Stat Fax® 2600

OPERATOR'S MANUAL

AWARENESS TECHNOLOGY
Cost Effective by Design℠

CE

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1. Introduction

1.1 Summary of the Instrument

The ***Stat Fax*® *2600*** is a microprocessor-controlled automatic microplate washer that accepts many types of standard microplates and micro strip trays. The instrument will accept microwells having flat-, round-, or V-bottom configurations. It automatically accommodates partially filled micro strip trays. Plates may be washed in the A to H direction (8 strips of 12 wells each) or in the 1 to 12 direction (12 strips of 8 wells each) depending upon the plate orientation in the carrier and the number of wash probes on the head. Instruments are available with user changeable wash heads. The 8-probe head is standard; 12-probe and 16-probe (8 x 2) heads are available as optional accessories.

The instrument is fully programmable to provide multistep combinations of dispense, aspirate, combined aspirate/dispense, and timed soak cycles. Each user-programmed test can have up to 20 steps, and the instrument is capable of storing approximately 50 separate tests in non-volatile memory. As a convenience feature, the instrument can be programmed to automatically perform a rinse operation at a particular time of day. The instrument may also be used in the direct mode whereby wash operations are selected via the built-in keypad. A feature allowing user-assigned well depth may also be used, if preferred to the automatic well sensing feature. For volumes larger than the capacity of the wells, or to reduce bubbles, a top-wash feature is included so the wash solution may be aspirated off the top as it is being dispensed. Instructions for all of these operations can be found in this manual.

In addition to the 8-probe combination dispense/aspirate wash head, each instrument is supplied with wash, rinse, and waste bottles utilizing integral electronic level sensors, and an aerosol shield. A stainless steel bottle rack is available as an optional accessory.

1.2 Intended Use

IVD FOR IN-VITRO DIAGNOSTIC USE

The ***Stat Fax*™ *2600*** is designed for use in processing enzyme-linked immunosorbent assays (“ELISA” or “EIA”), including clinical diagnostic assays, requiring multistep washing, rinsing, and soaking. This general purpose instrument is intended to be used by laboratory professionals who are capable of selecting the appropriate features and options for each specific clinical application.

1.3 Warning Markings Inscriptions d'avertissement

1.3.1 Safety Symbols *Le Symboles de Sûreté*

Symbols that may appear on the product:

Les symboles de sûreté peuvent apparaitre sur le produit:

			
WARNING *AVERTISSEMENT*	Protective Ground *La Terre Electrique*	CAUTION *L'ATTENTION*	BIOHAZARD *BIOHAZARD*
Risk of Shock *Risque de Choc*	(Earth) Terminal *Prise de Terre*	Refer to Manual *Se Rapportent a Manuel*	Risk of Infection *Risque d'infection*

1.3.2 Safety Terms Terminologie de Sûreté

These terms may appear on the product: Les marques sur le produit: *These terms may appear in this manual: Les marques dans l'opérateur manuel:*	
DANGER *DANGER Le "de marque: DANGER"*	*Indicates an injury immediately accessible as you read this marking* *Indique le risque immédiat de dommages (assessible tandis que vous lisez la marque)*
WARNING *AVERTISSEMENT! Le "de marque: WARNING"*	*WARNING statements identify conditions or practices that could result in injury or loss of life. WARNING indicates an injury hazard not immediately accessible as you read this marking.* *Ces rapports identifient les conditions ou les pratiques qui pourraient avoir comme conséquence les dommages ou les pertes humaines.*
CAUTION *L'ATTENTION "Le de marque: CAUTION"*	*CAUTION statements identify conditions or practices that could result in damage to this product or other property.* *Ces rapports identifient les conditions ou les pratiques qui pourraient avoir comme conséquence les dommages a ce produit ou a toute autre propriété.*
BIOHAZARD	BIOHAZARDS are biological agents that can cause disease in humans. Lab workers handling potentially infectious materials must use universal precautions to reduce the risk of exposure to these agents.

1.4 Safety Precautions

To assure operator safety and prolong the life of your instrument, follow all instructions outlined below.	
Read Instructions	Take time to read this manual carefully before using this instrument. Review the following safety precautions to avoid injury and prevent damage to this instrument or any products connected to it. To avoid potential hazards, use this instrument only as specified. For best results, familiarize yourself with the instrument and its capabilities before attempting any clinical diagnostic tests. Refer any questions to your instrument service provider.
Servicing	There are no user-serviceable parts inside the instrument. Refer servicing to qualified service personnel. Use only factory-authorized parts. Failure to do so may void the warranty.
Wear Protective Apparel	Many diagnostic assays utilize materials that are potential biohazards. WARNING: Always wear protective apparel and eye protection while using this instrument.
Follow Operating Instructions	WARNING: Do not use this instrument in a manner not specified by the manual, or the protection provided by the instrument may be impaired.
Use Proper Power Cord	WARNING: Use only the power cord specified for this product and certified for the country of use.
Observe All Terminal Ratings	WARNING: To avoid fire or shock hazard, observe all ratings and markings on the instrument. Consult this manual for further ratings information before making connections to the instrument.
Install as Directed	The instrument should be installed on a sturdy, level surface capable of safely supporting the instrument's weight 5 lbs (2.3kg). The mounting surface should be free of vibrations.
Provide Proper Ventilation	Refer to the installation instructions for details on installing the product so it has proper ventilation. The instrument should be surrounded by the following clearances: 8cm (3") around perimeter of unit, 8cm on top, and 1.27cm bottom (1/2").
Do Not Operate Without Protective Covers	WARNING: Do not operate this instrument with covers and panels removed.
Avoid Exposed Circuitry	WARNING: Do not touch exposed connections and components when power is present.
Avoid Excessive Dust	Do not operate in an area with excessive dust.
Do Not Operate With Suspected Failures	WARNING: If you suspect there is damage to this instrument, have it inspected by a qualified service person.
Do Not Operate in Wet/Damp Conditions	WARNING: Do not operate instrument in wet/damp conditions.
Do Not Operate In An Explosive Atmosphere	WARNING: Do not operate instrument in an explosive atmosphere.
Operating Precautions	Be sure to run a sufficient number of controls in each assay. If controls are not within their acceptable limits, disregard test results.
Keep Instrument Surfaces Clean and Dry	CAUTION: Solvents such as acetone or paint thinner will damage the instrument. • Do not use solvents to clean the unit. Avoid abrasive cleaners; the display overlay is liquid-resistant, but easily scratched. • Clean the exterior of the instrument with a soft cloth using plain water. If needed, a mild all-purpose or nonabrasive cleaner may be used. • Use as a disinfectant a 10% solution of chlorine bleach (5.25% Sodium Hypochlorite) or 70% isopropyl alcohol • Take special care not to spill liquid inside the instrument

CAUTION! *L'ATTENTION*!	
	WARNING: If any materials are overturned during operation, immediately set the power switch to OFF (0). This material should be treated as potentially biohazardous. Appropriate cleanup and disposal of biohazardous waste should be used. *Avertissement! Lors du fonctionnement, si on renverse des matériaux, coupez immédiatement le courant. Placez le commutateur électrique a AU LOIN(0). Traitez le matériel comme biohazardous, utilisant approprie nettoient et des méthodes de disposition.*

1.5 Specifications

Physical:	8/12 probe microplate transport accepts flat, round, or V-bottom wells, plates & strip trays 8-probe aspirate and dispense head (12- or 16-probe heads optional) Stainless steel plate bed Transparent acrylic aerosol shield Weight 22 lb. (10 kg)
Dimensions……	13.5" W x 16" D x 7.5" H (34.3 cm W x 40.6 cm D x 19 cm H)
Bottle Assembly……	One each Wash, Rinse and Waste bottles with electronic level sensing on all bottles (2 Wash Bottle option available) 13.5" W x 5.5" D x 10.5" H (34.3 cm W x 14 cm D x 26.7 cm H)
Electronic	
Microprocessor	Z80, 2.0 MHz clock
Memory……	8K bytes non-volatile RAM,32K bytes EPROM
Display……	24 character x 2 line liquid crystal display (LCD) 4 x 4 keypad
Power Source:	Switch selectable power supply (115V or 230V indicated)
Voltage Source:	110-120V / 220-240V from 50 to 60 Hz, CAT II Power Consumption less than 70 Watts Fuse 1/2 A, T rating, 250 All power cords must be approved for the country of use.

Recommended Environmental Condition:

Indoor Use

Mains supply voltage:	Fluctuations not to exceed ±10% of the nominal voltage
Operating Temperature:	18-35°C recommended
Operating Humidity:	Less than 85% recommended

NOTE: Although it may be safe to operate in these conditions, it may not be suitable for the performance of your tests. Check with your reagent supplier.

Specifications (Continued)

Performance:

Residual (double aspiration)..... - 3 µl per well
Dispense precision ..... 3% C.V. across 96 wells
Dispense accuracy ..... Mean volume ± 3% from reference
Test Storage ..... Approximately 50

1.6 Installation

1.6.1 Unpacking

Carefully unpack the instrument and remove it from the plastic bag. Report any visible damage to your freight carrier at once.

