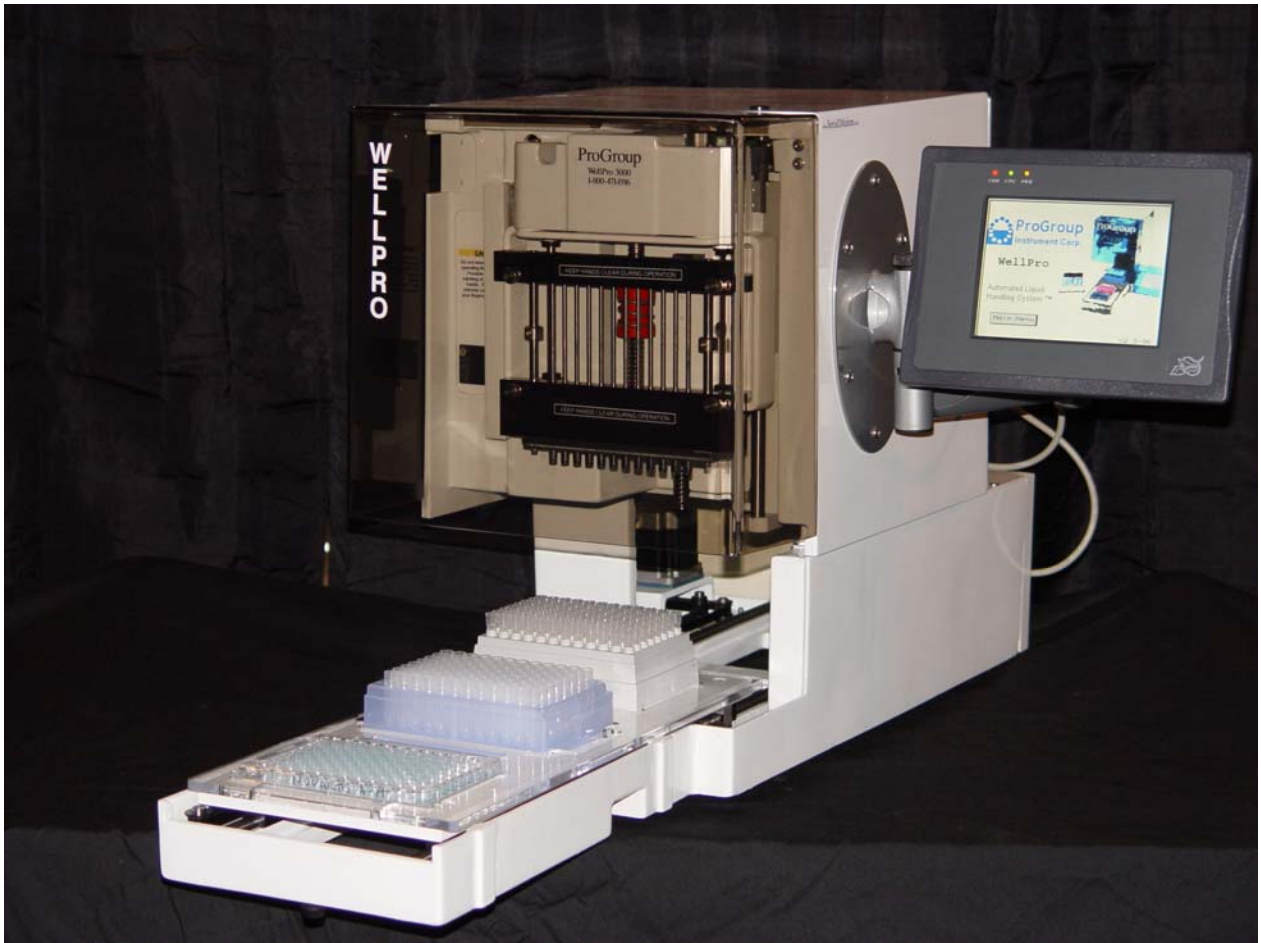




WellPro 3000 Liquid Handler



WellPro 3000 Liquid Handler

User Manual

User Manual Rev. 2.4; February 18, 2007

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SAFETY SYMBOLS AND MARKINGS

These symbols are intended to draw your attention to essential information and alert you to the presence of hazards as indicated. Some of these symbols may not appear in the manual or on the product:

SAFETY SYMBOLS used in the WellPro Model 3000 Liquid Handler



Power ON



Power OFF

WARNING MARKINGS used in the documentation



Caution: risk of electric shock.



Caution: biohazard risk.



Caution: risk of personal injury to the operator or a safety hazard to the surrounding area.



Caution: risk of damage to the instrument, other equipment or loss of performance or function in a specific application.

ABOUT THE USER MANUAL

This User Manual has been written for the user (e.g. laboratory technician) and provides information on the WellPro Model 3000 Liquid Handler. This manual contains the installation and operating instructions for the WellPro Model 3000 Liquid Handler. **Read the manual in its entirety prior to operating the instrument.**

This User Manual has been designed to give you the information you need to:

- Review safety precautions.
- Install the WellPro Model 3000 Liquid Handler.
- Use the WellPro Model 3000 Liquid Handler in routine analyses and research.
- Perform basic maintenance procedures.

This User Manual also describes features and specifications of the WellPro Model 3000 Liquid Handler hardware and on-board software.

This manual includes various options that may not be installed in your instrument. If you desire to add these options, please contact ProGroup Instrument Corporation or your local distributor for further information.

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1 INTRODUCTION

1.1 Overview

THANK YOU ...

... for purchasing the WellPro 3000 multichannel automated pipetting workstation. We are proud to send you our flexible 12 or 24 channel automated workstation, which is capable of performing various routine liquid manipulations. It is an intelligent alternative to tedious and potentially error-prone manual pipetting operations. Now, applications such as reagent addition, serial dilution, microplate replication and sample dilution can be easily performed.

The ProGroup Instrument Corporation WellPro WP3000 Liquid Handler (Figure 1.1) is designed to perform the following liquid handling activities on a user-programmable basis:

- Precisely transfer liquids in volumes from 1 μL to 50 μL using disposable tips with the 24 channel head
- Precisely transfer liquids in volumes from 1 μL to 200 μL using disposable tips with the 12 channel head
- Perform serial dilutions in almost any ratio,
- Perform serial dilutions of 16 wells or 24 wells simultaneously with 24 channel head
- Perform serial dilutions of 8 wells or 12 wells simultaneously with 12 channel head
- Precisely mix the contents of a microplate
- Transfer samples to or from microplates
- Perform mother-daughter “repli-plating”
- Perform well to well transfer / Cherry Picking (Optional Feature and is not standard w/ instrument)



Fig 1.1 ProGroup Instrument Corporation WellPro WP3000 Liquid Handler

1.2 Principle of Operation

The ProGroup Instrument Corporation WellPro WP3000 Liquid Handler consists of a hand-held touch screen controller and a liquid handling unit. A variety of reagent containers can be used to hold liquids that will be added to the wells in a plate (or have been removed from a plate).

1.2.1 Touch Screen Controller

The ProGroup Instrument Corporation WellPro WP3000 Liquid Handler includes a touch screen display that is used to program all operations of the unit. The controller allows the user to control parameters such as the volumes to transfer, mix, or dispense, the transfer speed, and whether to change tips between transfers.

1.2.2 Liquid Handling Unit

The ProGroup Instrument Corporation WellPro WP3000 Liquid Handler is an electro-mechanical transfer unit that is comprised of two basic parts: a table and a vertical head assembly.

The *table* accommodates a series of interchangeable templates for the short base unit and a single template for the long base that position the reagent containers and a magazine with the disposable tips, etc. During operation, the table slides back and forth to bring the appropriate component under the head assembly.

The short base unit is several inches shorter so that it can fit inside a hood. The shorter base unit does not have the plate filling in portrait mode feature like the long base due to the table space being shorter.

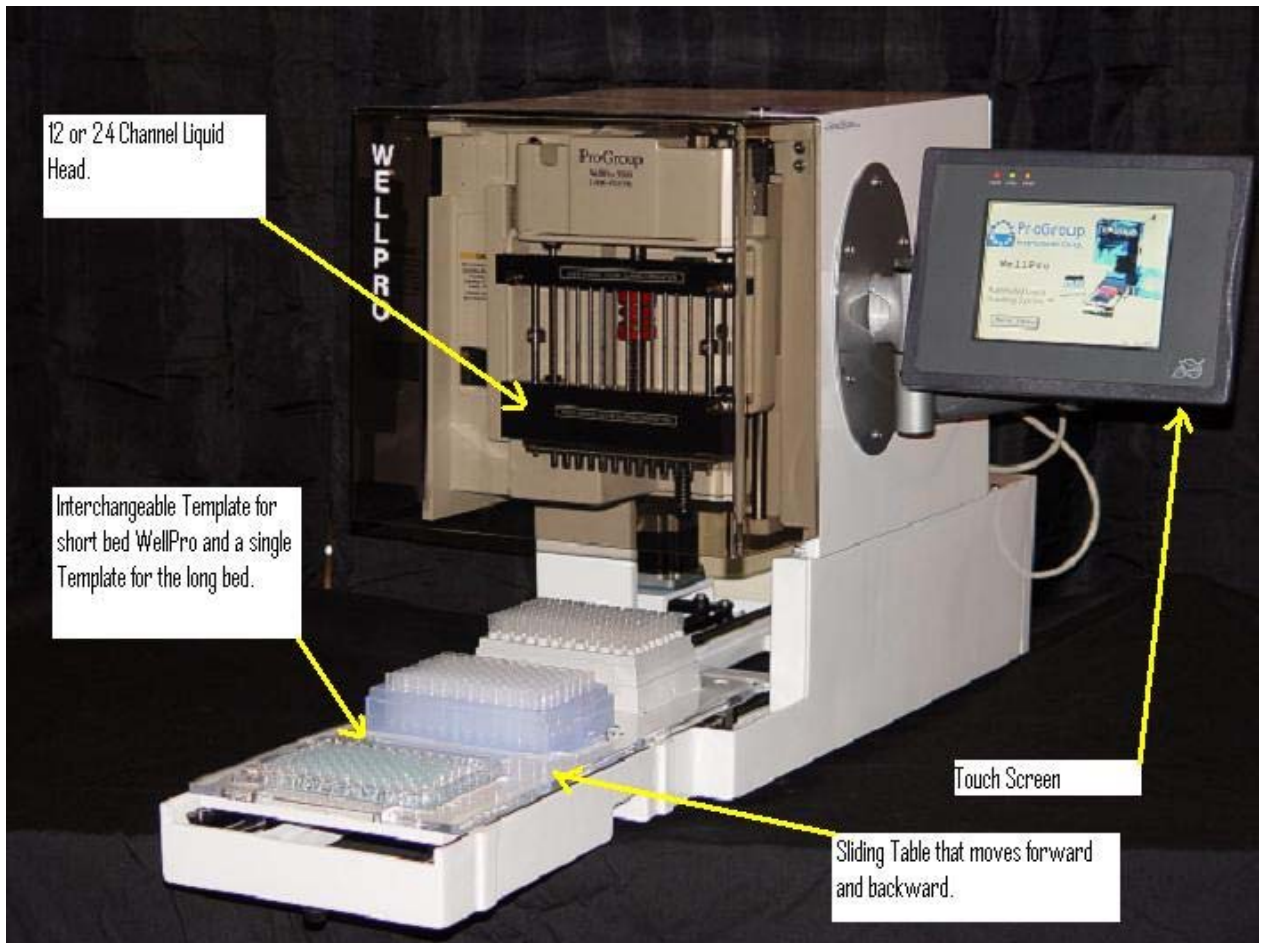
The *head assembly* consists of three basic parts:

- a plunger housing which contains nozzles that press into the tips to form airtight seals
- a plunger block which moves up and down to aspirate and deliver samples
- a tip ejector plate which removes used tips

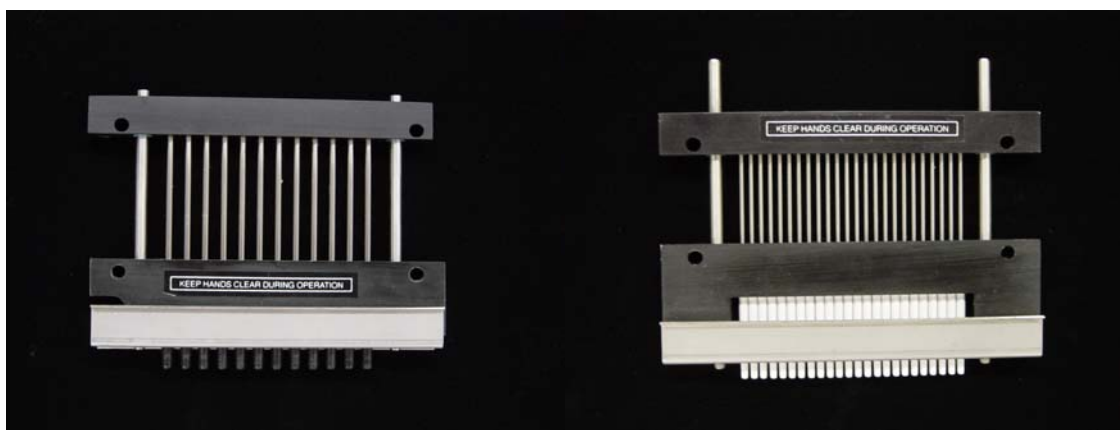
The head assembly slides up and down to bring the tips to the appropriate height to perform the designated operations.

The WellPro WP3000 can be configured with, a 24 channel (tip) air displacement pipetting head or a 12 channel (tip) air displacement pipetting head. Serial dilutions can be performed in the 16 or 24 channel mode with 24 channel head to allow for maximum dilution capability with the 384 well plate or can be performed in the 8 or 12 channel mode with 12 channel head to allow for maximum dilution capability with the 96 well plate.

An optional single channel well to well / cherry picker head can be added to the instrument. The single channel head can perform well to well transfers and dilutions in a 1-200 ul range for the 96 WellPro and 1-50 ul for the 384 WellPro. This module uses an excel spreadsheet and requires a computer to operate.



Standard WellPro (Optional single channel cherry picking head not shown)



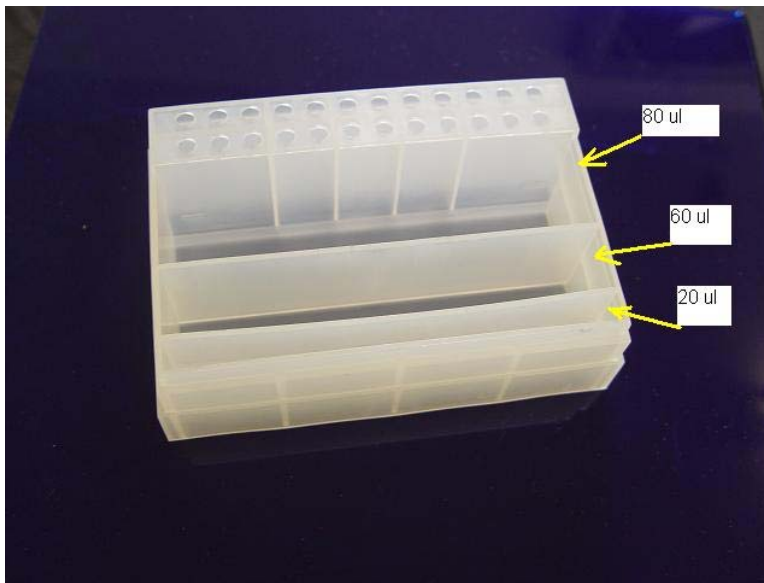
12 Channel Liquid Head

24 Channel Liquid head

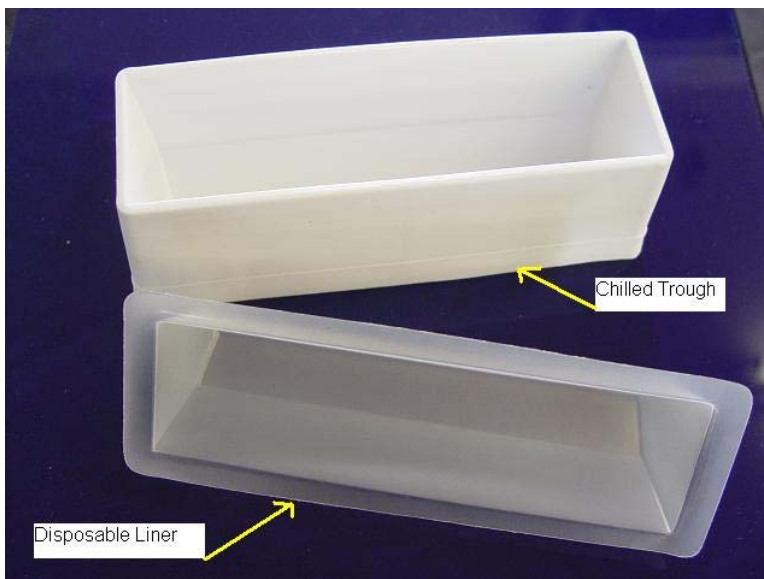
Cherry Picking Single Channel Head not shown (Refer to manual for this module)

1.2.3 WellPro Reagent Containers

The WellPro liquid handler can be used with the MICRO-TROUGH reagent container, each of which consists of three reservoirs. Each reservoir holds a different amount of liquid: (e.g. 20 mL, 58 mL, and 77 mL). You can use the reservoirs to hold reagents that will be added to a plate or waste that has been removed from a plate.



The WellPro liquid handler can be used with a 100 ml chilled reagent container. You can use this reservoir to hold reagents that does or does not required chilled. The trough also has disposable liners as an added benefit.



1.2.4 WellPro Templates

The WellPro WP3000 liquid handler uses a template to position microplates, reagent containers and tip magazines on the movable table.

Standard templates provided:

- **Standard Template for WellPro with a Long Bed**

One general purpose template is used for WellPro long bed liquid handling operations. The well plates can be orientated with the (96 well plates) 12 well rows (**A-H**) or (384 well plates) 24 well rows (**A-P**) landscape as shown in Figures 1.2, 1.3, 1.4, 1.5, . With the same template the plates can be placed in a portrait orientation (96 well plates) **1-12** or (384 well plates) **1-24** well columns as shown in Figures 1.6 and 1.7.

