SERVICE INSTRUCTIONS FOR 3M™ 12,000 RPM 5 in. (127 mm) and 6 in. (150 mm) RANDOM ORBITAL SANDERS

3M™ Overhaul Service Kit

The part number 20347, 3M™ Overhaul Service Kit, contains all the replacement parts that naturally wear over time and a straightforward manual to make servicing a 3M™ sander simple. Overhauling the Random Orbital Sander can be made even easier with the use of the above Service Tools. The Service Tools also reduce the chance of improper assembly.

Part Number	Description	Qty
3MA0040	EXTERNAL RETAINING RING	1
3MA0021	BEARING - 2 SHIELDS	1
3MB0005	ROTOR	1
3MA0010	VANE	5
3MA0041	WOODRUFF KEY	1
3MA0042	O-RING	1
3MA0019	BEARING - 2 SHIELDS	1
3MA0938	DOUBLE ROW ANGULAR CONTACT BEARING - 1 SEAL	1
3MA0039	INTERNAL RETAINING RING	1
3MA0062	INTERNAL MUFFLER	1
3MA0068	MUFFLER INSERT	1
3MA0007	VALVE	1
3MA0009	VALVE SEAT	1
3MA0014	VALVE SPRING	1
3MA0043	O-RING	1
3MA0008	VALVE STEM ASSEMBLY	1
3MA0166	MUFFLER HOUSING	1
3MA0016	SPACER	1
3MA1417	INSTRUCTIONS FOR 5 in. AND 6 in. ROS OVERHAUL SERVICE KIT	1

12,000 RPM – 5 in. (127 mm) and 6 in. (150 mm) RANDOM ORBITAL SANDERS SERVICE INSTRUCTIONS

NOTICE: To receive any expressed or implied warranty, the tool must be repaired by an authorized Service Center. The 5 in (127 mm.) and 6 in. (150 mm) Random Orbital Sander Service Instructions section provided is for use after completion of the warranty period.

DISASSEMBLY INSTRUCTIONS

Changing Grips:

1. The Grip has two “tabs” that wrap around the body of the sander under the inlet and exhaust. Use a small screwdriver to pick out one of the “tabs” of the Grip, and then continue to go underneath the Grip with the screwdriver and pry the Grip off of sander. To install a new Grip, hold the Grip by the tabs making them face outward, align the Grip and slide it under the Throttle Lever then press the Grip down until it seats onto the top of the sander. Make sure the two “tabs” seat under the inlet and exhaust.

Motor Disassembly:

1. Lightly secure the tool in a vise using the T-7 Soft Collar or padded jaw vice and remove the pad with the 24 mm Pad Wrench then remove the Shroud or Skirt (whichever applies).
2. Remove the Lock Ring with the T-6 Motor Lock Ring Wrench/Spindle Puller Tool. The motor assembly can now be lifted out of the Housing.
3. Secure the motor assembly by clamping the 5 in. or 6 in. (125 or 150 mm) Shaft Balancer in a padded jaw vise and remove the Retaining Ring and the O-Ring from the Cylinder.
4. Remove the Rear Endplate. This may require supporting the Rear Endplate with a Bearing Separator and lightly pressing the shaft through the Bearing and Rear Endplate. Remove Cylinder and the Vanes and Rotor Set from the shaft of the Shaft Balancer. Remove the Key then press off the Front Endplate (with Bearing), O-Ring and the Lock Ring. It may be necessary to remove the Bearing with a Bearing Separator if it came out of the Front Endplate and stuck to the shaft of the Shaft Balancer.
5. Remove the Bearing(s) from the Endplates by using the T-8 Bearing Removal Tool to press out the Bearings.

Shaft Balancer and Spindle Disassembly:

1. Grip the shaft end of the Shaft Balancer in a padded vise. With a thin screwdriver pick out the slotted end of the Retaining Ring and peel out.
2. Screw the threaded end of the T-6 Motor Lock Ring Wrench/Spindle Puller Tool into the Spindle until hand tight. Apply a gentle heat from a propane torch or hot air gun to the large end of the Balancer Shaft until it is about 212° F (100° C) to soften the adhesive. Do not over heat. Remove the Spindle assembly by using the slider to give sharp outward blows to the Spindle. Allow the parts to cool so they are safe to handle. Follow one of the appropriate directions below:
   - If the Bearing come out with the spindle, use a small Bearing Separator to remove it. Move onto step 3.
   - If the Bearing stays in the Shaft Balancer. Follow steps A - D below.

