digital Tachometer

The following equipment will greatly assist the technician in servicing the KitchenAid® Stand Mixer:

- ½” Socket (not shown in Appendix A)
- Awl or pointed punch (not shown in Appendix A)
- Low pressure compressed air to remove debris and dust from components.
- Heyco R-29 pliers (for older Heyco style cord strain reliefs (not shown in Appendix A).
- Clean rags/shop towels
- Cushion the service area to keep from scratching the painted stand mixer parts as they are removed. A clean shop towel or a folded paper towel will usually work well for this purpose.

ELECTRICAL REQUIREMENTS



This product is designed for use with 120 VAC, 60 Hz (240 VAC, 50 Hz International) only. It has a grounded plug and should not be modified in any way. Do not use an extension cord or any plug adapter with this stand mixer.

GENERAL INFORMATION

Normal Performance

The KitchenAid Stand Mixer is powered with a universal motor which will operate on 50 or 60 hertz, alternating current only.

The Voltage of the power supply should be within 10 volts either way of the voltage stamped on the mixer trimband and nameplate.

All solid state KitchenAid mixers have the same motor and control parts and the gears in the gear case are alike, with one exception: "K45SS units built prior to May 6th, 2002" (see Note on pg. 23).

Planetary parts are similar, except that some early production K5SS units had a weight in the planetary body.

Gearing and motor instructions are for both tilt head and bowl lift machines and any differences between them will be pointed out.

Power

A mixer should have adequate torque on all speed settings. To check for torque, remove the beater, dough hook or wire whip from the planetary agitator shaft and turn the mixer on to speed STIR. Carefully try to stop the planetary (rotation) with your right hand.

At the STIR position, it should not be possible to stall the mixer's planetary; nor should the planetary slow down noticeably when pressure is applied.

Heating

Under normal conditions, the mixer will not show any tendency to heat because of the built-in ventilating system in the motor.

Under heavy loads with extended mixing time periods, the motor head (top) may heat up to the point of being uncomfortable to the touch.

Attachments (flat beater, dough hook, wire whisk)

The attachments should easily fit on the planetary agitator shaft of the stand mixer.

Power is transmitted from the motor to the attachments by means of the worm gear and center-bevel gear assemblies.

The center-bevel gear assembly is fixed to the center shaft by means of a drive pin. The planetary is fixed to the center shaft with a groove pin. The agitator shaft turns in a fixed internal gear by means of a pinion gear located at the top of the planetary agitator shaft. The internal gear is located in the lower motor housing assembly.

The attachment hub (bevel) gear also meshes with the center-bevel gear assembly to transmit power to the attachment hub (nose) drive of the mixer for the use of various hub attachments (i.e. the food grinder attachment).

THEORY OF OPERATION

The KitchenAid Classic Stand Mixer speed control mechanism is an electro-mechanical system comprised of (4) components; the governor, the speed lever (including the speed link and cam assembly), the control board and the phase control circuit.

Electro-mechanical means that the control system takes the rotational speed of the armature (mechanical) and uses it to determine the control voltage (electrical) to send to the mixer motor.

To understand how the complete system works, it is best to first understand what the basic function of each component is. The following sections will cover the functions of each component.

The Governor

The job of the governor is to take the rotational speed (spin) of the motor's armature and convert it to a linear (straight line, back-and-forth) motion (see Illustration 1).

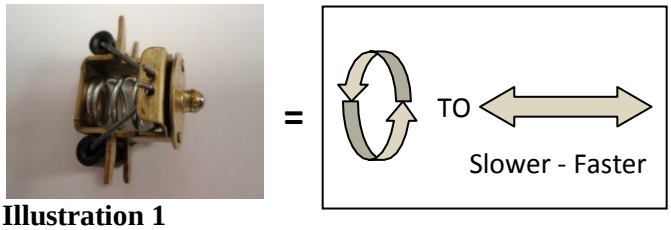


Illustration 1

It does this through the use of the weight arms whose ends are fastened to the governor flange. The flange is held at a fixed location on the armature shaft by the governor pin.

As the motor spins, the weight arms are moved outward in an arcing motion by centrifugal force. It is this outward arcing motion of the weight arms that push the governor yoke backward against the force of the governor spring (see Diagram 1 in Appendix D). When the motor is slowing down, the motion of the weight arms and yoke are forward - toward the front of the stand mixer with the force of the governor spring (see Illustration 1).

The (ball) top plate of the governor is fastened to the governor yoke so that it also moves with the yoke. When the motor is not running (OFF) the governor ball plate is at its farthest forward position and when the motor is running at full speed the governor ball plate is at its farthest back position. This linear motion of the governor yoke/ball (forward and backward) is what the speed control board uses to do its part.

The control board uses switches to determine the output of the phase control to the motor field (stator).

The Phase Control (TRIAC) circuit

There is no need to go into a detailed theory of operation on the electrical workings within the phase control circuit. All that is needed to know is that the phase control will supply one of three different voltages to the motor stator (field) windings via a device called a TRIAC. These voltages are determined by the opening and closing of the w-bar switches on the control board. We will get into how these switches work in the section titled "The Control Board". The voltages that the phase control produces are roughly 1/3 supply, 2/3 supply and Full supply voltage (i.e. 40VAC, 80VAC and 120VAC - these voltages are not exact but are presented here as even round numbers for the sake of explanation). Leaving the electrical description at that, let's just say that ideally the phase control circuit will maintain the voltage going to the stator at 2/3 full supply voltage under normal running conditions. It does this by "reading" the state of the w-bar switches on the control board. We will call these switches switch 1 (in BLUE – in Fig.1) and switch 2 (in GREEN – in Fig. 1).

The Control Board

The control board is a moveable plate with 3 contact switches on it (see Fig. 1). One of the switches is used to power the mixer ON and OFF (shown in RED in Fig. 1).

The power switch is made up of the two point contacts; a fixed (stationary) point and a moveable blade at the bottom of the control board. The black cord lead is attached to the stationary point on the control board. The power switch is normally open when the mixer is in the OFF position. Whenever the speed control lever is moved from OFF to speed STIR or any of the other ON speed positions, the speed link and cam (white plastic piece on the end of the speed link) will allow the points to close energizing the motor through the moveable blade to one side of the stator field windings (white lead wire). The white power cord lead is connected through the phase control and control board (via the w-bar points – switches 1 & 2) as well as the brushes and armature commutator to the other side of the stator field windings (red lead wire).

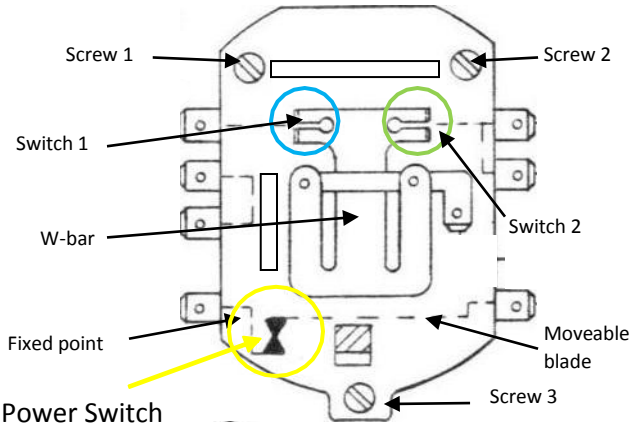


Fig. 1) Control Board parts (as viewed from the rear)

Table 1

Switch condition	Switch 1	Switch 2	AC Voltage to Motor
1	CLOSED	CLOSED	**Full** (speeds mixer up)
2	OPEN	CLOSED	**2/3 supply** (normal operating condition)
3	OPEN	OPEN	**1/3 supply** (slows mixer down)
4	CLOSED	OPEN	***INVALID*** (see Note)

Note: Condition 4 is invalid as the control board is designed such that switch 1 always opens first (see Fig. 2).

With the mixer in the OFF position both w-bar switches will be closed. As you can see in Table 1 that represents a 120 volt AC condition, however the voltage will not be

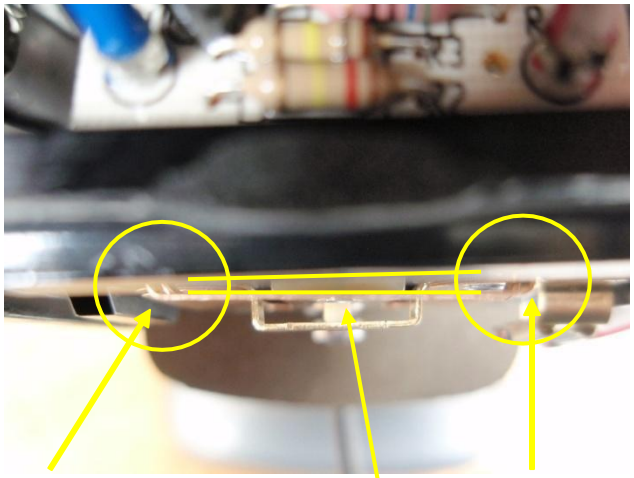
sent to the motor's stator windings because the power switch should be open.

Now, recall from the section on the governor that it is going to move (backward) toward the w-bar as the mixer speeds up and (forward) away from the w-bar as the mixer slows down. It is this forward and backward (linear) action that causes the w-bar switches to open and close. Also recall that the phase control will try to maintain the voltage at roughly 2/3 full supply voltage (condition 2 in Table 1) under normal running conditions.

When the speed control lever is moved to a lower speed, the condition of the switches will go from condition 2 to 3 (switch 1 and 2 both open). When this happens, the phase control will send only 1/3 of the supply voltage to the stator to slow the armature rotation down reducing the speed of the mixer until condition 2 is once again achieved.

When the speed control lever is moved to a higher speed, switch 1 will close (condition 1) and the phase control will send full supply voltage to the stator to increase the rotational speed of the armature. This will also happen when more torque is needed as the mixer will slow down under a heavy load causing switch 1 to close.

The w-bar points are skewed (see Fig. 2) in such a way as to force switch 1 to always open before switch 2 to maintain the proper operation of the speed control as represented in Table 1.



switch 1 **switch 2**

Fig. 2) Control Board w-bar switch point skew

Figure 2 shows how a properly assembled control board should look like when viewing the mixer from the top. The upper yellow line in between the two circles represents the plane of the control board and the lower yellow line represents the plane of the w-bar switches. As you can see, switch 1 is closer to the plane of the control board than switch 2 (see the gap distance between the ends of the yellow lines). This will always facilitate the opening of switch 1 first.

A condition called "Points jumping" happens when the skew of the two switches is nearly identical or so close that condition 2 in the table is skipped over (both switches open and close simultaneously) and the phase control then jumps between 1/3 supply voltage and full supply voltage while unsuccessfully trying to set condition 2 (2/3 supply voltage).

The screws on the control board (see Fig. 1) are used to set the desired speeds of the stand mixer. The screw adjustment will move the control board closer to or farther away from the governor (ball) top plate. The end result is that when the screws are adjusted properly, the distance the governor has to move to contact the w-bar points is fixed and the speeds are set. The speed setting screws 1 & 2 (see Fig. 1) at the top of the control board *must* be adjusted to approximately the same distance (level - nut to nut & screw head to screw head), because if they aren't it can affect the proper opening of the control board w-bar switches.

Screw 3 is used to set the mixer's speed 2 rpm. The screws are currently adjusted to the following speed settings:

- Speed STIR – adjust screws 1 & 2 for a hub rotational speed of 43 to 50 rpm (planetary rotational speed of approximately 60 rpm).
- Speed 2 – adjust screw 3 for a hub rotational speed of 56 to 64 rpm (planetary rotational speed of approximately 95 rpm).

The Switch Lever, Speed link and cam

Once the speeds are locked in by the setting of the control board screws, the only thing left that should have any effect on the mixer speeds is the Switch Lever, Speed Link & cam assembly. This assembly has a two-fold function.

First, when moved from the OFF position to STIR it moves the link and cam (white plastic piece) backward into the square opening on the control board underneath the moveable blade. The cam has a slope on the front edge that when moved into the control board opening, allows the moveable blade of the power switch to drop down onto the fixed point applying power to the stand mixer motor. When this happens, the governor weight arms will move the governor yoke and ball backward until w-bar switch 1 opens and condition 2 (2/3 supply voltage) in Table 1 is satisfied.

Second, as the speeds above speed STIR are selected, the speed link along with screw 3 at the bottom of the control board (see Fig. 1), will move the control board farther away from the governor directly affecting the

distance that the governor has to travel to open the w-bar switch 1 to again satisfy condition 2 (Table 1).

Remember that the linear motion of the governor yoke/ball plate is changed as the motor speeds up or slows down. For example, when the mixer switch is moved from speed 2 to speed 4, the link/cam assembly will move the control board backward lifting it away from the governor ball. This lifting causes both of the w-bar switches to close (condition 1) applying full voltage to speed up the motor until the governor ball again comes into contact with the w-bar opening switch 1 (condition 2).

Ideally, when the speed adjustment screws are set properly, speed 8 will still have the governor ball in contact with the w-bar pad and the phase will still maintain 2/3 supply voltage to the stator field (see Table 1 – condition 2). However, once the switch lever is moved from speed 8 to speed 10 the control board should lift off of the governor ball to a position where the w-bar points will both remain closed (governor fully backward does not contact the w-bar). The end result is that the phase control will send the full supply voltage to the motor and it will run at maximum speed (speed 10).

Note: Due to parts variations, w-bar switch 1 may not always be closed on speed 10, but as long as there is good speed change (>15 rpm) between speed 8 and 10, the mixer should perform normally.

W-bar switch 1 should only close as higher speeds are selected (speed selector) or more torque is needed, and w-bar switch 2 should only open when moving the speed selector from a higher to a lower speed.

The switch lever should move freely with the "feel" of definite detent positions for speed numbers STIR, 2, 4, 6, 8 and 10. Speed numbers 3, 5, 7 and 9 do not have detents.

GEARCASE LUBRICATION

Under normal service conditions, the mixer will not require lubrication for many years.

All KitchenAid® Classic Stand Mixer gear cases are lubricated with 6 Ounces (by weight) of Benalene 930-2 grease (or equivalent).

NOTE: Gear cases lubricated with this grease will not require lubrication for years.

The rear motor bearing and the beater shaft bearing are oil impregnated.

The rear motor bearing has a felt washer around it which has been pre-soaked in oil for extended lubrication.

The front motor (armature) shaft bearing in the mixer housing is a sealed ball bearing.

TESTING THE STAND MIXER

In some situations, the service technician will have to test the performance of the stand mixer to identify and diagnose a problem. Normal electrical testing techniques, using a volt/ohm meter and watt meter, are sufficient to test the stand mixer's electrical components.

NOTE: Refer to the Troubleshooting Quick Reference Guide (Appendix B) at the back of this manual while performing any test.

- Review any documentation accompanying the faulty stand mixer.
- Perform a ground continuity test and a dielectric withstand (hi-pot) test prior to plugging the stand mixer into any electrical outlet. If the unit was returned for electric shock, perform a leakage current test as well.
- Prior to disassembling the stand mixer, plug it into an electrical outlet and perform a function test. Test the switches, speed selections, etc. for proper operation and to troubleshoot the stated problem.

Before repairs are attempted on any KitchenAid mixer, a wattmeter test should be made..

Fig. 3) KitchenAid stand mixer shown plugged into a digital wattmeter.

If the wattmeter shows up to 135 watts, going from speed STIR to speed 10, the mixer is in good condition.

A higher than normal watt meter reading indicates either an electrical or mechanical problem.

After troubleshooting the stand mixer, use the SERVICE PROCEDURE to replace any faulty component.

SERVICE PROCEDURE

CAUTION: Always remove the power cord plug from the electrical outlet before servicing any part of the mixer.

This manual is written as a step-by-step guide to disassemble and reassemble the KitchenAid® Stand Mixer or to gain access to the systems within the unit that are in need of repair. For models covered in this manual, refer to the index page.

NOTE: When removing self-tapping screws from any plastic or metal housing, the filings created will be scattered onto adjoining components. Prior to performing any reassembly procedure, make sure to remove all the filings using clean rags and/or low-pressure compressed air.

Use of the Troubleshooting Quick Reference Guide (Appendix B) will aid in determining what steps are necessary for repairing the unit. Not all steps will be needed for some of the repairs so it is important to consult the Troubleshooting Quick Reference Guide first.

Appendix C lists all of the KitchenAid® Stand Mixer fastener/screw torques required for proper reassembly of the unit.

SECTION 1

DISASSEMBLY OF THE GEAR CASE AND PLANETARY

Most of the KitchenAid® Classic Stand Mixer components are contained within the stand mixer upper gear case/motor housing assembly. All solid state KitchenAid Classic Stand Mixers have similar controls, motors and gears, with one exception: The K45SS (tilt-head) units built prior to May 6th, 2002 have an eleven tooth pinion gear in the worm gear bracket. Units built after that date, are built with a 10 tooth pinion gear. The gears are interchangeable, so a 10 tooth pinion gear can be replaced with the new 11 tooth pinion gear.

Also, some of the earlier bowl-lift models had added weight to give the planetary more torque.

Gearing and motor instructions are for both tilt head and bowl lift machines and any differences will be pointed out.

Bowl, column, base and bowl lift details are covered separately in Section 7.

Note: Remove the bowl and any attachments before disassembly of any unit.

Start by removing the #6-32x3/8" (tapered head) screw from the end cover (Fig. 4).

Fig. 4) Removing the tapered head end cover screw.

Remove the two #6-32x3/16" screws that hold the trimband to the gear case-motor housing (Fig. 5).

With the screws removed, take the trimband off and set aside being careful not to scratch, bend or damage it as it can be used in reassembly.

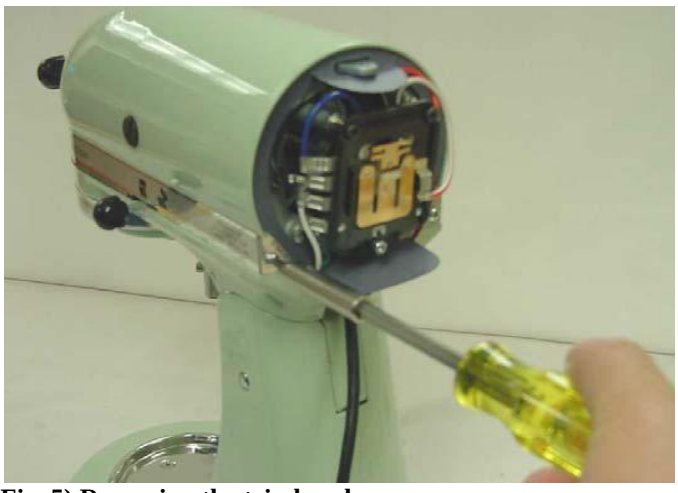


Fig. 5) Removing the trimband screws.