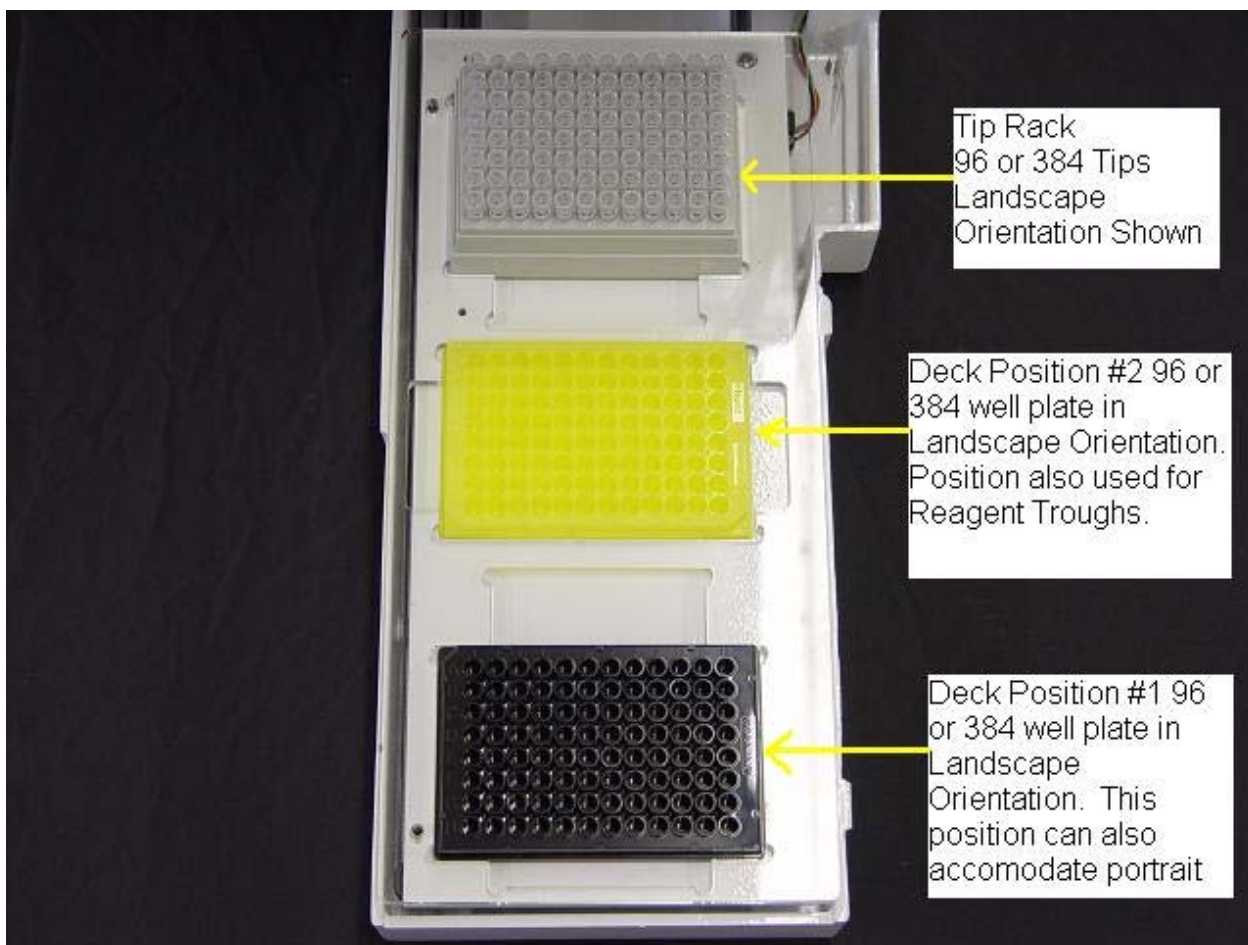


Fig 1.2 Standard Template for Long Bed WellPro showing plates positioned in landscape orientation

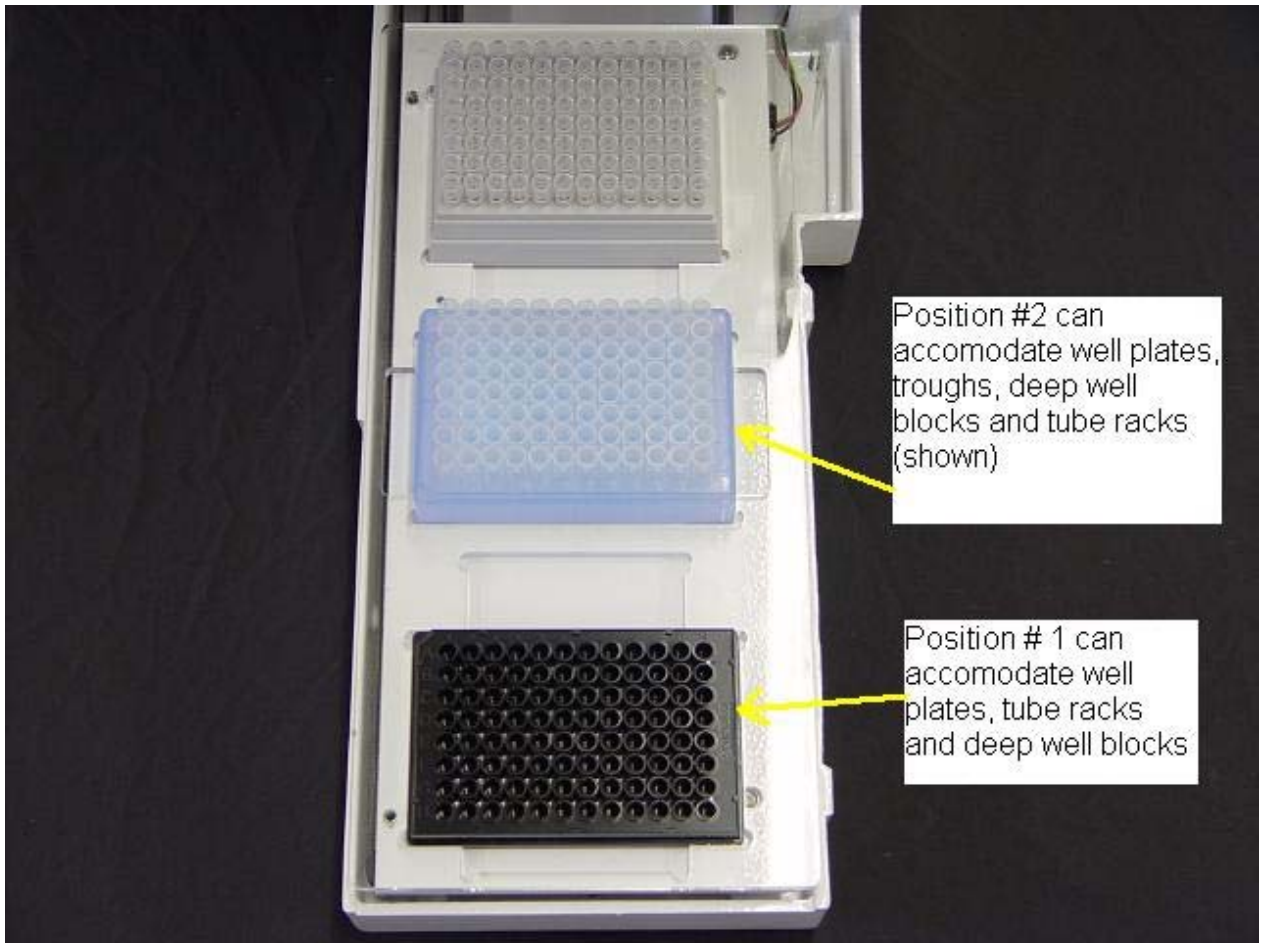
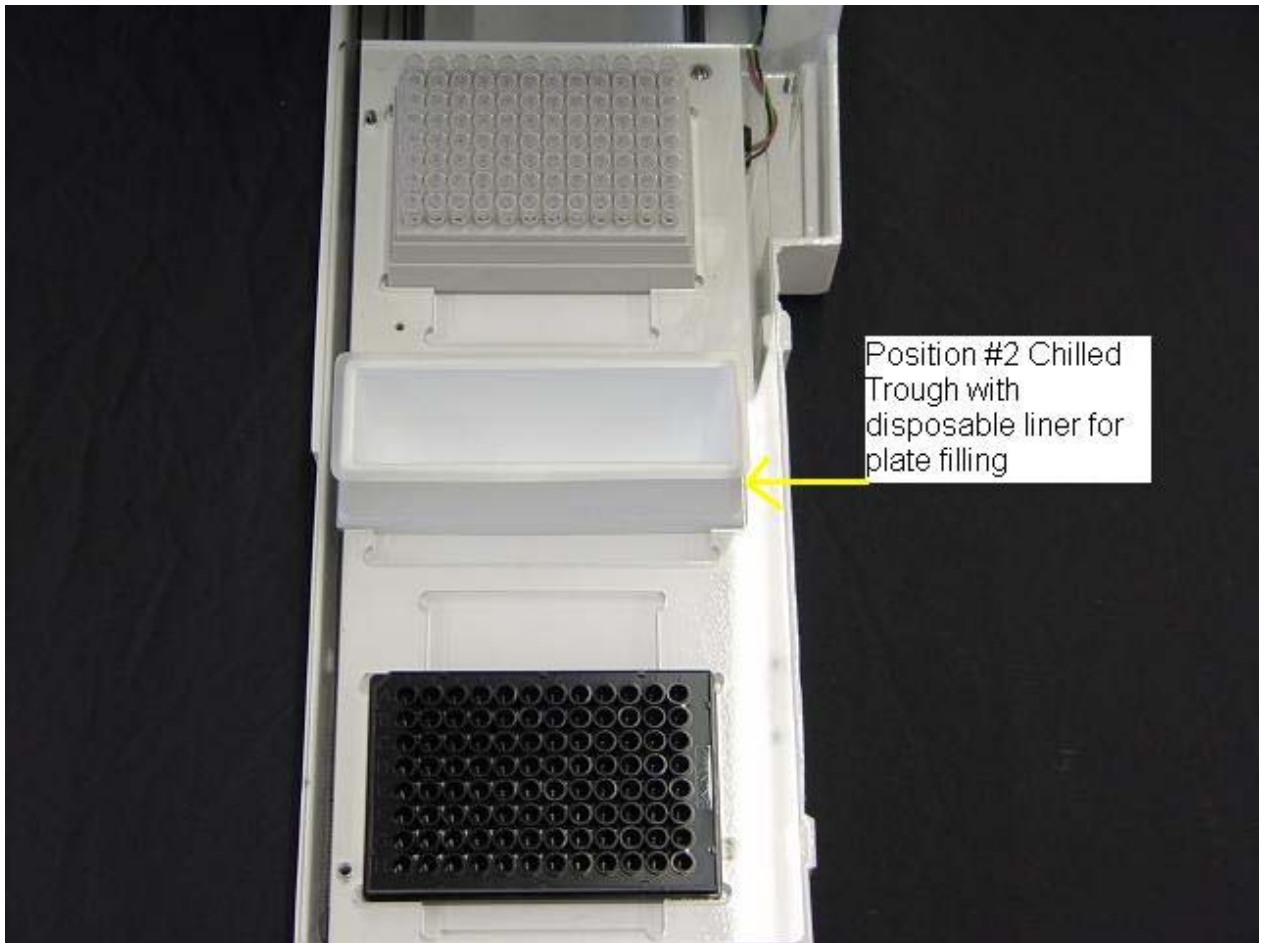


Fig 1.3 Standard Template for Long Bed WellPro showing plates positioned in landscape orientation



Position #2 Chilled
Trough with
disposable liner for
plate filling

Fig 1.4 Standard Template for Long Bed WellPro showing plates positioned in landscape orientation

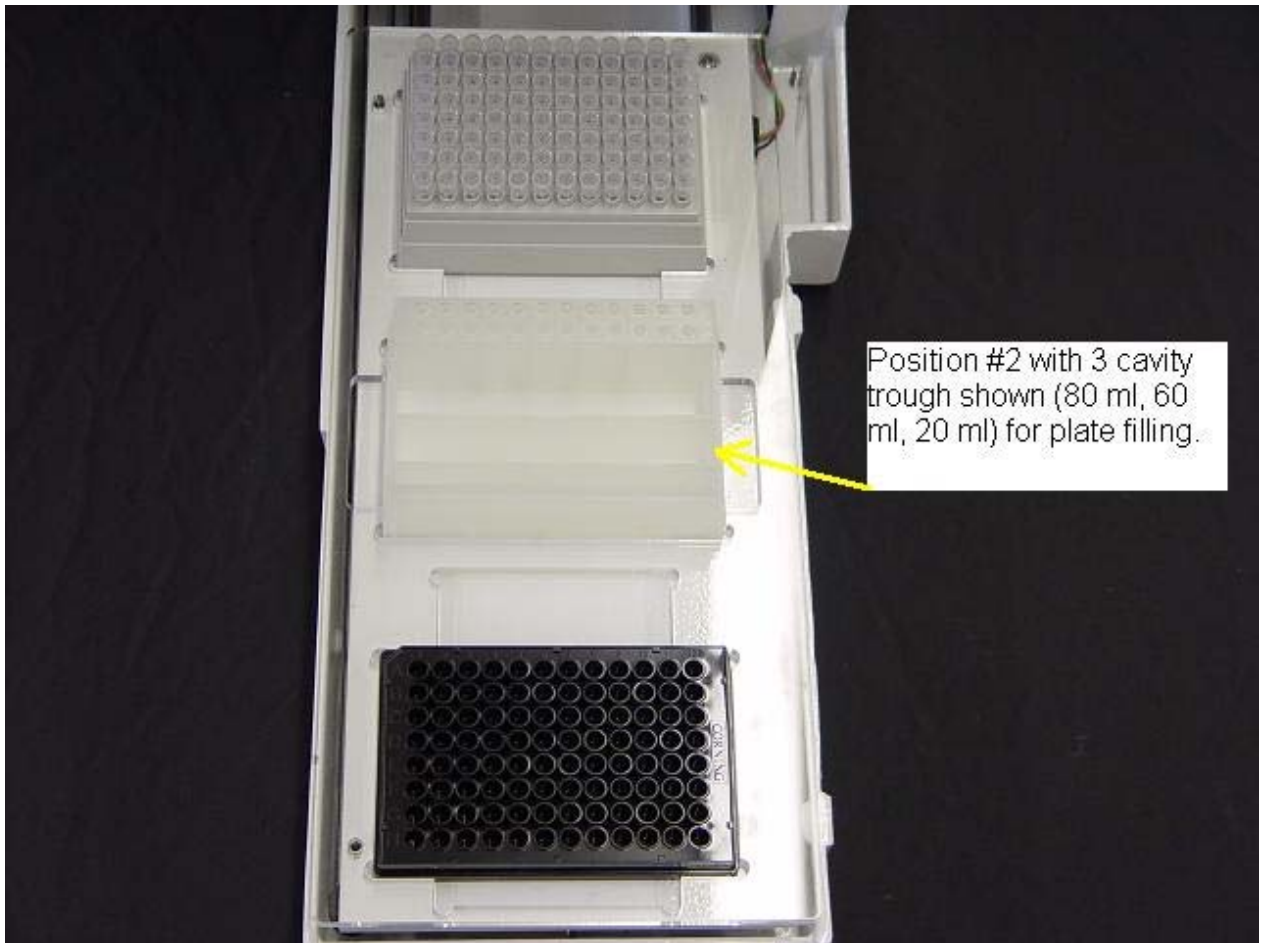


Fig 1.5 Standard Template for Long Bed WellPro showing plates positioned in landscape orientation

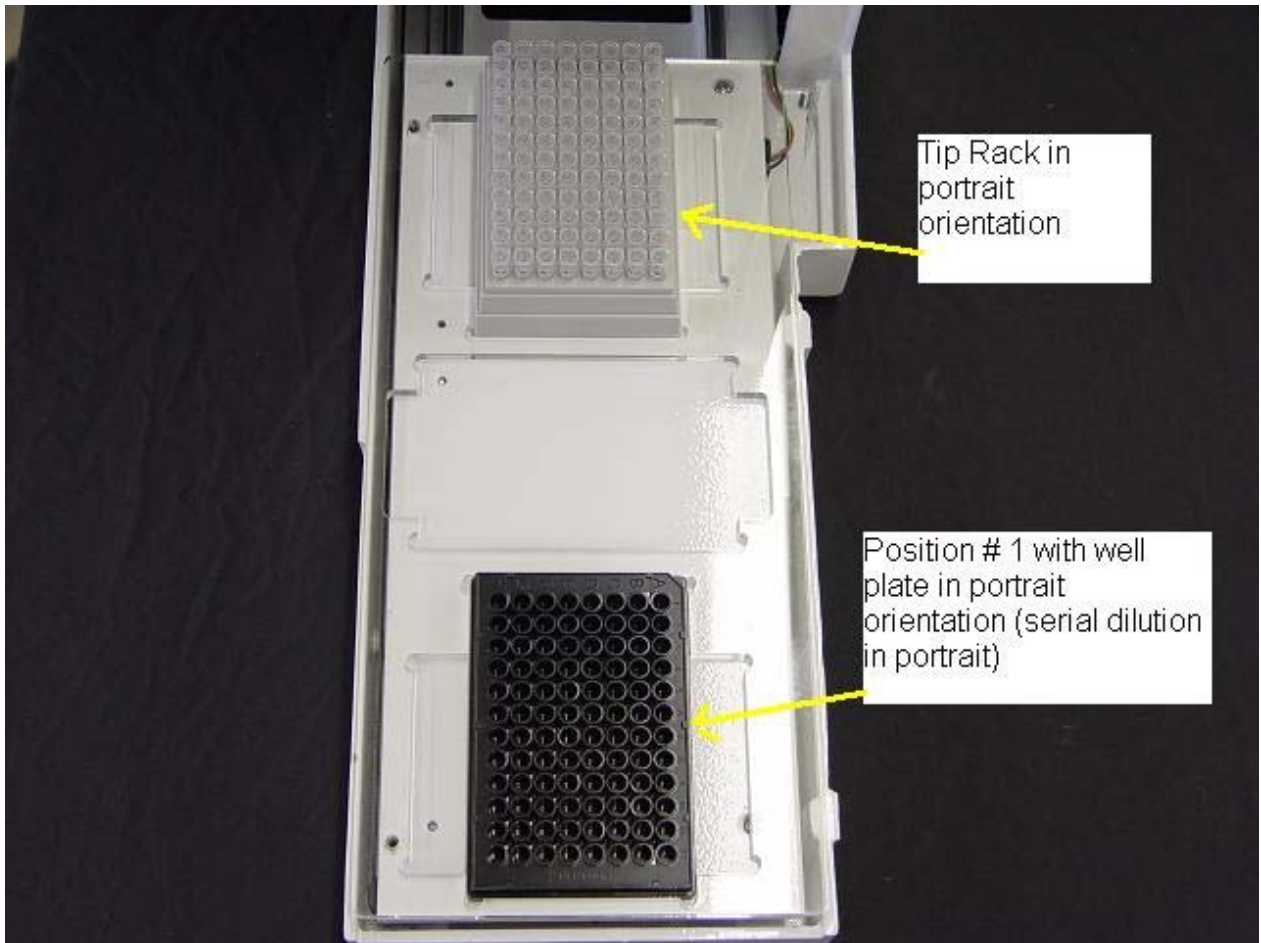


Fig 1.6 Standard Template for Long Bed WellPro showing plates positioned in portrait orientation