Procedure for removal of the Bearings from the Shaft Balancer:

A. Position the Set Screw in the top of the T-9 12 mm ID Bearing Puller.
B. Make sure the Retaining Ring is removed, then press the Bearing Puller into the I.D. of Bearing until the Bearing Puller hits the bottom of the Shaft Balancer.
C. Thread the Set Screw down until it hits the bottom of the Shaft Balancer or becomes very tight. Grip the shaft end of the Shaft Balancer in a padded vise.
D. Screw the threaded end of the T-6 Motor Lock Ring Wrench/Spindle Puller Tool into the Bearing Puller until hand tight. Apply a gentle heat from a propane torch or hot air gun to the large end of the Shaft Balancer to re-heat it until it is about 212° F (100° C) to soften the adhesive. Do not over heat. Remove the Bearing by using the slider to give sharp outward blows to the Bearing Puller. Allow the Bearing Puller, Bearing and Shaft Balancer to cool. After cooling, unthread the T-6 Motor Lock Ring Wrench/Spindle Puller Tool from the Bearing Puller. Back off the set screw. Secure the Bearing Puller and Bearings in a Bearing Separator and press out the Bearing Puller.

3. The beraing shield components are held in place by the light press fit of the Retainer. These components can be damaged during removal and may need to be replaced if removed. To remove the Retainer, use an O-ring pick or a #8 sheet metal screw to grip and pull out the Retainer. Remove the Valve and Filter from the bore in the Shaft Balancer. If the Retainer and Valve were not damaged, they can be reused. However, the filter should be replaced on re-assembly.

Housing Disassembly:

1. For Non-Vacuum (NV) and Central Vacuum (CV) machines follow the steps outlined in Section I below. For Self Generated Vacuum (SGV) machines follow the steps outlined in Section III.

I. This section is for NV and CV machines.
A) Unscrew the Muffler Housing from the Housing.
B) Remove the Bronze Muffler from the Muffler Housing and remove the Muffler insert from the cavity of the Muffler Housing.
C) For NV machines move onto D. For CV machines move onto Section II.
D) Remove the NV Shroud. Move onto Step 2.

II. This section continued from Section I for CV Exhaust machines:
A) Remove the Screw, Washer and Nut.
B) Remove the Ø 1 in. (28 mm) CV Swivel Exhaust Assembly or the Ø 3/4 in. (19 mm) CV Swivel Exhaust Assembly from the Shroud or Clean Sanding Shroud.
C) Remove the Shroud or Clean Sanding Shroud from the Housing. Move onto step 2.

III. This section is for SGV Exhaust machines:
A) Unscrew the SGV Retainer with an 8 mm hex wrench.

B) Remove the Ø 1 in. (28 mm) Hose SGV Swivel Exhaust Assembly from the Housing and SGV Skirt Adapter or SGV Shroud Adapter.
C) Pull the SGV Retainer out of the bore of the Swivel Exhaust Assembly and remove the two O-rings.
D) Remove the Vacuum Shroud or Vacuum Skirt from the Housing. Move onto step 2.
2. Place the Speed Control to the midway position and remove the Retaining Ring. NOTE: If the machine is a vacuum model, the vacuum exhaust must be removed (see Section 1 above for removal) before the Retaining Ring can be removed with lock ring pliers. The Speed Control will now pull straight out. Remove the O-ring.
3. Unscrew the Inlet Bushing Assembly from the Housing. Remove the Valve Spring, Valve, Valve Seat, Valve Stem and O-Ring.
4. Press out the Spring Pin from the Housing and remove the Throttle Lever.

ASSEMBLY INSTRUCTIONS

NOTE: All assembly must be done with clean dry parts and all bearings are to be pressed in place by the correct tools and procedures as outlined by the bearing manufacturers.

