Bio-Rad's Model 1550 Microplate Washer

Instruction Manual

Catalog Number 170-6540 and 170-6541

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Section 1
General Information

1.1 Introduction to the Model 1550 Microplate Washer

The Model 1550 Microplate Washer provides the speed, efficiency, and reproducibility required for any 96-well microtitration plate washing application. It automatically dispenses and aspirates wash or rinse solutions. All operations are easily performed using the spill-proof membrane control pad.

In the automatic mode, a selected volume of solution, 100 to 300 µl. is pumped through the washer and into the wells of a 96-well plate. Wash solution soaks the wells from 2 to 128 seconds, and is then aspirated to a waste vacuum flask. This completes one wash cycle that rakes approximately 10 seconds when the washer is programmed for a 2 second soak. In the manual mode, fill volumes, duration of soak, and aspiration are completely controlled by the operator. All wash steps are easily visible in the mirror positioned at the &mm of the plate carrier.

Note: The microplate washer is designed for use w&h solutions containing 0.05% detegoent such as Tween-20. Il the solution contains no detergent, air bubbles may develop in the aspiration tubes resulting iii incomplete aspiration.

1.2 List of Components

Each Model 1550 Microplate Washer cornes with the components listed in Table I. I. Check the unit to be sure all items are present. Contact your Bio-Rad representative if any Of the items are missing.

Table 1. 1 **Microplate Washer Components**

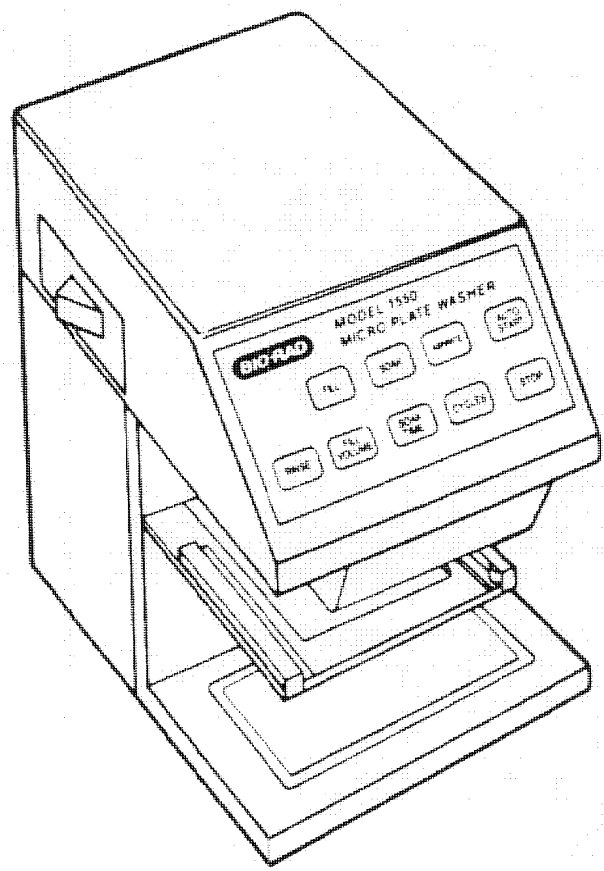
- Plate washer unit
- Power cord
- Plate mirror
- Rubber vacuum tubing, 2 pieces
- Plastic vacuum tubing with filter attachments, 2 pieces
- 3-way stopcock
- Cleaning wire
- Instruction manual

The following items are required but riot included:

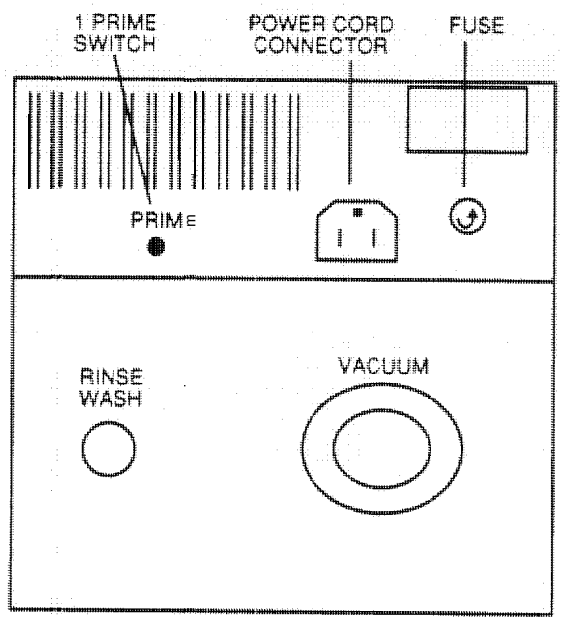
- Two vacuum Erlenmeyer flasks with one-hole stoppers and glass tubing, 4 liter volume or greater recommended.
- Two reservoir flasks, 4 liter volume or paw recommended.
- Vacuum pump, 25" Hg vacuum pressure and 20 titers per minute flow rate minimum.