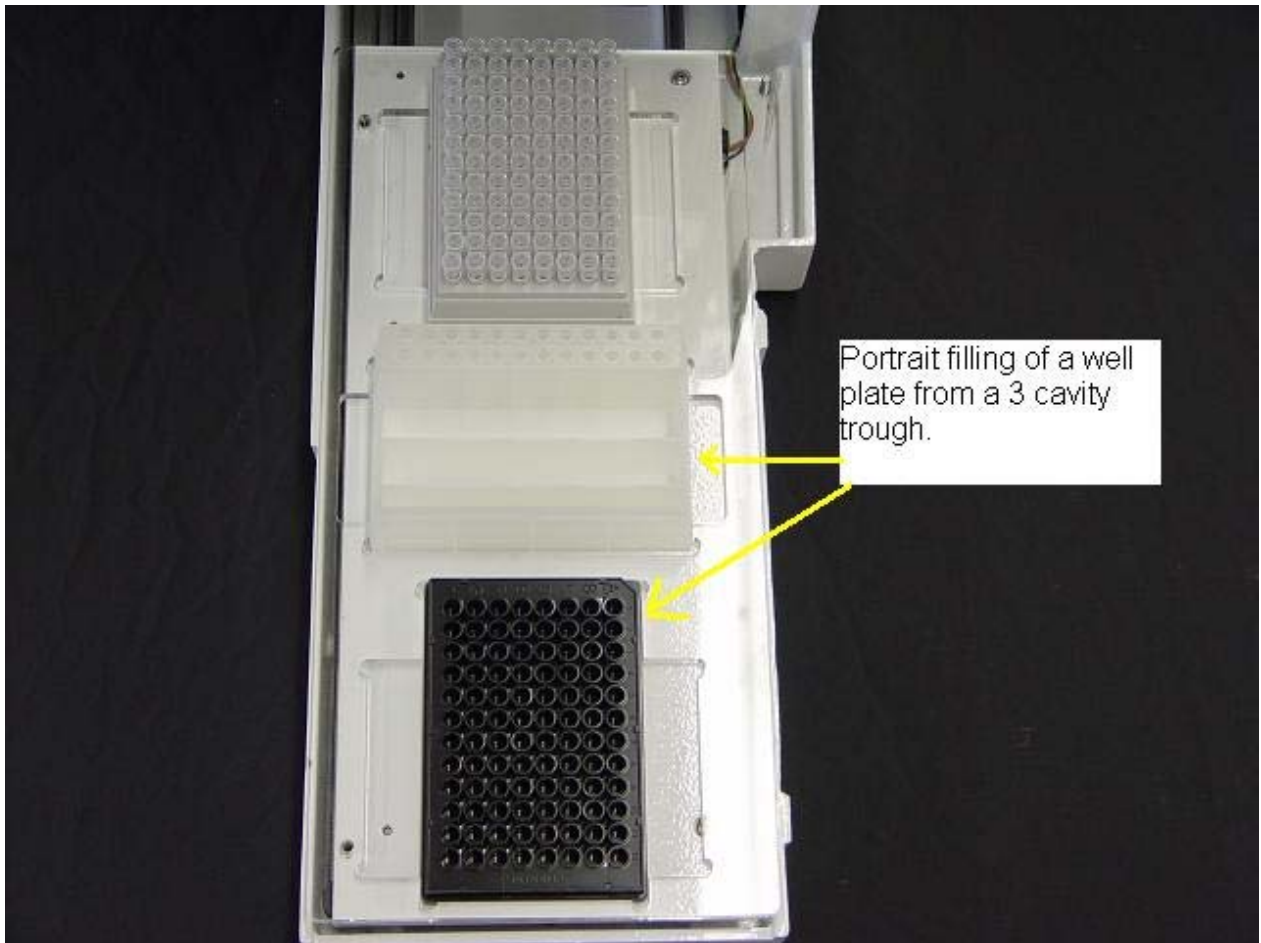


Fig 1.7 Standard Template for Long Bed WellPro showing plates positioned in portrait orientation

- **Standard Templates for WellPro with a Short Bed**

The short bed requires two templates. One template is for positioning plates in a landscape orientation and the other template for portrait orientation. Landscape template can accept well plates orientated (96 well plates) 12 well rows (**A-H**) or (384 well plates) 24 well rows (**A-P**) landscape as shown in Figure 1.8. The portrait template accepts plates in a portrait orientation (96 well plates) **1-12** or (384 well plates) **1-24** well columns as shown in Figure 1.9.

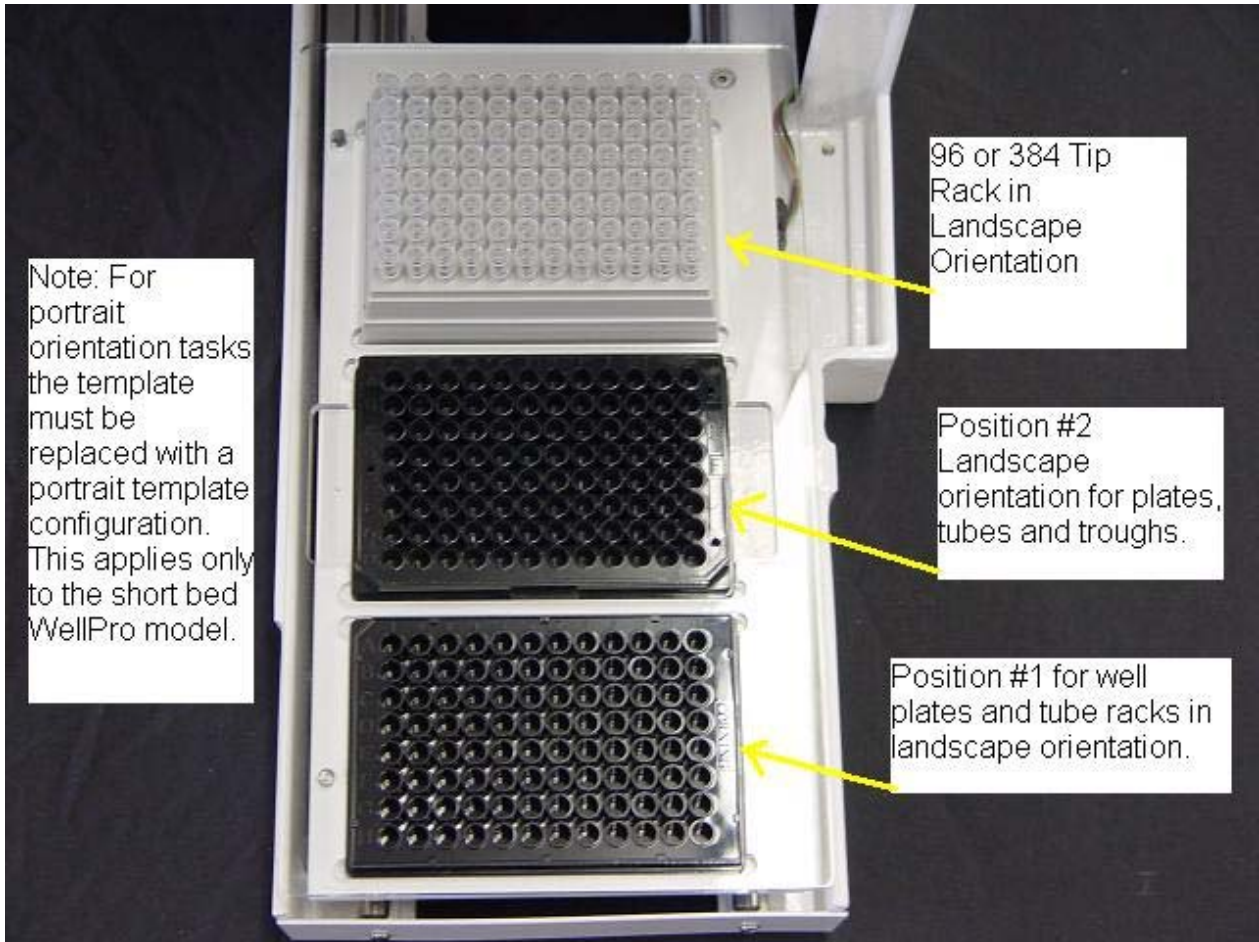


Fig 1.8 Standard Landscape Template for Short Bed WellPro showing plates positioned in landscape (note: for portrait orientation this template must be removed and replaced with a portrait template)

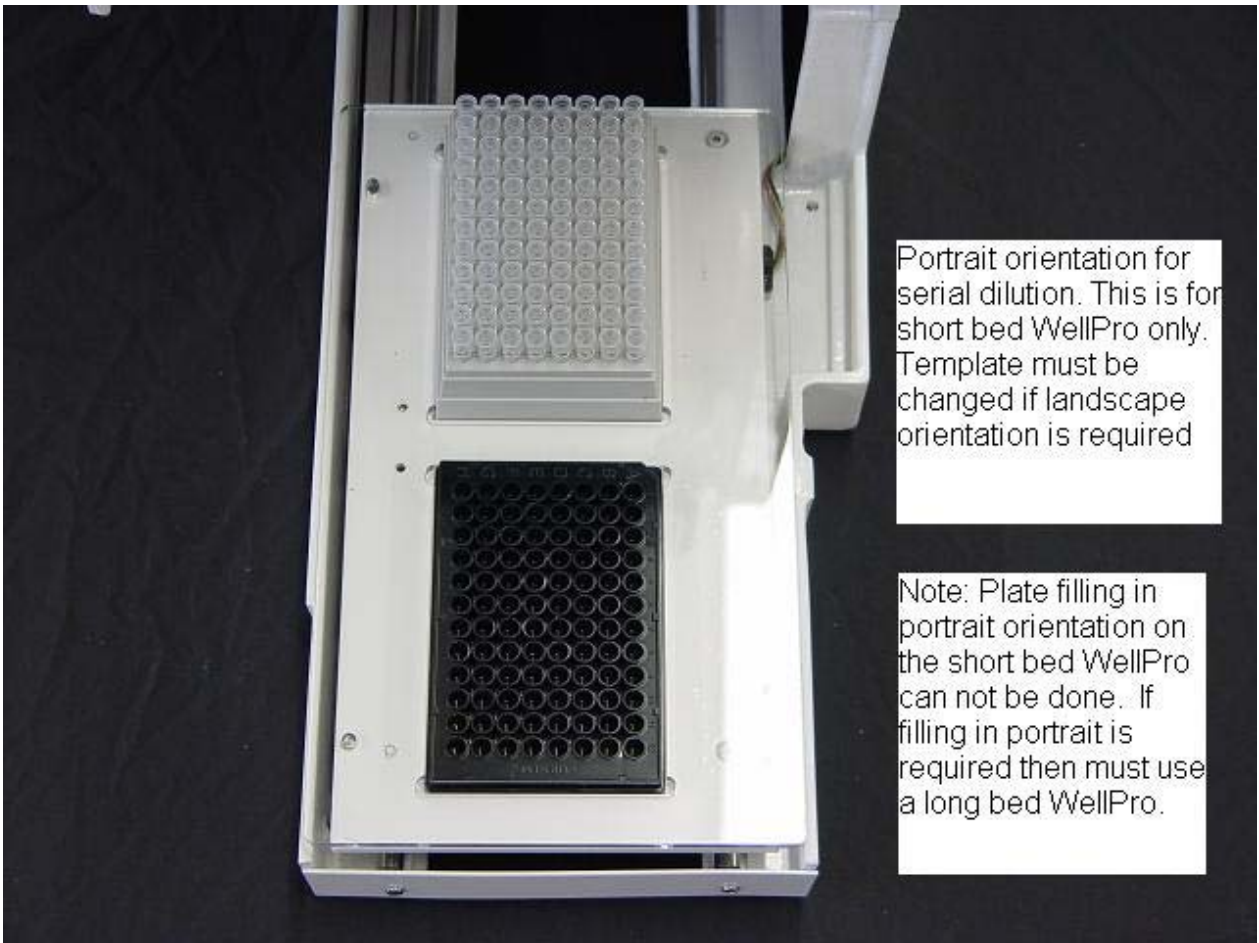


Fig 1.9 Standard Portrait Template for Short Bed WellPro showing plates positioned in Portrait (note: for landscape orientation this template must be removed and replaced with a landscape template)

About the User Manual

This User Manual has been written for the end user of the system (e.g. a laboratory technician) and provides information about the operation and maintenance of the ProGroup Instrument Corporation WellPro WP3000 Liquid Handler. **Read the manual in its entirety prior to operating the instrument.**

This User Manual has been designed to give you the information you need to:

- Review safety precautions.
- Install the system
- Use the system in routine jobs and research.
- Perform basic maintenance procedures.

This User Manual also describes features and specifications of the ProGroup Instrument Corporation WellPro WP3000 Liquid Handler.

This manual includes the following sections:

- Installation
- System Components
- Plate Filling
- Serial Dilution
- Plate to Plate Transfer
- Position Settings
- Managing Files
- Linking Files
- Adjusting the Tip Position for Custom Well Plates
- Operating Hints and Maintenance
- Specifications

2 INSTALLATION PROCEDURES

2.1 Overview

The ProGroup Instrument Corporation WellPro 3000 Liquid Handler is designed to be installed by the operator. This chapter describes how the unit is to be unpacked and assembled.

2.2 Location of the Unit in the Laboratory

The unit should be installed in a facility with the following conditions:

- The temperature should be maintained between 20-26°C (68-79°F). To prevent temperature fluctuations, do not place the WellPro 3000 liquid handler in direct sunlight, near equipment that gives off heat, or under heating or air conditioning outlets.
- If flammable or toxic solvents are to be used, a suitable ventilation system should be provided.
- The use of open flames in the laboratory should be prohibited.
- Corrosive vapors or dust should not be present as these materials can adversely affect the long-term performance of the system.

The Well-Pro 3000 module requires approximately 24.5" x 11.50" x 16.5" of lab bench space.



Note: Place the ProGroup Instrument Corporation WellPro 3000 on a stable, level bench or hood. Excessive jarring or vibration during operation may affect its performance.

2.3 Power Requirements

The ProGroup Instrument Corporation WellPro 3000 Liquid Handler is designed to operate at 100, 120, 220 or 240 V (50/60 Hz) with a maximum power consumption of 360 watts. The operating potential is set at the factory and is indicated on the serial number tag on the rear panel of the system.



WARNING: Verify that this voltage is correct for your location before installation.



CAUTION: ProGroup Instrument Corporation WellPro 3000 Liquid Handlers shipped to locations in the United States and Canada are supplied with a standard three-conductor power cable and a three-terminal plug that provides an earth ground. The unit **MUST be connected to a three-terminal socket that is properly wired according to the U.S. National Electrical Code and is grounded to a true earth ground. The use of an adapter to a two-terminal outlet is PROHIBITED.**

2.4 Unpacking and Inspection

The ProGroup Instrument Corporation WellPro 3000 Liquid Handler is shipped in one carton that contains the items listed in Table 2.1. When the system is received, carefully unpack the unit and verify receipt of all components. We recommend that you save the shipping container and packing material in case you need to move or ship the instrument.

Table 2.1 PACKING LIST

<u>Quantity</u>	<u>Description</u>	<u>Part Number</u>
1	WellPro 96 Long base	WP3000-96
1	WellPro 96 Long base w/ Single Channel	WP3000-96-CP
1	WellPro 96 short base	WP3000-96S
1	WellPro 96 short base w / Single Channel	WP3000-96S-CP
1	WellPro 384 Long base	WP3000-384
1	WellPro 384 Long base w / Single Channel	WP3000-384-CP
1	WellPro 384 short base	WP3000-384S
1	WellPro 384 short base w / Single Channel	WP3000-384S-CP
1	WellPro 3000 Operators Manual	OM3000
1	Controller Touch Screen	8025
1	Plastic Cover Tinted	76090
2	Templates for Short Bed Instrument	
1	Template for Long Bed Instrument	
1	Micro Trough 4 per pack	SAMPLE
1	Chilled Reservoir	SAMPLE
1	Benchtop Ionizer for the 384 Instrument only	4009885

If there is external damage to the shipping carton, report the damage to the shipping company and your local ProGroup Instrument Corporation representative. If internal parts are missing or damaged, report this to the shipping company and your local ProGroup Instrument Corporation representative as soon as the problem is observed.



Note: If there is any apparent damage to the system, the user should investigate the nature of the damage before plugging the unit into the mains to ensure that powering up of the system will not create a hazardous condition or damage internal components. If the damage appears significant, call your local ProGroup Instrument Corporation representative before connecting the unit to the mains.