Housing Assembly:

1. Install Throttle Lever into Housing with the Spring Pin.
2. Lightly grease the O-ring and place it on the Speed Control. Install Valve Stem, O-ring (cleaned and lightly greased) and insert the Speed control into the Housing in the midway position. Install the Retaining Ring. CAUTION: Make sure the Retaining Ring is completely snapped into groove in the Housing.
3. Install the Valve Seat, the Valve and the Valve Spring. Coat the threads of the Bushing Assembly with 1 or 2 drops of 3M Rite-Loc TL22 or equivalent non-permanent pipe thread sealant. Screw the assembly into the Housing. Torque to 60 in/lbs (6.77 Nm.)
4. For NV and CV machines follow the steps outlined in Section I below. For SGV machines follow the steps in Section III.

I. This section is for CV and NV

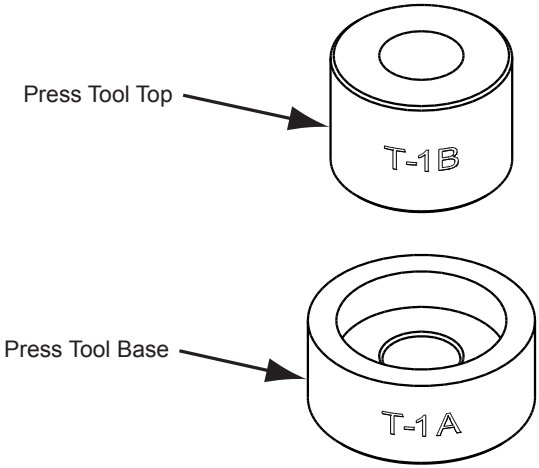
A) Place a clean felt Muffler all-the-way into the chamber of the Muffler Housing. Press the Bronze Muffler onto the Muffler Housing.
B) Screw the Muffler Housing assembly into the Housing until hand tight. Use a 21 mm socket/torque wrench combination to torque the Muffler Housing. Torque to 20 in/lbs (2.25 Nm). For NV machines move onto C. For CV machines move onto Section II.
C) Install the Non-Vacuum Shroud onto the Housing by working the shroud over and around the bottom of the housing flanges. Make sure the line up slots (on the Housing) and tabs (on the Shroud) are engaged. Move onto the ”Spindle, bearing shield and Shaft Balancer Assembly” Section.

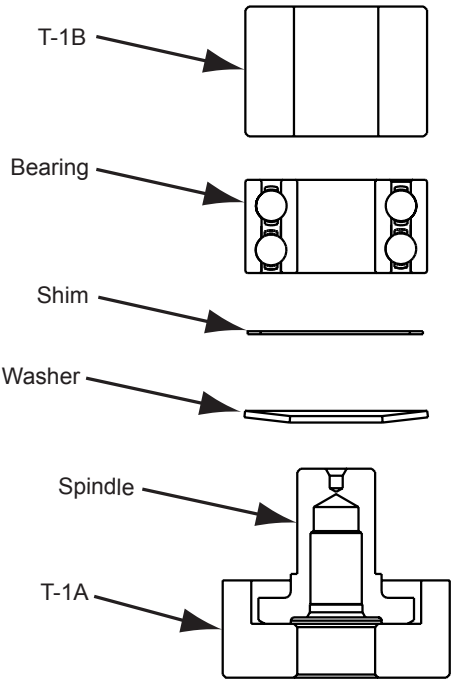
II. This section continued from Section I for CV Exhaust machines:

A) For 5 and 6 in. (125 and 150 mm) machines:
(1) Install the 5 or 6 in. (125 or 150 mm.) Shroud or 6 in. (150 mm) Clean Sanding Shroud onto the Housing by working the shroud over and around the bottom of the housing flanges. Slide the inlet end of the Ø 1 in. (28 mm) CV Swivel Exhaust Assembly or the Ø 3/4 in. (19 mm) CV Swivel Exhaust Assembly into the exhaust port of the Shroud or Clean Sanding Shroud until it hits the stop on the Swivel Exhaust Assembly.

NOTE: For installation of Shrouds and Skirts make sure the line up slots (on the Housing) and tabs (on the Shroud or Skirt) are engaged. Make sure that the key on the Swivel Exhaust Assembly bracket is aligned and engaged with the keyway on the Housing.

B) Place the Washer over the Screw. Thread the screw





into the mounting hole of the Swivel Exhaust Assembly and Housing until the end of the screw is flush with the inside surface of the Housing. Place the Nut into the cavity of the Housing and thread the Screw into the Nut until tight. Move onto the “Spindle, bearing shield and Shaft Balancer Assembly” Section.