1.3 General Description

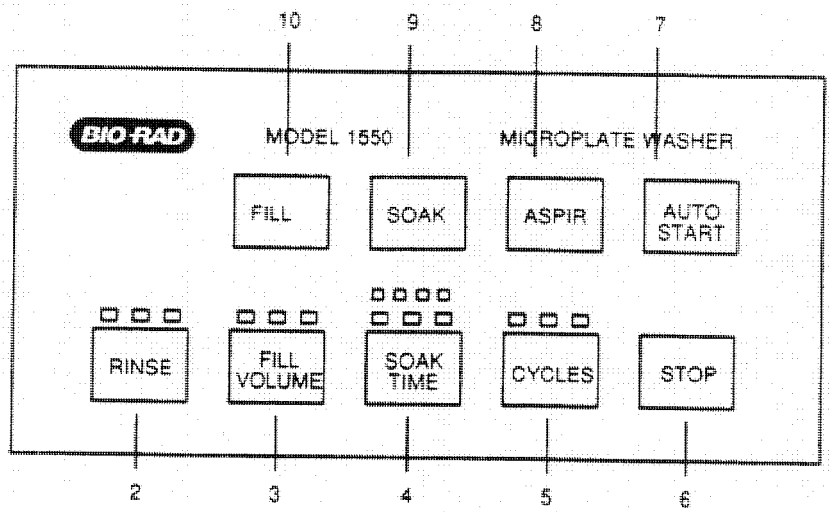
Model 1550 Microplate Washer, front



Model 1550 Microplate Washer, rear



Model 1550 Microplate Washer, membrane pad



1. PRIME — The red button at the rear of the instrument is used to prime wash of rinse solutions into the system's reservoir. Prime is used primarily when beginning a wash sequence for the day and when shutting down the unit for the day.

2. RINSE — Flushes the system with wash solution. rinse solution, or air, Rinse is used when changing solutions or shutting down the unit for the day.

3. FILL VOLUME — Desired la-ash volumes are set at either 100, 200. or 300 µl. A light indicating chosen volume will illuminate on LED display.

4. SOAK TIME — Set desired soak time to 2, 4, 8, IQ, 32. 64, or 128 seconds. The chosen soak time will be displayed on the LED display,