To ensure the painted surface does not get damaged, lay the unit in a padded cradle or on a cloth pad.

To remove the pedestal from the gear case/bottom cover, turn the unit upside down in a padded cradle.

Loosen the set screw with a flat blade screwdriver (Fig. 6).

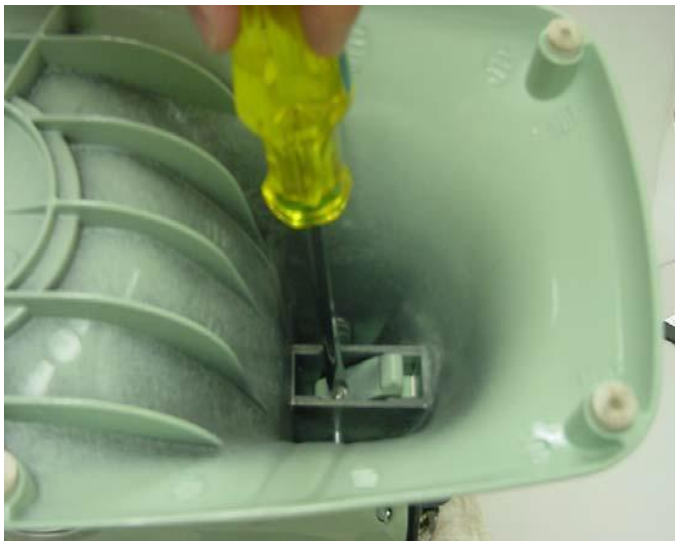


Fig. 6) Loosen the hinge pin setscrew to remove the pedestal from the bottom cover.

Using a drift punch and hammer, drive out the hinge pin (Fig. 7) and lift the pedestal off the gear case/bottom cover assembly.

Fig. 7) Use a drift punch and hammer to drive out the hinge pin.

To remove the planetary, first remove the drip ring. Use a screwdriver on the upper edge of the drip ring and gently tap the screwdriver to remove the drip ring (Fig. 8).

Fig. 8) The Drip Ring fits tightly and must be started off by tapping it.

With a 5/32" drift punch, remove the groove pin that holds the planetary to the vertical center shaft (Fig. 9).

Fig. 9) Remove the groove pin that holds the planetary to the vertical center shaft.

With the pin out, the planetary can be removed from the center shaft. Using two (2) flat blade screwdrivers, pry the planetary up and off the shaft (Fig. 10).

Fig. 10) Use two screwdrivers to pry the planetary off from the center shaft

Remove the power cord from the bottom cover by sliding the molded strain relief out of the slot in the bottom cover (Fig. 11).

Fig. 11) Pull back on the molded strain relief to remove the power cord from the slot in the bottom cover

To remove the power cord on a unit with a Heyco strain relief (older models), use a pair of Heyco R-29 pliers or standard pliers to squeeze the strain relief while pulling up (Fig. 12). Reverse this procedure to reinstall it.

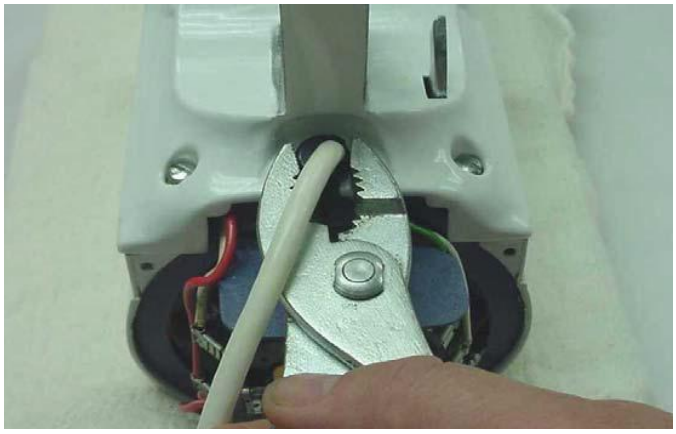


Fig. 12) Removal of (older) Heyco style strain relief using standard pliers.

To remove the bottom cover from the gear case motor housing, unscrew the five (5) #10-24 slotted flat-head screws on older models or square drive screws on newer models (Fig. 13). These screws hold the internal gear into the bottom cover.

Fig. 13) Removal of the five #10-24 slotted flat head screws holding the internal gear in the bottom cover on an older model.

Next remove the four (4) #10-24 slotted fillister head screws (older models) or square drive fillister head screws (newer models) from the bottom cover (Fig. 14).

Fig. 14) Removal of the four #10-24 fillister head screws on an older unit with the slotted head screws.

To remove the bottom cover from the gear case/motor housing, insert a drift punch through the hole in the center shaft and lift, while using a screwdriver in one of the gear case slots to break the bottom cover loose (Fig. 15).

IMPORTANT: Do NOT pry in the area of the transmission gasket, as this may damage the gasket and prevent it from sealing properly upon reassembly.

The transmission gears will come out with the bottom cover. Be careful not to allow any grease to fall into the motor area of the housing.

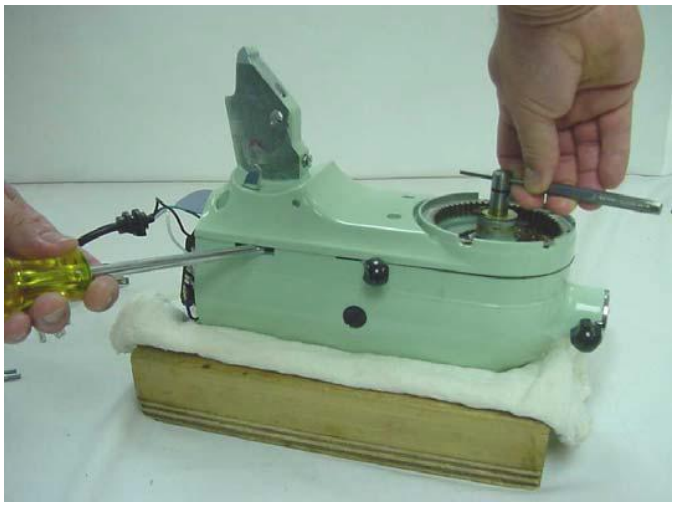


Fig. 15) While lifting up on the center shaft, use a screw driver to gently pry the bottom cover from the housing.

Remove the attachment hub bevel gear from the gear case/motor housing.

This gear is removed by simply pulling it out of the attachment hub (Fig. 16). The gear will clear the worm

of the motor's armature shaft and should be easy to remove.

Note: For clarity, the pictures that follow in this manual have no grease shown in the gear case. Normally the gear case has 6 ounces (by weight) of grease surrounding the gears.

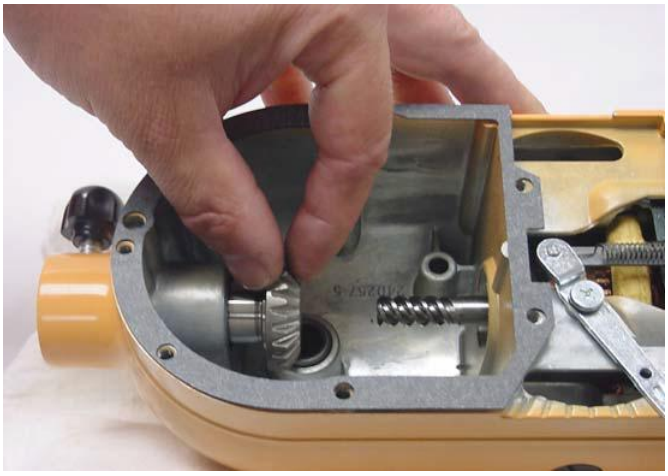


Fig. 16) The attachment hub gear being removed from the mixer attachment hub bearing.

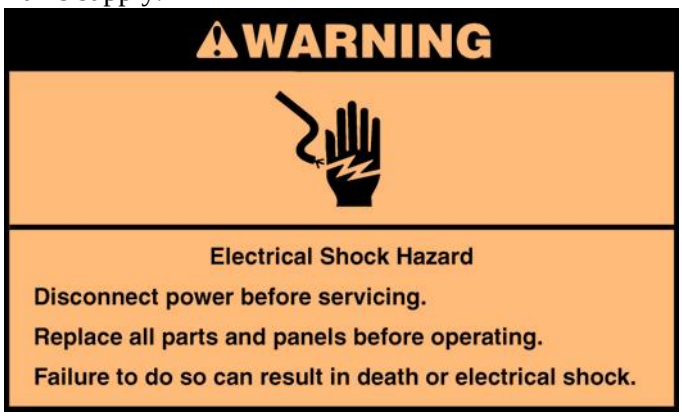
Clean out the gear case and remove as much of the grease as possible.

A more thorough cleaning of the gear case can be done after the motor parts have been removed from the motor housing.

SECTION 2

DISASSEMBLY OF THE STAND MIXER MOTOR AND SPEED CONTROL

Note: All service operations discussed here should be performed with the mixer disconnected from the A. C. mains supply.



Start the disassembly of the control unit by removing the cord flag terminals from the control board and the ground wire from the bearing bracket (Fig. 17).

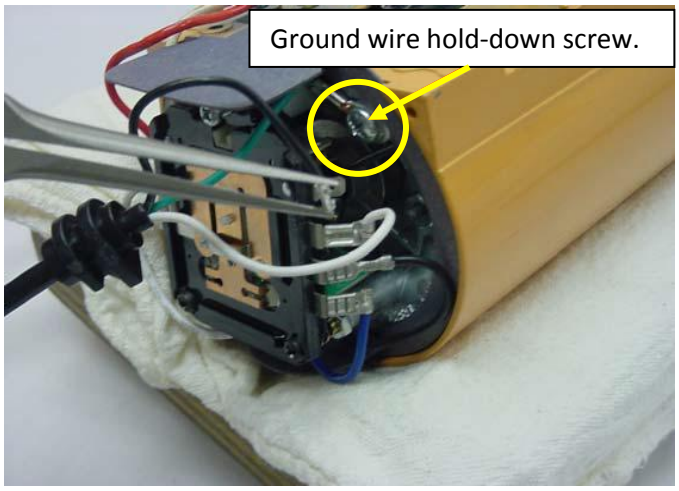


Fig. 17) Remove the cord flag terminals and power cord ground wire hold down screw.

Remove the motor stator flag terminals from the control board (Fig. 18).

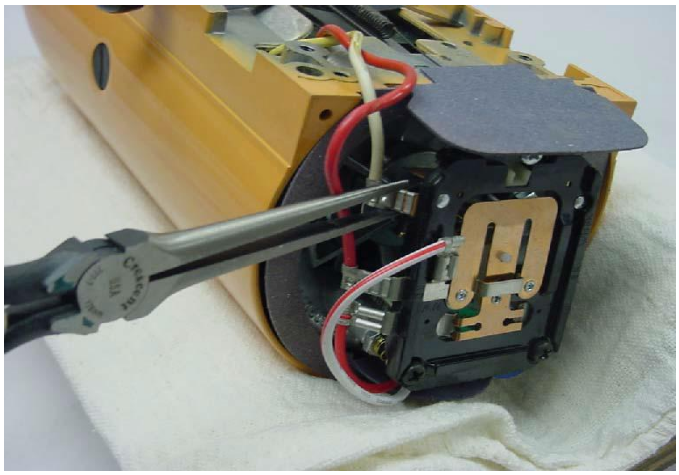


Fig. 18) Remove the motor stator flag terminals (red & white wires) from the control board.

Remove the end seal (see Fig. 21) and disconnect the phase control flag terminals from the control board (Fig. 19).

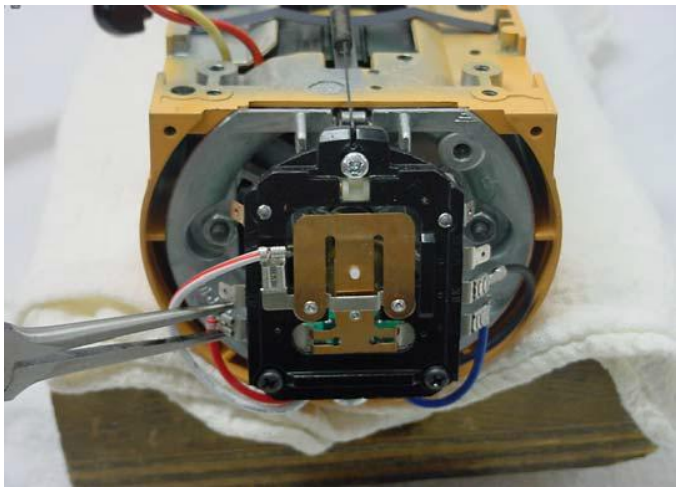


Fig. 19) Remove the phase control flag terminals.

Unhook the control board spring at the bottom of the control board using needle-nose pliers (Fig. 20).

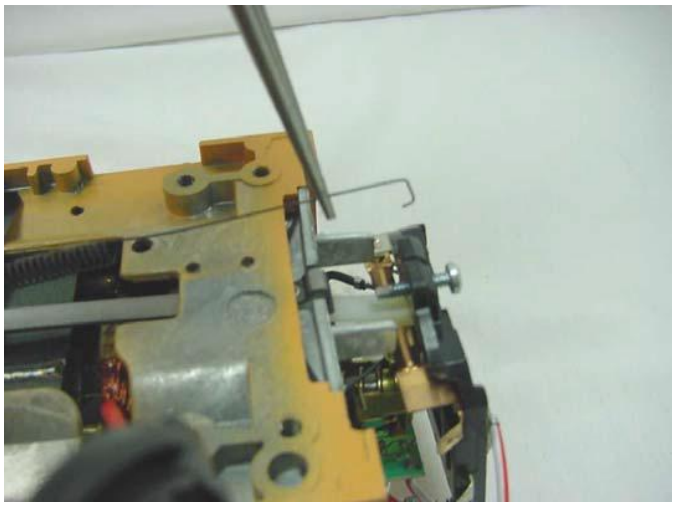


Fig. 20) Unhook the control board spring from the control board.

Unlock the two lock nuts at the top of the control board and unscrew the two speed adjusting screws.

The mixer control board can now be removed a set aside for later evaluation (Fig. 18).

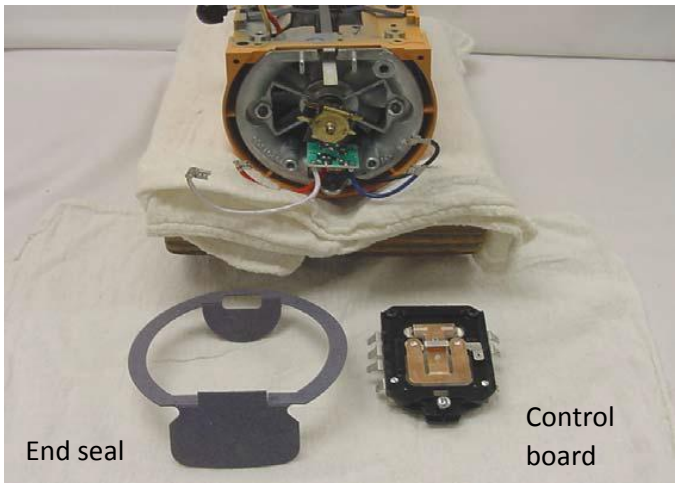


Fig. 21) Mixer housing with end seal and control board removed.

The phase control can now be removed from the bearing bracket, if necessary, by unscrewing the #4-40 x 1/4" Phillips pan head screw (Figs. 22 & 23).

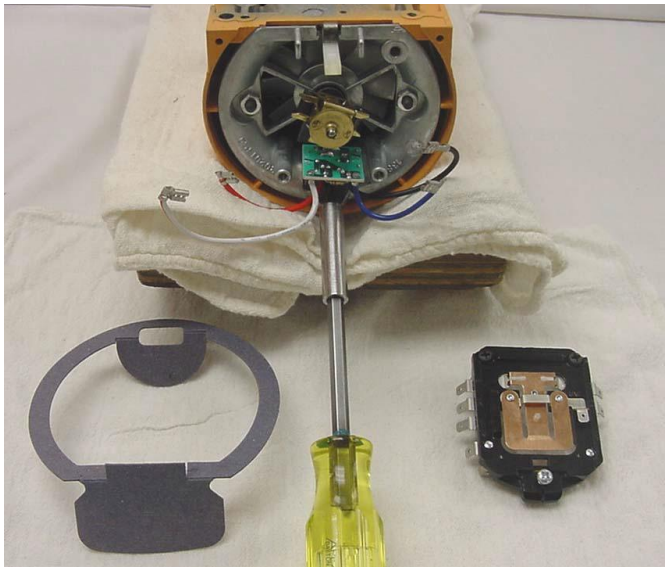


Fig. 22) Removal of the phase control board from the bearing bracket.

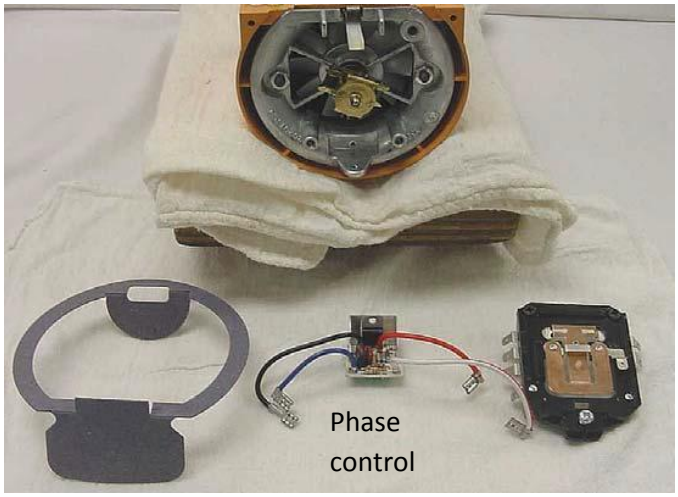


Fig. 23) Phase control board shown removed in lower center.