2.5 Initial Installation of the WellPro 3000 Liquid Handler

Assembly, installation and final inspection of the WellPro 3000 Liquid Handler will be done by the user. To install the unit:

1. Connect the Touch Screen Cord to the back of the WellPro and slide the Touch Screen onto the bracket connected to side of the unit.
2. Place the power cord to the line into the socket into the rear panel of the liquid handling unit and plug the unit into the line.



Figure 2.1: The Controller Screen when Powered Up

Power up the unit. The liquid handler will initialize and the controller will present Figure 2.1. The pipette tip head will move in the Z upward direction and the table will move in the Y outward direction to determine the zero. If the head does not move, contact your local ProGroup Instrument Corporation service representative for assistance.

3 SYSTEM COMPONENTS

3.1 Introduction

The ProGroup Instrument Corporation WellPro 3000 Liquid Handler system includes the following components:

- WellPro Controller (Section 3.2)
- WellPro WP3000 Liquid Handling Unit (Section 3.3)
- WellPro Reagent Troughs and Pipette Tips

3.2 WellPro WP3000 Touch Screen Controller

The WellPro WP3000 Controller includes a touch screen display which provides the operator with complete control of all liquid handling operations. The basis of operation is via a user generated method which includes a series of primary operations. The method can be stored and retrieved as desired.

Each primary operations provides for user control of a given aspect of the operation. Typical operations include the volumes to transfer, mix, or dispense, the transfer speed, and whether to change tips between transfers.

3.3 The WellPro WP3000 Liquid Handling Unit

The WellPro WP3000 Liquid Handling Unit is an electro-mechanical transfer unit that includes a table and a vertical head assembly. The table accommodates templates which position reagent containers, a magazine with rows of disposable tips, etc. During operation, the table slides back and forth horizontally to bring the appropriate workstation under the head.

The standard head assembly consists of three basic parts:

- A plunger housing which contains nozzles that press into the tips to form airtight seals
- A plunger block which moves up and down to aspirate and deliver samples,
- A tip ejector plate which removes used tips. The head assembly slides up and down vertically to bring the tips to the appropriate height to perform the designated operations.

(A single channel nozzle for cherry picking is an additional configuration option)

A 12 or 24 channel (tip) air displacement pipetting head is included on the WellPro liquid handler as most protocols are designed to be performed in the 12 or 24 channel mode, but serial dilutions can be performed in the 8 or 16 channel mode to allow for maximum dilution capability with the 96 or 384 well plate.

The table assembly drives the plate which holds the well plates and the Micro-Trough reagent containers.

The precision of this sensitive device is affected by a series of variables. These include the degree to which the pipette tips are able to be wet, which is dependent on the viscosity of the pipetted liquid, the dimensional accuracy of the tip orifice, piston speed and delay time. Therefore, please keep the following in mind when using the WellPro. Liquid is pipetted with vacuum pressure generated by the pistons.

This technique requires dwell time to equalize air pressure in the pipet tips during pipetting. Pipetting time is highly dependent upon the properties of the liquid factors. It is necessary to allow some dwell time during pipetting operations, particularly for smaller volumes and viscous liquids. Changing the aspirate speed to a lower setting of medium or slow will provide more dwell time.

Rinsing if dry tips are used, more time is required to saturate the dry air with moisture. Vapor pressure increases above the pipetted liquid inside a dry tip. As a result, dry tips may cause liquid to be driven out, compromising accuracy. To avoid this, use the mix option prior to a programmed aspiration to equalize the air in the tips before pipetting the liquid. Proper vapor pressure will be maintained even if the device is left idle with filled tips for a prolonged period. Tip Immersion is important to ensure that pipet tips are properly immersed in liquid before aspirating. Tips should be immersed just below the level of the liquid and the depth should be consistent throughout the pipetting cycle. This will prevent air from being aspirated into the tips as well as avoid extra liquid adhering to the outside of the tip.

3.4 The WellPro Reagent Trough

The WellPro liquid handler is used with a Micro-Trough which is a reagent container. The Micro-Trough container consists of up to three reservoirs, each of which is used to contain a reagent or solution. In some cases, fluid from the wells is deposited in the Micro-Trough.

The WellPro also uses a 1 ml chilled trough with disposable liners for reagents that require to be kept cool during transfer.

The WellPro WP3000 liquid handler uses templates to position microplates, reagent containers and tip magazines on the movable table.

*Note that all WellPro's can fill plates in landscape mode but the long bed WellPro is the only instrument that can fill plates in both landscape and portrait orientation. The short bed can not fill in portrait orientation.

4 USER INTERFACE

4.1 Touch Screen Introduction

The basis of operation of the ProGroup Instrument Corporation WellPro 3000 Liquid Handler is the *file*, which is a set of instructions and conditions that are used to perform the desired operation. The operator can establish, store and execute files via the touch screen controller module.

The WellPro user interface consists of a touch panel that activates the liquid crystal display (LCD). From this touch panel all program modes and variables can be easily accessed and adjusted. To pause a program, simply press the **STOP** Icon on the touch panel during a run. Touching the **GO** Icon resumes the program.

All modes, commands and data input operations are accomplished using the touch panel. The instructions and prompts are in dialog format. **Variables can be changed by touching the text highlighted in blue.**



Figure 4.1

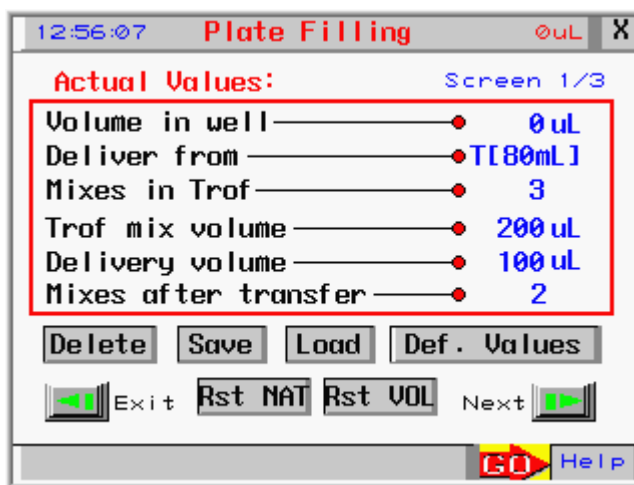
When the system is powered up, the display will be as shown in Figure 4.1. Touching the Main Menu button will pop up the main menu screen shown below. At the main menu screen you have the option of selecting a process and creating a file with your parameters and saving the file.



5 PLATE FILLING

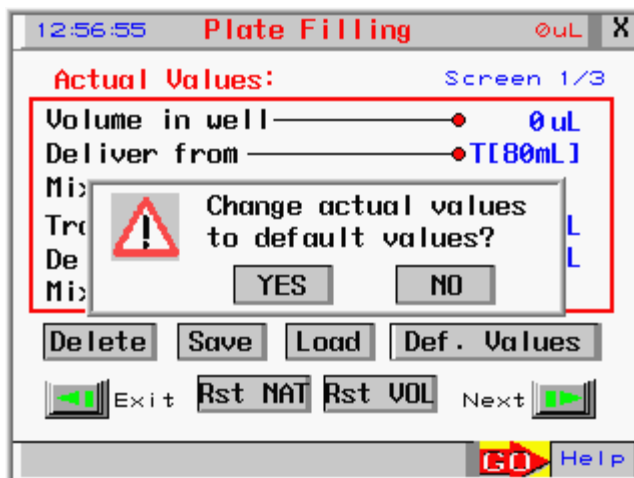
5.1 Overview

Plate filling refers to the addition of a user specified quantity of liquid to the wells in a plate from a Micro-Trough/Reservoir. The Plate Filling button is used to establish a user file which can be stored.



5.2 Creating and Editing a Plate Filling File

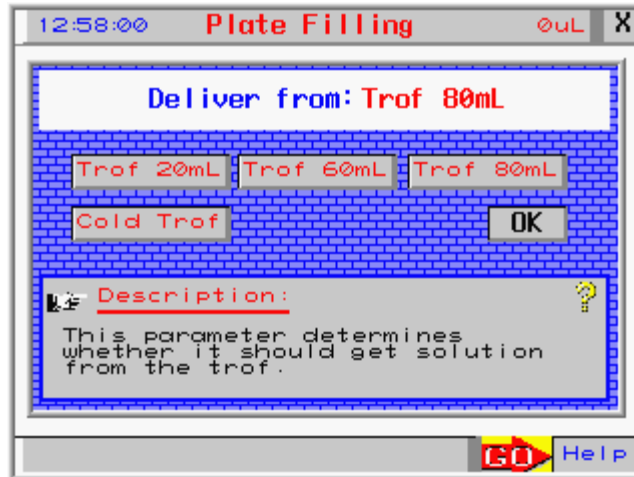
When you touch the Plate Filling button, the opening plate filling screen is presented. You can change the value of each parameter to provide the desired program to fill the plates. To change a plate filling parameter, touch the text in blue and enter the desired value.



Press the Def. Values button to change back to system default values



ACTUAL VOLUME IN WELL AT START is used to indicate how much liquid is in each well before any transfer has been made. This number is used to determine how far down into the wells the tips should go and also to prevent the instrument from attempting to add more liquid than each well can hold. This parameter can be set from 0 to 2000 μL in 1 μL increments. Do not exceed the volume capacity of the plate type you are using: ie. 350 μL in a standard 96 well flat plate or 1.2mL in a 1.2mL deep well plate, etc.



DELIVER FROM is used to indicate the MICRO-TROUGH reservoir that contains the liquid to be dispensed.



MIXES IN MICRO-TROUGH is used to specify mixing of the MICRO-TROUGH contents before an aliquot is taken. Mixing of a MICRO-TROUGH is especially important with cells or other inhomogeneous samples. This parameter can be set between 0 and 9 (0 indicates no mixing).



MICRO-TROUGH MIX VOLUME is used to indicate how much liquid to aspirate into the tip and dispense back into the MICRO-TROUGH in order to mix the MICRO-TROUGH contents. This parameter can be set from 0 to 200 μL in 1 μL increments (0 indicates no mixing) for 12 channel head and 0 to 50 μL in 1 μL increments for 24 channel head.



DELIVERY VOLUME indicates how much solution should be dispensed into each well from the MICRO-TROUGH reservoir. This parameter can be set from 0 to 200 μL in 1 μL increments for 12 channel head and 0 to 50 μL in 1 μL increments for 24 channel head.



MIXES AFTER TRANSFER is used to specify the number of mixes after the aliquot has been delivered to the plate. This parameter may be set from 0-9 in increments of 1 (0 indicates no mix after transfer)

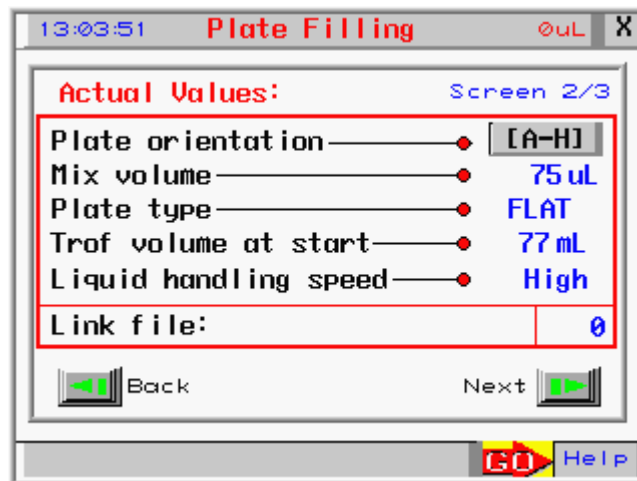


PLATE ORIENTATION is used to indicate how the plate is positioned. The value that is selected indicates the number of wells that will be under the pipette tips at one time. **(Important this must be set at A-H landscape at all times if you have a short bed WellPro)** The short bed can only fill plates in landscape but the long bed WellPro can fill in landscape and portrait orientation.

A-H for 96 well plate landscape orientation

1-12 for 96 well plate portrait orientation

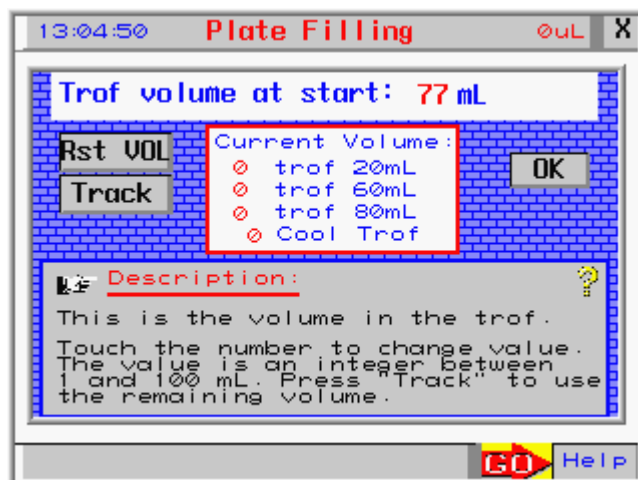
A-P for 384 well plate landscape orientation

1-24 for 384 portrait orientation

MIX VOLUME is used to specify the volume of the aspirate/delivery cycles used to mix the contents of the well after transfer.

PLATE TYPE is used to indicate the design of the bottom of the plate (V shape, U shape, Flat). This information is used to determine the height of the liquid in each well and thus calculate how far down

into the wells the tips should go. If you are not using a standard microplate, select custom one of the ten custom programs. The custom programs for non-standard plates are configured in the settings configuration from the main menu. In the settings menu you can set the HEIGHT and determine the amount to raise or lower the tip height. The height parameter can be set from 100 to 3500 in increments of 1 or 25.

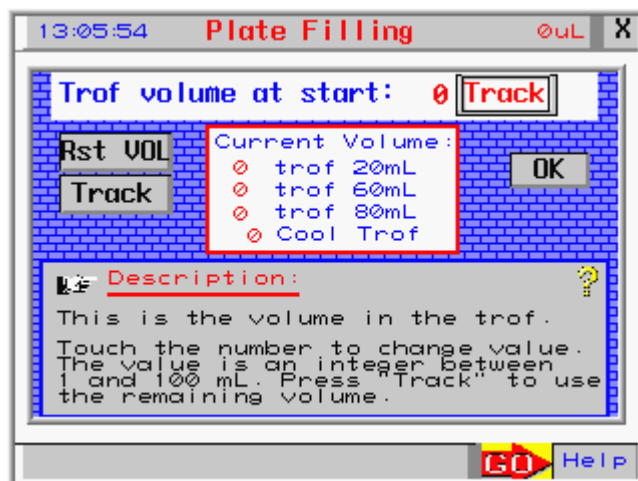


MICRO-TROUGH VOLUME AT START is used to indicate how much liquid is in the reservoir you have chosen before any liquid has been removed. The system uses the delivery volume and the number of rows to be filled to calculate the minimum volume needed to run the file and indicates it on the display as the lower limit. You can set the value of this parameter in 1 mL increments from this lower limit to 20 mL, 58 mL, or 77 mL for the front, middle, and rear reservoirs respectively for the MICRO-TROUGH reservoir.

The Cool Trof can hold 100 mL

Enter the amount of liquid volume present in trof at start of the program and press OK.

Note: If tracking of volume of liquid in trof during change of programs or linking of programs then set Track on. See screen below.



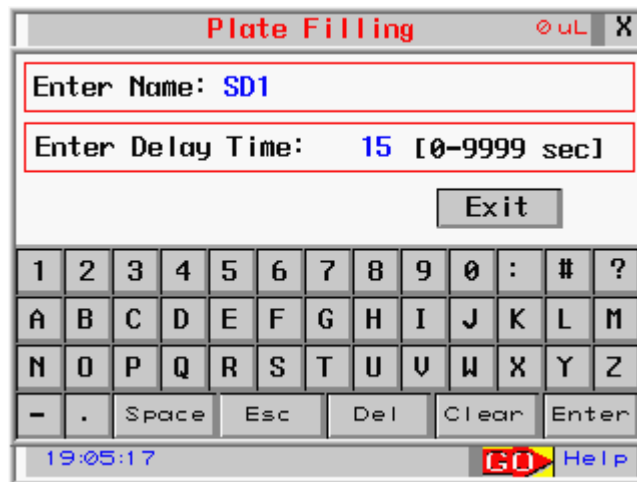
Pressing the Track button will turn and activate the tracking volume feature of software on. Press Rst Volume and then Track and OK.

After pressing Rst Vol , Track and OK the program takes you back to screen 1 of 3. When you press GO to run the program you will then be prompted to enter volume in Trof

Enter Volume in Trof: New Volume:_____ The software will now keep track of volume used in the trof during operation and running various programs and linking of programs.

LIQUID HANDLING SPEEDS is used to select the rate sample delivery from the tips (rapid, medium, or slow).

LINK FILE is used to link and run a previously saved program immediately after current program. If link file is left blank then system will run current program only. The area immediately to the right of link file displays a number which represents a time delay between the link files if desired.