5. CYCLES — Desired number of wash cycles a.% set to 3, 4. OF 5. The chosen cycle will appear on LED display.

6. STOP — Any function, automatic or manual, can be interrupted using the STOP touch pad.

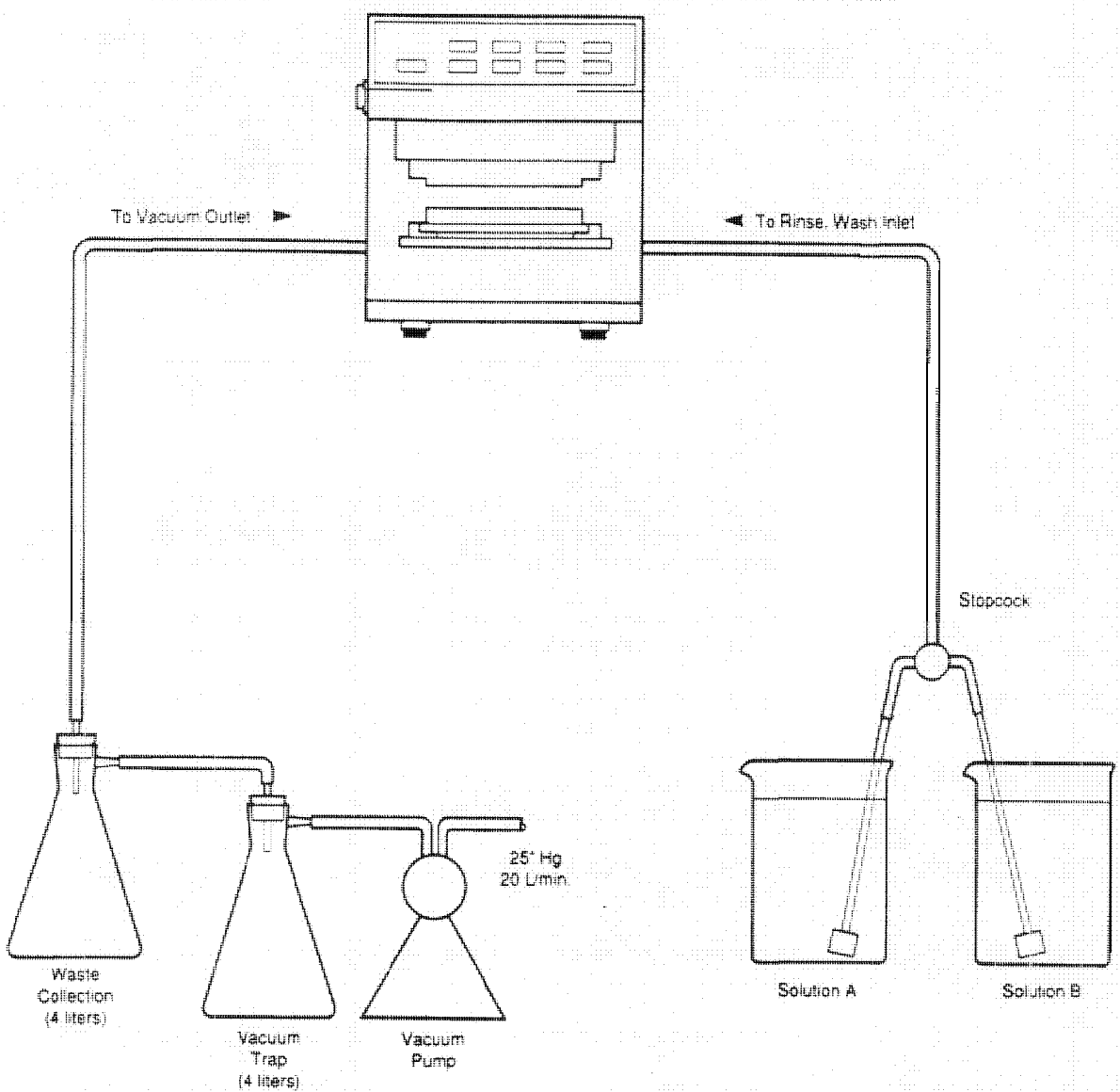
7 AUTO START — After programming a wash sequence, press AUTO START to begin the process.

8 ASPIRATE — Touch pad for manual aspiration. The pad illuminates when aspirating @are wells.

9. SOAK — Touch pad illuminates v&en wash sequence is in the SOAK mode. This pad is for display only.

10 FILL — Touch pad for manual well-filling. Wells can Ire flooded continuously when this pad is pressed. The pad illuminates as wells are filled with solution.

1.4 System Set-up



1.5 Specifications

Plate type	Flat, "U", or "V" bottomed (rigid) 96-well type only
Dispensing method	Liquid transfer pump
Dispensing volumes	3 step selection touch pad 100, 200, 300 µl
Soak time	7 step selection touch pad 2, 4, 8, 16, 32, 64, or 128 seconds
Wash cycles	3 step selection touch pad 3, 4, 5 cycles
Wash cycle timing	3 cycles - 40 sec, 4 cycles - 50 sec, and 5 cycles - 60 sec
Rinse function	Three step automatic operation
Overflow function	Continuous during fill
Manual Aspiration	Aspirate and dispense function only, no time constraints
Plate elevator adjustment	Standard position ±1 mm
Vacuum requirements	20 liter/minute capacity
Wash heads	Stainless steel tubes, coaxial type
Voltages available	100-120V AC, 50/60 Hz 220-240V AC, 50/60 Hz
Size (LxWxH)	220 x 170 x 260 cm
Weight	9 kg

Section 2
Operating Instructions

2.1 Priming the Washer

i, Turn the washer MI and Check that the plumbing is correctly connected according to the diagram in Section 1.4. selà clamp to attach the vacuum to the unit. Turn the stopcock to the wash reservoir.

2. Turn the vacuum on.

Note: When switching from one reservoir to another using the 3-way stopcock, avoid the setting which mixes the two solutions Switch the stopcock settings rapidly to avoid contaminating a distilled water rinse reservoir with a wash solution containing salts and detergents.