NOTE: Retain the original packing material for future use in the event that the instrument is placed in storage, shipped to another location, or returned for service.

Packing List

QTY	PART NO.	DESCRIPTION	QTY	PART NO.	DESCRIPTION
1	26XX	Washer	**1**	026010	Spare Parts kit
1	137521 OR 137522	US or Euro Power Supply	1		Plate Carrier
1	Operator's Manual		1	002190	Dust Cover
1	Declaration of Conformity		1	994008	3 Bottle Assembly
1	Certificate of Quality				

Contact your instrument supplier immediately if anything is missing.

Optional Accessories

- 12-probe head: white plastic with 12 pairs of stainless tubes
- 16-probe head: white plastic with 16 pairs of stainless tubes (two rows of 8)
- Bottle rack: stainless steel rack for holding wash, rinse, and waste bottles
- Configuration for 4 bottles…….. 2 labeled for wash, 1 rinse, and 1 waste

1.6.2 Parts and Connections

A) Display
B) Keypad
C) Aerosol Shield
D) Probe Head
E) Plate Carrier
F) Reservoir
G) Plate Bed

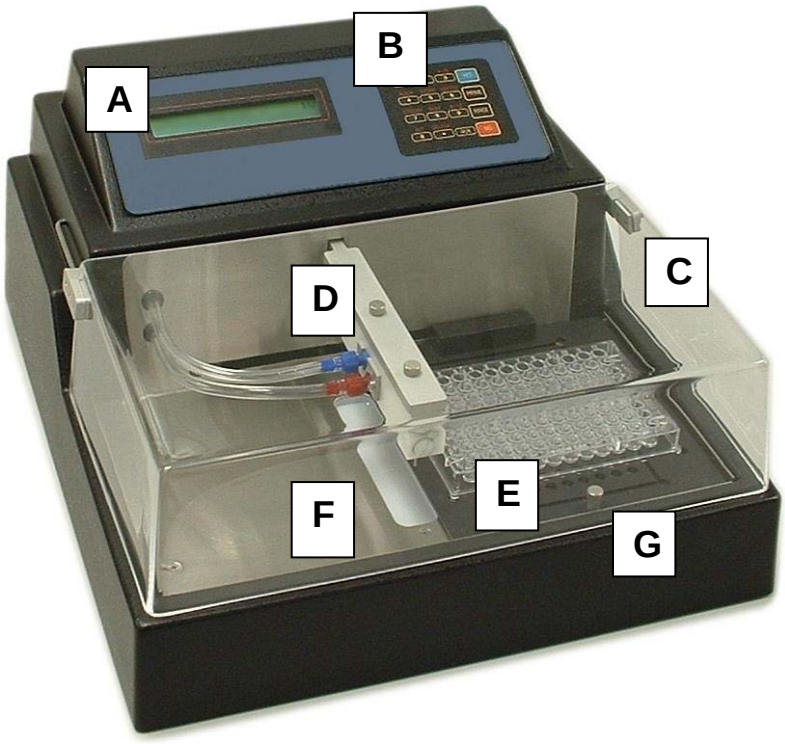


Figure 1.6.2- 1 – Top View

Figure 1.6.2-2 – 3 bottle assembly

Parts and Connections (continued)

H) Waste Sensor

I) Rinse Sensor

J) Wash Sensor(s)

K) Vacuum Connector

L) Pressure Connector

M) Power Switch

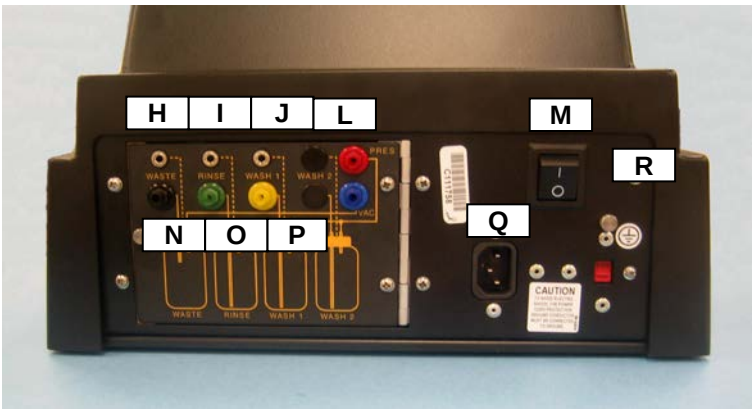
N) Waste Connector

O) Rinse Connector

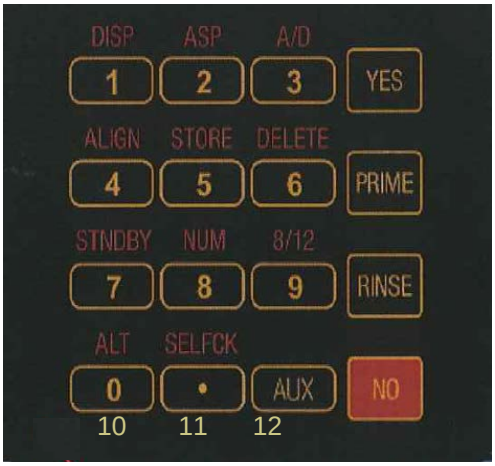
P) Wash Connector(s)

Q) Power Inlet

R) Voltage Select Switch



1.6.2-3 - Rear panel connections



1.6.2-4- Keypad Layout

IF the instrument keypad does not have the numbers 10, 11 and 12:

ALT/0 = 10 SELFCK/. = 11 AUX = 12

1.6.3 Instrument Setup

Complete this procedure to prepare the washer for operation.

1. Place the instrument on a flat working surface, at least 24 inches (61cm) deep, capable of safely supporting the weight of the instrument and filled bottles (approximately 25 lb., 11.4 kg). A clearance of at least 3 inches around the instrument is required to assure optimal ventilation.

   It is recommended that the instrument be operated within an ambient temperature range of 15-35ºC and humidity between 10 and 85%.

2. If the probe head has been shipped separately, install it as discussed in the section entitled *Maintenance: Changing Probe Heads*.

3. Refer to Section 1.6.3 Parts and Connections, Figure 2, for the remainder of this procedure. Place the bottles on the work surface behind the instrument. The order of the bottles, left to right, viewed from the front of the instrument, is:

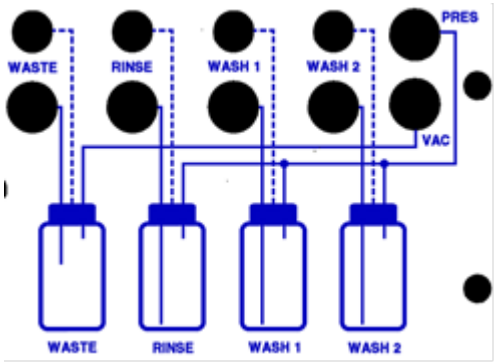
   WASH 1 RINSE WASTE (3 bottle configuration)

   WASH 1 WASH 2 RINSE WASTE (optional configuration)

4. Remove the bottle plumbing (caps, stoppers and tubing) and leads from the protective plastic bag. Locate each cap to its corresponding bottle. Note that the caps are color coded to the bottle label. Maneuver the stopper from the bottle cautiously as some pressure may remain. Hold the cap steady with one hand while turning the bottle with the other. The tubing should exit toward the front, and should not be kinked, twisted, or strained. Insert the stopper, tighten the bottle caps firmly. Do not place undue stress on the bottle cap tubing connections or sensor lead connectors.

5. Connect the tubes to the rear panel fittings. The tubes and the fitting are color-coded. In addition, all rear panel connections are shown on a color graphic overlay affixed to the rear panel.

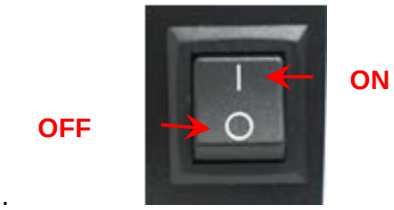
3 Bottle configuration



4 Bottle Configuration

6. Plug the sensor leads into the jacks on the rear panel. The sensor leads are color-coded.

7. Locate the power switch on the rear panel. Check that the power switch is in the OFF (O) position



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1.6.4 Electrical Setup and Safety Information

NOTE: See Section 1.4 for additional Safety Information.

1. Assure Proper Grounding: The safety classification of this instrument is Class 1.

	**WARNING: To avoid the risk of electric shock, the third prong of the AC power plug must be grounded at the main socket-outlet and connected to conductive parts internal to the equipment.**

The internal connection is provided for when manufactured by means of internal toothed solder lugs and stainless steel screws and nuts, or metal contacts, tooth lock washers, terminals and rivets. The location of the protective grounding conductor terminal is marked internally by the IEC 417 symbol 5019 (see section "Safety Terms and Symbols"). DO NOT loosen or remove these screws, rivets or contacts. Do not defeat the safety purpose of the grounding plug. It is the operator's responsibility to ensure the mains supply is properly grounded at the power outlet. If there is doubt that it is not properly grounded, contact a qualified electrician.