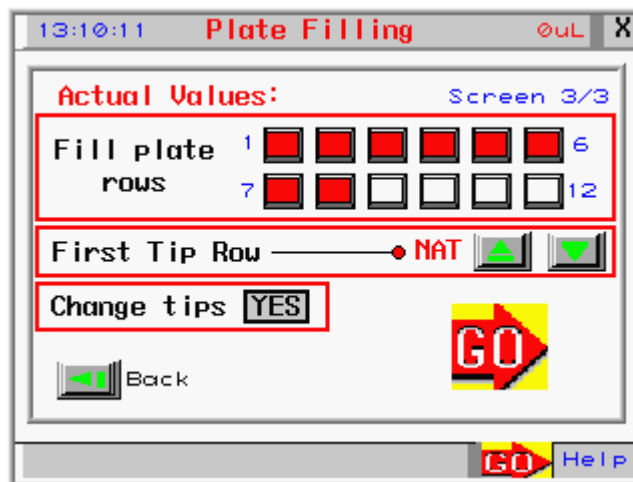
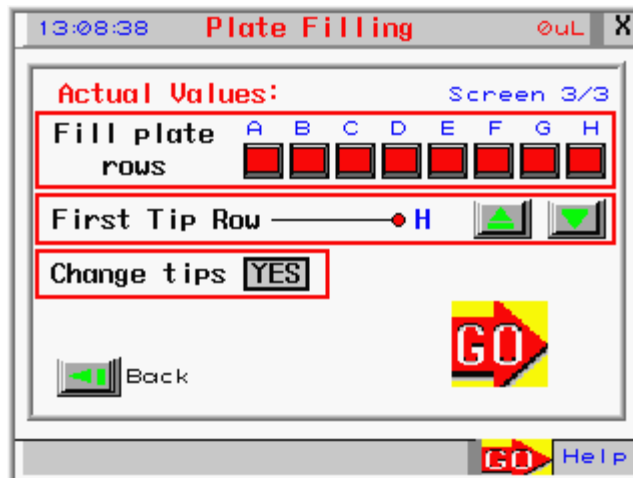


If you want the system to perform another file after the present file is complete, enter the desired file name and time delay between programs if desired. Use the displayed keypad to enter the text of the program to link with in the Enter Name field and select enter. Use the displayed keypad to enter the seconds in the delay time field. When complete click on Exit

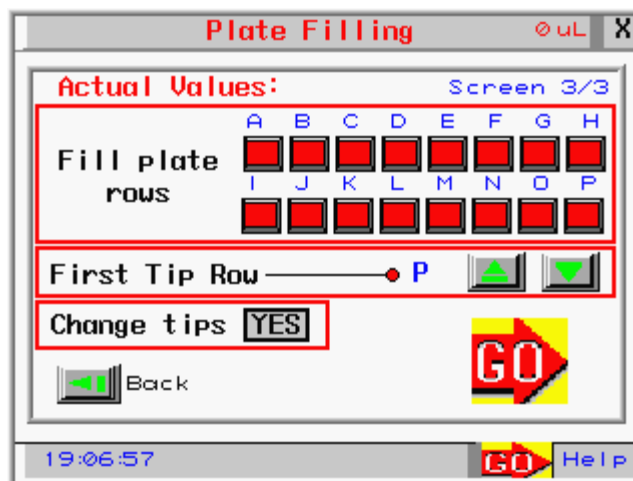
Now the Link File field should display the file you linked to and the specified time delay.

Pause

Enter Delay Time: Instead of a time delay you also have the option to have a pop up screen prompt you to press continue before starting the next program. This is done by entering the number “9999” which will create the pause before proceeding command.

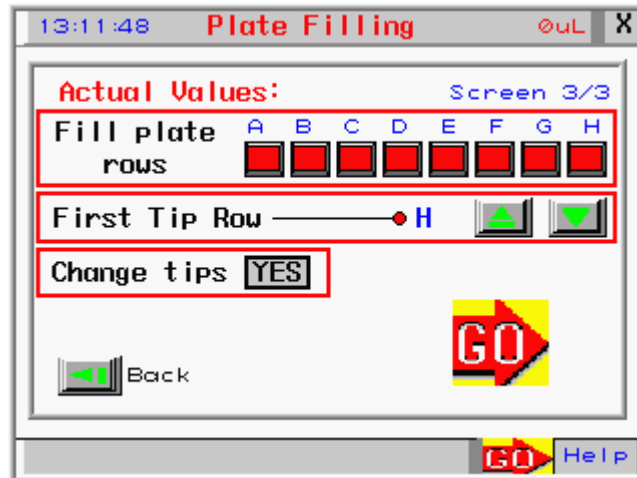


The above display is for the WellPro 12 channel (96 well plate) in landscape or portrait



The above display is for WellPro 24 channel head (384 well plate)

FILL PLATE ROWS is used to indicate the rows of the plate to fill and which to leave unfilled. Rows are designated by letters A through P for 384 well plates and A through H for 96 well plates. To select row A, press the A button which will then fill in with red. If you want all rows to be filled, press each button. For rows that you don't want filled then do not press the button with corresponding row letter. Non filled rows will have no red filled in on the box.



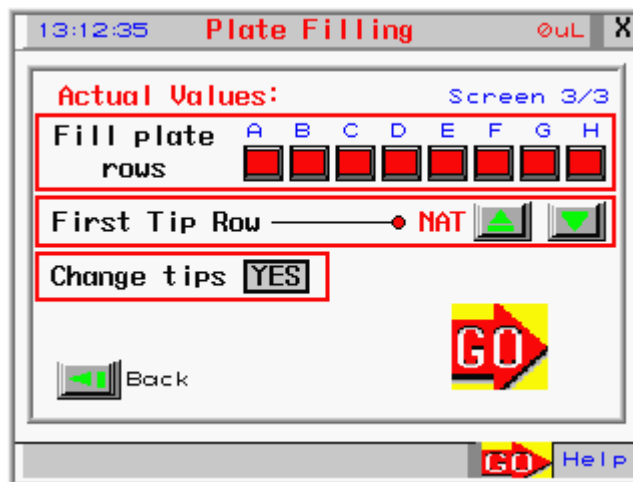
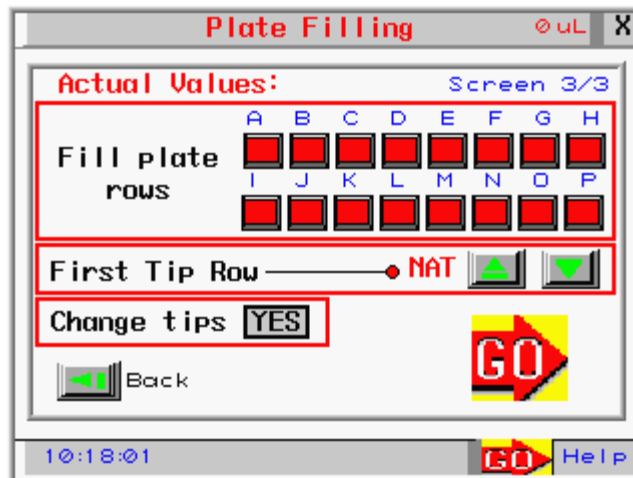
ENTER FIRST TIP ROW is used to specify which row of tips to use. Rows of the tip magazine are designated by letters A through P (back to front) or A through H. The program will start with first tip row specified and if the change tips is YES it will go to change tip row. For example:

The screen above will start with row P of tips and fill row A of well plate. It will then eject tips and pick up row O of tips and then fill row B of well plate etc.

If change tips is set to NO then program will use row P of tip rack to fill all the rows selected for well plate.

CHANGE TIPS is used to indicate if the tips should be removed after the first liquid is dispensed and a new set of tips from the tip magazine should be placed on the pipette head, thus decreasing carryover. If you don't want to change tips, then the same tips will be used throughout the entire operation.

Note: The above does not track tip rows used. If tip row tracking is needed for tasks such as linking programs or if you need to keep track of last row used after running a program so you know where to start with next available tip row then use the following setup below.



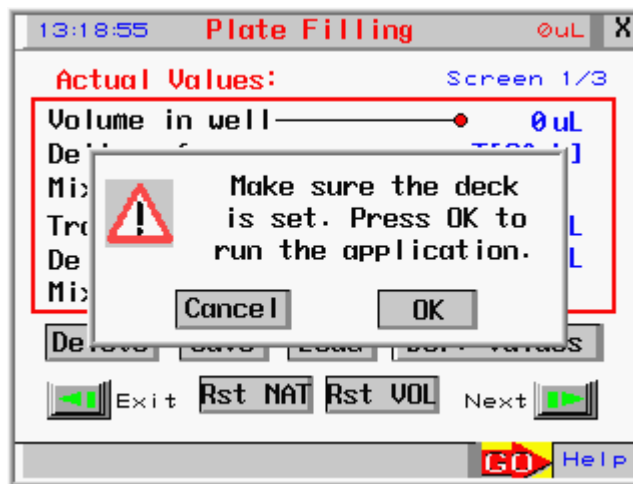
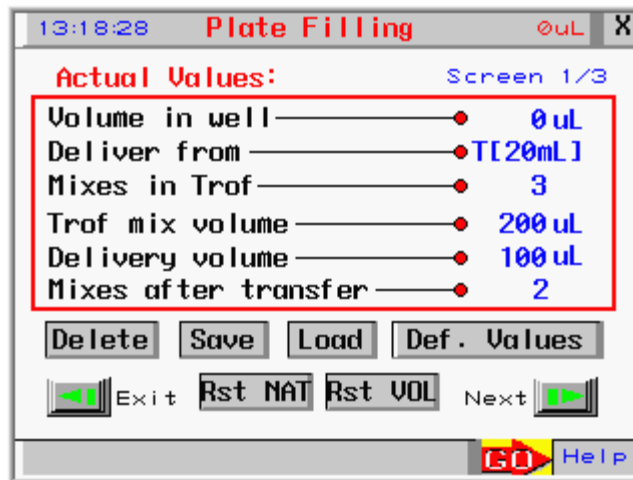
First Tip Row NAT - Setting the next First Tip Row to NAT will keep track of next available tip that has not been used. This should be set at NAT if you are linking programs or wanting to keep track of next row of tips to be used while manual running programs. If you want to reset the next available tip row to the beginning then at screen one press Rst NAT. See below.

When you press Rst NAT located on screen one a Pop Up screen will be displayed asking to make sure the deck is OK. If you press OK another screen will Pop Up asking;

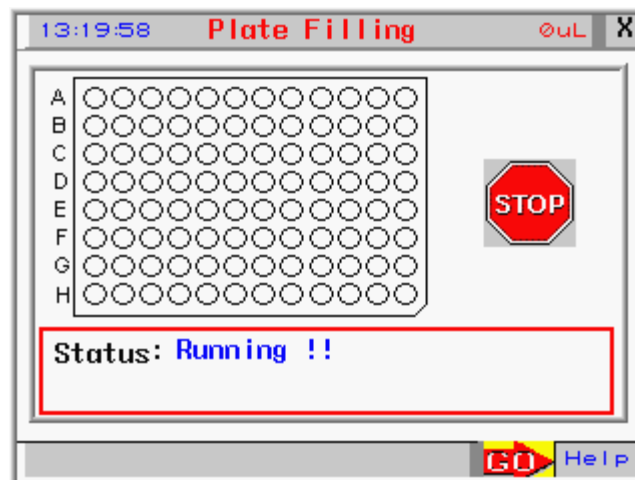
Change the magazine and select the next tip row, Next tip row:

Note: Changing magazine is not required if you would like to continue to use same tips.

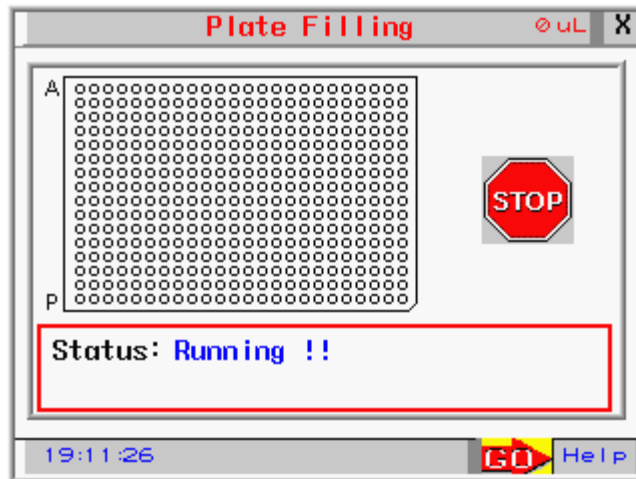
CHANGE TIPS is used to indicate if the tips should be removed after the first liquid is dispensed and a new set of tips from the tip magazine should be placed on the pipette head, thus decreasing carryover. If you don't want to change tips, then the same tips will be used throughout the entire operation.



Touching/Pressing the GO button will pop up a message to confirm that the appropriate plates are in position on the deck. Once you have confirmed then touch/press the OK button.

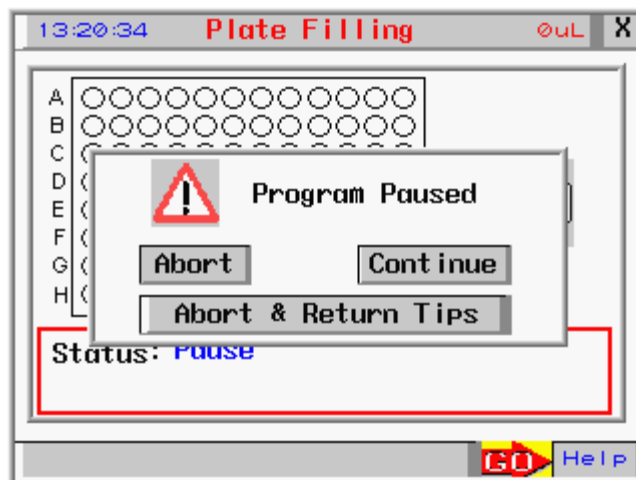


The above display is for the WellPro 12 channel head (96 well plate)

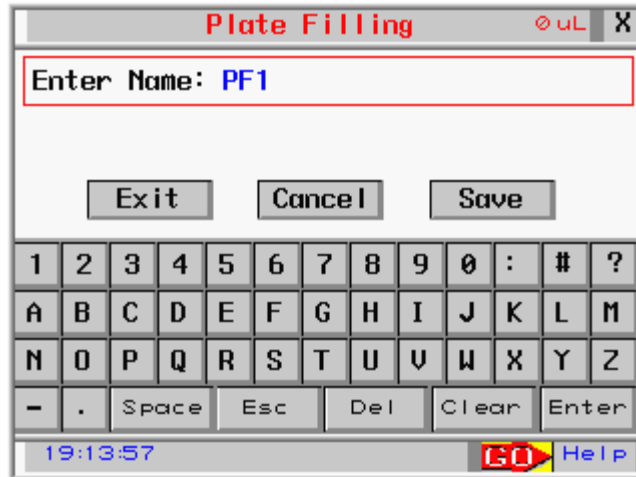


The above display is for the WellPro 24 channel head (384 well plate)

The plate filling will begin with a status screen showing the rows as they are being filled. Pressing the STOP button while program is running will cause a pause in the program and pop up a program paused message with option to abort or continue or abort and return tips.

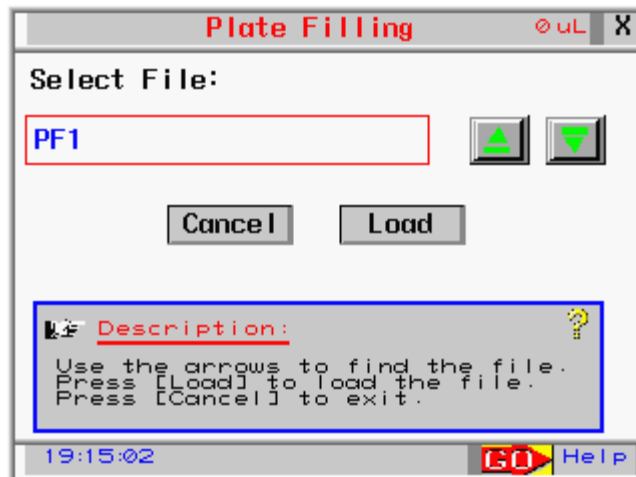


Pressing the STOP button while program is running will cause a pause in the program and pop up a program paused message with option to abort, continue or abort and return tips. Pressing the Abort button will abort the program or pressing the continue button will continue with the program. The abort and return tips option will return the tips to the rack and abort the program.

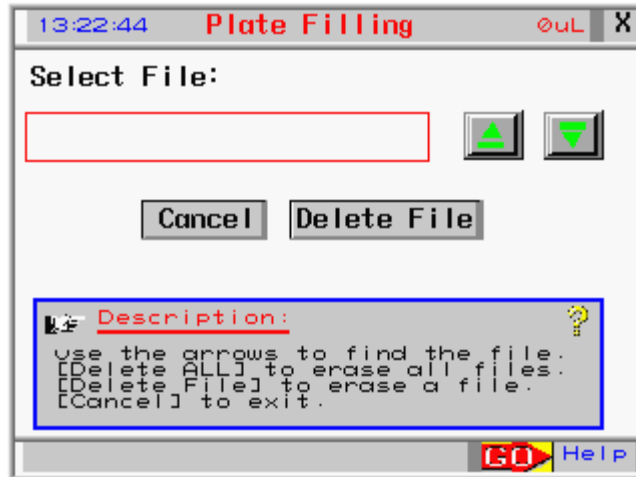


Saving a Program After setting the variables to desired value go back to screen 1 of the plate filling menu and press the Save button to save the parameters as a program file. Use the display keypad to enter the desired program name. The name can be any alpha numeric name. After entering the name click on enter button and then the save button. You are now ready to click on the exit button and go back to main plate filling screen.

The save can be performed after setting the variables and before pressing GO to run the program. Or the program can be saved after running the program by pressing the back button to screen 1 of the plate filling menu and then press save button.

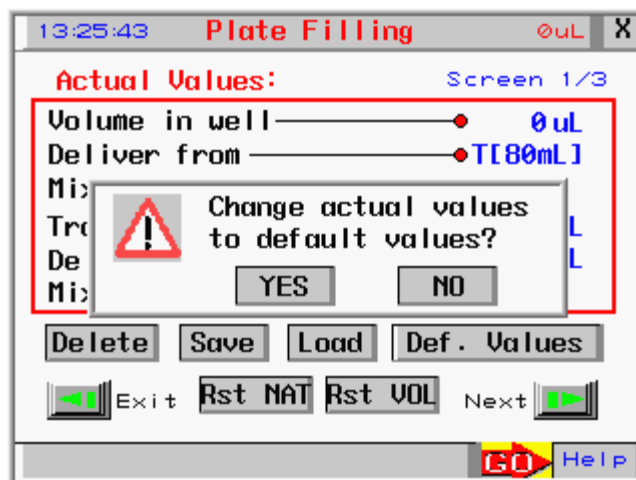


To load a saved program use the up or down arrow keys to scroll and select the program to load and run. This will load the parameters for the program to be run. Then go to the next screen and press "GO" button to run program.



To delete a program you can choose delete to delete specific files you have saved in the serial dilution, plate to plate and filling sections. Choose delete file to delete a specific file/program.