3. Place a 96-well microtitration plate in the carrier. Press the PRIME button at therear of the instrument. If the washer does not operate, check the seating of the plate in the carrier.

2.2 Adjusting the Plate Elevator

The microplate washer's plate elevator can be adjusted to accommodate most 96-well plates.

1. After setting up the entire system, place a microtitration pirate in the washer's carrier.

2. Locate the adjustment mechanism on the right rear side of the plate elevator. It consists of two knoba an adjusting screw on the top al' the elevator, and a locking screw an the bottom. During a washing cycie, the plate elevator will raise a plate to a, position proportional to the height of the adjusting screw,

3. Loosen the locking screw and turn the adjusting screw so its flat top is level with the top of a 96-well microtitration plate in she carrier. Line up any black line on the adjusting screw with the red reference line, This IS a starting position for further fine tuning adjustment.

4. Manually elevate the plate to the wash position by pressing FILL. Carefully check the position of the longest (aspirating) tubes relative to the bottom of several wells of a plate. For most efficient washing, the aspirating tubes should be adjusted to a height of 0.5 to l mm above the well bottoms. Note the distance, and whether the plate needs to be adjusted up or down. Lower the carrier.

5. Turn the adjusting screw **clockwise** to decrease the distance between the aspirating tube tips and the well bottoms. Turn: the adjusting screw **counter clockwise** to increase the distance between the aspirating tube rips and the well bottoms. Each graduation on the adjusting screw represents p 0. I. mm distance,

6. Lock this new position ho place using the locking screw, Press ASPIRATE to raise the plate to the washing position. Press FILL momentarily to fill the wells with 100 to 200 µl of solution. Press ASPIRATE and check how efficiently the solution is removed. Use the mirror to check for uniformity of the aspiration. Press STOP.

7. Remove the plate from the carrier and tap out the residual solution onto paper toweling. If all is satisfactory, proceed with washing experiments. If additional adjustment is required, repeat the adjustment procedure beginning with step 3.

Note: Plate position is essential for efficient plate washing. Positioning the bottom of a microtitration plate well too close to the aspirating tube will result in little or no aspiration. If it is positioned too far away, a substantial amount of wash solution will remain in the wells

2.3 Automatic Plate Washing

Setting washing parameters

Fill volume. soak time, and wash cycles are set by pressing the respective touch pad on the membrane pad. Any combination can be chasm In general. wash a plate with a fill volume greater than an incubation volume. Choose a soak time and cycle most appropriate for your particular assay . The most rapid automatic washing sequence involves a low fill volume of 100 µl. a shun soak tint of 2 seconds, cycling through the system three times. This process k&es approximately 35 seconds. The longest sequence takes I I .5 minutes.

Wash

1. After setting the washing parameters insert a plate into the carrier. Press auto start. When the cycle ends I beep will sound. indicating the end of the cycle. Repeat the process with additional plates."

2. During the washing process the fill, soak, and aspirate pads will illuminate during that particular function.

3. The stop touch pad can k pressed at any time to interrupt the washing cycle.

4. After washing the plates, invert and tap out any residual solution onto paper toweling, if necessary .

2.4 Manual Washing

Fill

1. Insert the plate to be washed into the plate carrier. Press the fill touch pad. The elevator will raise the plate to the wash position.

2. Press end hold she fill mush pad. Wash solution will flood the well as long as the pad is depressed. All overflowing wash solution is automatically aspirated to waste by the overflow tube.

3. When the desired fill time has elapsed, release the touch pad. To lower and remove the @are. press stop. To continue a wash cycle, proceed to aspirate, step 2.

Aspirate

1. To manually aspirate a plate filled with solution, place the plate in the carrier and press aspirate. The elevator will lift the plate to the wash position.

2. To aspirate for IO seconds, press the aspirate pad a second time. If a ionper time is desired. press and hold the touch pad. At IO second intervals the alarm will sound.

3I Press stop to end manual aspiration. 'KC plate is then lowered.

Note: The soak touch pad functions only as an indicator light. To soak a plate for more than 128 seconds, press stop immediately after any fill function. Let the plate soak while the plate and elevator are in the down position.