With a pair of needle nose pliers, carefully pry off the governor assembly. (Fig. 24) Do NOT bend.

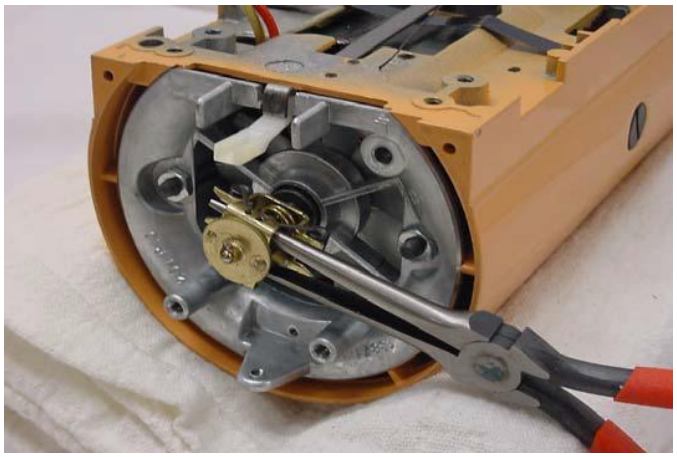


Fig. 24) Needle nose pliers used to pry governor off the motor shaft.

Remove the governor drive pin and lay it aside so it will not be lost (Fig. 25).

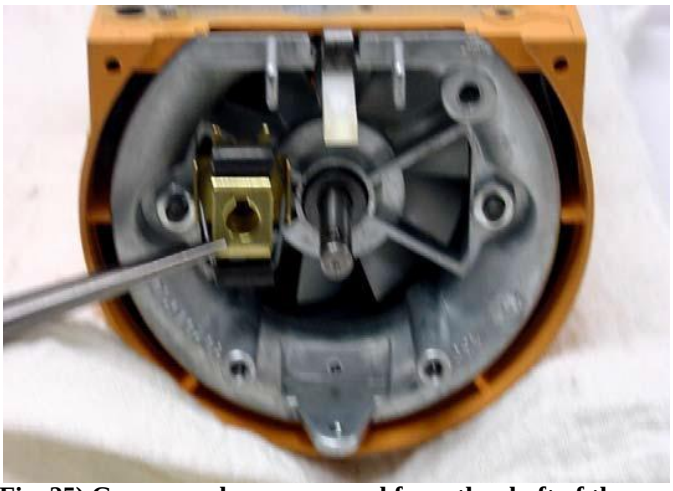


Fig. 25) Governor shown removed from the shaft of the motor.

To remove the speed control link and cam assembly, take out the pivot screw and tension washer (Fig. 26).

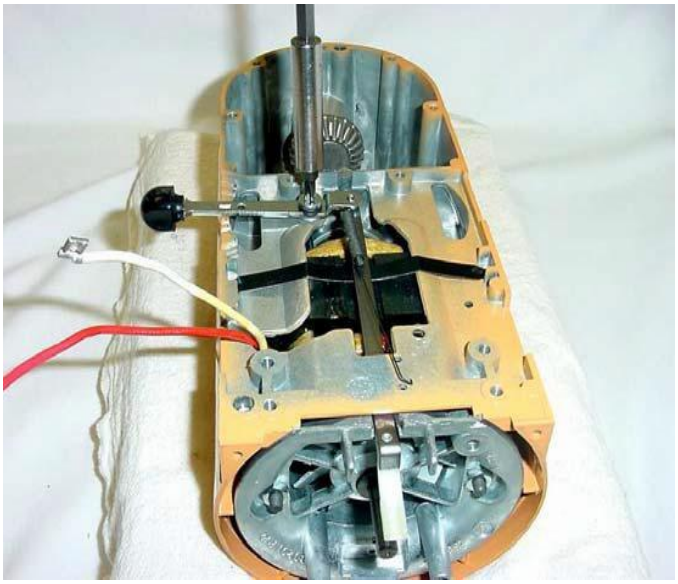


Fig. 26) The pivot screw and tension washer are removed with a Phillips screwdriver.

Before removing the speed control link and cam assembly, remove the control board spring from the link by lifting it up and out of the small hole in the link assembly.

The flat spring is removed as you remove the speed control link assembly.

The speed control link and cam assembly can be removed by pulling it out of the gear case motor housing (Fig. 27).

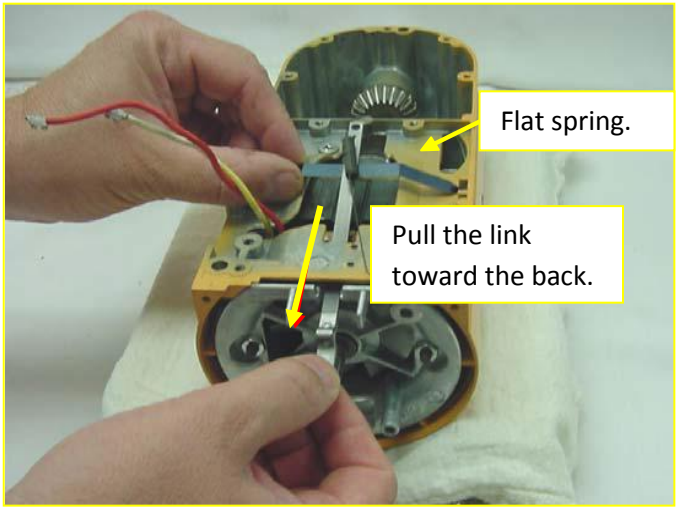


Fig. 27) Remove the speed control spring, flat spring and the speed control link assembly.

Unscrew and remove the two #10-24 nuts that hold the bearing bracket in place (Fig. 28).

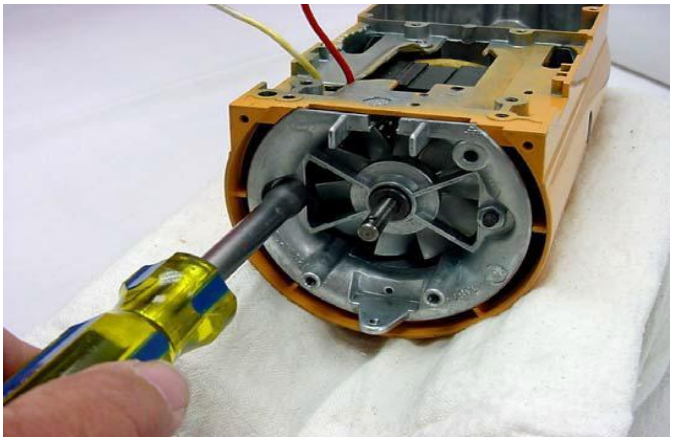


Fig. 28) Two 10-24 nuts are removed from the bearing bracket.

Remove the bearing bracket (Fig. 29).

Now remove the motor stud sleeve from the stator stud (Fig. 30).

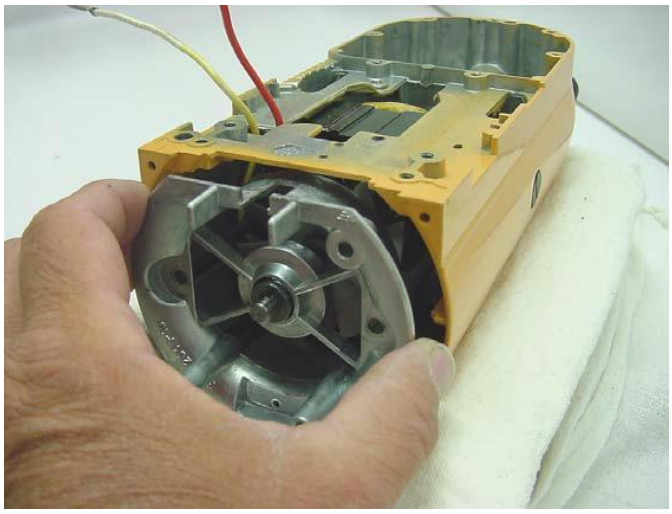


Fig. 29) Bearing bracket being removed after two #10-24 nuts have been removed.

Fig. 30) The motor stud sleeve is shown being removed after bearing bracket removal.

Unscrew the two brush holder screw caps and remove the brushes and springs (Fig. 29).

Viewing from the rear, mark the brushes right and left, and also the top of the brush, just as it was removed from the motor.

Fig. 31) The brush holder caps are loosened to access brushes for removal. Make sure to note brush orientation.

The armature can now be removed.

With the attachment hub bevel gear removed, insert a drift punch through the attachment hub opening and gently tap the armature back through the stator using a block of wood to protect the shaft (Fig. 32).

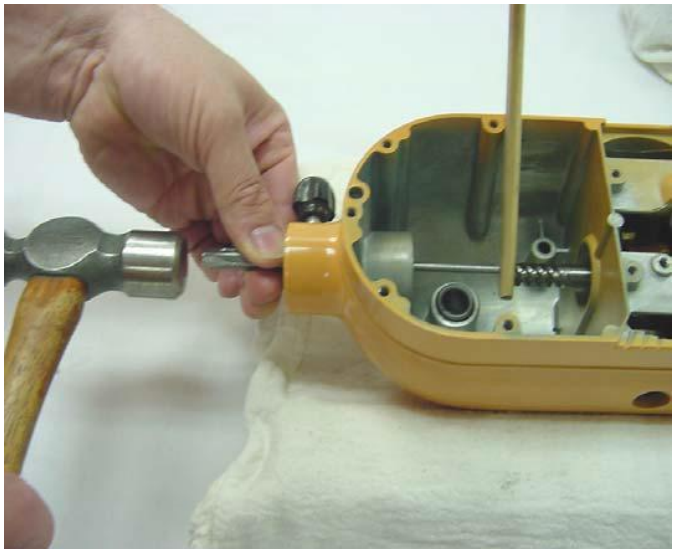


Fig. 32) A block of wood is used to protect the motor shaft when removing the armature.

Remove the worm end bearing flat (metal) washer and the fan end spacer (fiber) washer.

Pull the two wires from the rear of the stator through the slot in the gear case motor housing so they are inside the gear case motor housing and sticking out the back (Fig. 33).

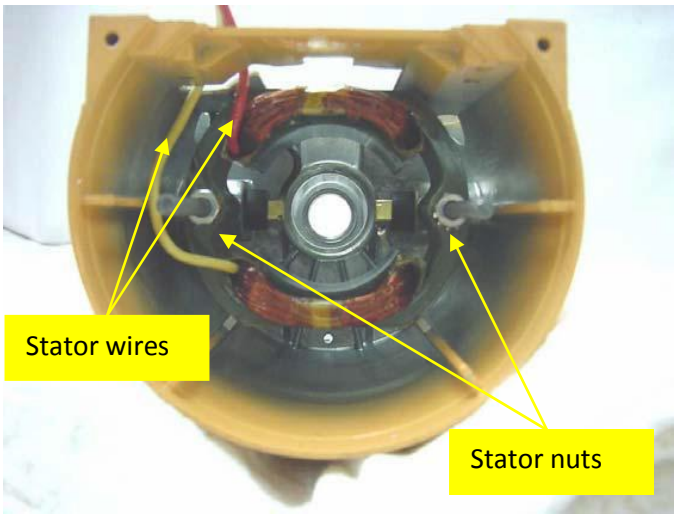


Fig. 33) Wire orientation inside the gear case motor housing.

Using long pliers, pull the brush clips from the stator out of the brush holders. Note orientation of stator clip in brush holder.

Loosen the two #10-24 stator hold down nuts and the studs (Fig. 33) that secure the stator in the motor housing and set aside for use during reassembly. There is no reason to remove the nuts entirely from the studs.

Note: Newer units have the locking nuts which do not easily come off from the studs. At least one of the stator studs will have a lock washer under the nut (both may have in some units).

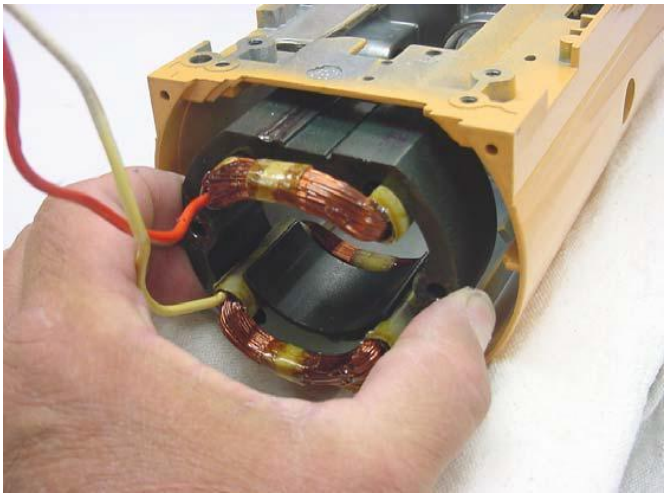


Fig. 34) Remove the stator from the motor housing.

To pull the stator out, reach into the motor housing and grasp the stator and pull it out.

Caution: Do not nick or damage the copper coil wires on the motor.

Under the stator studs are #10-24x1/4 cup point screws. To remove the set screws, use a 3/32" Allen wrench; older models may use a flat screwdriver (Fig. 33).

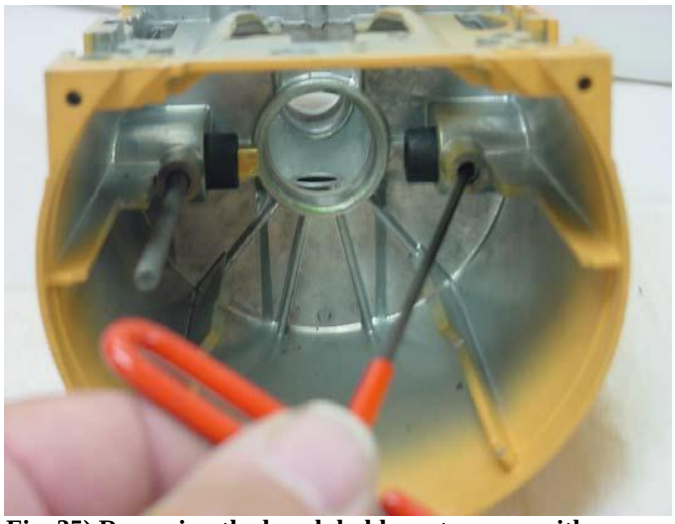


Fig. 35) Removing the brush holder set screws with an Allen wrench.

Unscrew the set screws a few turns and (from inside the housing) push the brush holder out by hand. Note the orientation of the (brass) brush insert inside the brush holder.

SECTION 3

REPAIRS TO MOTOR AND SPEED CONTROL

Install the brush holder into the gear case motor housing so that the ridge on the brush holder lines up with the channel in the motor housing brush holder bore. Install the (brass) inserts into the brush holder so that the small locking hole is toward the brush clip channel. Lock the brush holder with inset in place with the #10-24x1/4" cup point set screws taking care not to over tighten them (the insert should move freely after the set screws have been tightened down. See Appendix C for proper screw torques.

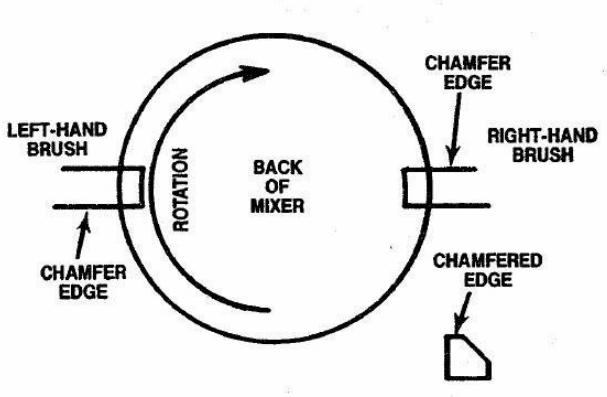


Fig. 36) The orientation of the brush holder inserts viewing from the rear of the motor housing.

Note on early production solid state stand mixers: The early production solid state stand mixers utilized a square brush and brush holder. Square brushes are no

longer available. However, brushes with the chamfered edges will fit into square brush holders.

To test the stator, use a multi-meter or ohmmeter (Fig. 37). Set the multi-meter on to measure ohms or set the ohmmeter on the 1X scale and be sure it is zeroed while shorting the meters test leads.

Fig. 37 Test the two stator coils for continuity with an ohmmeter set on the low ohms scale.

To test the lower coil, connect one ohmmeter lead to the red wire and the other to the black wire of the coil. If the ohmmeter shows a low resistance reading, the coil is good. Check the upper coil in the same way using the white wires.

If the needle on the ohmmeter deflects to zero (showing a short) or there is no deflection (open winding), the coil is bad and the stator must be replaced.

Typical ohmmeter readings on good coils will be in the neighborhood of 1.5 to 2.0 ohms on 100 - 120 volt units, 3.5 to 4.5 on 127 volt units and 8.0 to 18.0 ohms on 220 - 240 volt units.

Place the stator into the motor housing so that the (long) Red and White stator wires are toward the rear of the motor housing. The coil with the white wires should be toward the top of the motor housing (Fig. 38). Remember the motor housing is inverted in the cradle so the white motor coil would be the lowest.

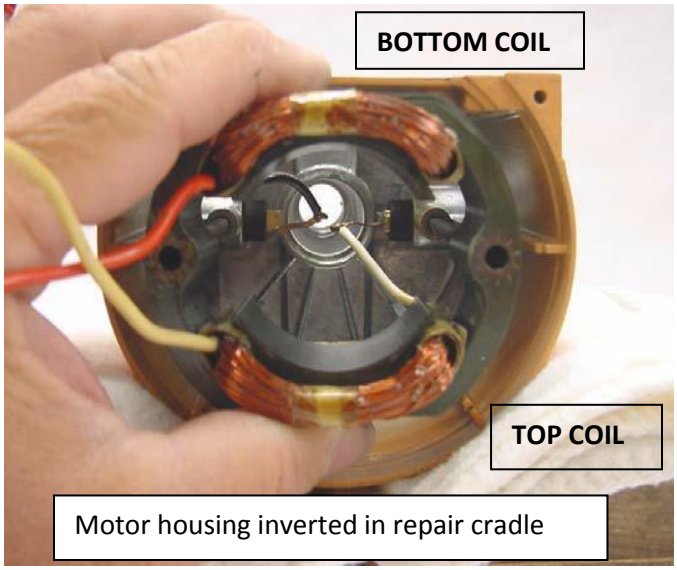


Fig. 38) Position the stator into the inverted motor housing.