A message will pop up “Do you want to delete this file?” you can choose yes or no to continue.



Rst NAT - Reset next available tip row. Pressing this will reset the next available tip row to the first row in the tip rack. Rst NAT is only active when NAT is selected on last screen in the First Tip Row field.

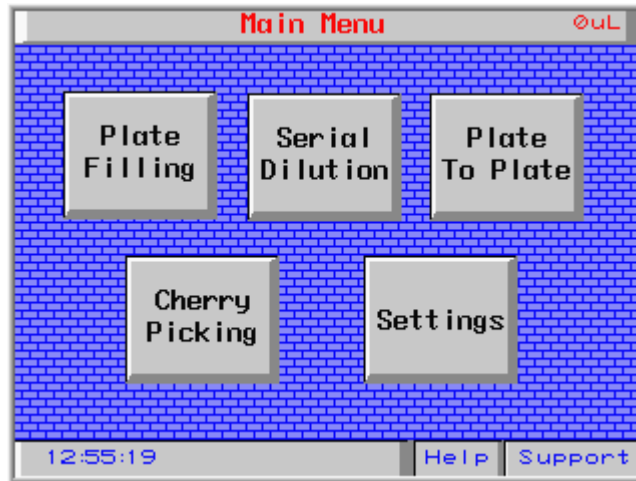
Rst VOL - Will reset the volume in the trough. This allows tracking the level of liquid in the trough as it is used. This is only active if Tracking is set to ON.

A “GO” button exists at the lower right hand corner of every screen. This can be pressed at anytime to run the current program loaded into the system.

6 SERIAL DILUTION

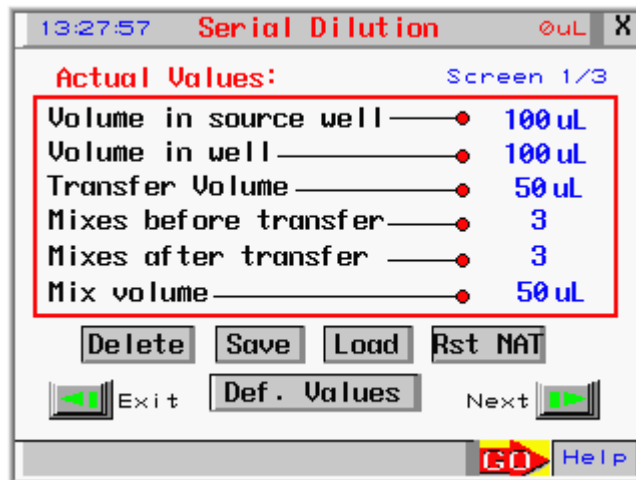
6.1 Overview

Serial Dilution is the progressive dilution and redilution of a liquid. In this process, a sample is added to a diluent and the two are mixed. An aliquot is then removed for addition to the next diluent-containing well. This sequence is repeated until the desired number of dilutions have been obtained ("serial dilutions"). As an example, if equal volumes of sample and diluent were mixed during each step of the series, the sample concentration would be 1:2, 1:4, 1:8, 1:16, 1:32, and so on in sequential rows.

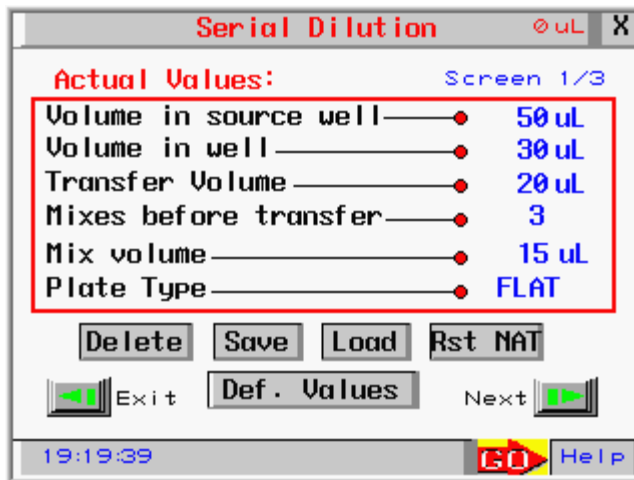


6.2 Creating and Editing a Serial Dilution File

At the main menu screen you have the option of selecting a process and creating a file with your parameters and saving the file. Pressing the Serial Dilution button will open up a screen for changing the serial dilution parameters.



Press the Def. Values button to change back to system default values



Pressing the text values/parameters in blue will lead to other screens shown below so that parameters can be changed.

Rst NAT - Reset next available tip row. Pressing this will reset the next available tip row to the first row in the tip rack. Rst NAT is only active when NAT is selected on last screen in the First Tip Row field.

A “GO” button exists at the lower right hand corner of every screen. This can be pressed at anytime to run the current program loaded into the system.



VOLUME IN SOURCE WELL AT START is used to tell the system how much volume is in the initial source row.



ACTUAL VOLUME IN WELL is used to tell the system how much diluent is in each well before any transfer has been made. This parameter does not pertain to the first row, which contains the sample. The system uses this number to determine how far down into the wells the tips should go, and also to prevent the instrument from attempting to withdraw more sample than is actually present. This parameter can be set from 0 to 2000 μL in 1 μL increments. Verify the capacity of the plate type you are using is greater than the volume selected.



The above display is for WellPro 12 channel (96 well plate)



The above display is for WellPro 24 channel (384 well plate)

TRANSFER VOLUME indicates how much sample should be withdrawn from the original well for transfer to the new well during a serial dilution. This parameter can be set from 0 to 50 μL in 1 μL increments for 384 well plates and 0 to 200 μL in 1 μL increments for 96 well plates. A transfer volume of 0 may be used if you wish to simply mix the contents of the well.



MIXES BEFORE TRANSFER is used to indicate the number of aspiration/delivery cycles that should be performed before transferring a sample. As an example, if you are diluting cells which may settle, the MIX BEFORE TRANSFER step might be used to agitate them back into suspension before transfer by mixing. This parameter can be set from 0 to 9 (0 indicates no mixing).



MIXES AFTER TRANSFER is used to indicate the number of aspiration/delivery cycles that should be performed after transferring a sample. This parameter can be set from 0 to 9 (0 indicates no mixing).



MIX VOLUME is used to tell the system how much solution should be used in the Mix step. Typically this volume is 50% of the total volume in the well to be mixed, but will be more or less depending on the application (when mixing cells, it may be desirable to use a lower volume of the total volume).

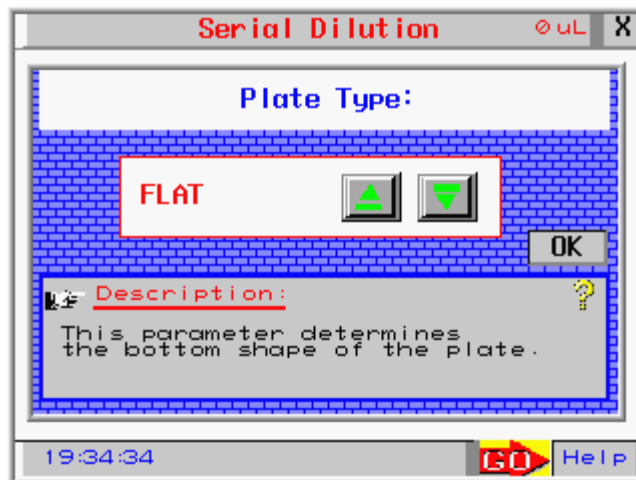
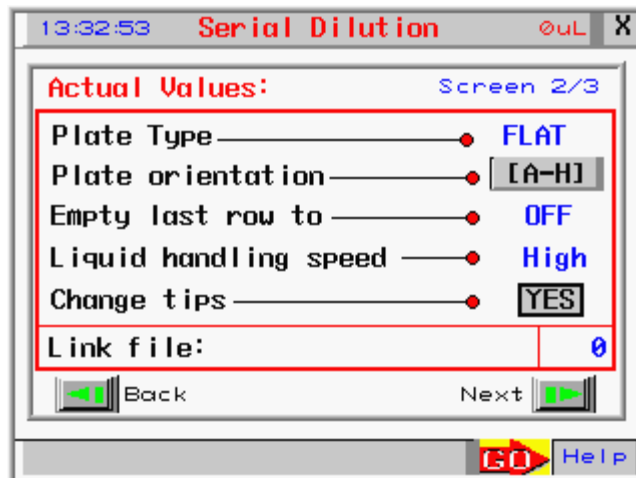
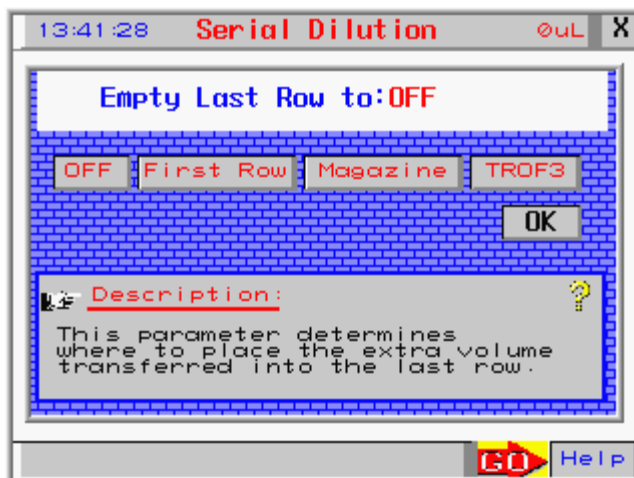


PLATE TYPE is used to indicate the design of the bottom of the plate (V shape, U shape, Flat). This information is used to determine the height of the liquid in each well and thus calculate how far down into the wells the tips should go. If you are not using a standard microplate, select custom for one of the ten custom plate types available. The custom programs for non-standard plates are configured in the settings configuration from the main menu. In the settings menu you can set these parameters and determine the amount to raise or lower the tip height. The height parameter can be set from 100 to 3500 in increments of 1 or 25.



Empty Last Row to: This parameter determines where to place the extra volume transferred into the last row.

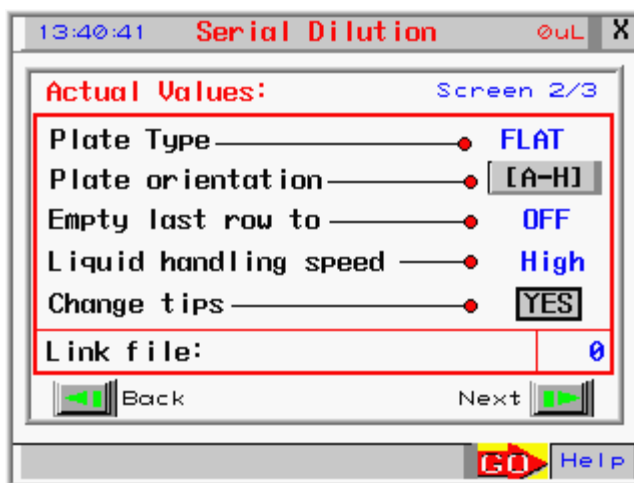


PLATE ORIENTATION is used to indicate how the plate is positioned. The value that is selected indicates the number of wells that will be under the pipette tips at one time.

A-H for 96 well plate landscape orientation

1-12 for 96 well plate portrait orientation

A-P for 384 well plate landscape orientation

1-24 for 384 portrait orientation

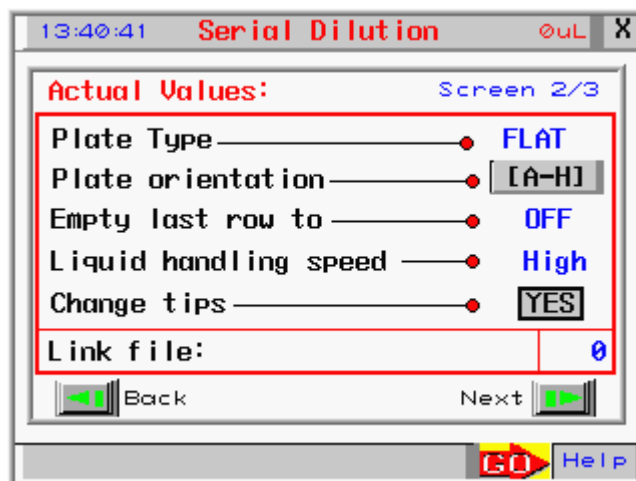
EMPTY LAST ROW TO is used to tell the system where to place the extra volume of liquid transferred into the last row of wells after a serial dilution.

1. If you select OFF, the extra liquid will be left in the last row of wells.
2. If you select 1ST ROW, the extra liquid will be removed from the last row of wells and return it to the first row of wells you chose in ROWS TO DILUTE.
3. If you select MAGAZINE, the system will remove the extra liquid and discard it into the tip magazine.
4. If you select MICRO-TROUGH, the system will remove the extra liquid and discard it into the rear reservoir of a MICRO-TROUGH container located in the P2 cavity of the template.



Note: MICRO-TROUGH will appear on the display only when the 12 or 24 wells (landscape) across PLATE ORIENTATION selected. If performing a serial dilution in portrait then this option is not available.

LIQUID HANDLING SPEEDS is used to select the rate sample delivery from the tips (rapid, medium, or slow).

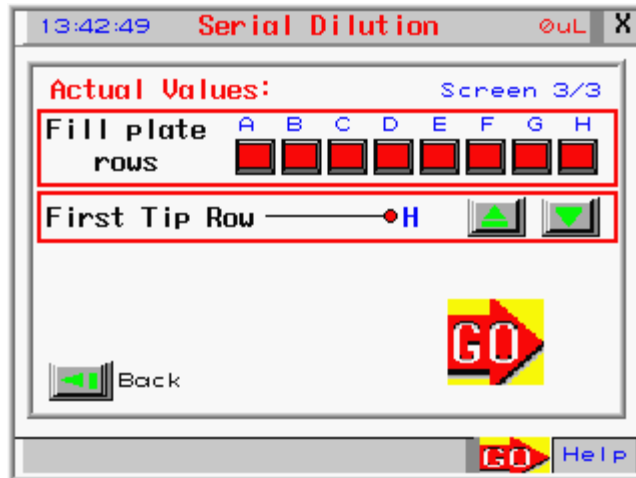


LINK TO FILE is used to indicate what the system should do after it completes the file it is currently running.

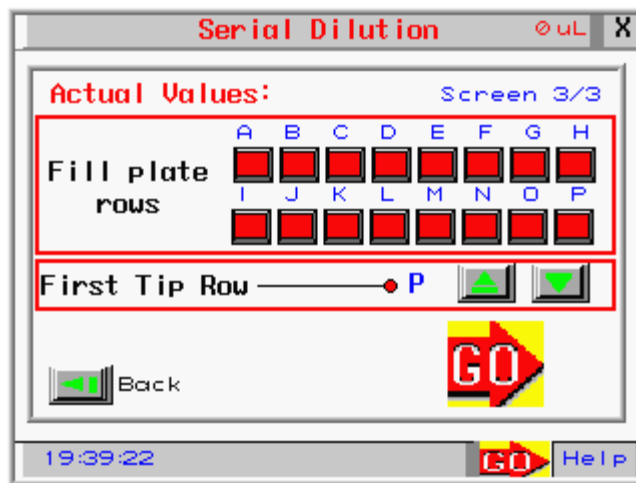
If you want the system to stop at the end of the file do not enter anything in the link file field.

If you want the system to perform another file after the present file is complete, link to the desired file.

CHANGE TIPS is used to indicate if the tips should be removed after the first liquid is dispensed and a new set of tips from the tip magazine should be placed on the pipette head, thus decreasing carryover. If you don't want to change tips, then the same tips will be used throughout the entire operation.



Above screen represents WellPro 12 channel (96 well plate)

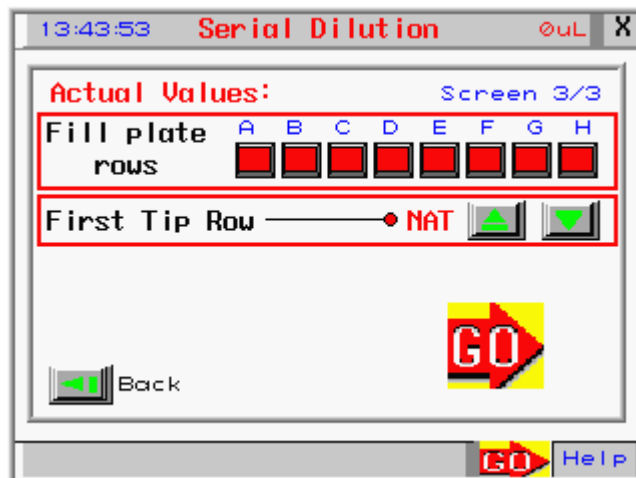


Above screen represents WellPro 24 channel (384 well plate)

FILL PLATE ROWS TO DILUTE is used to indicate the rows of the plate are to be included in the serial dilution. Rows are designated by letters A through P (back to front) for 384 well plates in the "24 across" configuration and 1 through 16 in the "16 across" configuration. Rows are designated by letters A through H for 96 well plates in "12 across" configuration and 1 through 8 in the "8 across" configuration. To select row A, press the A button which will then fill in with red. If you want all rows to be filled, press each button. For rows that you don't want filled then do not press the button with corresponding row letter. Non filled rows will have no red filled in on the box.

ENTER FIRST TIP ROW is used to specify which row of tips to use. Rows of the tip magazine are designated by letters A through P (back to front) or A through H.

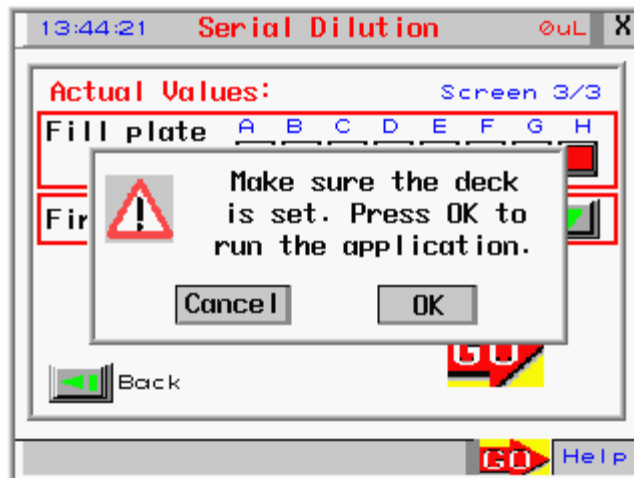
First Tip Row NAT - Setting the next First Tip Row to NAT will keep track of next available tip that has not been used. This should be set at NAT if you are linking programs or wanting to keep track of next row of tips to be used while manual running programs. If you want to reset the next available tip row to the beginning then at screen one press Rst NAT. See below.