2. Assure Proper Power Availability and Voltage Select Switch Setting: the power requirements can be found on the specifications page.

	**WARNING! The voltage select switch setting must match the local AC line voltage or permanent damage to the instrument may occur. The voltage select switch must be set for the appropriate input voltage prior to powering up.**

Locate the voltage select switch on the rear panel. This is a 2 position slide switch that will configure the instrument to accept either 230V or 115V input. Do not connect the instrument to the power supply before assuring the proper position of the line voltage selection switch.

When you can see the 230V label, the instrument is set for 230V input. If you plug the instrument into an 115V power supply while 230V is selected, the instrument will have insufficient operating power.

Electrical Setup and Safety Information (Continued)

To select 115V input, insert a straight screw driver blade (or similar instrument) into the slot on the switch, and slide it into its alternate position. Upon sliding the switch, you will see the 115V label appear.

WARNING! If the instrument is configured to accept 115V and you plug it in to a 230V power supply, the fuses will blow and permanent damage to the electronics may result.

3. Assure Proper Power Cord Selection: use only the power cord specified for this product and certified for the country of use

For units for use at 110-120 V inside the US: Use a listed cord set consisting of a minimum 18 AWG, Type SVT or SJT three conductor cord, maximum 3 meter (9.8 feet) in length, rated 10 A, 125 V, with a parallel blade, grounding type attachment plug. The cord set provided by the manufacturer meets these requirements.

For units for use at 220-240 V inside the US: Use a listed cord as above, except rated 250 V, with a tandem blade, grounding type attachment plug.

Connect the supplied power cable to the rear of the instrument as shown. Plug the other end of the power cable into an AC outlet.

4. Install the plate carrier in the plate bed. Refer to Figure 3, Parts and Controls. Slide the two metal pins into the two slots at the back of the plate bed, and lower the plate carrier into the plate bed. Do not use excessive force on the plate carrier.

5. Assure Clean Power Availability: the circuit used should be substantially free of large voltage transients (Kilovolt amp loads) such as large pumps, large centrifuges, refrigerators and freezers, air conditioners, large autoclaves, ovens, and dryers. The instrument may fail to operate normally if the power supply is interrupted. If this occurs, turn the instrument off for several seconds. When you turn the instrument back on, it will resume normal operation, but information not stored in nonvolatile memory will be lost.

6. Fuses: the fuses are located internally in the instrument; there are two fuses, fusing both sides of the main power supply. Fuse failure is a very rare occurrence and should indicate malfunction of the equipment requiring service by qualified personnel.

The fuses used with this instrument are 1/2 Amp, T rating (slow blow) 250 V. Cartridge size is 3AG or size '0', dimensions 1/4 x 1-1/4" (6.3 x 32 mm). For continued protection against risk of fire, use the same fuse for either 115 or 230 V line voltage selection. Disconnect power cord from mains supply before replacing fuses.

Do not attempt to make repairs or adjustments to the circuitry. Do not install any non-specified replacement parts. Awareness Technology will supply all service and accessories. Consult your dealer to make arrangements. Use of a fuse of the improper rating may constitute a fire hazard.

1.7 Getting Started

This section gives you brief instructions so that you may begin working with the instrument right away. For a closer look at the instrument's capabilities, refer to the other sections of the manual. Follow the steps below to perform wash operations on a microplate. Refer to the assay package insert for information on number of washes required, wash solution formulae, and other details.

Before continuing, be sure the instrument is prepared for use by completing the procedures in the ***Installation (1.6)*** and ***Checkout Procedure (1.7.2)*** sections.

NOTE: Pressing NO twice results in cancelling any operation and returning to the main prompt.

1.7.1 Fill the Wash and Rinse Bottles

Fill the Wash and Rinse Bottles:	Display/Prompt:
Press STNDBY The instrument will release the pressure from the bottles. Wait at least 15 seconds after pressing STNDBY for the pressure to fully release.	**STNDBY**
Unscrew the wash bottle cap, cautiously remove the rubber stopper (some pressure may remain in the bottles) and fill the bottle with wash solution. Replace the rubber stopper and wash bottle cap. Repeat with rinse bottle and rinse solution. Tighten all bottle caps firmly.	
Unscrew the wash bottle cap and fill the bottle with wash solution. Replace the wash bottle cap. Repeat with rinse bottle and rinse solution. Tighten all bottle caps firmly.	
Place a microplate in the plate carrier. With an 8- or 16-probe head, orient the plate so that well number A-1 is at the left rear corner. With a 12-probe head, orient the plate so that well number A-1 is at the left front corner. Be sure that the plate is securely seated in the grooves on the plate carrier.	
Press YES to exit the STNDBY mode and resume normal operation.	**YES**

1.7.2 Checkout Procedure

Visually confirm the following:

√	Each tube connected to the corresponding color-coded fitting and all sensor leads are plugged in.
√	All tubing fully seated on fittings.
√	Plate carrier installed to plate bed.
√	Wash bottle filled with wash solution
√	Rinse bottle filled with deionized water or other rinse solution.
√	Waste bottle empty.
√	All bottle caps tight.
√	Power cable plugged into rear of unit and into AC outlet.
√	Power switch set to OFF (O).
√	Correct wash head (8, 12, or 16 probes) is installed.

The instrument is now ready for power-up.

Power Up Instructions:	Display/Prompt:
Turn the power switch at the left rear of the instrument to the ON (1) position. The current firmware revision will display:	:AE
The pump will continue to run until the pressure stabilizes and vacuum is checked. After a few seconds, the main prompt will display: Va indicates whether the vacuum is Off or On Pr indicates pressure in pounds per square inch During operation, the pump will cycle on and off automatically to maintain pressure within range. When the instrument is not performing wash functions, the pump should not run continuously for more than 60 seconds or cycle on and off more often than once in 60 seconds. If the pump runs or cycles on and off excessively, check for leaks in the system. Check that the bottle caps are tight and the tubing connections are correctly located and secure.	Press <YES> to run prog Va OFF Pr 5.0 09:42:00

Place a microplate in the plate carrier. With an 8- or 16-probe head, orient the plate so that well number A-1 is at the left rear corner. With a 12-probe head, orient the plate so that well number A-1 is at the left front corner. Be sure that the plate is securely seated in the grooves on the plate carrier.

Power Up Instructions:	Display/Prompt:
Press **ALIGN** The instrument will lower the head to the reservoir, and then return the probe to the up position. The instrument will check the orientation of the plate and measure the depth of the plate wells. When the instrument has completed this process, the probe and plate will return to home positions.	**ALIGN**
Press **PRIME** The instrument will alternately dispense wash solution into the reservoir and aspirate, which serves to prime the wash solution dispense system.	**PRIME**
(FOR OPTIONAL 4 BOTTLE Configuration)	Use Wash Bottle 1 Y/N To use Wash Bottle 1, press Yes. To use Wash Bottle 2, press No.
If the display prompts: Respond by pressing **NO** twice to return to the main prompt. Check that the sensor is plugged into the proper receptacle (see SET UP section).	**Rinse Bottle is Low xxx** **or** **Wash Bottle is Low xxx** **NO** **NO**
To disable the pumps and release pressure, press **STNDBY** Wait at least 15 seconds before removing caps from bottles. Add the appropriate solutions to the bottles and replace the stoppers and caps. Tighten the caps securely to prevent pressure loss. Press **YES** to exit **STNDBY** mode and return to the main prompt. **NOTE:** The 3 digit number which appears after the message is a direct reading of the sensor parameter, and is used for troubleshooting.	**STNDBY** **YES**

If the instrument produces results other than those described here, set the power switch to OFF (O). Go to the section entitled “Setup” and review all steps carefully. Repeat the Checkout procedure. If the instrument still performs erratically, contact your dealer for assistance.

1.7.3 Aspirate

Fill the Wash and Rinse Bottles:	Display/Prompt:
Press **ASP** The display will prompt:	**ASP** **Aspirate** ⌊⌋ **Double Aspirate Y/N**
Double aspirate means that, for each strip, the instrument will first aspirate from one side and then reposition the head and aspirate again. This produces the exceptionally low residual volume. Double aspiration is highly recommended on the initial and final aspirates. The symbol at the right of the top line indicates the flat-bottom well type. If your microplate contains other than flat-bottom wells, you must first select the type of well. Refer to Section *2.1 - Direct Operation* for more information. **NOTE 1:** If round-bottom or V-bottom wells are selected, the double aspirate option will not be displayed. **NOTE 2:** The instrument is preset for automatic well-depth detection. If you prefer to set the well-depth manually, see Section *2.2.6 - Set Auto Aspiration Depth.*	
Press **ASP** The display will prompt:	**ASP** **Aspirate** ⌊⌋ **Double Aspirate Y/N**
To use double aspiration, press: **YES** To use single aspiration, press **NO**. The single aspiration leaves more residual fluid in the plate, but is much faster.	**YES** **or** **NO**
The prompt will display: Press **YES** and the instrument aspirates the contents of the plate. When the instrument has completed the plate, it will return the plate to the right side of the plate bed. You may inspect the wells for residual wash solution at this time.	**Aspirate** ⌊⌋ **Insert plate --> <YES>**