III. This section for SGV Exhaust machines:

A) Install the Shroud or SGV Vacuum Skirt onto the Housing by working the shroud or skirt over and around the bottom of the housing flanges. Make sure the line up slots (on the Housing) and tabs (on the Shroud or Skirt) are engaged.

B) Attach the SGV Skirt Adapter or SGV Shroud Adapter to the exhaust port of the Shroud or SGV Skirt.

C) Clean and lightly grease the two O-rings and place them in the two grooves in the SGV Retainer.

D) Put the SGV Retainer into the mounting hole of the Ø 1 in. (28 mm) Hose SGV Swivel Exhaust Assembly.

E) Push the Ø 1 in. (28 mm) Hose SGV Swivel Exhaust Assembly into the exhaust port of the SGV Skirt Adapter or SGV Shroud Adapter. Screw the SGV Retainer into the threaded exhaust port on the Housing with an 8 mm Hex Wrench. Torque to 45 in/lbs (5.08 Nm.).

Spindle, Bearing Shield and Shaft Balancer Assembly:

1. Place the Washer and Shim on the Spindle shaft with the curve of the Washer facing up so that the outside diameter of the washer will contact the outer diameter of the Bearing. Place the Bearing on the Spindle with the seal side toward the Washer. Press onto Spindle using the T-1B Spindle Bearing Press Tool (see figure) until seated at bottom.
2. Insert Shim with tangs into the bottom of Spindle Bore of the Shaft Balancer. (Do not use this shim if Shaft Balancer text shows a + symbol.)
3. When the Spindle Assembly is done correctly, the Bearing will rotate freely but not loosely.
4. Take the new Filter and center it on the small bore that the original Filter was in before removal. With a small diameter screwdriver or flat-ended rod, press the Filter into the bore until it is flat in the bottom of the bore. Place the Valve into the bore so it is oriented correctly, then press the Retainer into the bore until it is flush with the bottom of the Bearing bore.
5. Apply a pin head size drop of 3M Rite-Loc TL71 or equivalent to the outside diameter of each of the bearings on the spindle assembly. Spread the drop of bearing locker around the bearing until distributed evenly. CAUTION: Only a very small amount of bearing locker is needed to prevent rotation of the bearing OD. Any excess will make future removal difficult. Place the Spindle Assembly into the bore of the Shaft Balancer and secure with the Retaining Ring. CAUTION: Make sure that the Retaining Ring is completely snapped into the groove in the Balancer Shaft. Allow the adhesive to cure.

Motor Assembly:

1. Use the larger end of the T-13 Bearing Press Sleeve to press the front Bearing (with 2 Shields) onto the shaft of the Shaft Balancer.
2. Slide the Front Endplate with the bearing pocket facing down onto the Motor Shaft. Gently press the Front Endplate onto the Bearing using the larger end of the T-13 Bearing Press Sleeve until the Front Bearing is seated in the bearing pocket of the Endplate. CAUTION: Only press just enough to seat the bearing into the pocket. Over-pressing can damage the bearing.
3. Place the Key into the groove on the Shaft Balancer. Place the Rotor on the Shaft Balancer, making sure that it is a tight slip fit.
4. Oil the five Vanes with a quality pneumatic tool oil and place them in the slots of the Rotor. Place the Cylinder Assembly over the Rotor with the short end of the Spring Pin engaging the blind hole in the Front Endplate. NOTE: The Spring Pin must project .060 in. (1.5 mm) above the flanged side of the Cylinder.
5. Press fit the rear Bearing (2 shields) into the Rear Endplate with the T-1B Bearing Press Tool. Make sure the T-1B Press Tool is centered on the O.D. of the outer race. Lightly press fit the Rear Endplate and Bearing Assembly over the Shaft Balancer using the small end of the T-13 Bearing Press Sleeve. The sleeve should press only the inner race of the bearing. IMPORTANT: The Rear Endplate and Bearing Assembly is pressed correctly when the Cylinder is squeezed just enough between the Endplates to stop it from moving freely under its own weight when the shaft is held horizontal, but be able to slide between the Endplates with a very light force. If the assembly is pressed to tightly the motor will not run freely. If the pressed assembly is to loose, the motor will not turn freely after assembly in the Housing. Secure the assembly by placing the Retaining Ring in the groove of the Shaft Balancer. CAUTION: The Retaining Ring must be placed so that the middle and two ends of the hoop touch the Bearing first. Both raised center portions must be securely “snapped” into the groove in the Shaft Balancer by pushing on the curved portions with a small screwdriver.
6. Lightly grease the O-Ring and place in the air inlet of the Cylinder Assembly.
7. Lightly grease or oil the inside diameter of the Housing, line up the Spring Pin with the marking on the Housing and slide the Motor Assembly into the Housing. Make sure the Spring Pin engages the pocket in Housing.
8. Carefully screw the Lock Ring into the Housing with the T-6 Motor Lock Ring Wrench/Spindle Puller Tool. Torque to 60 in/lbs (6.77 Nm.) NOTE: A simple technique to assure first thread engagement is to turn the lock ring counter clockwise with the T-6 Motor Lock Ring Wrench/Spindle Puller while applying light pressure. You will hear and feel a click when the lead thread of the lock ring drops into the lead thread of the housing.
9. Spin on a new Pad and hand tighten it using a 24 mm Pad Wrench.