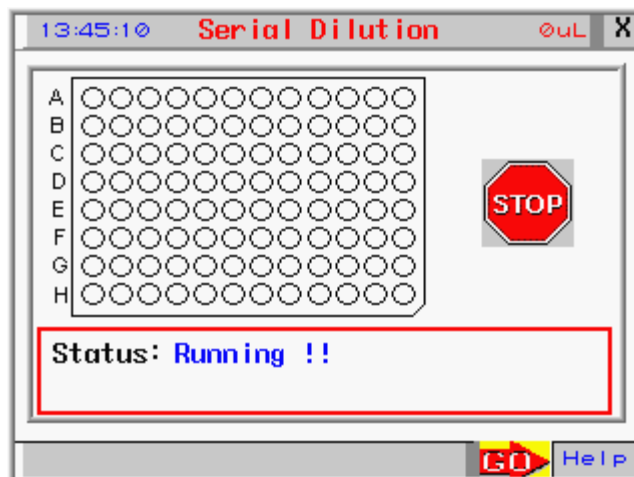
When you press Rst NAT located on screen one a Pop Up screen will be displayed asking to make sure the deck is OK. If you press OK another screen will pop up asking;

Change the magazine and select the next tip row, Next tip row:

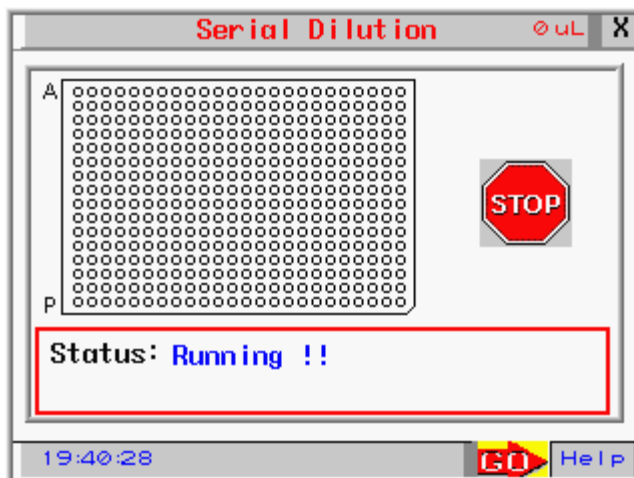
Note: Changing magazine is not required if you would like to continue to use same tips.



Touching/Pressing the GO button will pop up a message to confirm that the appropriate plates are in position on the deck. Once you have confirmed then touch/press the OK button.

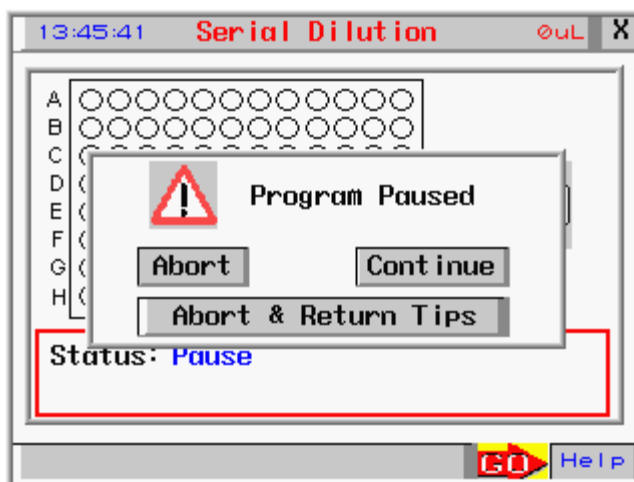


Above screen is for WellPro 12 channel (96 well plate)



Above screen is for WellPro 24 channel (384 well plate)

The serial dilution will begin with a status screen showing the rows as they are being filled. Pressing the STOP button while program is running will cause a pause in the program and pop up a program paused message with option to abort or continue.



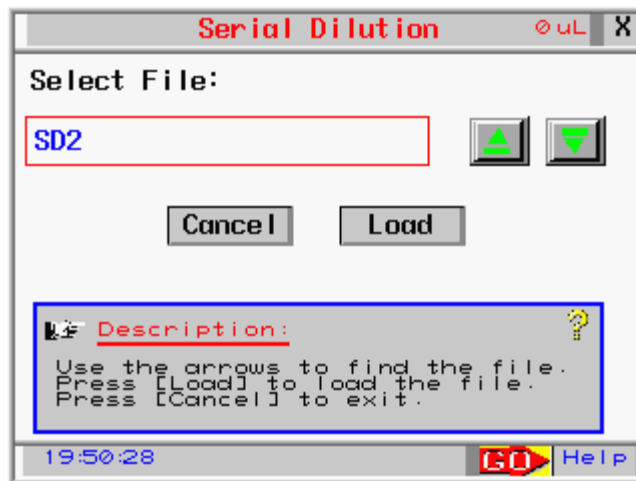
Pressing the STOP button while program is running will cause a pause in the program and pop up a program paused message with option to abort, continue or abort and return tips. Pressing the Abort button will abort the program or pressing the continue button will continue with the program. The abort and return tips option will return the tips to the rack and abort the program.



Saving a Program after setting the variables to desired value go back to screen 1 of the serial dilution menu and press the Save button to save the parameters as a program file.

Use the keyboard on the display to enter the alpha numeric name of the program and then press enter and save.

The save can be performed after setting the variables and before pressing GO to run the program. Or the program can be saved after running the program by pressing the back button to screen 1 of the serial dilution menu and then press save button.



To load a saved program press the load button and then select a file to load by using the up or down arrow scroll buttons. Press the load button then go to next screen and press GO button to run program.

7 PLATE TO PLATE TRANSFER

7.1 Overview

Transferring an aliquot of sample from one plate to another is called "plate-to-plate" transfer or "replica plating." This technique allows for transfer of samples in a SOURCE plate to a RECEIVER plate for assay, culture, etc.

The steps required to perform the plate transfer are:

1. Aspirate sample from source plate.
2. Deliver sample to receiver plate.
3. Replace used tips with fresh ones and proceed to the next sample row, etc.

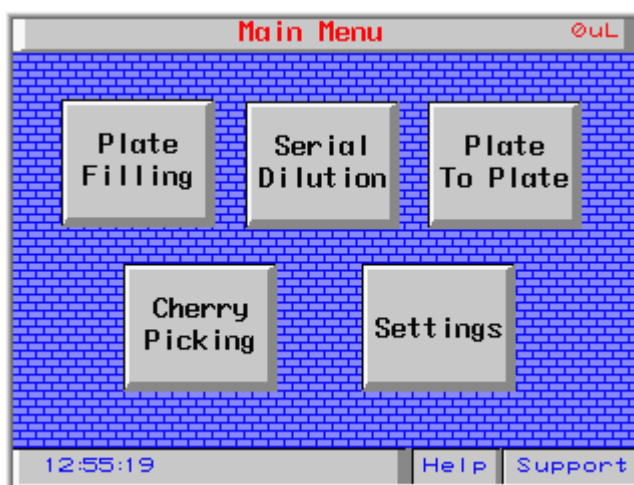
7.2 Types of Plate to Plate Transfer

There are two general types of Plate to Plate Transfer:

1. transfer any single row in one plate to any other single row in another plate.
2. transfer any single row in one plate to two or more rows in another plate.

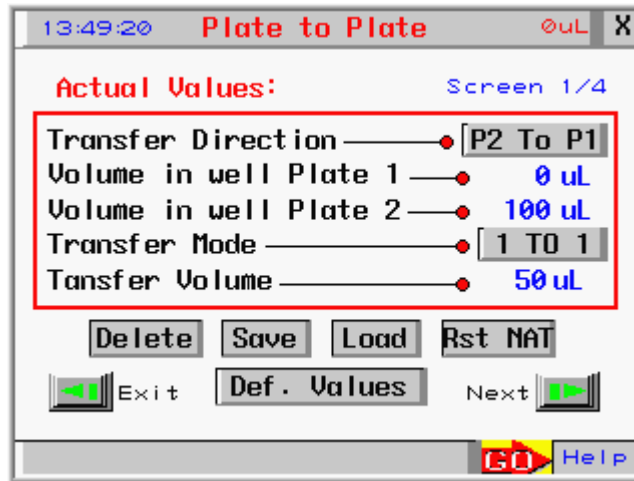
The program allows you to specify the direction of the transfer. The default direction is from plate 2 to plate 1, but the system also allows you to transfer from plate 1 to plate 2, so that either plate can be used as the DESTINATION plate. As examples, you can transfer from row A of plate 1 to row B of plate 2 or you can transfer from row A of plate 2 to rows A, B, and C of plate 1. This enables you to set up an assay plate to do duplicates, triplicates, etc.

At the main menu screen you have the option of selecting a process and creating a file with your parameters and saving the file. Select the Plate to Plate button for changing plate transfer parameters.

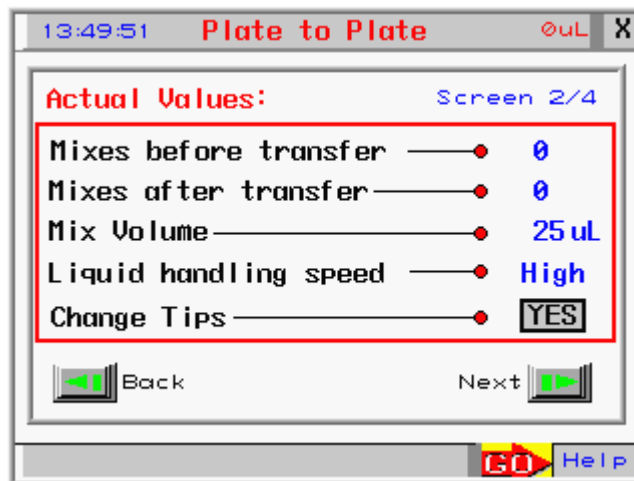


7.3 Creating and Editing a Plate to Plate Transfer File

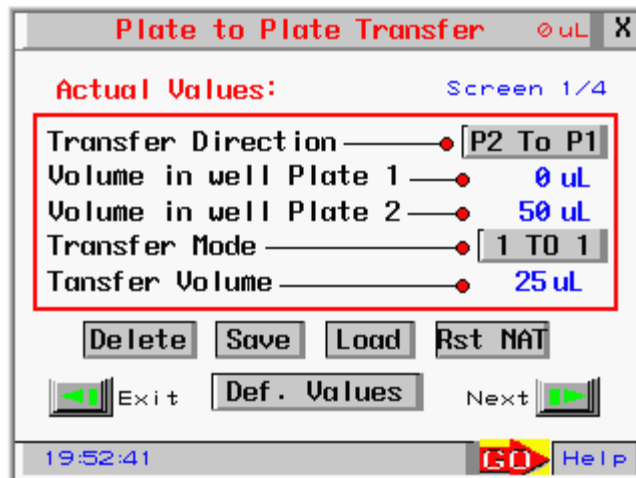
Transferring an aliquot of sample from one plate to another is called "plate-to-plate" transfer or "replica plating." This technique allows for transfer of samples in a SOURCE plate to a RECEIVER plate for assay, culture, etc. The Plate To Plate button is used to establish a user file which can be stored and used as desired.



Press the Def. Values button to change back to system default values



Above display for WellPro 12 channel (96 well plate)



Above display for WellPro 24 channel (384 well plate)

The **TRANSFER MODE/DIRECTION** is a feature that is especially useful when it is combined with **FILE LINK** because it allows you to transfer duplicate samples from the rows of one plate to another plate. Thus, using these functions in combination makes it possible to transfer from row A of plate 1 to rows A and B of plate 2, then automatically continue with another file which transfers from row B of plate 1 to rows C and D of plate 2, and so on.

TRANSFER MODE/DIRECTION also allows you to use a 384 well plate (24 channel head) or 96 well plate (12 channel head) as a reagent reservoir to deliver multiple reagents to a single assay plate. You can place the same or different reagents in each of the 24 or 12 columns, and/or each of the 16 or 8 rows of the source plate. These reagents can be delivered to specified rows on the destination plate. This arrangement minimizes reagent waste.

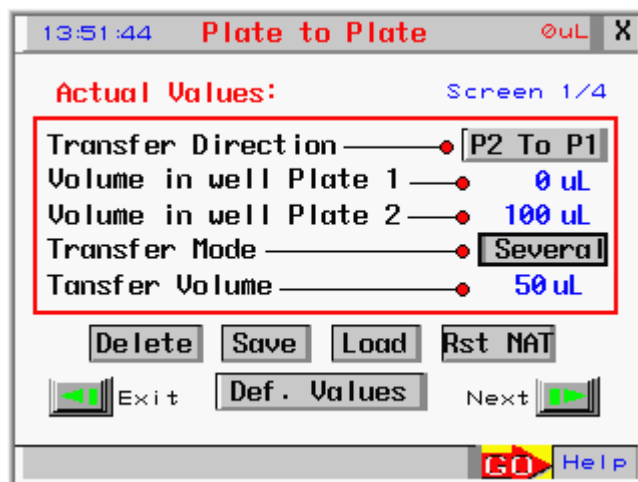
TRANSFER DIRECTION is used to indicate whether the system should transfer from plate 2 to plate 1 or from plate 1 to plate 2 (i.e. either plate 1 (the plate in the front cavity of the template) or plate 2 (the plate in the middle cavity) can be used as the source plate.



VOLUME IN WELL PLATE 1 is used to indicate how much liquid is in each well of plate 1. The system uses this value to determine how far down into the wells the tips should go and also to prevent exceeding the volume capacity of the wells.



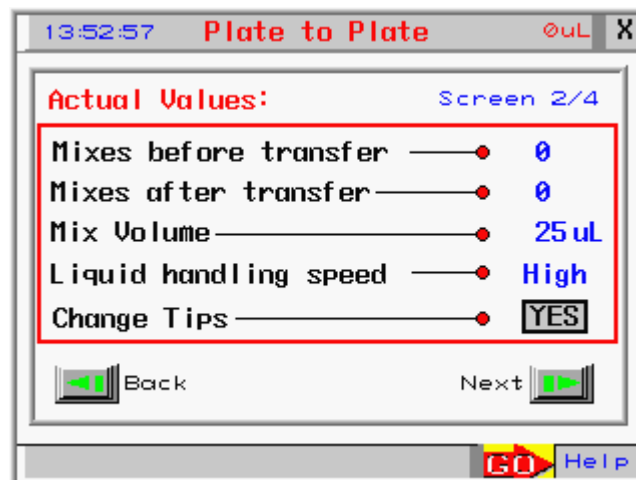
VOLUME IN WELL PLATE 2 is used to indicate how much liquid is in each well of plate 2. The system uses this value to determine how far down into the wells the tips should go and also to prevent exceeding the volume capacity of the wells.



TRANSFER MODE is used to tell the system whether to transfer **1 to 1** one row of plate 1 to the corresponding row of plate 2, **or** to transfer one row of plate 1 to **several** different or multiple rows of plate 2.



TRANSFER VOLUME is used to tell the system how much sample to withdraw from a source well for transfer to a new well during a plate transfer. This parameter can be set in 1 μL increments. The system calculates the maximum TRANSFER VOLUME for the row by dividing the VOLUME IN WELL AT START by the number of transfers specified for that row.

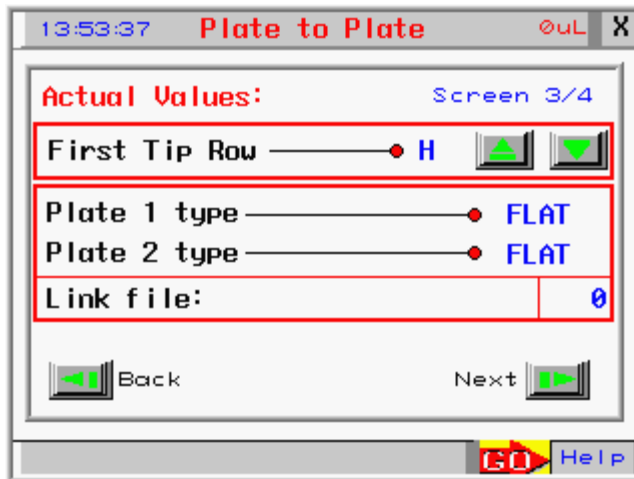


MIXES BEFORE TRANSFER is used to indicate the number of aspiration/delivery cycles that should be performed before transferring a sample. For example, when you are diluting cells which may settle, you should agitate them back into suspension before transfer by mixing. This parameter can be set from 0 to 9.

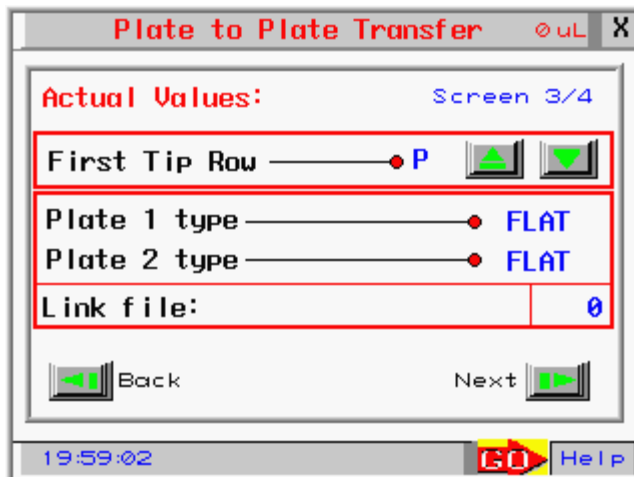
MIXES AFTER TRANSFER is used to indicate the number of aspiration/delivery cycles that should be performed after transferring a sample. For example, when you are diluting cells which may settle, you should agitate them back into suspension after transfer by mixing. This parameter can be set from 0 to 9.