1.7.4 Dispense

Dispense:	Display/Prompt:
Press **DISP** The display will prompt: **NOTE:** The instrument is preset for automatic dispense-depth. If you wish to use the top wash feature, see section *2.2.7 - Set Dispense Depth (Top Wash).*	**DISP** **Enter desired vol(µL):** **<YES> = 300**
Press **PRIME** The instrument will alternately dispense wash solution into the reservoir and aspirate, to prime the dispense system. Repeat.	**PRIME**
To accept the displayed volume, or enter a new dispense volume and then press **YES**. Enter a volume between 25 µL and the total well volume (350µL for flat-bottom well), or up to 999µL if you are using the top wash feature.	**YES** **Dispense** ␣ **Insert plate --> <YES>**
Press **YES** to dispense wash solution into all wells. When the dispense is complete, the plate will return to the right side of the plate bed.	**YES**

1.7.5 Aspirate/Dispense

Aspirate/Dispense:	Display/Prompt:
Press **A/D** The prompt will display: The symbol at the right of the top line indicates the flat-bottom well type. If your microplate contains other than flat-bottom wells, you must first select the type of well. Refer to the section *"Direct Operation"* for more information. Double aspirate means that, for each strip, the instrument will first aspirate, then reposition the head and aspirate again. This produces the exceptionally low residual volume. Double aspiration is highly recommended on the initial and final aspirates. **NOTE:** If round-bottom or V-bottom wells are selected, the double aspirate option will not be displayed.	**Aspirate** ␣ **Double Aspirate Y/N**

Aspirate Dispense (Continued)

Press **YES** to use double aspiration, or **NO** to use single aspiration. The single aspiration leaves more residual fluid in the plate, but is much faster. The display shows:	**YES** **or** **NO** **Enter desired vol (µL)** **<YES> = 300**
Press **YES** to accept the displayed volume,or enter a new dispense volume and then press **YES**. Enter a volume between 25 µL and the total well volume (350µL for flat-bottom well), or up to 999µL if you are using the top wash feature.	**Dispense** ␣ **Insert plate --> <YES>**
Press **YES** to aspirate and dispense wash solution into all wells, with each row of wells being aspirated and dispensed before the washer proceeds to the next row. When the aspirate/dispense cycle is complete, the plate will return to the right side of the plate bed.	**YES**

Repeat the **ASP, DISP,** or **A/D** selections described above, as recommended in your assay literature.

You may use a single aspirate for intermediate washes. However, on the final aspirate, be sure to select double aspiration to ensure low residual wash solution.

1.7.6 Sleep Mode

During Standby, or after an inactive period of approximately 12 minutes, the pressure is relieved by means of the pressure relief valve. As shown on Line 2 of the instrument's display, the pressure will change from 5±.2 PSI to OFF indicating a sleep period.

Pressing any key will reactivate this system.

In the sleep period, the probe head will lower to the tray and the instrument will display the flag message **CAUTION: Probe Lowering**. A small amount of liquid will be released in order to keep the probe heads moist and free from crystallized wash solution.

To avoid injury, stay clear of the probe head when the flag message **CAUTION: Probe Lowering** is displayed**.**

2. Operating Procedures

2.1 Direct Operation

Direct operation allows you to control the instrument from the keypad. You can select aspirate and dispense operations, and you can set various stored parameters, such as the auto-rinse time and well type.

For convenience, you can store wash operations as a program and simply run the program when needed. Refer to section *2.3 - Programmed Operation* for more information.

The direct operation selections are described below.

KEYPAD	DESCRIPTION:
YES, NO	The **YES** and **NO** keys are used in response to displayed messages. The **YES** key usually serves to select an option or to enter a value. The **NO** key serves to bypass a selection or to clear the entered value. Pressing the **NO** key twice during any wash operation will end the wash operation and return to the main prompt.
0-9 [Numeric Keys]	The **numeric keys** are used to directly enter numeric data when required. The numeric keys are also labeled with the direct operations described below
PRIME	**PRIME** alternately dispenses wash solution into the reservoir and aspirates. This serves to prime the system with wash solution. Always PRIME after filling the wash bottle and after changing the head.
RINSE	**RINSE** flushes the system with rinse solution by dispensing rinse solution into the reservoir while aspirating. Always perform a **RINSE** at the end of a usage period to prevent wash solution from drying and crystallizing in the dispense tubes.

Direct Operation (Continued)

KEYPAD	DESCRIPTION:
DISP (Dispense)	**DISP** dispenses a selected amount of wash solution The range for volume is from 25 µL to the total well volume of 350 µL for flat-bottom wells, or up to 999µL if using the top wash feature. The instrument automatically senses the orientation of the plate and detects the presence of individual strips, unless you have selected manual depth mode The instrument will show its progress graphically across the plate by displaying icons Verify that probe tips do not hit either the left or right side when skipping rows
OPTIONAL 2 Wash Bottle system	Allows for the use of for the use of two separate wash solutions. There will be a prompt to select Bottle 1 when programming a wash. If you want Bottle 2 simply answer "NO" to this prompt There is no way to switch from Bottle 1 to Bottle 2 in the middle of a wash if one is low. It would be necessary to press the **STNBY** (stand by) button and either refill the wash bottle or swap bottles.
ASP (Aspirate)	**ASP** aspirates the contents of the wells into the waste bottle. A double aspiration aspirates the well, then repositions the tube and aspirates again. It is very effective at drying the well, but is somewhat slower than single aspiration. Note that double aspiration is only available with flat-bottom wells. The instrument automatically senses the orientation of the plate and detects the presence of individual strips, unless you have selected manual depth mode. The display shows: Press **YES** to perform the operation. The instrument shows its progress across the plate graphically with well icons.

KEYPAD	DESCRIPTION:
A/D (Aspirate/Dispense)	**A/D** performs a combined aspirate and dispense in one pass, aspirating and dispensing each row before proceeding to the next. Operation is identical to **ASP** and **DISP**, described above.
ALIGN (Align mechanism)	ALIGN causes the instrument to sense the position of the head, plate, and carrier mechanisms. Always perform an ALIGN after changing heads, the well type, or the plate type.
STORE (Store user programs)	**STORE** allows you to create multistep programs in memory. (Section 2.3.2)
DELETE (Delete user programs)	**DELETE** allows you to remove stored programs from memory.
STNDBY (Enter standby mode)	**STNDBY** disables the pump and releases the pressure and vacuum on the system. This allows you to change bottles or heads, without running the pumps. Press **YES** to continue operation. **NOTE: Use caution when removing the stopper from the waste bottle as some pressure may remain.**
NUM (Select number of strips)	For washing part of a plate see **Section 2.2.6 Select Aspiration Depth**. When the display shows “Insert plate --<**YES**>”, in response to an aspirate, dispense, aspirate/dispense selection or prior to running a stored test, press **NUM** to select the strips to be included. The instrument will not attempt to auto-detect the presence of strips if this feature is selected
8/12	Selects method of plate detection Press **8/12**. The display shows: Select Wash Head Mode 8 position head Y/N (If no is selected, then...) 12 position head Y/N (If no is selected, then...) 16 pos (double row)Y/N At the beginning of each program or direct operation, the probe head goes directly to the first row of the selected type of plate. Be sure that the “8/12” key setting is properly selected when changing probe heads to avoid damaging the aspiration tubes.

Direct Operation (Continued)

KEYPAD	DESCRIPTION:
ALT	Aspirate reservoir Pressing **ALT** aspirates any fluid remaining in the reservoir.
SELFCK (Self Check)	Press the **SELFCK** key Probe goes down and up Plate travels across to first well, probe touches, goes down and then back up Unit should return to the main prompt with no error messages.
AUX	Auxiliary menu/SETUP mode The **AUX** menu allows access to various stored parameters and options described in the next section.

2.2 Auxiliary Menu/SETUP Mode

Press **AUX** to enter the **SETUP** Mode.

2.2.1 Select Well Type

Select Well Type:	Display/Prompt:
Press **AUX** to enter the Setup mode. The display prompts:	**Setup Mode** **Select well type Y/N**
Press **NO** to continue to the next selection, or press **YES** to select the well type. You may select from flat-, V-, or U-bottom wells. If you press **YES**, the display shows the current well type. Press **NO** to select different well types, then press **YES** to make the displayed well type the current well type.	**The well icons are:** **Flat-bottom** **V-bottom (semi-round)** **Round-bottom**
After selecting a well type, the display shows:	**Mech must be realigned** **Insert plate --> <YES>**
Install a plate and press **YES**. The instrument will realign and return to the main prompt. **NOTE:** With an 8- or 16-probe head, orient the plate with well A-1 at the left rear corner. With a 12-probe head, well A-1 is at the left front corner.	**YES** **Calibrating Mechanism**

2.2.2 Run Constant Time

The constant time option allows uniform wash times for all strips in a partially filled tray. The instrument operates as it would with a full strip tray, except that it detects the empty rows and does not dispense into them. The last step of the program aspirates or dispenses only the filled rows.