The two long leads from the stator must be on the same side as the slot in the motor housing (Fig. 39).

Insert the stator brush clips between the brush holder housing and (brass) brush insert. A slot is provided in the brush holder housing for this brush clip. Insure that the brush clips are pushed in all the way so the brush and commutator on the armature will clear them when assembled. Seat the stator in the motor housing making sure that the stud holes in the laminations line up with the stud mounting holes in the motor housing.

Install the studs into the motor housing locations that they were removed from keeping in mind that the star washer gets located. Tighten both nuts (see Appendix C for torques).

Put the long red lead from the stator through the slot in the bottom of the motor housing (Fig. 39).

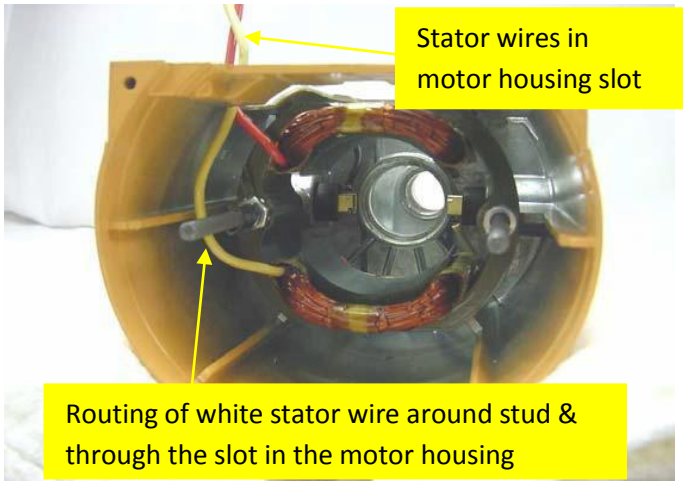


Fig. 39) Route the two stator wires through the slot in the motor housing.

Place the stator stud sleeve over the stator stud and route the white wire from the stator between the stud sleeve and the motor housing (around the outside of the stud).

Place the large metal flat washer into the armature bearing bore pocket in the motor housing.

Make sure the armature that is being installed is in good condition. The armature wiring can be checked on a tool called a “growler” or you can take the armature to an electric motor repair shop and let them test it. If it is not in good condition, replace it with a new one.

The armature bearing can be checked by grasping two sides of the bearing between your forefinger and thumb of one hand while allowing the armature to hang vertical with the fan downward. With the other hand, spin the armature shaft from below the fan. The armature should spin smoothly. If any clicking is heard or the bearing does not turn smoothly, replace the armature.

Check the ventilating fan on the armature for bent or damaged blades. Straighten the blades if they are slightly bent (Fig. 40). If they are too badly damaged, replace the armature.

If the armature is replaced, move the fiber washer from the rear of the old armature shaft to the rear of the new armature shaft.

Add one drop of Loctite 648 to the outer race of the ball bearing and install the armature in the motor housing (Fig. 40). Be careful not to touch the armature bearing with the loctite to any of the installed brush holders as this will cause the brushes to become fouled.

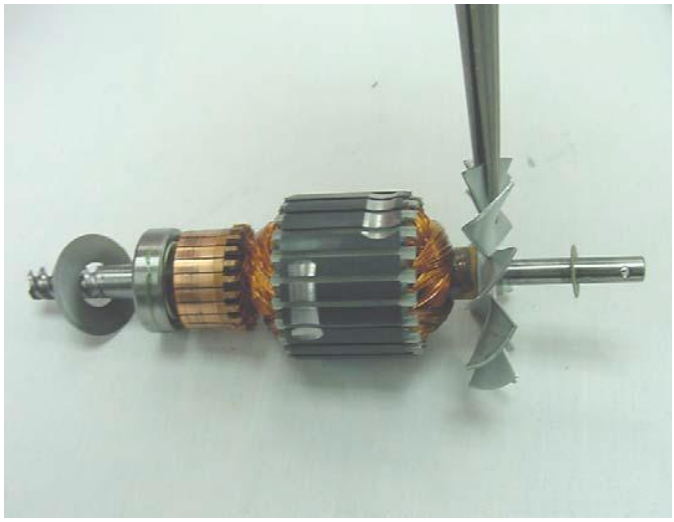


Fig. 40) Check the blades of the armature ventilating fan and straighten if bent.

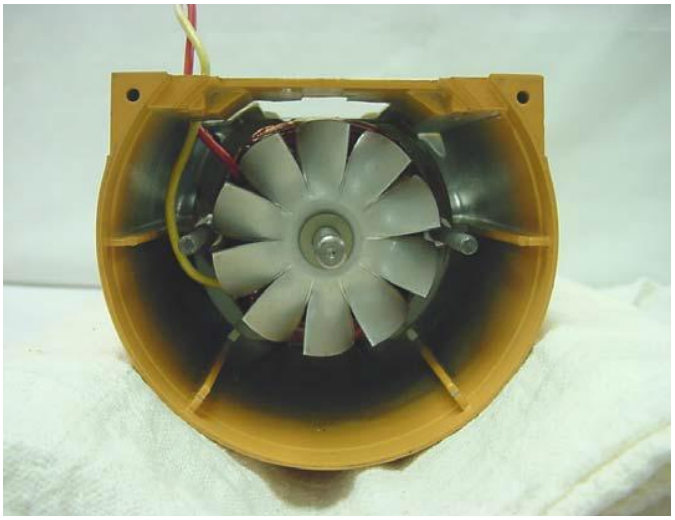


Fig. 41) The armature properly installed in the motor housing.

If necessary, tap the end of the armature shaft with a non-metallic mallet to seat the armature bearing into the motor housing. When the armature is properly seated, you should not be able to rotate the flat (metal) washer in front of the bearing. You can check this using the tip of the pointed punch.

Check the bearing in the bearing bracket for wear or cracks. Also check that the bearing bracket itself is not damaged. If there is any damage to the bearing or bearing bracket, replace the entire assembly. If needed, a few drops of machine oil can be added to the felt washer around the bearing to moisten it (do not saturate the felt washer as this will cause oil to be pulled into the motor and lessen the brush life).

On older models, the felt washer can be accessed by removing the three #4-40 x ½” retaining screws that secure the bearing retainer cap to the bearing bracket. To replace the bearing cap, place the retainer on the bearing and screw back in place with the three #4-40 x 1/2” screws.

Install the bearing bracket onto the rear of the motor. Start bracket onto the two stator studs. Push the bracket down until the stator studs are through the bracket and it seats into the ribs of the motor housing.

Start the two nuts on the stator studs and turn them until the bearing bracket is seated and the proper torque is achieved (Fig. 42 see Appendix C for torque specification).

With the bearing bracket installed, the armature should turn freely with minimal end play.

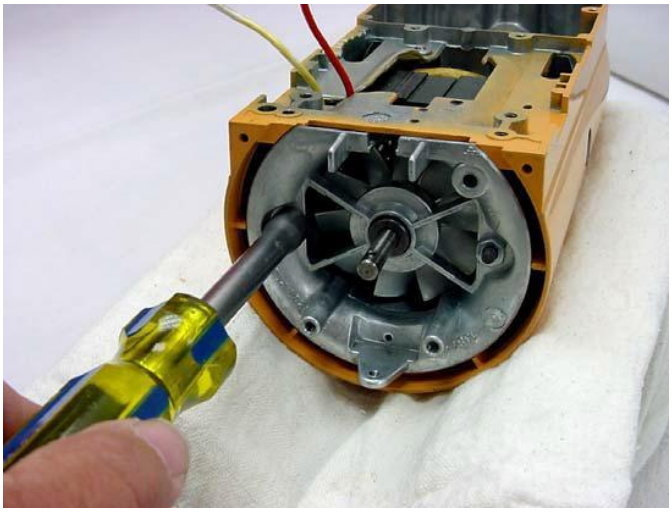


Fig. 42) Tighten the two nuts on the stator studs to seat the bearing bracket.

Check the motor brushes for excessive wear. If the old brushes are more than 5/16" long they can be reused. If they are shorter than 5/16" or show uneven wear or signs of fouling they should be replaced with new brushes.

Install the brushes in the same orientation that they were removed. Remember that the chamfered edge of the brush must line up with the chamfered side of the (brass) brush insert. If in doubt about the orientation, you can check for commutator contact through the bottom opening of the motor housing.

Push the brush in and lock it in place with a brush holder screw cap, seat and spring (Fig. 43).

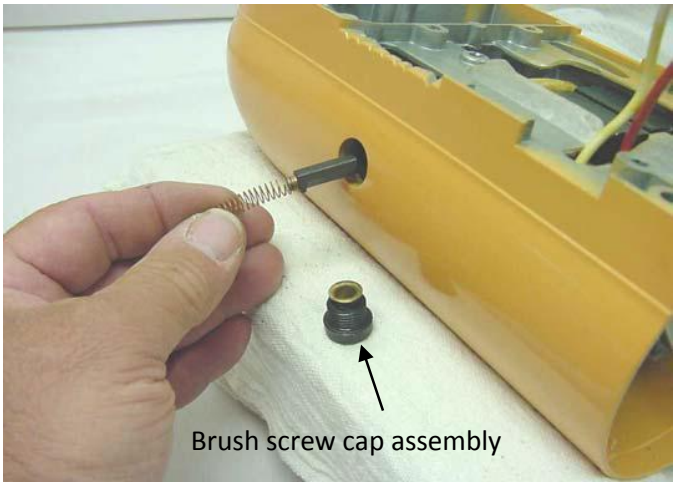


Fig. 43) Place the brushes into the mixer brush holder.

Place the speed control link and cam assembly through the slot in the bearing bracket with the cam portion of the speed control link and cam assembly toward the top of the motor housing.

Place the flat spring in position and slide the mixer speed link and cam assembly over the flat spring. Attach the speed control spring through the small hole on the speed control link and cam assembly (Fig. 44).

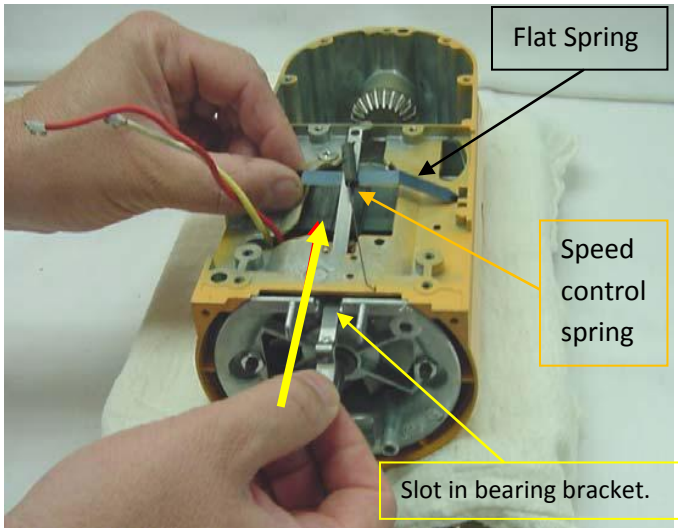


Fig. 44) Slide the speed control link over the flat spring and attach the speed control spring to the link.

Place the stud on the speed control lever through the larger hole at the front end of the speed control link.

Place the tension washer on the pivot screw and screw it into the motor housing until tight (Fig. 45).

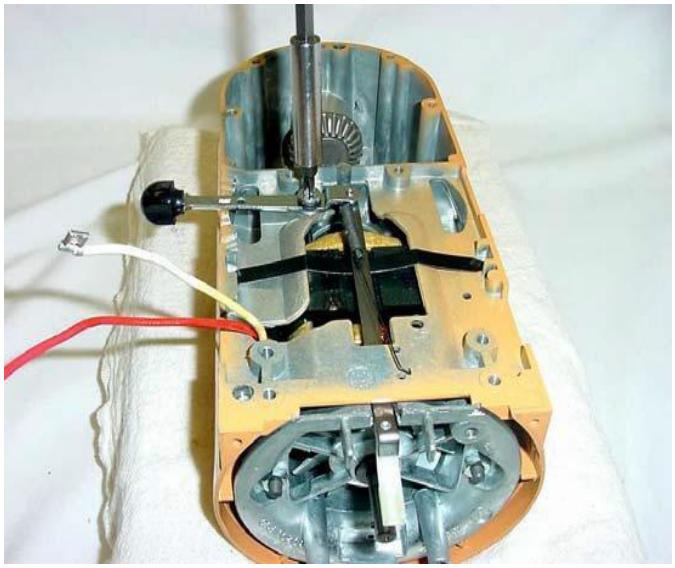


Fig. 45) Secure the pivot screw and tension washer to the motor housing.

Inspect the governor for any defects. A good governor will have good symmetry. The weight arms should not be too tight (some free "wiggle" or movement of the weights is desired). The weight arms (wire) should not be in contact with the "fingers" on the yoke. The top (ball) plate (stakes) should be tight to the yoke. If the spring in the governor is rusty, replace the entire governor assembly.

Place the governor drive pin in the armature shaft. The pin should be inserted into the larger opening of the drive pin bore with the longest end inserted first. With the drive pin at top of the shaft, place the governor on

the shaft with the keyway up (Fig.46). Push the governor onto the shaft as far as it will go.

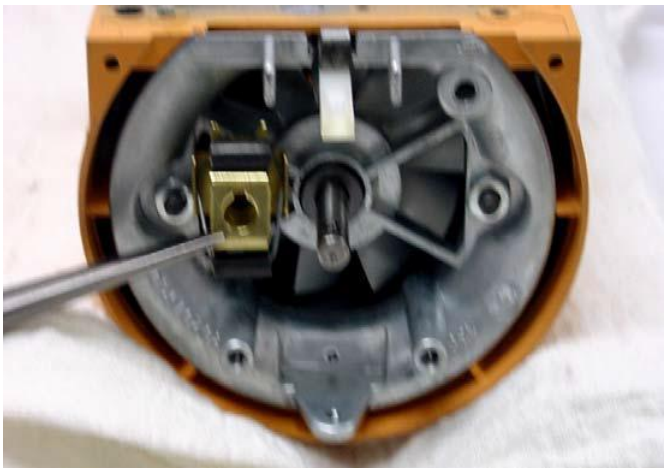


Fig. 46) The governor shown before being placed on the motor shaft.

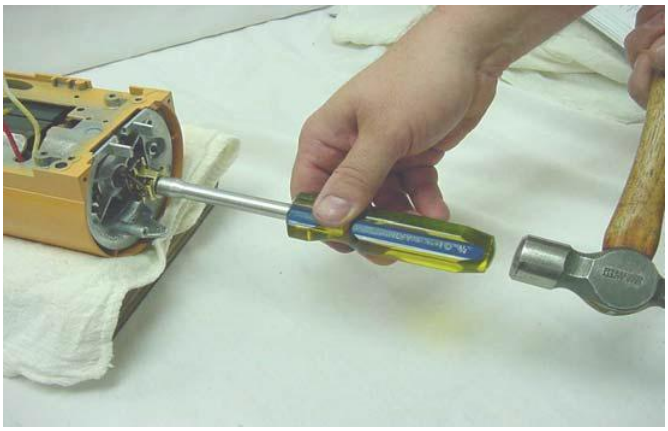


Fig. 47) Using a 3/8" nut driver to seat the governor. Tap gently. Never drive directly against governor ball.

Earlier models had thermal conductive compound on the surface of the heat sink that is in contact with the bearing bracket. It is no longer used on newer models and is not required when replacing the phase control circuit with a new one. If however, it was one the model being repaired, it should be reapplied before reassembly.

Place the #4-40x1/4" pan head screw through the hole in the Triac and screw it into the bearing bracket (Fig. 48) until it is tight (4 to 5 in. lbs.).

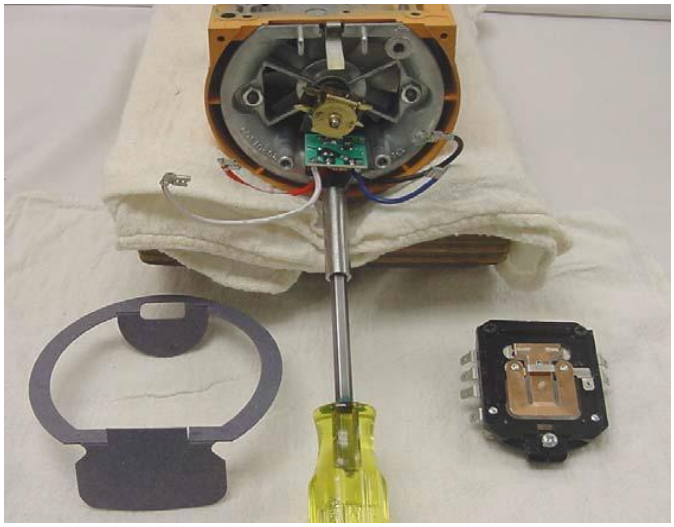


Fig. 48) The Phase control circuit is secured to the bearing bracket.

CAUTION: Do not attach the phase control excessively tight, as this pressure could deform the heat sink, resulting in damage to the control.

Place the control board on the bearing bracket with the adjusting screws and springs at the top (Fig. 49).

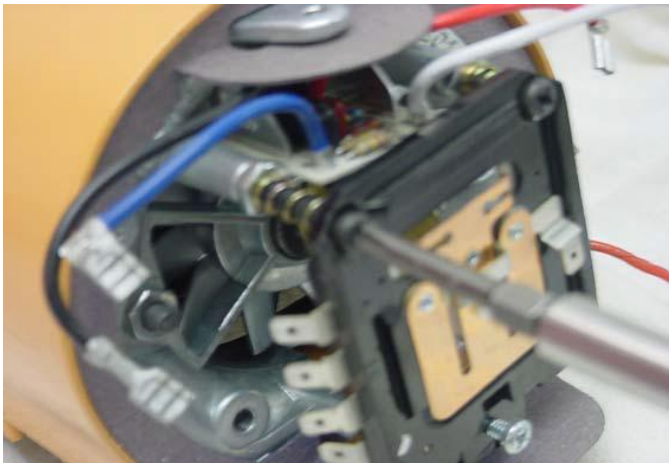


Fig. 49) Place the control board on the bearing bracket.