Rinse

The rinse touch pad can k used to flush and purge the instrument with wash solution, tins-e solution, or air. Use any of the following procedures to switch from one solution to another, or to shut the unit down forTAX! day,

Note: To operate any rim&r steps a plate must be in the carrier. The washer should be w/d of all solutions between wash sequences of 4 ham or more. If the instrument is going to be used intermittently, rinse the unit with distilled water using rinse cycle (below). Leaving buffers in the unit's plumbing can result in blockages that can only be cleared by Bio-Rad's instrumentation specialists.

.A Changing from one solution to another

1. Switch solutions by turning the stopcock or changing the tubing with filter attachments to another vessel

2. Press rinse. The plate will automatically raise to the wash position and cycle. After the cycle is complete, an alarm will sound. This process empties the washer of fluid.

3 Press the prime Switch on the back of the washer. The unit will cycle, then sound the alarm. Rinse cycle 2 fills the washer with the new solution.

4. Press stop. The washer is ready to wash plates with the new solution.

Note: The procedure for changing from one solution to another is the minimum flushing required to change from one solution to another. If the second wash solution is incompatible with the first, additional rinsing is recommended. For example, to change a wash solution containing a detergent to a solution that doesn't, follow steps A2-A4 a second time. This insures a more thorough exchange of one solution for another.

B. Shutting the washer down

1 Remove the plumbing from the wash solution.

2. Press rinse and let the washer complete rinse cycle 1, which will empty the lines of wash solution. The alarm will sound when cycle I is complete.

3. Place the plumbing in deionized distilled water containing 0.05% Tween-20. Press prime and let the washer complete rinse cycle 2. This flushes the plate washer *with solution. The alarm will sound when cycle 2 is complete.

4. Remove the plumbing from the sW ution. Press prime. Rinse cycle 3 empties the washer of fluid. When cycle % IS complete, the plate elevator will lower and the machine will beep once.

5. Turn the power and vacuum off.

Section 3
Cleaning and Maintenance

1. Clean the outside case and membrane pad with mild soap and water. Never use solvents to clean the membrane pad.

2. The steel case and membrane pad provide excellent protection to the internal circuitry. Do not open the case unless directed to do so by a &o-Wad representative.

3. When shutting dawn the unit, thoroughly flush the was&r with ddH_2O containing 0.05% Tween-20 following the 3-step rinse cycle described in Sectjan 2.4. Salt solutions left ins& the unit *for* long periods of time em result in internal blockages. Use the cleaning wire to clear any obstructed nozzles.

4. Da not leave solutions in the washer longer than necessary. Solutions left in the washer for extended periods can support bacterial growth. If" bacterial growth is suspected, purge the washer with 10% chlorine bleach solution using the three step rinse (Section 2.4). Thoroughly rinse the system of bleach before continuing.

5 To reduce the chances of evaporation causing the nozzles to clog, avoid operating the washer in excessively warm areas of the laboratory [i.e. direct sunlight). Use the cleaning wire to clear any obstructed nozzles.

6. When changing from one solution to another, turn the stopcock quickly to the new position to avoid mixing the solutions in the reservoirs.

7. Optimal washing efficiencies occur using a vacuum system with a 20 liter per minute capacity. Use of a large vacuum trap (4 liter container or greater) also helps to maintain a greater capacity.

Section 4
Trouble Shooting Guide

PROBLEM	CAUSE	SOLUTION
1. Washer does not operate Lights off	1a. Blown fuse	1a. Replace fuse
	1b. Washer unplugged	1b. Check birth washer and walloutlets
Lights on	1c. No plate in the carrier	1c. Washer requires a plate in the carrier to operate
	1d. Plate misalignment	1d. Check plate alignment in the carrier. The plate must contact the microswitch for the unit to operate.
2. Plate floods with solution	2a. No vacuum	2a. Connect to vacuum
	2b. Insufficient vacuum	2b. Check vacuum connection for leaks; vacuum must ha:% 20 liter/min capacity
3. Localized well flooding	3a. Obstructed asp&m nozzles	3a. Clean respective aspirate nozzles with wire
	3b. Obstructed overfill nozzles	3b. Clean respective overfill nozzles with wife
4. Plate washes improperly; plate well(s) ma filling	4a. Incomplete priming	4a. Re-prime instrument according to instructions in Section 2.1
	4b. Obstructed fill ports	4b. Clean respective fill ports with wire
	4c. Vacuum leak	4c. Check all connections for leaks. Use a clamp to attach vacuum hose %a the washer. My-me unit
5. Excessive wash solution remains in plates after washing	5a. Plate carrier misaligned	5a Adjust the plate carrier according to the procedure in Sactim 2.2