Run Constant Time:	Display/Prompt:
Press **AUX** to enter the Setup mode. The display prompts: Press **YES.** The display will prompt:	**Setup Mode** **Set Const Time opt Y/N**
Press **NO** to continue to the next selection, or press **YES** to enable constant run times.	**Run Constant Time Y/N**

2.2.3 View a Program

View a Program:	Display/Prompt:
Press **AUX** to enter the Setup mode. The display prompts: Press **YES.** The display will prompt:	**Setup Mode** **View a program Y/N**
Press **NO** to continue to the next selection, or press **YES** to view the steps of a previously stored program. If YES is selected, the display will prompt:	**View a program** **Ent prog number --> <YES>**
Enter the program number and press **YES**. The name of the program, along with the programmed well type, is briefly displayed. The display then shows information similar to the following:	**02-01 Dbl Asp/Disp 300µL** **Press <YES> for next step**
The top line of the display shows the program number, the step number, and a description of the operation for that step. Press **YES** to view the next program step. If there are no more program steps, or you press **NO**, the display reverts to the main prompt.	**YES** **or** **NO**

2.2.4 Configure Auto-Rinse

Configure Auto-Rinse:	Display/Prompt:
Press **AUX** to enter the Setup mode. The display prompts: Press **YES.** The display will prompt:	**Setup Mode** **Set Auto Rinse Y/N**
Press **NO** to continue to the next selection or press **YES** to configure the auto-rinse feature. When auto-rinse is enabled, the instrument automatically performs a **RINSE** operation at a specified time each day, and then goes into Standby mode. If the washer is in operation at the specified time, the auto-rinse time will be automatically advanced one hour. Once the auto-rinse has been completed, the auto-rinse time will be reset to the previously specified time for the next day. If you press **YES**, the display prompts:	**YES** **or** **NO** **Setup Mode** **Turn Auto Rinse ON Y/N**
Press **YES** to enable auto-rinse or **NO** to disable. If you press **YES**, the display will show the currently programmed auto-rinse time:	**YES** **or** **NO** **Setup Mode** **Auto Rinse at 12:00:00**
Press **YES** to accept the displayed time, or enter the desired auto-rinse time using 24-hour format HH.MM.SS and press **YES**. Using 24-hour format, 1:00 PM is entered as 13:00:00.	**YES**

-

2.2.5 Set Date and Time

Set Date and Time:	Display/Prompt:
Press **AUX** to enter the Setup mode. The display prompts: Press **YES.** The display will prompt:	**Setup Mode** **Set Date/Time Y/N**
Press **NO** to return to the main prompt, or press **YES** and the display prompts:	**YES** **or** **NO** **Setup Mode** **Enter Date as YY.MM.DD**
Enter the current date using YY.MM.DD as the format and press **YES**. The display prompts:	**Setup Mode** **Enter Time as HH.MM.SS**
Enter the correct time using 24-hour format HH.MM.SS and press **YES**. Using 24-hour format, 1:00 PM is entered as 13:00:00.	**YES**

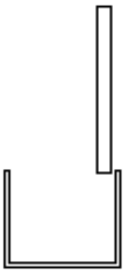
2.2.6 Set Aspiration Depth

Set Aspiration Depth:	Display/Prompt:
Press **AUX** to enter the Setup mode. The display prompts: Press **YES.** The display will prompt:	**Setup Mode** **Set Asp Depth Y/N**
If the response is YES, the display prompts:	**Set Asp Depth** **0=Automatic 1=Manual**

To make the probe go deeper, press the 0 or . key. To make the probe go higher, press the 1 or 2 key. Press YES when the probe tips are where you desire the depth to be set. Auto-detection for partial plates is disabled when in manual mode, so use NUM to select the number of strips being washed in a partial plate. If you set the depth so the probes are not touching the bottom of the wells, you may notice an increased amount of residual liquid after aspirating, and single aspiration may leave less residual liquid than double aspiration.

Set Aspiration Depth:	Display/Prompt:
Press **0** to select Automatic well depth selection, or press **1** to select Manual well depth selection. Partial plate auto-detection is disabled when you are in Manual well depth mode, so you are automatically prompted to set your strip number when washing plates. If you have not yet set your manual plate depth parameter, you should do so. The value is retained when you switch between manual and automatic depth selection, so you need only perform this procedure once. The default value is 40 “counts” from the probe home position.	**0** **or** **1**
To set your manual plate depth parameter, select test #216. The display prompts:	**Test 216** **Enter Well Depth Y/N**
If you have set this value before and are either re-entering it because of a memory failure or a software change, you may press **YES** to enter the same value as before. Otherwise, install a plate in the plate bed and press **NO**. The instrument will position the probe head with the tips in the first row of wells. The display prompts: To make the probe go deeper, press the **0** or . (decimal point key). To make the probe go higher, press the 1 or 2 key. Press **YES** when the probe tips are where you desire the depth to be set. Auto-detection for partial plates is disabled when in manual mode, so use **NUM** to select the number of strips being washed in a partial plate. If you set the depth so the probes are not touching the bottom of the wells, you may notice an increased amount of residual liquid after aspirating, and single aspiration may leave less residual liquid than double aspiration.	**YES** **or** **NO** **Set Well Depth: YES=Done** **0=+1, .=+5, 1=-1, 2=-5**

2.2.7 Set Dispense Depth (Top Wash)

Set Dispense Depth (Top Wash): (For Dispensing Volumes Less than or Equal to 999uL)	Actions
Press **AUX** to enter the Setup mode. Press **NO** until Set Disp Depth is displayed, then press **YES**	**Setup Mode** **Set Disp Depth Y(YES)**
The display will prompt: "Set Disp Depth"	**Select 1=Manual**
Run Test 217 and "Enter Disp Depth Y/N" will display	**YES**
The instrument will position the probe head with the tips in the first row of wells. **NOTE:** The probe must aspirate off of the top of the wells during the 999uL top wash.	**Set Disp Depth: YES=Done**
To make the probe go deeper, press the **0** or **.** key. (The zero or period/decimal point key) To make the probe go higher, press the -1 or -2 key. Press **YES** when the probe tips are at the depth to be set - it should be so the aspirate tubes are below the level of the top of the wells (see figure below).  ***Test #217 Disp Depth Suggested Setting***	**0=+1, .=+5, 1=-1, 2=-5** **YES**

2.2.8 Individual Strip Selection

This allows washing of selected strips. When storing a program, the user describes the wash routine but not which strips to wash because that may change day to day. Only when selecting to run a program will the user have to either press **YES** to start at row 1 or press **NUM** to access individual strip selection. After pressing **NUM**, the display will show the individual rows, and the user can then select which strips to wash (or if it is easier to program, where to start and stop washing).

This is not a feature that can be preprogrammed and stored into a test. The rows must be selected prior to running each plate.

This is user defined for both stored and new tests at the time of running of the test.

After the selection of Aspirate, Dispense, or Aspirate/Dispense, press the **NUM** key on the keypad	"**Press 1-12 Strip ON/OFF**".....
Select strips 1 through 9 using the numbered keys. Select Strip 10 using the Alt/0 key Select Strip 11 using the SELFCK/. Key Select Strip 12 using the AUX key.	The instrument display will show the strips that have been selected or unselected. Selecting a key 2x's will deselect it (toggle it on or off). **Press 1-12 Strip ON/OFF** **w..ww..w.wwwww**
Press **YES** to accept the selection and proceed.	
Default Selection	Do not press **NUM** key. This is the same as choosing "all-on"

2.3 Programmed Operation

2.3.1 Overview

Program the instrument to perform multi-step dispense, aspirate, combined aspirate/dispense, and soak operations in any order.

Store up to 20 steps in each program, and store approximately 50 programs in the instrument's non-volatile (battery-backed) memory.

Give each program a descriptive name; however, programs are recalled by number.

List the stored programs, and view the steps of each program.

2.3.2 Store

Store:	Display/Prompt:
From the main prompt, press **STORE** to enter the programming mode. The display will prompt:	**Store a new program** **Use Well type Y/N**
Press **YES** to use the displayed well type, or press **NO** to select a different well type. If response is **NO**, the display shows the available well types. Press **NO** again to display the next well type, or press **YES** to select the displayed well type and continue. The display will prompt: Press **NO** to select a different action, or press **YES** to select the displayed action and continue. Programmable actions are described below. Some programmable actions require additional input as noted below. You must select an action for the first step.	**Select action for step: 1** **Aspirate plate Y/N**
Repeat step 2 as needed to build the program. The display shows the current step number and the available actions.	
Select the action "FINISHED PROGRAMMING" to save the program. The program is now stored in memory and the display shows: Press **YES** to run the test using the constant run time feature described in the section *2.2 - Auxiliary Menu*. Otherwise press **NO**.	**Saved as program 7** **Run Constant Time Y/N**
The display will prompt:	**Saved as program 7** **Name the program Y/N**
Note the number of the program in the upper right corner of the display. It is advisable to keep a written record of the program number and the actions programmed.	