Turn in the screws until approximately 3/8" of the screw remains visible within the spring.

Have both screws turned in evenly so the opposite end of the control plate rests squarely on the extension posts at the bottom of the bearing bracket.

With long nose pliers, hook the control plate spring into the hole on the bottom part of the control board assembly (Fig. 50).

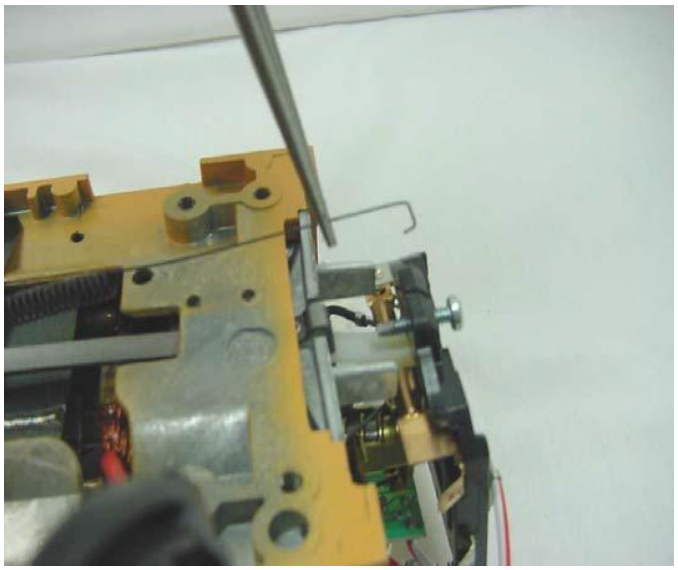


Fig. 50) Grasp the control spring with pliers and positioning the hook into the slot and hole at the bottom of the control board assembly.

Place the end seal onto the mixer.

Connect the two flag terminals from the stator and the four flag terminals from the phase control to the control plate. Refer to the wiring diagrams (Appendix D) for proper terminal connections. Be certain the flag terminal connections to the control board are tight (cannot be easily pulled off). If necessary, crimp the terminals with needle nose pliers to ensure a tight fit to the control board.

SECTION 4

REPAIRS TO GEAR CASE AND PLANETARY

NOTE: For illustrative purposes, grease is not shown in the pictures in this section.

Examine the bearings in the attachment hub area and top of the gear-case. The hub bearing is cast into the gear-case/motor housing. If it is worn badly, the entire housing must be replaced. The vertical shaft bearing is a press fit and should not be removed from the gear-case. However, the gear shafts turn fairly slowly in these bearings and the bearings have a long life.

Examine the attachment hub bevel gear. If it shows wear in the teeth, it should be replaced. If the gear is replaced, coat the shaft of the bevel gear with light grease. Push it into the attachment hub bearing from the inside of the gear-case (Fig. 51). It does not have a washer, so push it in as far as it will go.

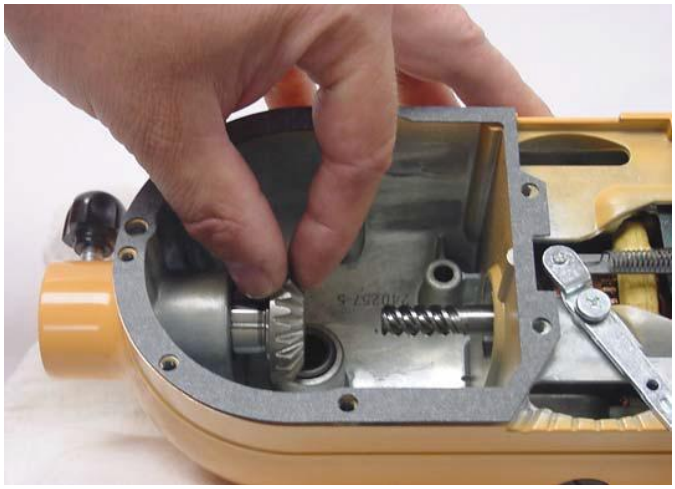


Fig. 51) Installing the attachment hub beveled gear into the attachment hub bearing of the gear-case.

With a Philips head screwdriver, remove the three #10-24x7/16" Philips fillister head screws and lock washer assemblies and lift up on the worm gear bracket bearing and pin assembly to remove (Fig. 52).

Fig. 52) Remove the worm gear bracket assembly.

Remove the center bevel gear and vertical center shaft. Push the vertical center shaft upward, exposing the pin (Fig. 53), and remove the pin.

Fig. 53) Remove the center gear drive pin.

Remove the shaft from the bottom of the lower gear housing (Fig. 54). Check the shaft for bearing wear. Dark gray or indented surfaces indicate shaft should be replaced. Lift gears from case for inspection (Fig. 55).

Fig. 54) Remove the (vertical) center shaft from the lower gear housing.

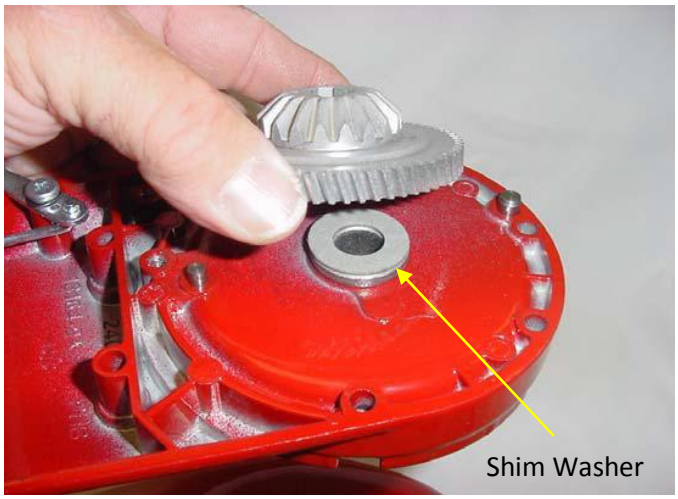


Fig. 55) Center/Bevel gear being lifted for inspection.

Check the lower center bearing for wear. If it is worn, the lower gear case (bottom cover) will have to be replaced, since the bearing is an integral part.

If the attachment hub gear was replaced, then the center/bevel gear on the lower housing may also need to be replaced. If the center/bevel gear shows no signs of wear or damage, it can be reused.

Place the fiber washer on lower center bearing. Place the gear assembly on top of the center bearing. Insert the end of the vertical center shaft opposite the "O" ring into the bottom cover (Fig. 54). Push shaft upward and insert the pin (Fig. 53). Center the drive pin in the shaft and lower the shaft into the gear assembly. Turn the shaft until the pin lines up with the slot of the center gear. Seat the shaft and pin into the center gear such that the gears and shaft turn together. Wipe all excess lubricant from the bottom of the vertical shaft and "O" ring.

Check the worm and pinion gear assembly for wear and/or damage (Fig.56).

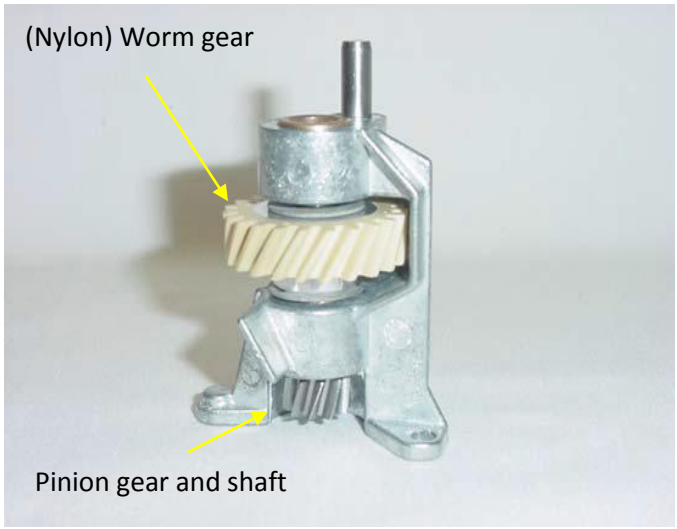


Fig. 56) Check worm gear and pinion before reassemble.

NOTE: The pinions on pre May 6th, 2002, K45SS models, have 11 teeth. On all other units the pinions have 10 teeth.

If any part of the assembly (including the gears) is worn or damaged, the entire worm gear (bracket) assembly will have to be replaced.

Place the worm gear (bracket) assembly on the lower gear housing so that the two dowels will fit into the base of the worm gear bracket (Fig. 57).

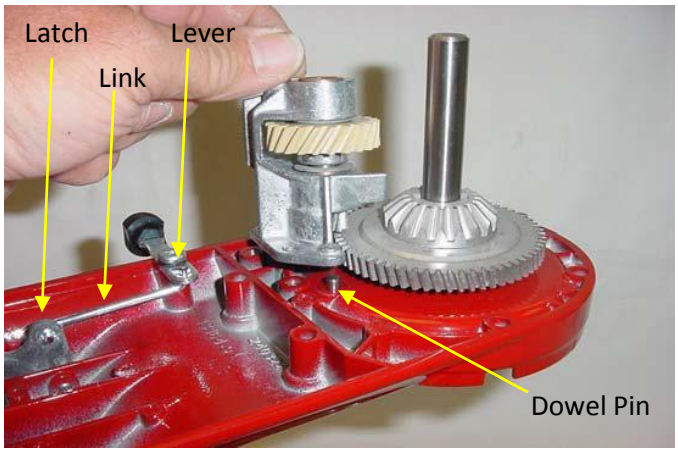


Fig. 57) Line the two dowels up to the base of the worm gear bracket.

Place the three lock washer screw assemblies in the holes and screw them into the bottom cover (Fig. 58). Be sure screws are torque to the proper specification (see Appendix C)

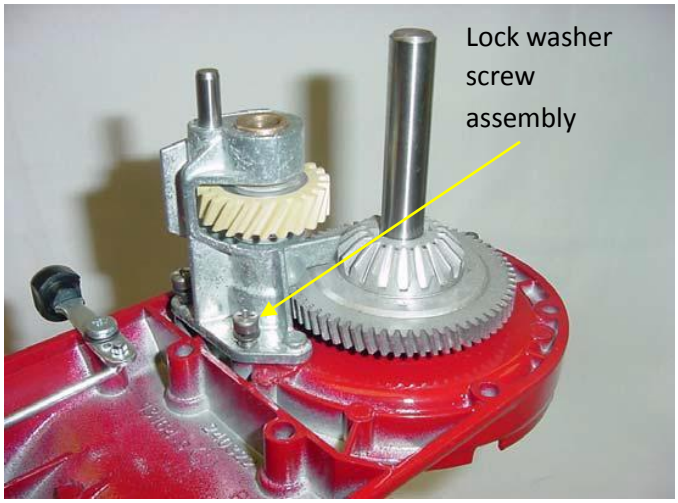


Fig. 58) Secure the three lock washer screw assemblies into the bottom cover.

Check the latch, link and lever assembly. There usually is no wear or trouble with this assembly (Fig. 57).

Use 6 oz. (by weight) of Benalene 930-2 lubricant when lubricating around the gears and when filling the upper gear case. Try to keep the upper center shaft bearing in the top of the gear case free of grease when adding grease to the upper gear case housing. This will help when assembling the lower housing to the upper gear case and motor housing.

Clean the gear case gasket surface of the upper and lower housings. Place a new gasket on the upper gear case. Use of special alignment pins is recommended to properly align the gasket during reassembly (Fig. 59).

Check the cord and plug. If it is drying and cracking, replace it.

Lock the latch lever and hold the bottom cover in position over the gear case/motor housing and start joining them together (Fig. 59).

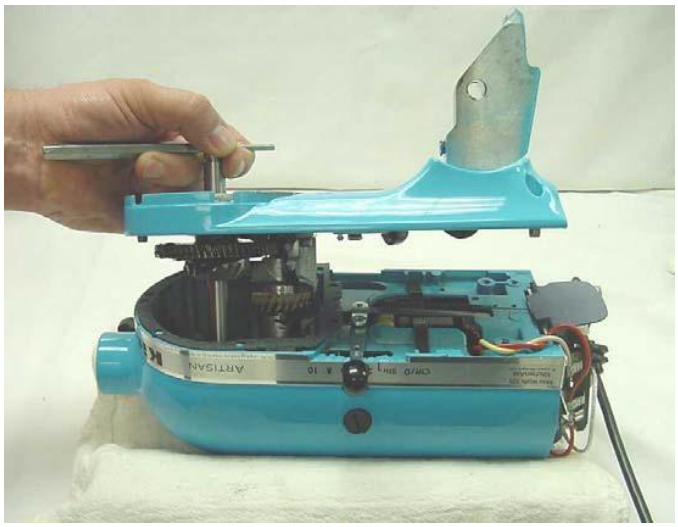


Fig. 59) Use a punch to assemble the upper and lower housing assemblies together.

Using a punch to hold the shaft, invert and assemble the lower gear case housing to the upper gear case housing being certain not to pinch the motor leads in between the two parts.

CAUTION: Do not force the upper gear case and lower bottom cover together. Doing so will result in gear damage. The two parts will fit together easily when the gears are properly meshed. Proper gear mesh is obtained by using the punch to turn the center shaft in a counter-clockwise motion (looking down on the shaft) until the two housing fully seat.

If the internal gear is heavily worn or damaged, it can be removed by prying it free from the bottom cover using a large flat blade screwdriver (Fig. 60).

Fig. 60) Remove the internal gear by prying around and under its edge with a large flat blade screwdriver.

When installing new gear, start with the beveled side down; align notches with holes in gear case and tap lightly with a non-metallic mallet and flat punch.

Insert and tighten the 5 internal gear retaining screws to their proper torques (see Appendix C) using the sequence shown in Fig. 61.

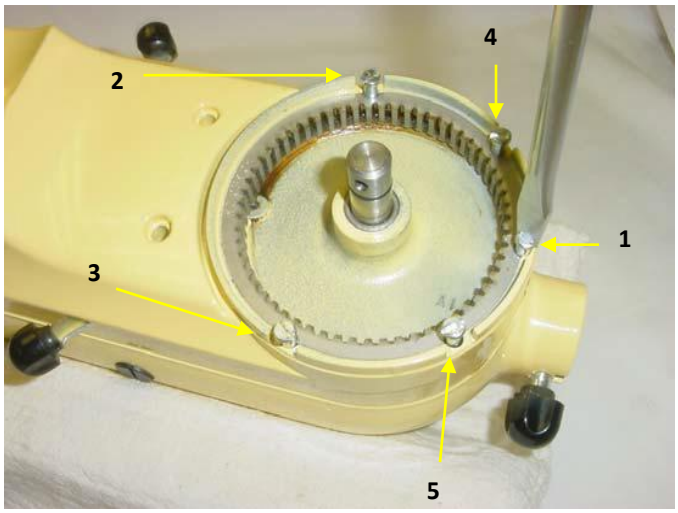


Fig. 61) Tighten the 5 internal gear retaining screws using the sequence shown.

Insert the four #10-24x1" fillister head screws into the bottom cover and tighten to the proper torque (Fig. 62). Make sure to include the lock washer on one of the rear screws.

Place a small amount of Benalene 930-2 lubricant on the teeth of the internal gear.

Check the condition of the planetary. If there is any play in the agitator shaft and bearing (Fig. 65), replace both the planetary body and agitator shaft**.**

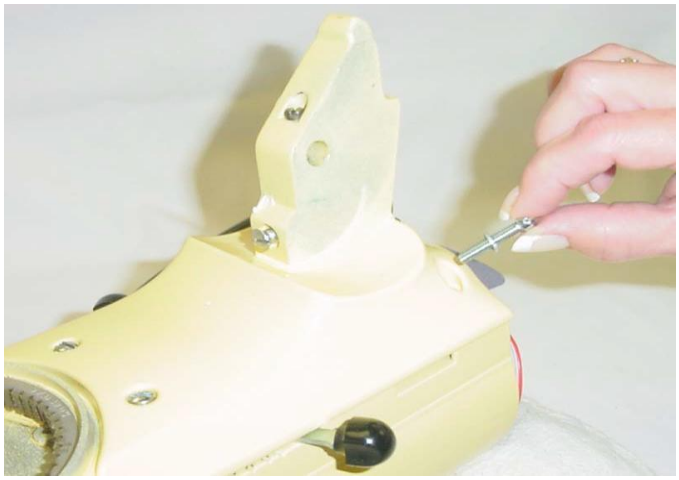


Fig. 62) Secure the four fillister head screws (lock washer on screw shown).

The bearing is an integral part of the planetary body. Using the ring pliers, hold the agitator shaft firmly and remove the pinion gear retaining clip (Fig. 63).

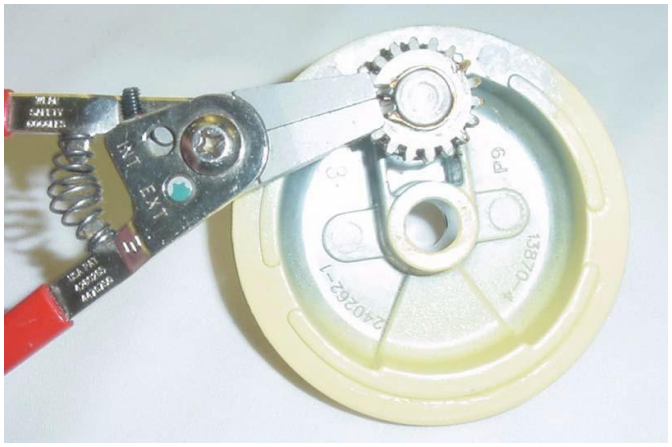


Fig. 63) Use the ring pliers to remove the agitator pinion retaining clip.

Lift the pinion gear from the planetary agitator shaft (Fig. 64). Remove the pin and pull the shaft down from the planetary to remove taking care not to lose the flat washer from under the pin.

Fig. 64) Lift the pinion gear from the agitator shaft.

The agitator shaft with the attachment drive pin, spring, washers and clips is a complete assembly. If any of the shaft parts are worn or damaged, the entire shaft assembly will need to be replaced.

To reassemble, place the agitator shaft assembly into the planetary agitator shaft bearing. Place the flat metal washer over the shaft and down against the top of the agitator bearing. Insert the pin through the shaft. Set the pinion gear on the shaft so that the pin notches in the pinion gear aligns with the pin ends in the agitator shaft. Seat the gear over the pin and install the retaining clip in the groove above the gear on the shaft. Make sure that the clip is fully engaged into the groove all the way around.