Testing:

Place 3 drops of quality pneumatic air tool oil directly into the motor inlet and connect it to a 90 psig (6.2 bar) air supply. A 12,000 RPM tool should run between 11,500 to 12,000 RPM when the air pressure is 90 psig (6.2 bar) at the inlet of the tool while the tool is running at free speed. This free speed will be about 500 RPM to 1,000 RPM less when a Vacuum or Hook Face Pad is used because of wind resistance. This will not affect performance when sanding.

Troubleshooting Guide

Symptom	Possible Cause	Solution
Low Power and/or Low Free Speed	Insufficient Air Pressure	Check air line pressure at the Inlet of the Sander while the tool is running at free speed. It must be 90 psig (6.2 Bar).
	Clogged Muffler(s)	See the “Housing Disassembly” section for Muffler removal. The Muffler can be back flushed with a clean, suitable cleaning solution until all contaminates and obstructions have been removed. If the Muffler can not be properly cleaned then replace it. Replace Muffler Insert (See the “Housing Assembly” Section).
	Plugged Inlet Screen	Clean the Inlet Screen with a clean, suitable cleaning solution. If Screen does not come clean replace it.
	One or more Worn or Broken Vanes	Install a complete set of new Vanes (all vanes must be replaced for proper operation). Coat all vanes with quality pneumatic tool oil. See “Motor Disassembly” and “Motor Assembly”.
	Internal air leakage in the Motor Housing indicated by higher than normal air consumption and lower than normal speed.	Check for proper Motor alignment and Lock Ring engagement. Check for damaged O-Ring in Lock Ring groove. Remove Motor Assembly and Re-Install the Motor Assembly. See “Motor Disassembly” and “Motor Assembly”.
	Motor Parts Worn	Overhaul Motor. Contact authorized Service Center.
	Worn or broken Spindle Bearings	Replace the worn or broken Bearings. See “Shaft Balancer and Spindle Disassembly” and “Spindle Bearings, Bearing Shield and Shaft Balancer Assembly”.
Air leakage through the Speed Control and/or Valve Stem.	Dirty, broken or bent Valve Spring, Valve or Valve Seat.	Disassemble, inspect and replace worn or damaged parts. See Steps 2 and 3 in “Housing Disassembly” and Steps 2 and 3 in “Housing Assembly”.
Vibration/Rough Operation	Incorrect Pad	Only use Pad Sizes and Weights designed for the machine.
	Addition of interface pad or other material	Only use abrasive and/or interface designed for the machine. Do not attach anything to the Sanders Pad face that was not specifically designed to be used with the Pad and Sander.
	Improper lubrication or buildup of foreign debris.	Disassemble the Sander and clean in a suitable cleaning solution. Assemble the Sander.
	Worn or broken Rear or Front Motor Bearing(s)	Replace the worn or broken Bearings. See “Motor Disassembly” and “Motor Assembly”.
	For vacuum machines it is possible to have too much vacuum while sanding on a flat surface causing the pad to stick to the sanding surface.	For SGV machines add extra washer(s) to the pad spindle to increase the gap between the pad and shroud. For CV machines reduce vacuum through the vacuum system and/or add extra washer(s) to the pad.