Store (Continued)

Store:	Display/Prompt:
Press **YES** to name the program, or press **NO** to return to the main prompt.	**YES or NO**
If response is YES, the display will prompt: Build a 12-character name on the bottom line by selecting letters from the top line. The numeric keys **4** and **6** move the cursor left and right through the character set. The display will scroll as needed to display more letters. Press **YES** to select the letter under the cursor and add it to the program name. Press **NO** to remove the last letter added.	**ABCDEFGHIJKLMN OPQRSTUVWX** **<4 6> YES=Let STORE=Done**
When you have finished adding characters to the program name, press **STORE** to save the program name, and return to the main prompt.	**STORE**

2.3.2.1 Description of Programmable Actions

Programmable Actions:	Display/Prompt:
Repeat Last Step Select this option to repeat the last step you programmed. This is not available on the first step.	
Aspirate - Aspirate the contents of all wells. If the selected well type is flat bottom, the display prompts: Press **YES** for double aspirate, or press **NO** for single aspirate. Double aspirate is recommended for the first and last aspirate in the wash program.	**"DOUBLE ASPIRATION Y/N".**
Dispense - Dispense wash solution into plate wells. The display prompts: And display the most recently entered dispense volume. Press **YES** to accept the displayed value or enter a new dispense volume and press **YES.**	**Enter desired vol (µL):** **YES**
Aspirate & Dispense This performs a combined aspirate and dispense in one pass. Operation is identical to ASPIRATE and DISPENSE, as described in the section *2.1 - Direct Operation*.	
Shake The shake while soak operation is performed while in soak mode. After entering soak time, the display will prompt: To program the instrument to gently shake the microwell, press: The maximum 'shake while soak' time is thirty seconds. Enter as: 0.30	**Shake while soak Y/N?** **Enter as 0.ss** **YES**

Description of Programmable Actions (Continued)

Programmable Actions:	Display/Prompt:
Soak Pause for a selected amount of time, then continue to the next step. Enter the minutes and seconds separated by a decimal point, then press **YES**.	**Enter the mm.ss** **YES**
Pause for keystroke Pause until a key is pressed. This is useful for tests in which multiple washes are performed. When this step is encountered during the program, the program will pause and display: When a key is pressed, the program resumes at the next step.	**Program XX in progress** **Press a key to continue**
Finished Programming Save the steps you have entered as a numbered program.	

2.3.3 Delete program

Delete Program:	Display/Prompt:
Press **DELETE** to remove a program from memory. Enter the program number and press **YES**. The display shows:	**Delete USER PROGRAM Y/N (or test name)**
Press **YES** to delete, or press **NO** twice to cancel and return to the main prompt.	

2.3.4 Run a program

From the main prompt, press **YES** and then enter the number of the program you wish to run. Press **YES** to begin running the program.

2.3.5 List programs

List Programs:	Display/Prompt:
Run program 99 to view a list of stored programs. You will be shown the name of each program; if you have declined to name a program, it will be shown as “User Program”. If there are no programs in memory, running program 99 will return to the main prompt.	**99**

2.3.6 View program

The name of the program is displayed briefly, along with the programmed well type.

View Program:	Display/Prompt:
To view the steps of a program, press **AUX**. Press **NO** until the display prompts:	**AUX** **View a program Y/N**
Press **YES**. Enter the program number and press **YES**. The name of the program is displayed briefly, along with the programmed well type. The display then shows information similar to the following:	**YES** **02-01 Dbl Asp/Disp 300µL** **Press <YES> for nxt step**
The top line of the display shows the program number, the step number, and a description of the operation for that step. Press **YES** to view the next program step. If there are no more steps, the display reverts to the main prompt.	**YES**

2.3.7 Factory programs

Several factory programs are included as program number 1 through 6 to enable you to begin using the instrument in programmed mode. They are permanent and cannot be erased.

Test # and Name	Description
1. 3x@300 Const.	Wash 3 times with 300 µL/constant time
2. 4x@300 Const.	Wash 4 times with 300 µL/constant time
3. 5x@300 Const.	Wash 5 times with 300 µL/constant time
4. 3x@300 Wash	Wash 3 times with 300 µL
5. 4x@300 Wash	Wash 4 times with 300 µL
6. 5x@300 Wash	Wash 5 times with 300 µL

2.3.8 Run a Program

From the main prompt, press **YES** and enter the number of the program to run. Press **YES** to execute the program.

3. Additional Tips and Information

3.1 Cleaning

3.1.1 Rinsing

A **RINSE** should be performed when the instrument will not be used for an extended period, e.g. overnight, at end of shift, etc. Proper rinsing will help to prevent clogging of the dispense tubes (see below). A rinse should also be performed when the wash solution is changed, to prevent contamination.

The auto-rinse feature may be programmed to automatically perform a **RINSE** at a predetermined time of day. It is recommended that the rinse bottle be filled with deionized water. If the instrument is inactive for approximately 15 minutes, it will go into an idle mode. This will lower the probe head into the reservoir and release the vacuum and pressure. To allow for cases where the probe heads have not been rinsed prior to inactivity, a small amount of liquid will be dispensed into the reservoir, in order to keep the probe heads moist (to avoid crystallization of wash solution).

3.1.2 Cleaning the exterior

Avoid any abrasive cleaners. The keypad and display areas are liquid-resistant, but are easily scratched.

CAUTION: Solvents such as acetone or paint thinner will damage the instrument! Use only water!

The exterior of the instrument as well as the stainless steel plate bed may be cleaned with a soft cloth using plain water. If needed, a mild all-purpose or non-abrasive cleaner may be used. A 10% solution of chlorine bleach or 70% isopropyl alcohol may also be safely used as a disinfectant. Take special care not to spill excessive liquid into the plate bed area.

3.1.3 Cleaning the probe head

The supplied tool kit contains gauged wires, used to clean the aspirate and dispense tubes.

- The dispense tubes may become clogged due to suspended particulate matter in the wash solution.
- Always use fresh wash solution and inspect frequently. The dispense tubes as well as the aspirate tubes can clog due to crystallization of the wash solution.
- To prevent this, always perform a **RINSE** operation after use.

To clean the probe head, put it in STANDBY mode and remove the probe head (see the section *Maintenance: Changing Probe Heads*).

Use the gauged wires for the first step of cleaning the head. When using the gauged wires to clean the dispense tubes, be especially gentle.

Do not scrub the wire vigorously up and down or place any horizontal pressure against the tube. Excessive or indelicate use of the cleaning wire can cause abrasion of the inside of the dispense tubes and may adversely affect dispense precision.

After using the gauged wires, remove the large plastic screws on the probe head: the lower screws are for the dispense probes and the upper screws are for the aspirate probes.

Run deionized water through the openings to flush out any particulate matter loosened by use of the gauged wires. Replace the head as described in the section *Maintenance: Changing Probe Heads*.

3.1.4 Disinfecting the Washer

	Use adequate precautions when disposing of waste. Eye protection, gloves, and proper clothing are indicated. Waste material should be treated as potentially biohazardous

Use all standard laboratory safety precautions when working with known or suspected biological and chemical hazards. The following procedure is recommended by the manufacturer for disinfecting the Microplate Washer.

3.1.4.1 Disinfecting the Waste Bottle

- Enter the Standby mode and wait 15 seconds, or turn off the washer, before disconnecting any bottle.
- Holding the cap of the waste bottle still, unscrew the waste bottle and discard the waste material in an appropriate manner (See section *3.2.2 - Emptying the Waste Bottle*).
- Prepare a fresh 10% solution of bleach containing Sodium Hypochlorite.
    - Fill the bottle to one-third capacity with this solution.
    - Cap tightly.
    - Swirl the solution in the bottle to rinse it.
    - Discard the rinse solution appropriately and repeat this step.
    - Rinse the bottle at least 3 times with fresh water to remove the bleach if desired. Alternately a small amount of undiluted bleach may be retained in the bottle.
- Replace the waste bottle on its cap and either turn the instrument on, or press the **YES** key to resume vacuum.
- Other bottles can be disinfected similarly; however, complete rinsing is required afterwards.

3.1.4.2 Disinfecting the probes and tubing

- Prepare a fresh 10% solution of bleach containing Sodium Hypochlorite. Alternately, you may use any of the standard disinfectants used for laboratory decontamination. These will not harm the washer as long as they are completely rinsed out immediately after use. Many disinfectants can cause drying of the tubing over time. This will lead to premature aging and more frequent need for tubing replacement. Therefore, disinfectant should be rinsed out immediately after use.
- Put the instrument in the Standby mode.
    - Wait at least 15 seconds before disconnecting the rinse bottle.
    - Replace the rinse with the disinfecting solution.
    - Reassemble and operate the rinse cycle at least two times to flush out the tubing.
- Put the instrument in the Standby mode again.
    - Wait at least 15 seconds.
    - Replace the disinfectant with a bottle of fresh deionized water.
    - Reassemble and operate the rinse cycle 3-5 times. This should clear the disinfectant out of the tubing.