Fig. 65) disassembled planetary components.

Place the fiber washer on the vertical center shaft of the upper motor assembly. Be sure that the planetary pinion gear teeth and the internal gear teeth have a light coat of grease (Benalene 930-2) on them. Place the planetary on the shaft and push it down. Line up the holes in the planetary and shaft. It may be necessary to use an awl or pointed punch to align the holes (Fig. 66).

Fig. 66) A pointed punch can be used to align the holes of the shaft with the planetary.

Drive the groove pin into the shaft (Fig. 67) using the 5/32" flat tipped drift punch. At this point you should check for end play by pulling up on the planetary. There should be a very small amount of end play. You can also check for easy rotation of the center shaft in the gear case. The planetary and center shaft should rotate easily between gear mesh. Once the gears are engaged in any direction, the planetary will still turn but with more effort. If there is no rotational motion of the planetary, it means that the vertical center shaft is binding usually caused by misalignment of the upper and lower center shaft bearings.

Fig. 67) Carefully drive the groove pin into the shaft of the planetary.

Place the drip cup (ring) over the planetary and onto the bottom cover. Tap it down into place lightly using a non-metallic hammer (i.e. rubber or rawhide) taking care not to dent it.

Check the beater height adjusting screw (Fig. 68). This screw is slotted and has a nylon insert. As it is screwed in, threads are cut in the nylon and hold the screw tight. Replace this adjusting screw if it is loose in the threads.

Fig. 68) The beater height adjusting screw has a nylon insert and should not be loose in the threads.

SECTION 5

REPAIRS TO THE TILT-HEAD PEDESTAL

If the pedestal is removed, check the hinge pin. If it has been galled around its center by the set screw, replace it (Fig. 69).

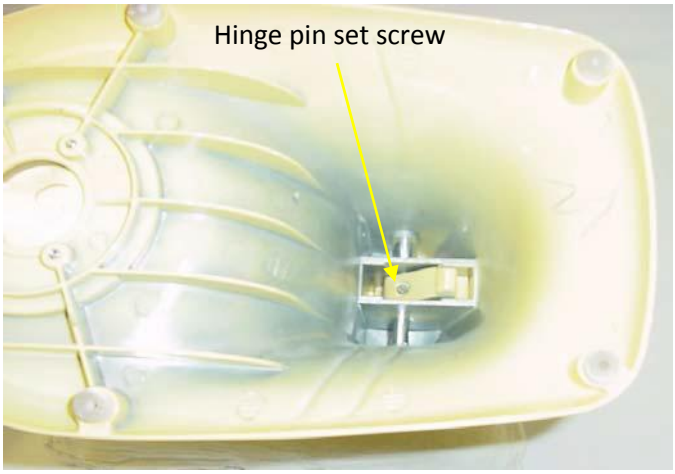


Fig. 69) Location of the hinge pin set screw.

Loosen the set screw so that it will clear the hinge pin. Place the new hinge pin in the pedestal, but do not drive it in.

Check the rubber feet. If they are worn or softened from grease, replace them. Twist the old feet out (Fig. 71). The new style feet have a larger base and are interchangeable with the older style (shown in Fig. 70).

Fig. 70) The pedestal feet should be replaced on older mixers.

Tap the new feet into place using a mallet. Be sure all feet are totally seated in the pedestal to maintain a level foundation. If the mixer does not sit level on the countertop, re-tap the feet until the mixer sets level.

Remove the pedestal again and check the bowl screw cap for damage. If the bowl screw cap has worn out (bowl no longer locks in place), replace the screw cap. To remove the old bowl screw cap, take out the three #10- 24x1/2" flush mounted screws and lift out the old cap from the pedestal. Place the new screw cap on the pedestal such that the screw at the front is the one that is evenly positioned between two of the four bowl retainers on the plate (Fig. 71). The four bowl retainers should form a square pattern like that shown by the red dashed line in Fig. 71.

Once in place, tighten the screws to the proper torque (see Appendix C).

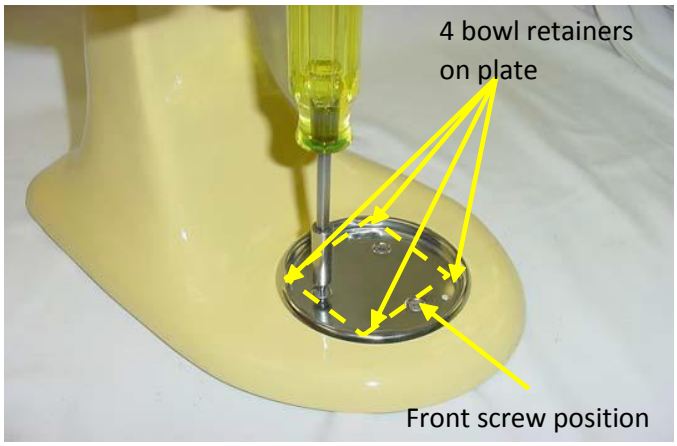


Fig. 71) The new cap is secured to the pedestal with three screws.

While the motor housing assembly is still in the cradle, place the pedestal back on the bottom cover tongue. Line up the holes for the hinge pin and tap it in so that an equal amount of the pin extends on each side of the pedestal (Fig. 72).

Fig. 72) Use a rubber or rawhide mallet to tap the hinge pin into the pedestal.

Using a flat blade screwdriver, tighten the hinge pin set screw on the underside of the pedestal (Fig. 69).

On international export models shown, a plastic head lock foot has been riveted to the pedestal to permit the locking of the motor housing in the "inclined" position.

The latch lever on these models is spring loaded and the locking action is obtained by removing tension from the lever after the motor housing has been put in the "inclined" position (Fig. 73).

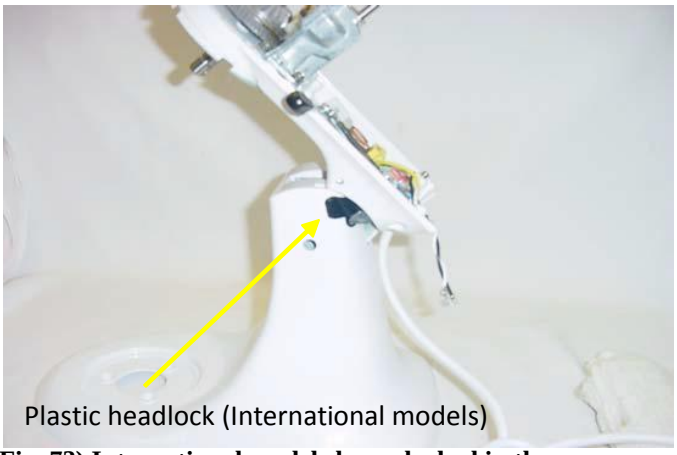


Fig. 73) International model shown locked in the "inclined" position.

The small circuit board shown (Fig. 74) is an RF (radio frequency) filter used on international models. It is fastened to the bottom cover with a single round head screw.

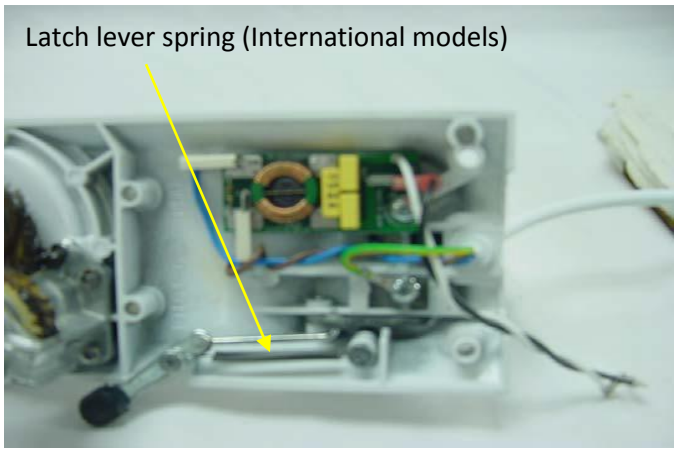


Fig. 74) International model bottom cover with R.F. filter and spring loaded latch lever.

SECTION 6

ADJUSTING THE STAND MIXER SPEEDS

NOTE: When replacing the control plate, a cloth, (Fig. 75), hooked over the end of the control plate spring, will keep the spring accessible, not allowing it to "snap" between the upper and lower gear case and become "lost."

Then when reassembling the control, simply pull the cloth to where the spring can be grasped with the needle-nose pliers and reattached at the bottom of the control board (Fig. 75)..

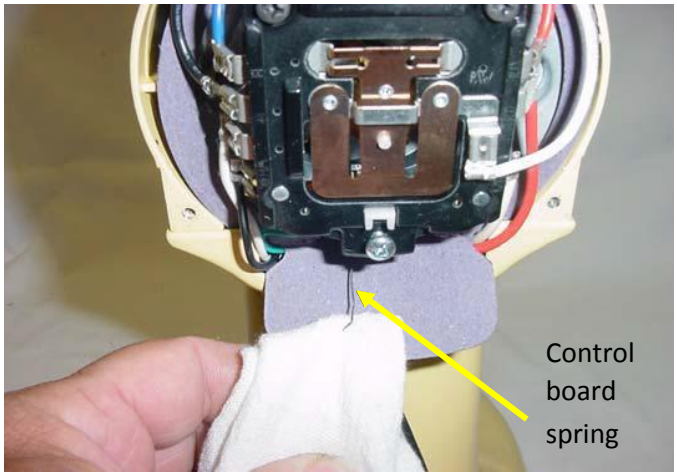


Fig. 75) Hold the control plate spring with a cloth to retain access for reassembly.

After assembly, the control board must be adjusted to properly set the speeds.

Make sure that all of the wire leads are secure and that they are in their proper positions. Make sure that the mixer speed selector is in the OFF position.

Plug the cord into a receptacle having the proper voltage.

To adjust the speeds, move the switch lever from OFF to STIR. This may or may not start the motor. If the motor does not start, turn out the two adjusting screws evenly to a point where the planetary makes roughly 60 revolutions per minute (RPMs). To test the speed, hold a finger of the right hand lightly on the edge of the planetary (Fig. 76). Let the beater shaft hit the finger. Count the number of times the finger is touched in 15 seconds. Adjust the two screws until the shaft touches the finger about 15 times in 15 seconds.

A digital tachometer like that shown in Fig. 77 can also be used to set the hub speed through the nose of the mixer. When using this method, set speed STIR at 43 to 50 RPM.

When the proper speed has been set, lock the two lock nuts using an 11/32" wrench with an insulated handle (Fig. 78). After tightening the nuts, recheck the speeds to make sure they did not change.

Fig. 76) Method used to count test speeds and check torque.

Fig. 77) Digital tachometer for setting speeds on KitchenAid mixers .

Fig. 78) Setting speeds using the digital tachometer.

Next move the switch lever to speed 2. At this setting, the planetary must turn at 95 revolutions per minute. Check the speed as was done for STIR speed. The planetary should touch your finger approximately 22 times in 15 seconds. If the planetary touches the finger less than 22 times in 15 seconds, turn the adjusting screw at the bottom of the control plate inward or clock-wise (Fig.79).

If using the digital tachometer, set the hub speed of the stand mixer for a speed of 56 to 64 RPM.

Check the revolutions again and keep adjusting the screw at the bottom until the right speed is reached. There is no locking of this screw.

Fig. 79) Adjust the bottom speed setting screw for speed #2.

Try all mixer speeds from STIR to 10. There should be a definite change in all speeds from STIR to 10.

Place the trimband on the gear case/motor housing, and with the two # 6-32 x 3/16" screws, fasten it to the housing (Fig. 80).

Place the end cover on the end of the motor housing making sure not to pinch any of the control wires and secure it with the # 6-32 x 3/8" oval head screw (Fig. 81).

Now that the stand mixer is fully assembled, perform a ground continuity and dielectric withstand (hi-pot) test again on the stand mixer prior to plugging the stand mixer into any electrical outlet. This will ensure that no wires were pinched in the reassembly of the end cover.

Plug the mixer in and test the speeds again to make sure no change took place when installing the end cover.

With the mixer working correctly, place the bowl on the bowl screw cap and lock into place. Place the flat beater on the agitator shaft and fully lower the head of the mixer. There should be approximately 1/16" clearance between the bowl and the beater. If the beater is too close to the bowl, turn the beater height adjusting screw (Fig. 82) out or counter clock-wise. Likewise, if it is too far away, turn the adjusting screw in or clock-wise until the desired clearance is attained (Fig. 82). The mixer is now ready for operation.

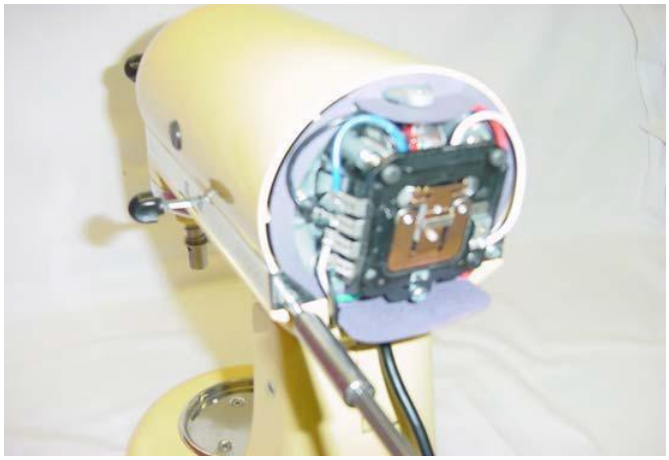


Fig. 80) Fasten the trim band to the upper housing.

Fig. 81) Secure the end cover with a tapered head screw.

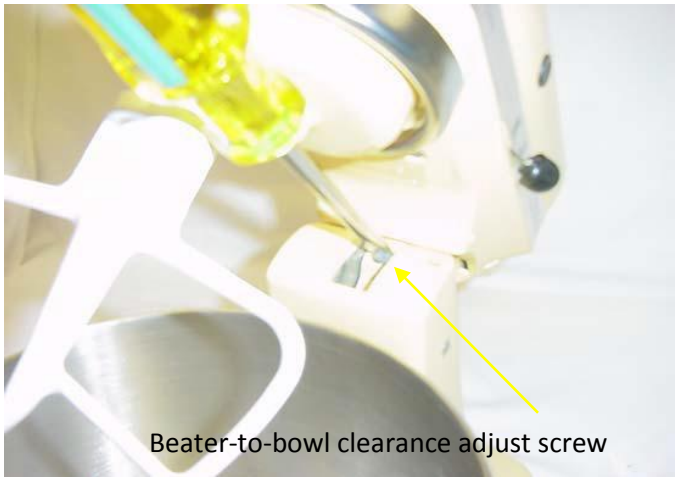


Fig. 82) Adjust the beater to bowl clearance using the height adjustment screw.

SECTION 7

REPAIRS TO THE BOWL-LIFT ASSEMBLY

The bowl lift models of KitchenAid mixers have a different type of bowl and are different in size. On the tilt head models, the bowl is held stationary by mechanical means at the bottom of the mixer pedestal; whereas, on bowl lift models, the bowl support slides up and down rails on the sides of the column.

Should the mixer be tipped over or knocked off the table or counter, the unit's bowl support assembly may be broken. To repair it, it will be necessary to replace the bowl support.

To replace the bowl support, remove the four 5/16"-18 x 3/4" round Phillips head screws (Fig. 83) and lift the column and base assembly off the bottom cover (Fig. 84). KSMC50 models use 5/16"- 18 x3/4" hex head screws.

Fig. 83) Four round Phillips head screws must be removed to replace the bowl support assembly.

With the bowl lift assembly on the bench, turn it over and remove the four 5/16"-18 x 3/4" round head screws (Fig. 85) from the base and set the base aside.

Remove the two #10-24x1/2" flat head screws from the bowl support (Fig. 86) and slide the bowl support down and off the column (Fig. 87).

Examine the (white plastic) bowl lift arm. This part is held on the bowl lift handle with a roll pin. If the arm is cracked near the pin, replace it.

Fig. 84) Lift the column and bowl support assembly off of the bottom cover.

Fig. 85) Remove the four round head screws from the base to separate it from the bowl lift assembly.

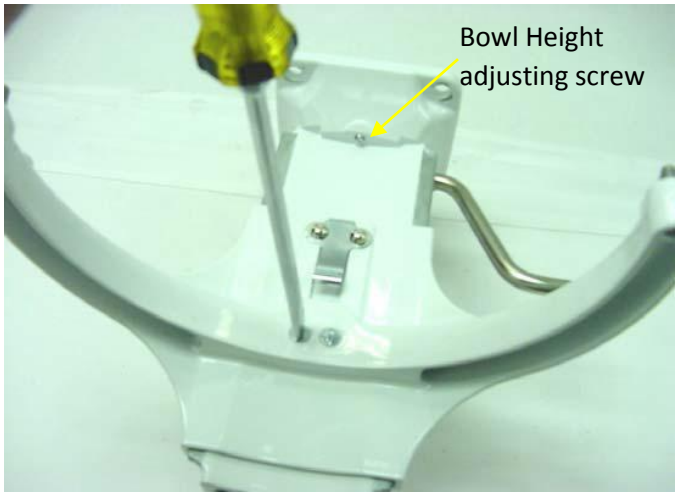


Fig. 86) Remove 2 flat head screws to separate the bowl support from the bowl lift assembly.

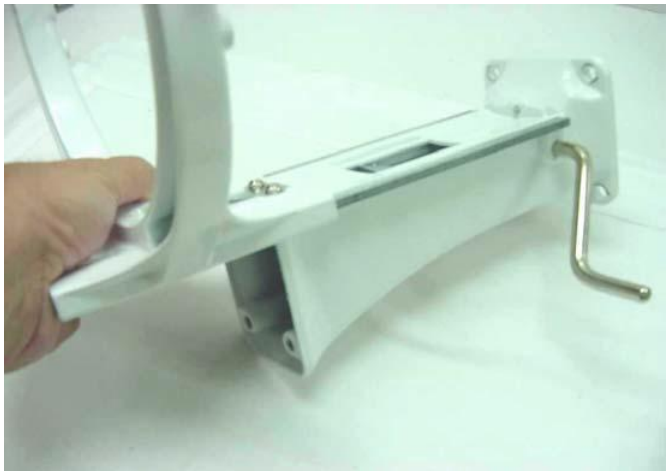


Fig. 87) Slide the bowl support down and off the column to access the bowl lift assembly.

To install the new bowl lift arm, raise the handle to the full upright position and drive out the roll pin (Fig. 88). With the roll pin out, remove the bowl lift handle (Fig. 89) from the column. The bowl lift arm and rod assembly can now be removed from the column. If there is any fault with the column (dowels or height adjust screw missing, parts bent or dented), replace it at this time.

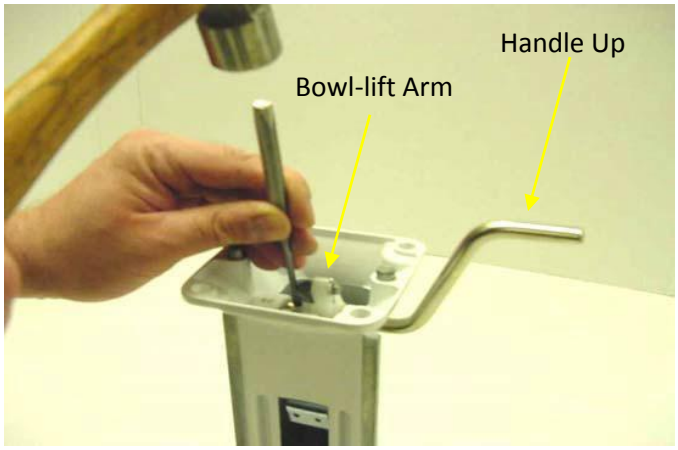


Fig. 88) Drive out the roll pin to remove the bowl lift arm.

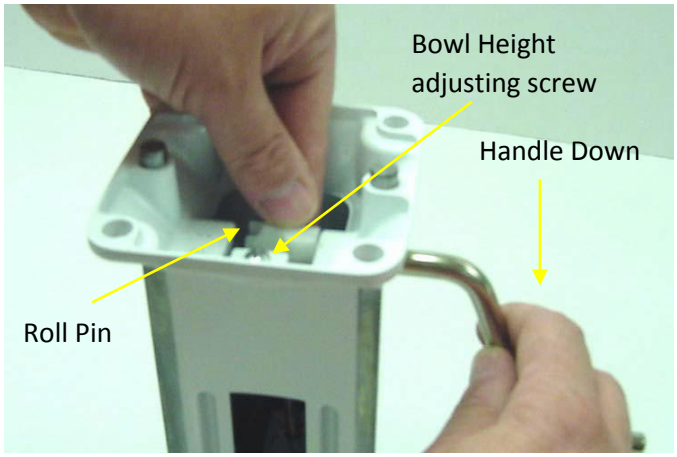


Fig. 89) with the roll pin removed, pull the handle from the column.

The bowl-lift arm and rod assembly can be torn down further by removing the 3/8" castle nut, spring and washers (including the v-washer) from the bottom end of the rod. When reassembling, replace the parts to the rod in the same order and orientation that they were removed.

With the bowl lift handle down, push it through the hole in the column, through the new arm and into the bearing hole in the column. Place the roll pin in the arm and drive it through the lift handle until it is almost flush with the (white plastic) bowl-lift arm (Fig. 90). Take care not to damage the new arm and be sure the pin is tight.

Fig. 90) the roll pin is driven in until it is almost flush with the arm.

Check the beater height adjusting screw at the top front of the column and replace if missing (Fig. 90).

Slide the bowl support assembly onto the bottom of the column (Fig.87). Place the bowl lift bracket in place behind the bowl support and screw in the two #10-24x1/2" flat head screws (Fig. 86). Tighten to the specified torque (see Appendix C). Make sure the castle nut on the end of the bowl-lift rod is adjusted so that the tension will be great enough to snap the rod into the arm and hold it there (Fig. 91).

Fig. 91) Check the nut for proper tension on the bowl lift bracket.

Place the base on the bottom of the column and screw it down using the four 5/16"-18x3/4" round head screws (Fig. 85). Tighten the screws to the specified torque (Appendix C).

If the mixer base feet are worn, replace them. To replace the mixer base feet, pull them out with pliers using a twisting motion.

Note: Older models require the removal of four # 8-32 x 1/2" round head screws to remove the feet (Fig. 92).

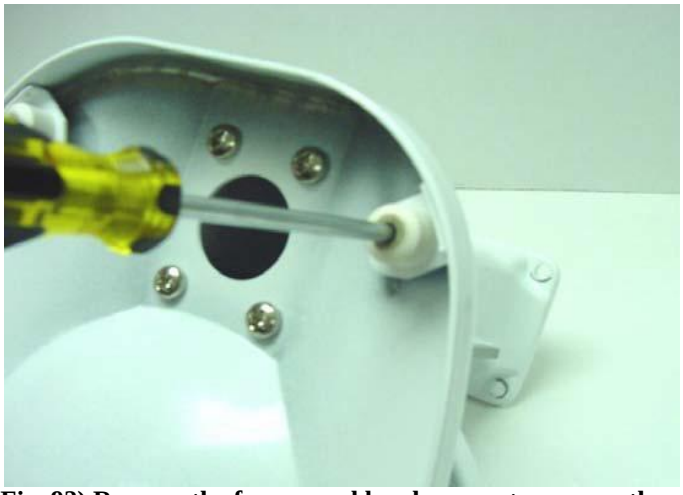


Fig. 92) Remove the four round head screws to remove the feet from older models.

Install new feet by pushing the tapered end into the foot supports with a twisting motion (Fig. 93). Older models place the screws in the new feet and screw the feet to the base. Do not over-tighten as to push the screw through the bottom of the rubber foot (Fig. 92).

Fig. 93) Push tapered end of foot into foot support with twisting motion until seated.

The bowl latch spring must be removed from the old bowl support and placed on the new bowl support to complete the bowl support repair. To remove the bowl latch spring, unscrew the two #10-24 x 1/4" screws. Replace with new if rusted or broken. The function of the bowl latch spring is to hold down the rear of the bowl. Hold the bowl latch spring on the bowl support and insert the two #10-24 x 1/4" round head screws into the bowl support and tighten (Fig. 94).

Fig. 94) Two #10-24 x 1/4" screws hold the bowl latch spring in place.

Invert and place the column onto the bottom cover dowel pins (Fig. 84) and attach with the four 5/16"-18 x 3/4" round head screws (Fig. 83). Tighten the screws to the proper torque setting (Appendix C).

If needed, refer to Section 6 and set the speeds as outlined.

Place the end cover on the end of the motor housing making sure not to pinch any of the control wires and secure it with the # 6-32 x 3/8" oval head screw (Fig. 81).

Now that the stand mixer is fully assembled, perform a ground continuity and dielectric withstand (hi-pot) test again on the stand mixer prior to plugging the stand mixer into any electrical outlet. This will ensure that no wires were pinched when the end cover was installed.

The mixer is now ready for operation.

To attach the bowl to the bowl support, place the tabs on the bowl over the locating pins (Fig. 95). Press down on back of bowl, until the bowl pin on the back of the bowl snaps into the bowl latch spring.

Fig. 95) Attaching the bowl to the bowl support

To adjust the beater to bowl clearance, attach the beater to the beater shaft and raise the bowl into the mixing position. The beater should be within 1/16" from the bottom of the bowl. If not, adjust the bowl height by turning the beater height adjusting screw clockwise to decrease the clearance or counter-clockwise to increase the bowl to beater clearance (Fig. 96).

Fig. 96) Adjusting the beater to bowl clearance using the bowl height adjusting screw

SECTION 8

TROUBLESHOOTING THE BOWL-LIFT ASSEMBLY

If the beater rubs the bottom of the bowl, it can be corrected by turning the adjusting screw out. If the unit has no adjusting screw, it can be corrected by tapping the yoke arms down evenly with a mallet. There should be 1/16" clearance between the bowl and beater.

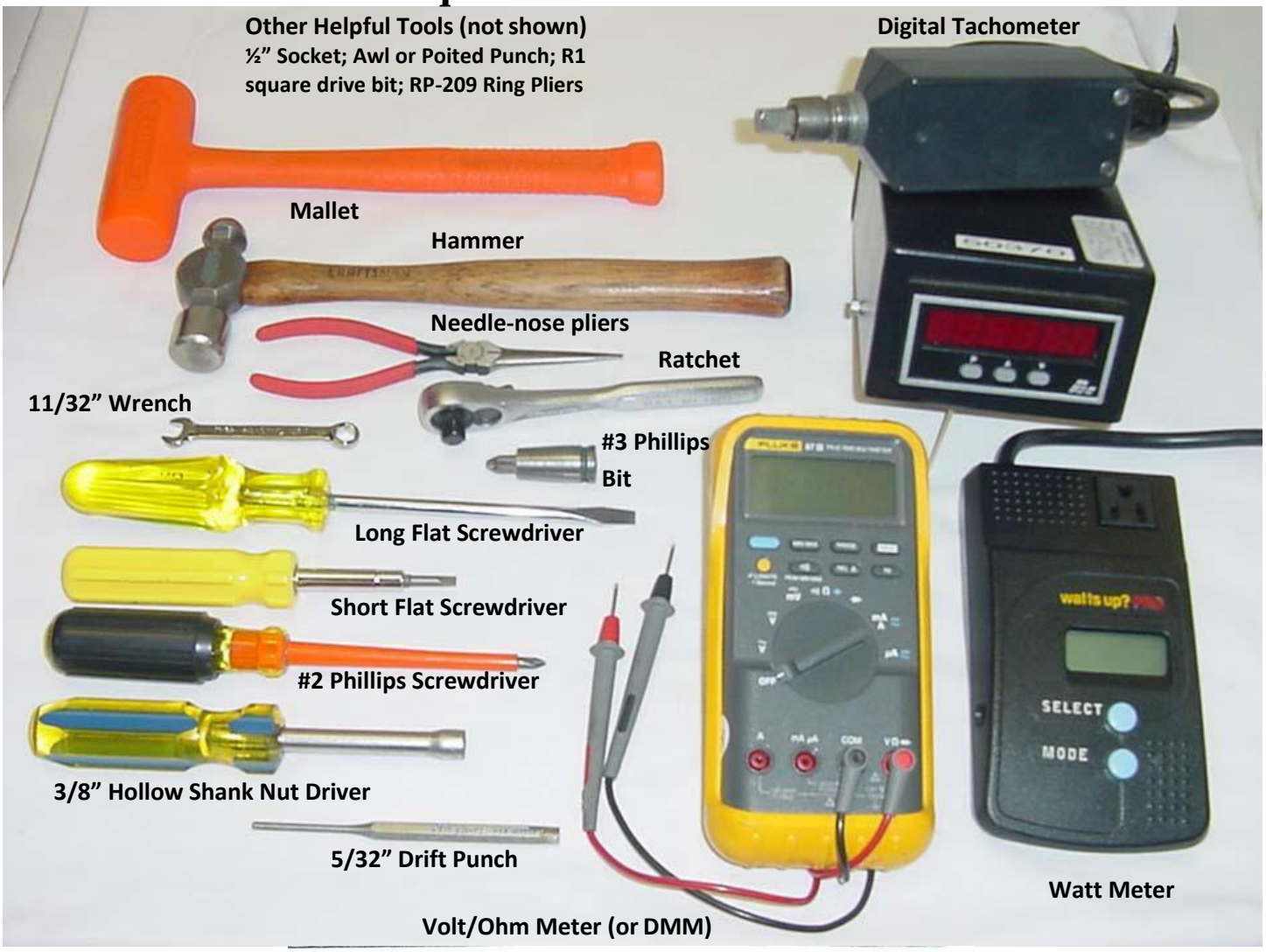
If too much clearance between beater and bowl, adjust the screw in until the 1/16" beater to bowl clearance is met. If unit has no adjusting screw, use a mallet to tap both sides of the yoke up evenly until the 1/16" beater to bowl clearance is met. If beater to bowl clearance is not met, you will have to change the bowl support.

NOTE: The 1/16" clearance can be determined by dropping a dime in the bowl. The flat beater should just touch the coin as the beater rotates.

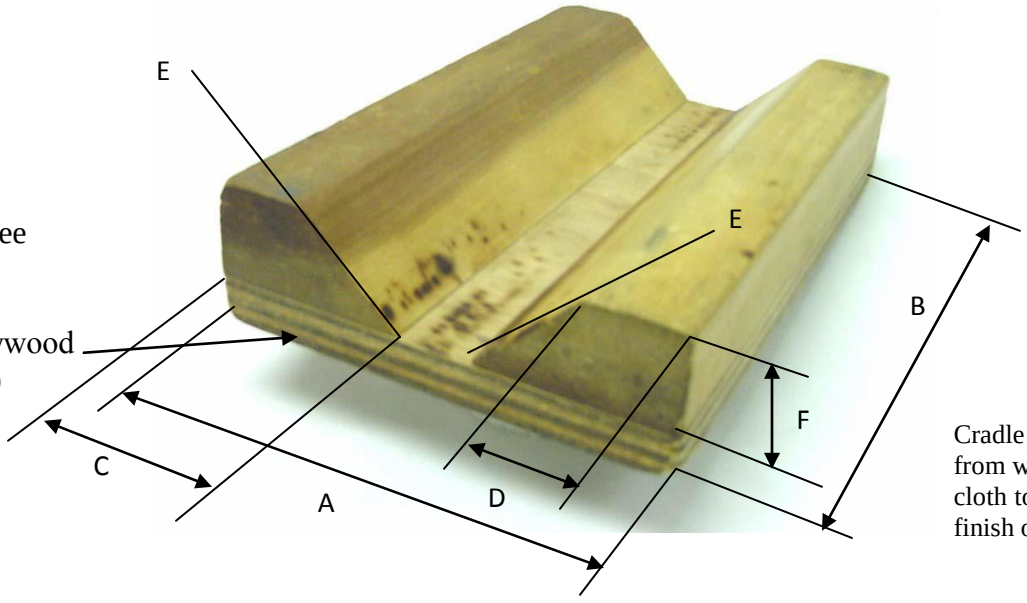
If the bowl rocks on the bowl support, this is caused by a broken bowl latch spring. Remove the two screws and place a new latch spring in place. Torque the two screws to proper specifications.

If the bowl retaining pins are worn, the bowl will move on the pins and the beater will hit the sides of the bowl. If this happens, replace the bowl support.

APPENDIX A
Tools Required for Stand Mixer Service



A - 7"
B - 11"
C - 3"
D - 1 1/2"
E - 45 Degree Angle
F - 1 1/2"
G - 3/4" Plywood (8" x 11")



Cradle - Make your own from wood, cushion with cloth to avoid damage to finish of mixer.

APPENDIX B
Troubleshooting Quick Reference Guide

MIXER PROBLEM	MOST LIKELY CAUSE(S)	WHAT TO DO / CHECK
Mixer will not run (no hum or buzz).	Open Electrical Cicuit	Check circuit breaker.
	Mixer not plugged in or no power source	Make sure the mixer is plugged in to a working "live" wall outlet.
	Faulty Power Cord	Check power cord for continuity using a multimeter. Also inspect for frayed, broken or exposed wires.
	Faulty speed control plate ON/OFF moveable blade switch points.	Remove end cover and check control plate switch contacts. The moveable blade and fixed point contact at the bottom of the control plate should close when the speed selector is moved from the OFF position to any of the selectable speeds.
	Wire (clip) loose from brush holder (open motor circuit).	Remove one of the stator leads from the control plate and, using an ohm-meter, measure the continuity from one of the stator leads (red) to the other (white). A high reading would indicate an open circuit.
	Bad stator field (circuit open).	Remove the brushes from the unit and, with an ohm-meter, check the continuity of the stator fields. You should see a low reading between the brush holder (brass insert) and one of the stator wires (Red wire is the control side and the White wire is the latch side).
	Incorrect brush orientation.	check that the beveled corner of the brush lines up with the notch in the brass insert.
	Bad armature (circuit open).	Remove the armature from the motor housing and inspect for broken or loose wires. Continuity can be checked straight across the commutator contacts.
	Dead phase control.	Replace the phase control.
Mixer motor runs but no rotation of the planetary (lower than normal watts)	Stripped gear(s)	Most likely that the (nylon) worm gear is stripped. Remove the bottom cover from the unit and inspect all of the gears. Replace the defective part(s).

APPENDIX B
Troubleshooting Quick Reference Guide (continued)

MIXER PROBLEM	MOST LIKELY CAUSE(S)	WHAT TO DO / CHECK
Hum heard from mixer motor when truned on but no rotation of the planetary (high watts).	Tight Motor	Remove the bottom cover from the motor to determine what is tight (gears or motor). Make sure that the armature is properly seated and that there is only one shim washer at the rear of the armature shaft (must remove rear bearing bracket)
	Tight Gear (bearings or bushings)	With the bottom cover removed, check for free movement of the center shaft by inserting a drift punch into the shaft pin hole and using it as a handle to turn the shaft (all gears should easily turn). Also check the hub gear in the nose of the motor housing as well as the planetary agitator shaft to be sure they are not tight or binding.
		NOTE: Tightness may also be due to alignment between the motor housing and lower gear case (center shaft binding). Check for extra gray fiber washer under the center/bevel gear (should only be one).
Hum heard from mixer motor when truned on but no rotation of the planetary (low watts).	Speeds not properly adjusted	Adjust top two speed screws until planetary rotates. Then adjust all screws for proper speeds at STIR and speed 2.
Mixer will not shut off with speed control lever.	ON/OFF switch not correctly adjusted with switch control link cam	Remove end cover and check control plate switch contacts. The moveable blade and fixed point contact at the bottom of the control plate should open when the speed selector is moved from any of the selectable speeds to the OFF position.
	Control board spring not connected	Check that the control spring is in place on the bottom of the control plate. If the spring hook is bent, bend it back into shape or replace the spring.