3.1.4.3 Disinfecting the instrument surfaces

- Prepare a 10% solution of bleach containing Sodium Hypochlorite.
    - To be sure that these will not harm the cosmetic finish of the instrument, experiment first with a small section at the back of the Microplate Washer.
    - It is highly recommended that the disinfected surfaces be wiped with fresh water and dried immediately after disinfecting. This will avoid leaving a chemical residue that may cause premature aging of the instrument cover.
    - The front panel is manufactured from chemically resistant stainless steel, and is unlikely to be damaged by any standard cleaners.
- Turn the instrument off.
- Remove the probe head (which may also be disinfected and rinsed). See instructions for cleaning the head in this manual.
- Remove the plate carrier (which may also be disinfected and rinsed).
- Use a soft cloth to wipe the surfaces with disinfectant.
    - Do not pour liquid on the instrument or into the plate bed area.
    - Do not allow liquid to soak up under the keyboard overlay.

Disinfecting the probes and tubing (Continued)

- Next, wipe the surfaces with a cloth wetted with fresh water to remove all chemical residue. Dry the instrument.

- 70% isopropanol can be used to remove dirt and fingerprints from the keypad overlay. It may also be used to remove ink marks or other stains that remain after cleaning with water. This may be left to evaporate and will not harm the instrument surfaces.

3.2 Maintenance

3.2.1 Adding solution / Changing bottles

- Press **STNDBY** to disable the pumps and release pressure and vacuum.
- Wait at least 15 seconds before removing stoppers and caps from bottles.
- Transfer solution and replace stoppers and caps.
- Tighten caps securely to prevent pressure loss.
- Press **YES** to exit **STNDBY** mode and return to the main prompt.

3.2.2 Emptying the Waste Bottle

- If the display shows:

  Empty the waste Bottle
  press <YES> to resume

  - If you have the optional bottle rack, loosen the Velcro strap on the waste bottle.
  - Carefully unscrew the bottle from the cap and remove the stopper.
  - Empty the waste bottle and replace the stopper and the cap.
  - Press **YES** to continue.

	**CAUTION!**: Use adequate precautions when disposing of waste. Eye protection, gloves, and proper clothing are indicated. Waste material should be treated as potentially biohazardous.

3.2.3 Changing Probe Heads

The head may be changed at any time other than during a wash operation.

- To change the head, first set the power switch to **OFF** (O).
  - Remove the plastic tubing connected to the fittings on the side of the head.
  - Remove the two knurled thumbscrews holding the head to the probe arm.
  - Place the new head beneath the probe arm and install the thumbscrews.
  - Connect the plastic tubing to the fittings on the new head, observing the color code.
- After changing the head (or reinstalling the original head after cleaning), you must realign the head with the plate carrier.

NOTE: Ensure that you first change the Microplate Washer to the proper head type (8-, 12, or 16-probe) using the 8/12 key.

After selecting the head type, perform an ALIGN:

- Place a microplate in the plate carrier.
    - If you are using an 8- or 16-probe head, orient the plate so that well number A-1 is at the left rear corner.
    - If using 12-probe head, orient the plate so that well number A-1 is at the left front corner.
    - Be sure that the plate is securely seated in the grooves on the plate carrier.
    - Press the **ALIGN** key and the instrument will sense the position of the new head in relation to the plate bed and the microplate.

NOTE: After a head change has been selected via the 8/12 key, the instrument will ask "Last plate was XX way; Is XX way head installed" during the ALIGN process. Press **YES** to confirm that the head has been properly changed and selected.

- After the **ALIGN** is complete, select test #214 and perform the plate alignment discussed in section *3.2.8-Plate Carrier Alignment.*
- Press **PRIME** to remove any trapped air from the newly installed head.
- Repeat the **PRIME** until a steady stream of fluid can be seen exiting the dispense tubes. To assure uniform washing, it is important to observe the proper functioning of each probe before washing a plate.

3.2.4 Hydrophobic (Exhaust) filter replacement

The filter that removes contaminant particles from the exhaust of the vacuum pump should be replaced only as needed. If the "WAIT" message for the pump is taking longer to clear, the filter may be clogged and should be replaced. In the event that the filter gets wet due to a waste bottle spill, the filter will need replacement.

> **CAUTION: Once the filter has become wet, it will be blocked. Continued use of a blocked filter may impair washer effectiveness and/or result in damage to the washer.**

Contact your dealer for a replacement filter. When replacing the filter, note that the INLET side should be toward the bottles.

3.2.5 Valve tubing replacement

It is not recommended to replace any tubing while the washer is performing properly. The short lengths of 1/16" silicone tubing used in the internal valves may become clogged or worn with age. If this occurs, contact your dealer for replacement valve tubing. Follow the instructions included with the replacement valve tubing.

3.2.6 Dispense volume repeatability check

Dispense volume repeatability should be checked at least once every 6 months to assure that the probes are not clogged or damaged.

- Fill the wash bottle with a solution containing a wetting agent (such as a drop of liquid soap).
- Press **PRIME** to prime the instrument.
- Dispense 300 µL into each well of a clean dry microplate.
- Remove the plate and examine the wells visually to see that each appears evenly filled.

If any row of wells has lower volumes than the other rows, suspect a clogged probe.

- Using the tool kit provided, attempt to clean the dispense probe that fills the affected row.
- Repeat the test.

If the wells do not appear to be filling evenly, consult your dealer for service, and do not use the washer in clinical testing until the problem is corrected.

3.2.7 Volume Calibration

The calibration of the dispense volume can be checked using a 50 mL graduated cylinder. Volume calibration is also recommended every 6 months.

Volume Calibration:	Display/Prompt:
From the main prompt, press **YES**:	**YES**
Enter 213 and press **YES**.	**213**
	YES
The display will prompt:	**PD:40 DD: 1 03/14/96**
The top line shows the plate depth parameter (used for manual depth), the dispense depth parameter, and the date of last parameter change. The bottom line shows the values for Plate Alignment, pressure, and volume. The value shown for volume in the example may be different than actual. Write down the value shown for volume.	**Pl:125 Pr: 5.0 Vol:27.0**
From the main prompt, press **YES**. Enter 212 and press **YES**.	**YES**
	212
	YES
The display will prompt:	**Run a program**
	Ent calibration vol Y/N

Volume Calibration (Continued)

Press **NO**. The display will prompt:	**NO** **Run a program** **Calibrate volumes Y/N**
Press **YES**. The display will prompt:	**Unplug dispense tube** **Place in cyl —> <YES>**
Unplug the plastic dispense tube from the lower (red) fitting on the side of the head. Place the end of the tubing in a clean, dry 50 mL graduated cylinder. Position the tubing so that the tubing remains level with the head. Press **YES** and the unit will dispense a relatively large amount of fluid (but not more than 50mL). When this is complete, the display will prompt:	**YES** **Enter measured vol (mL):**

Read the amount dispensed from the graduated cylinder. Enter the new value read from the graduated cylinder and press YES.

If you do not want to change the value, press NO twice in succession to cancel and return to the main prompt.

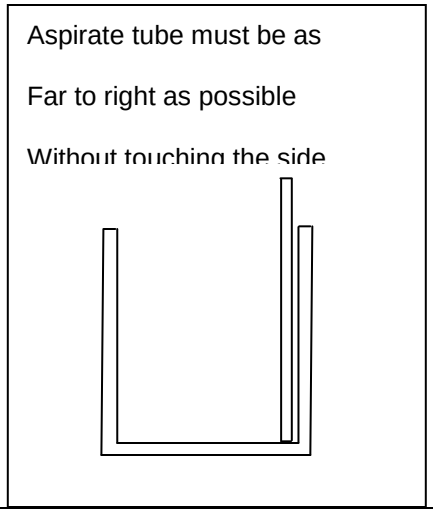
Record the volume each month. If the volume is trending lower each time, verify the pressure setting.

Connect the plastic dispense tube to the fitting on the head.

Be sure to PRIME before performing any dispense operation, to remove any trapped air from the head.

3.2.8 Plate Carrier Alignment

The plate carrier is aligned by means of a software adjustment value. The factory setting need not be changed. This information is included for verification only.

Plate Carrier Alignment:	Display/Prompt:
To enter the plate carrier alignment parameter from the calibration data label (located on the bottom of the instrument), select test #210. The display prompts:	**210** **Plate Carrier alignment**
Type the value shown on the calibration data label and press **YES**.	**YES**
To realign the plate carrier, first run **ALIGN**, then select test #214. The display prompts:	**214** **Plate Carrier alignment** **0=Lft, 1=Rt, YES=Accept**
The figure below shows the desired alignment. Press **0** (to move left) and **1** (to move right) to achieve the results pictured.  Press **YES** when complete.	**YES**

3.2.9 Dispense Verification

The following test may be run to ascertain proper performance characteristics. A scale capable of reading tenths of a gram (XX.X grams) and a standard 96 well microplate are necessary.

- Fill the wash bottle of the washer with deionized water containing a wetting agent (such as a drop of liquid soap).
- Press **PRIME** to prime the system, and then repeat the priming.
- Place a clean, dry 96-well standard microplate on the scale and tare it to 0.0 grams.
- Install the plate into the washer.
- Press **DISP**.
- Enter **200** and press **YES**. The instrument will dispense 200 µL of water into each well of the plate.
- When the dispense is complete, place the filled plate on the scale. The scale reading should be between 18.0 and 20.0 grams. If not, perform a Volume Calibration, and then repeat.