APPENDIX B
Troubleshooting Quick Reference Guide (continued)

MIXER PROBLEM	MOST LIKELY CAUSE(S)	WHAT TO DO / CHECK
Mixer will not shut off with speed control lever.	Bent L1 "flag" on control plate shorted to moveable blade on ON/OFF switch.	Make sure the unit is unplugged first. Then pull (straighten) the "flag" connection or replace the control plate assembly.
Speed control lever will not stay in the OFF position.	Speed lever screw is loose.	Remove the bottom cover from the motor housing and tighten the control lever screw.
Mixer runs on high speed only.	Phase control triac shorted.	Replace the phase control.
	Control spring not hooked to control plate.	Remove end cover and check control spring. If unhooked, reattach to bottom of the control plate (check hook on end - rebend if necessary).
Bowl not held firmly on pedestal	Loose clamp disc screws.	Tighten the clamp disc screws.
	Bent bowl screw cap.	Replace bowl screw cap. If none available, bend the four lugs or lips back into position.
Beater strikes bowl or too much beater to bowl clearance.	Beater to bowl height adjusting screw improperly set.	Turn the adjusting screw to adjust for proper beater to bowl clearance.
Planetary turns - beater does not revolve.	Planetary agitator pinion gear drive pin broken.	Remove planetary and take off the pinion gear. Replace the drive pin.
	Planetary agitator shaft pinion gear stripped.	Remove the planetary and replace the pinion gear.
Mixer vibrates and runs faster than normal.	Governor not balanced (missing weight arm).	Replace the governor.
Mixer runs on all speeds, but has no power (no torque - planetary can be easily stopped by hand) on speed STIR.	Loose rivets on control plate.	Check the rivets on the control plate. All control plate rivets are supposet to be tight. If any of the rivets are loose, replace the control board assembly.
	Stir speed improperly set. The hub gear should revolve at 43 to 50 rpm on "STIR"	With hub speed indicator connected to the mixer, remove the end cover and set "STIR" speed to 43 to 50 rpm. Set speed 2 to 56 to 64 rpm.
	Improperly installed governor.	Make sure that the governor is seated properly on the governor pin. The governor flange should be fully seated on the governor pin and should not be overdriven (flange material deformed around pin).
	Armature not fully seated.	Check for full seat of the armature in the motor housing. When the armature is fully seated, you should not be able to move the flat washer in front of the armature bearing.

APPENDIX B
Troubleshooting Quick Reference Guide (continued)

MIXER PROBLEM	MOST LIKELY CAUSE(S)	WHAT TO DO / CHECK
Sparking at armature commutator/motor brushes.	Fouled or worn motor brushes.	Inspect brushes for foreign material and wear. Replace if needed.
	Rough commutator.	Remove and replace armature. Check brushes for wear.
	Faulty armature or shorted field.	Dissemble and check motor.
Mixer is excessively noisy.	Worn spherical bearing (rear bearing bracket).	Remove bearing bracket and replace.
	Worn or damaged front armature bearing.	Replace the bearing on the front of the armature.
	broken or severely worn gears	Determine what gear is making the noise and replace. If the gear is part of a set, replace the set - i.e. worm gear bracket has the worm gear as well as a pinion gear (replace the entire worm gear bracket assembly).
	Broken or worn internal ring gear.	If the internal/ring gear is faulty, the complete bottom cover assembly will need to be replaced.
Electrical shock to operator.	Bare lead touching the inside of the motor housing.	Disconnect from power source. Turn the switch on and check for ground with a test lamp. Touch one lead of the test lamp to a prong on the plug on the power cord and the other lead to an unpainted surface on the motor housing. If the lamp lights, the mixer is grounded. Examine all the wiring in the order of its accessibility, until the grounded wire is found. If the mixer has a radio interference, condenser wired between a stator lead and power cord lead, remove it from the circuit.

APPENDIX C
Stand Mixer Fastener/Screw Torque Requirements

DESCRIPTION	QTY.	TORQUE
Base to column mounting screws - bowl-lift models	4	125/150
Note: Use a lock washer under one of the base mounting screws (KSMC50 Commercial only)		
Column to lower housing mounting screws - bowl-lift models	4	125/150
Bearing bracket assembly retaining nuts	2	15/20
Bowl screw cap retaining screws - tilt-head models	3	24/32
Bowl spring mounting screws	2	18/23
Bowl support mounting screws - tilt-head models	2	18/23
Brush holder caps	2	4/6
Brush holder set screws	2	3/5
Control lever (speed) pivot screw	1	18/23
Control plate locking nuts	2	9 (min.)
Power cord ground screw	1	18/23
End cover retaining screw	1	4/7 Foot
mounting screws - bowl-lift models	4	4/6
Gear case retaining screws	9	18/20
Note: Use a lock washer under one of the rear gear case mounting screws on tilt-head models		
Agitator shaft – attachment drive pin	1	30/40
Switch guard pin (KSMC50 Commercial only)	1	hand tight
Circuit breaker retaining nut (KSMC50 Commercial only)	1	hand tight
Head lock pivot screw – tilt-head models	1	18/23
Hinge pin locking screw – tilt-head models	1	24/33
Stator retaining nuts	2	30 (min.)
Note: If torque guns are set at 15/20 lbs., nuts must be hand torqued at least ¼ turn with a nutdriver		
Phase control retaining screw	1	4/5
Planetary gear retaining screw (KSMC50 Commercial only)	1	18/23
Trim band mounting screw	2	8/10
International ground and filter mounting screws	2	18 (min.)
Stator stud	2	3/5
Worm Gear Bracket mounting screws	3	18/23
Bowl height adjust screw bowl-lift models	1	10/12

APPENDIX D
Circuit Diagrams

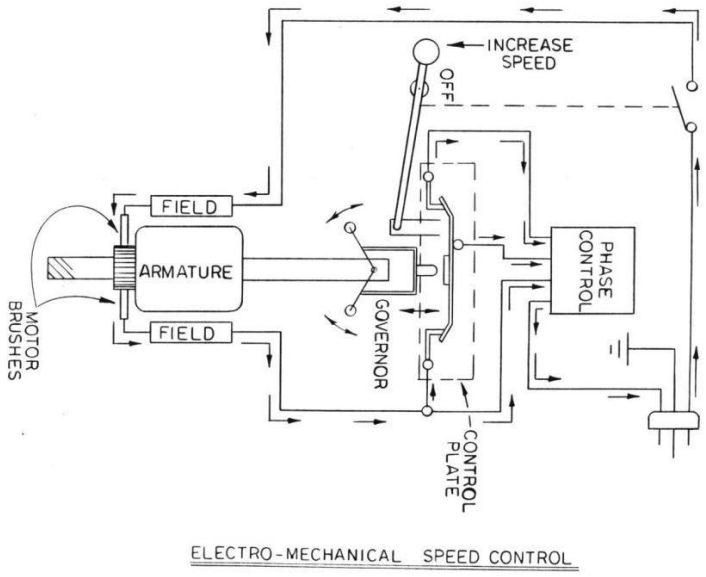
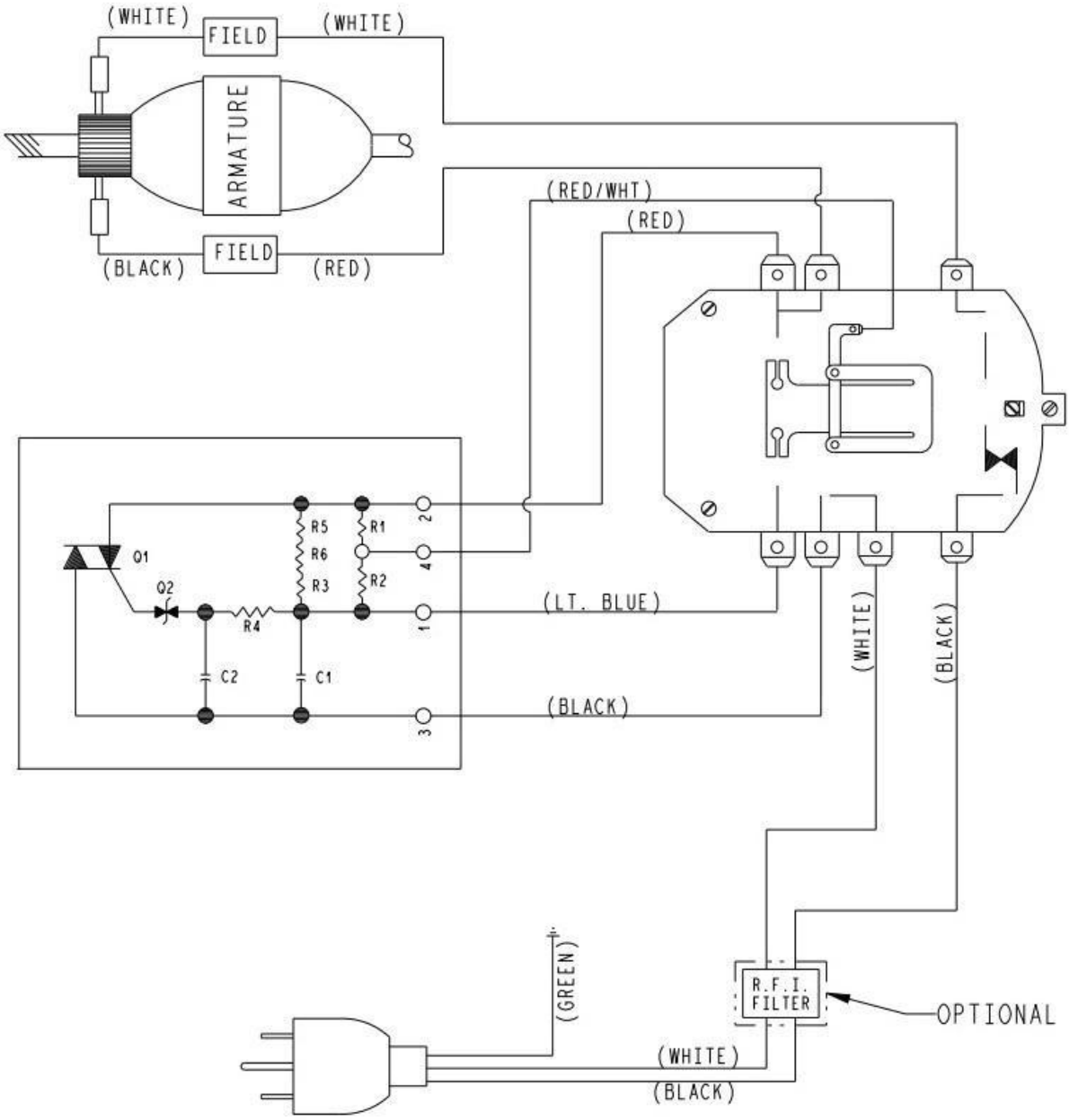


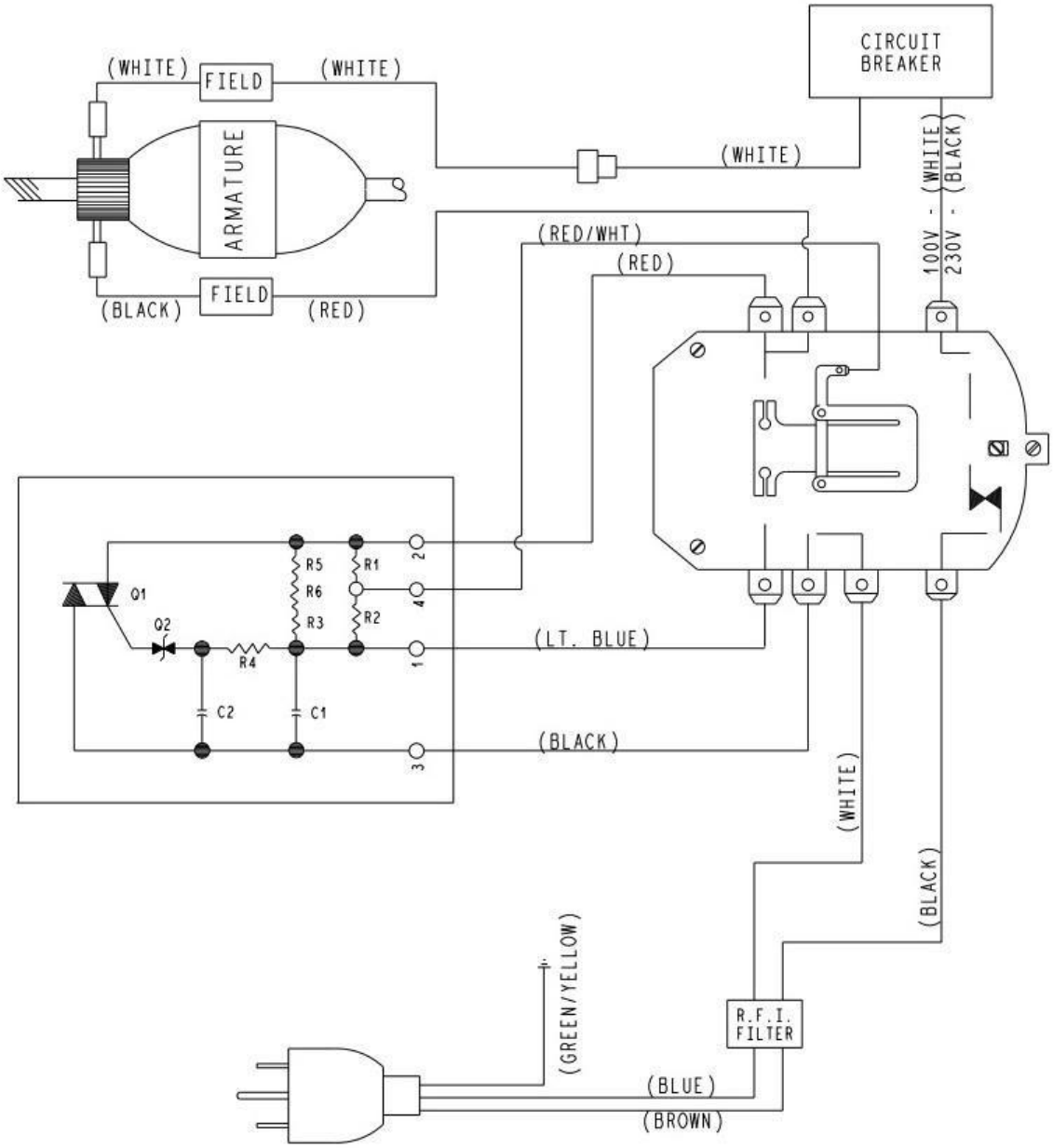
Diagram 1



120V CLASSIC STAND MIXER

Diagram 2

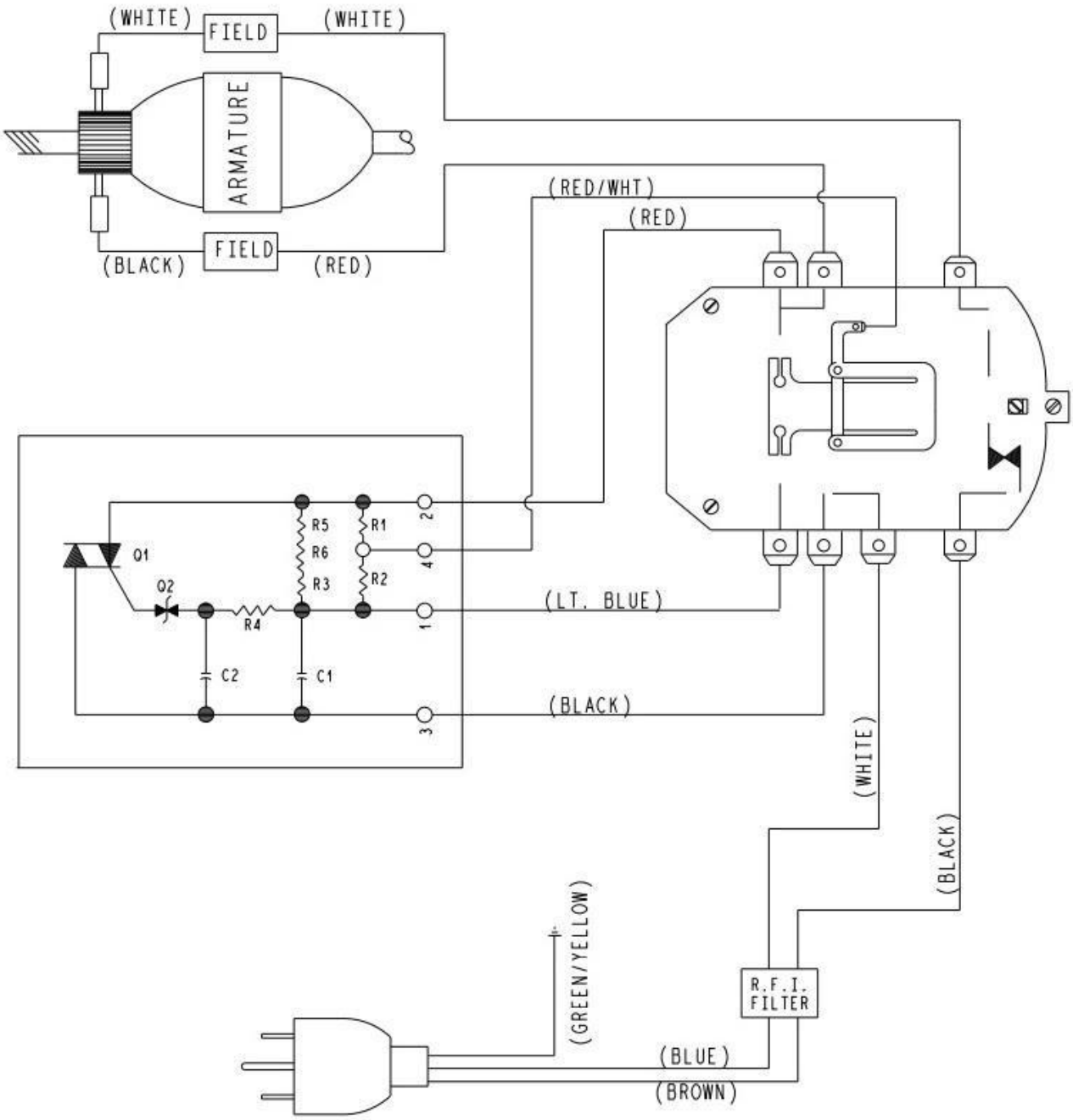
APPENDIX D
Circuit Diagrams
(continued)



100V & 230V CLASSIC STAND MIXER
WITH CIRCUIT BREAKER

Diagram 3

APPENDIX D
Circuit Diagrams
(continued)



100V, 127V & 230V CLASSIC STAND MIXER

Diagram 4