If the washer does not pass this test, contact your instrument supplier.

3.2.10 Pressure Adjustment

Some users may find they wish to adjust the pressure up or down in order to increase or decrease the wash force, or to reduce the forming of bubbles (in addition to the top wash feature, see *Section 2.2.7*).

Pressure Adjustment:	Display/Prompt:
To change the pressure, first put the instrument in Standby mode by pressing the **STNDBY** key. Select test #201. The display will prompt::	**STNDBY** **201** **Pressure (PSI) = ?**
Enter the desired pressure amount in PSI.	
You will then need to recalibrate the volume setting, following the instructions in ***Section 3.2.7*.** Note that reducing the value below 2.5 may decrease your precision; run a dispense plate and verify that all wells are filled uniformly.	

4. Storage

The instrument may be stored under the following environmental conditions:

Temperature ..... 5 to 70°C
Humidity ..... Maximum 85% non-condensing

Before storing or shipping the instrument, follow this procedure:

1. Fill the wash and rinse bottles with deionized water.
2. Perform a **PRIME** several times, then perform a **RINSE** several times to flush all solutions from the instrument.
3. Empty all bottles and replace.
4. Perform a **PRIME** to purge with air.
5. Perform a **RINSE** several times to purge with air. Repeat as needed until no more fluid is seen flowing out of the head or into the waste bottle.
6. Turn off the power switch and remove the power cord.
7. Disconnect all tubing and sensor leads from the rear panel.
8. Remove the plate carrier and dry the plate bed and reservoir thoroughly using lint-free absorbent towels. Replace the plate carrier. The instrument is now ready for storage.

NOTE: Always handle and store the wash head very carefully to avoid physical damage to the probes.

5. Troubleshooting and Error Messages

Successful troubleshooting will be aided by an understanding of the basic elements of the system. The instrument consists of an interdependent pressure and vacuum system and position systems for the plate and washes head. These systems are regulated and positioned to the programmed levels under microprocessor control. Pinch valves control the dispense functions. One pinch valve controls the wash solution and one controls the rinse solution. A third valve directs output of the pump to pressurize the bottles and maintain pressure under microprocessor control. A fourth valve is used to relieve the pressure system during the idle period and in the standby mode. The first two of these valves and most plumbing can be accessed through the door on the rear of the unit. Always turn the instrument off and disconnect the power cord before opening this door or disconnecting any reservoir tubing. Motorized lead screws and optical sensors provide for precise plate and probe positioning.

5.1.1 Wash and Rinse System

The wash and rinse bottles are pressurized by the common pump to a level of 5 psi (default setting) during active periods. Note that the user may change the pressure setting (see section ***3.2.10 - Pressure Adjustment***).

During standby, or after an inactive period of approximately 12 minutes, the pressure is relieved by means of the pressure relief valve. The displayed pressure on line 2 of the display will change from 5±.2 psi to OFF indicating a sleep period.

Pressing any key will reactivate this system. In the sleep period, the probe head will lower to the tray and a small amount of liquid will be released in order to keep the probe heads moist and free from crystallized wash solution.

The wash and rinse bottles are connected to the pressure system by means of a tee fitting located at the bottle caps. The unfilled portions of these bottles are the pressure reservoir for dispensing.

The outlet of each bottle is connected to a pinch valve mounted on the valve door. The exit side of these valves are again tied together and connected to the dispense chamber of the wash head. Control of the dispensed volume is achieved by precisely timed activation of these valves.

Conductivity sensors in each bottle sense fluid levels.

5.1.2 Aspiration System

The aspiration system is based on a strong vacuum pump; the pump runs continuously when active. The pump draws the waste bottle down to this vacuum level through a fine hydrophobic filter, and is directly connected to the aspirate chamber of the wash head.

A conductivity sensor connected to the bottle senses waste level. When a full condition is detected, the instrument goes into the standby mode, beeps to alert the operator, and relieves the pressure system.

Prior to going into standby mode, the instrument will complete any wash program in progress. The alert occurs when there is sufficient remaining wash solution (or sufficient room in the waste bottle) to allow the completion of the wash program.

5.1.3 Error Messages

Below are described some of the observations and error messages that will help you detect trouble. The solution provided for each is a suggested cause and remedy. If you have a problem that the suggested actions fail to solve, do not use the Microplate Washer for clinical testing. Consult your instrument supplier to arrange for further assistance.

Problem:	Explanation/Solution:
Incomplete aspiration	Not using dummy wells in partial strips - place empty wells to complete rows. Aspirate needle(s) clogged–use cleaning tool. Tubing kinked–check tubing.
Incomplete dispense	Dispense needle(s) clogged–use cleaning tool. Dispense tube kinked. Dispense valve stuck. Check for pinched tubing. Check volume calibration.
Inaccurate dispense	Check dispense needles. Perform dispense repeatability and calibration procedures. Verify pressure. Check volume calibration.
Excess bubbles affecting washing	Most washes are not affected by the amount of bubbles (caused by wash solution surfactant), but if your assay is sensitive or if you wish to decrease the level of bubbles in any case, use the top wash feature (see section 2.2.7).
Wash or Rinse fluid level not detected	Check that sensors are plugged in to bottle caps and valve door. Clean/dry sensor connections and the cap at the terminal entry points.
“Empty Waste” message, bottle not full.	Check that sensors are plugged in to bottle caps and valve door. Be sure the contacts and cap are free of moisture and salts by thoroughly cleaning the black stopper and that the contact wires with the loop on the end are not touching each other.
Vacuum pump is slow.	Filter clogged or Vacuum leak. Check tubing and fittings.

Problem:	Explanation/Solution:
Pump runs during inactive periods	Check system for leaks.
CAUTION: Probe lowering	Head is about to go into sleep mode. Move your hands to avoid injury.
Dispense system has been rinsed. Prime first? Y/N	This message occurs when dispense, aspirate, or program is selected prior to the system being primed. Press YES to prime the system.
Last plate was XX way Is XX way head installed	After a head change has been selected via the 8/12 key, the instrument will ask this question the first time a wash function is attempted. Press YES to confirm the head has been properly changed and selected.
*** MECH JAM: PROBE*** (or***MECH JAM: PLATE***) CLEAR JAM THEN --> <YES>	Check for obstructions and clear them, then press YES. If you cannot clear the obstructions easily, in most situations, pressing YES will cancel the mode and return to the “Press <YES> to run prog” message.
Check Vacuum System	Check tubing - may be kinked or clogged, or head may be clogged.
Check Pressure System	Possible leak on the air or fluid side. Check for air leak or fluid leak.
Vac OverRng-Check Filter	This will occur if the vacuum over-ranges, and is most likely due to a blocked vacuum filter. Replacement of the filter is needed.
CHECKSUM ERROR	Stored parameters have been lost. The display shows: **Enter Plate Align param** Enter the plate alignment parameter from the calibration data label and press YES. The display shows: **Enter measured vol (mL):** Enter the calibration volume from the calibration data label on the bottom of the instrument (or the most recent value determined from periodic volume calibration) and press YES. If you are using other stored parameters, such as manual depth and dispense depth, or have modified the pressure setting, you should also reset these at this time.
Cannot delete Perm Prog	The first six tests are permanent – cannot be deleted.
MEMORY FULL	Insufficient memory to store program. Delete previously stored programs to make more memory available.
MEMORY ERROR: Prog Ended	Checksum error in recalling the program. Contact your dealer if you continue to have problems.

6. Information

In the unlikely event that a problem occurs with the instrument, please consult your Instrument supplier first. If you continue to have problems after consulting your instrument supplier, contact the factory.

Factory:

Telephone: USA 772-283-6540

Fax: USA 772-283-8020

E-mail: support@awaretech.com

Mailing Address:

Awareness Technology, Inc.
1935 SW Martin Highway
Palm City FL 34990 USA

EC REP EMERGO EUROPE
Prinsessegracht 20
2514 AP The Hague
The Netherlands

IVD

CE

Important: When contacting us, please have the Model and Serial Number of the instrument in question. Have a description of the problem with as much detail as possible. Save any relevant printouts and send or e-mail us the information.

Model:_____

Serial #:_____

	WARNING: Instruments to be returned must be accompanied by a decontamination certificate completed by the responsible laboratory manager. If a decontamination certificate is not supplied, the returning laboratory will be responsible for charges resulting from non-acceptance of the instrument by the servicing center or from any authority's intervention.

7. Appendix A – Test Menu

These are special features accessed by using the test menu. Most are used for alignments, adjustments and calibrations.

Test #.:	Feature:	Section:
99	List All Stored Programs	2.3.5
201	Pressure Adjustment -	3.2.10
210	Plate Carrier Alignment -	3.2.8
212	Volume Calibration -	3.2.7
213	Display Calibration Settings	3.2.7
214	Plate Carrier Alignment	3.2.8
216	Select Aspiration Depth	2.2.6.
217	Set Dispense Depth	2.2.7