MIX VOLUME is used to tell the system how much solution should be used in the Mix step.

CHANGE TIPS is used to indicate if the tips should be removed after the first liquid is dispensed and a new set of tips from the tip magazine should be placed on the pipette head, thus decreasing carryover. If you don't want to change tips, then the same tips will be used throughout the entire operation.



Above display for WellPro 12 channel (96 well plate)

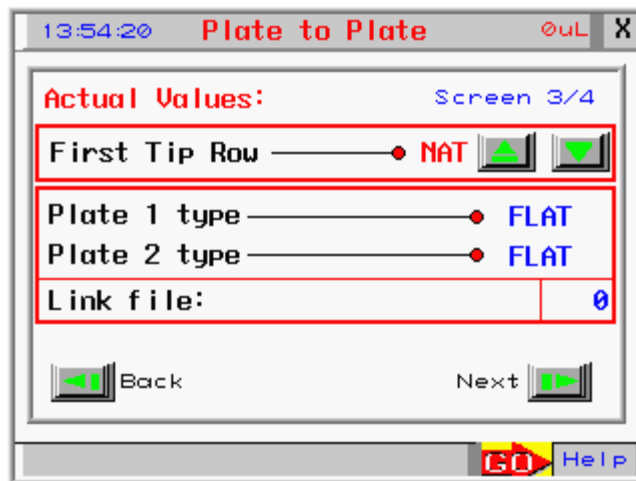


Above display for WellPro 24 channel (384 well plate)

ENTER FIRST TIP ROW is used to specify which row of tips to use. Rows of the tip magazine are designated by letters A through P (back to front 24 channel head) or A through H (back to front for 12 channel head).

SOURCE ROW is used to indicate which row of the SOURCE plate is used to withdraw samples from. This parameter only appears if the "1 to SEVERAL" mode is selected in this file. In that instance, the SOURCE row specified acts as the single source row for transfer to several receiving or DESTINATION rows.

First Tip Row NAT - Setting the next First Tip Row to NAT will keep track of next available tip that has not been used. This should be set at NAT if you are linking programs or wanting to keep track of next row of tips to be used while manual running programs. If you want to reset the next available tip row to the beginning then at screen one press Rst NAT. See below.



When you press Rst NAT located on screen one a Pop Up screen will be displayed asking to make sure the deck is OK. If you press OK another screen will pop up asking;

Change the magazine and select the next tip row, Next tip row:

Note: Changing magazine is not required if you would like to continue to use same tips.

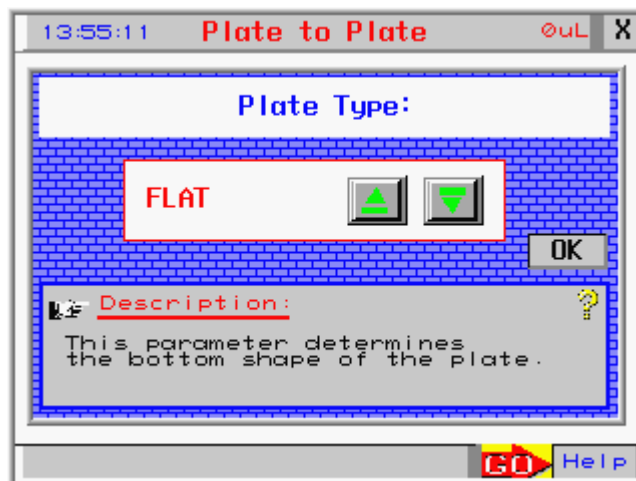


PLATE 1 TYPE is used to indicate the design of the bottom of plate 1. This information is used to determine the height of the liquid in each well and thus calculate how far down into the wells the tips should go. If you are not using a standard microplate, select CUSTOM and determine the amount to raise or lower the tip height.

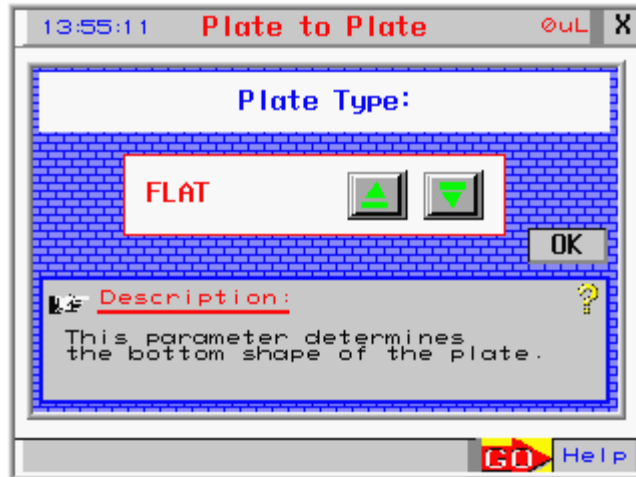
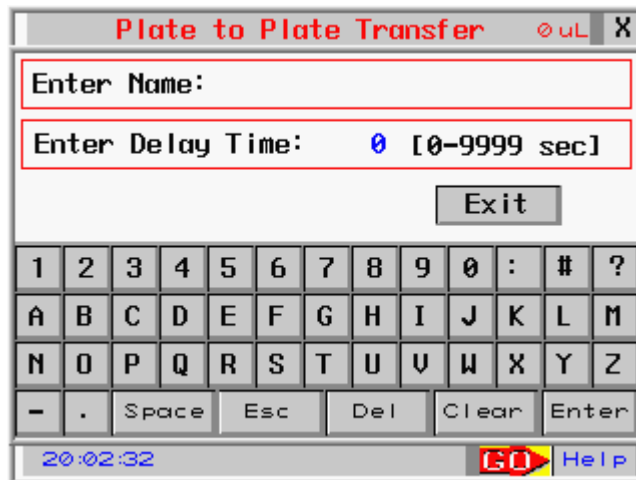


PLATE 2 TYPE is used to indicate the design of the bottom of plate 2. This information is used to determine the height of the liquid in each well and thus calculate how far down into the wells the tips should go. If you are not using a standard microplate, select CUSTOM and determine the amount to raise or lower the tip height.

LINK TO FILE is used to indicate what the system should do after it completes the file it is currently running.

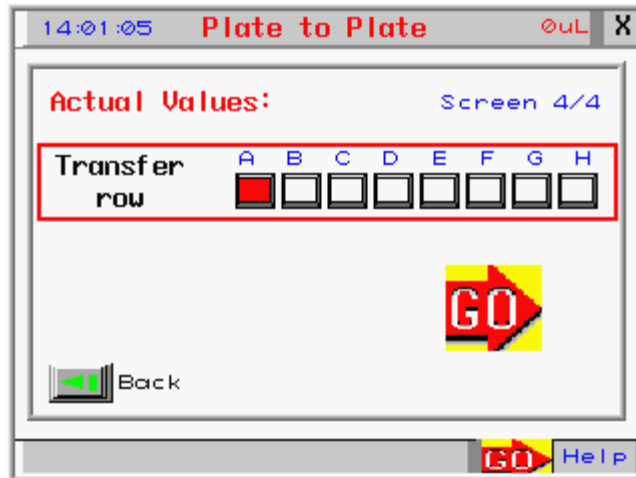
If you want the system to stop at the end of the file do not enter anything in the link file field.



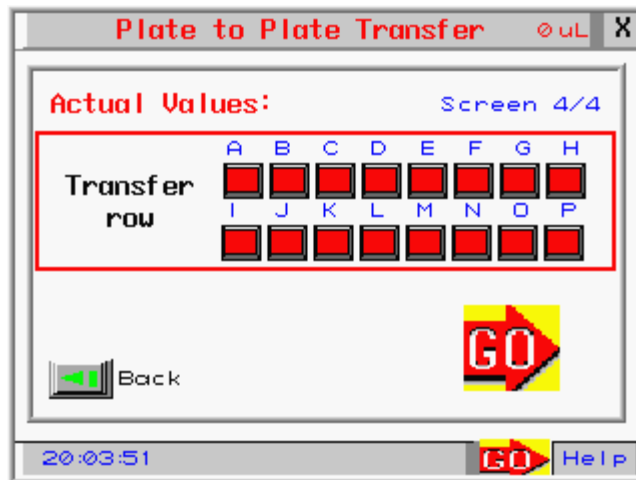
If you want the system to perform another file after the present file is complete, enter the name of the file in the enter name field and enter amount of seconds would like for time delay before running the next file. Press enter after entering text in the fields to accept and then exit.

Pause

Enter Delay Time: Instead of a time delay you also have the option to have a pop up screen prompt you to press continue before starting the next program. This is done by entering the number “9999” which will create the pause before proceeding command.

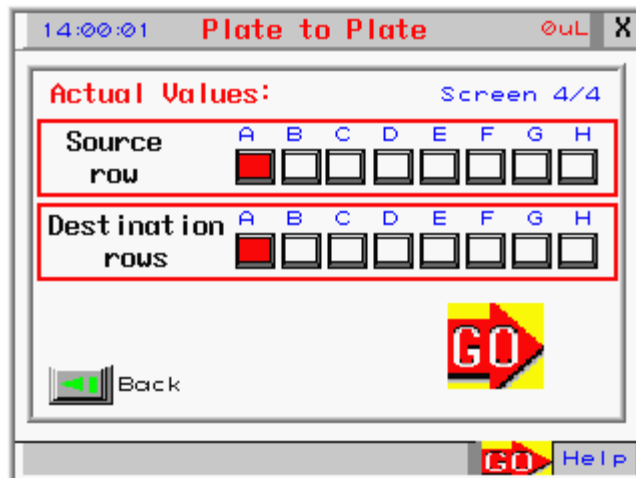


1 to 1transfer, Above display for WellPro 12 channel (96 well plate)



1 to 1transfer, Above display for WellPro 24 channel (384 well plate)

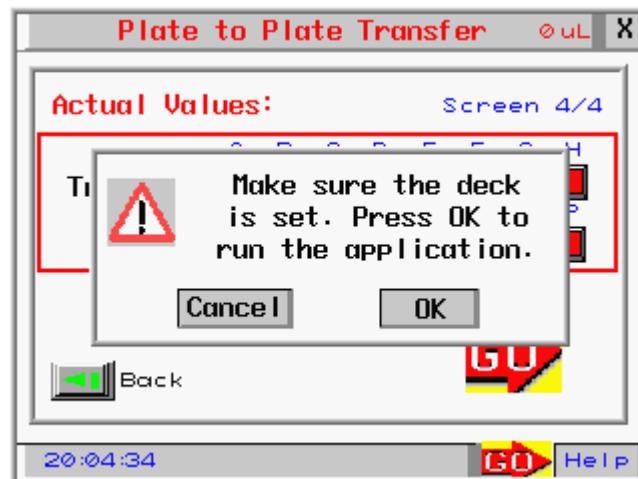
TRANSFER ROW is used to indicate which row of the source TRANSFER plate is used to place liquid in during transfer to the corresponding row on destination plate.



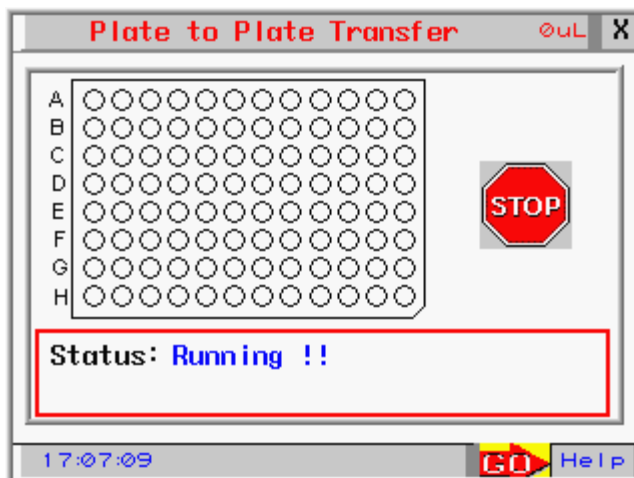
1 to Several, Above display for WellPro 24 channel (384 plate)

SOURCE ROW, the SOURCE row specified acts as the single source row for transfer to several receiving or DESTINATION rows.

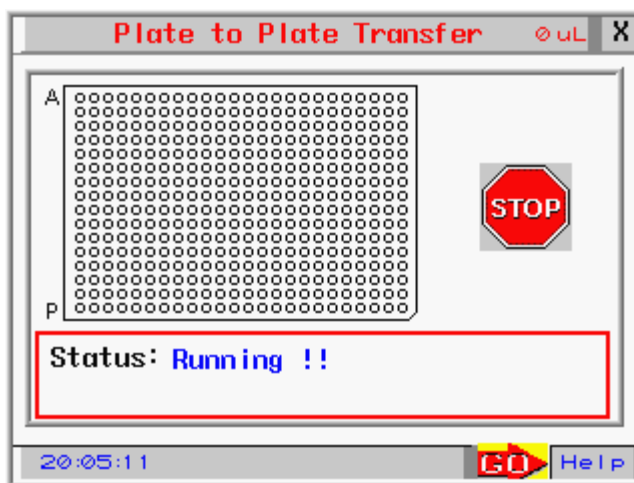
DESTINATION ROW is used to indicate which row of the DESTINATION plate is used to place liquid in during transfer. This parameter only appears if the "1 to SEVERAL" mode is selected in this file. In that instance, the SOURCE row specified acts as the single source row for transfer to several receiving or DESTINATION rows.



Touching/Pressing the GO button will pop up a message to confirm that the appropriate plates are in position on the deck. Once you have confirmed then touch/press the OK button.

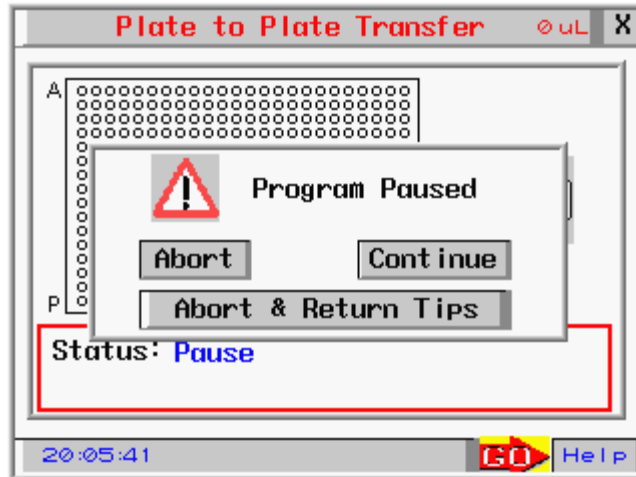


Above display for WellPro 12 channel (96 well plate)



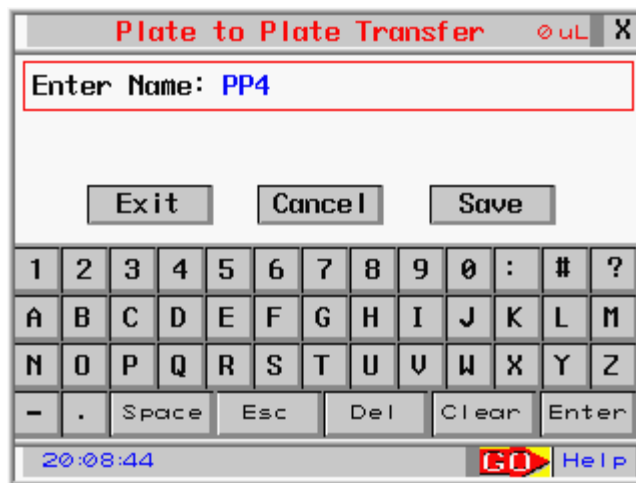
Above display for WellPro 24 channel (384 well plate)

The plate filling will begin with a status screen showing the rows as they are being filled. Pressing the STOP button while program is running will cause a pause in the program and pop up a program paused message with option to abort or continue



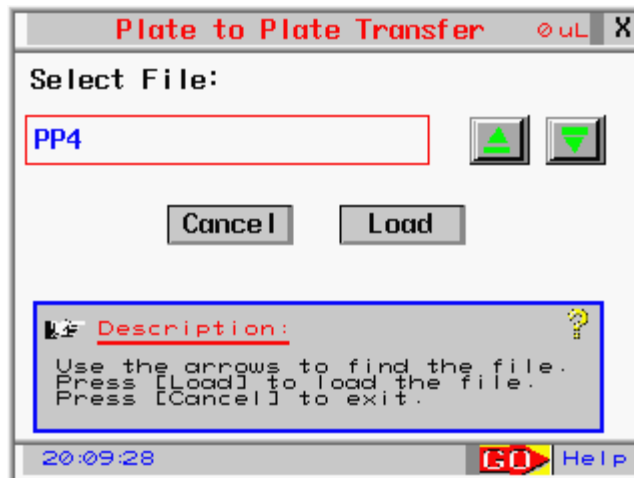
Pressing the STOP button while program is running will cause a pause in the program and pop up a program paused message with option to abort or continue.

Pressing the Abort button will abort the program and pressing the continue button will continue with the program.

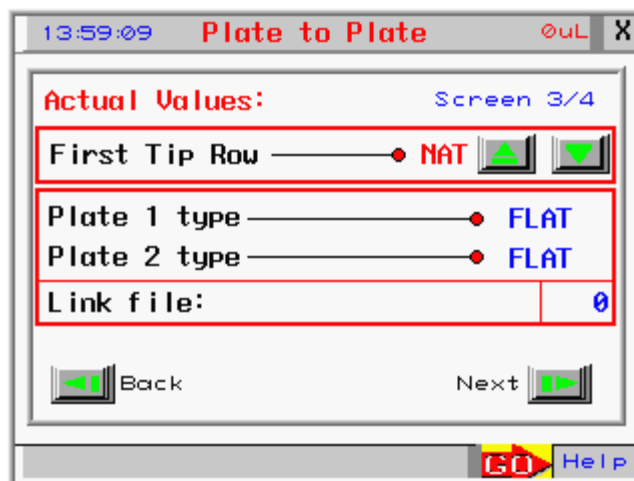
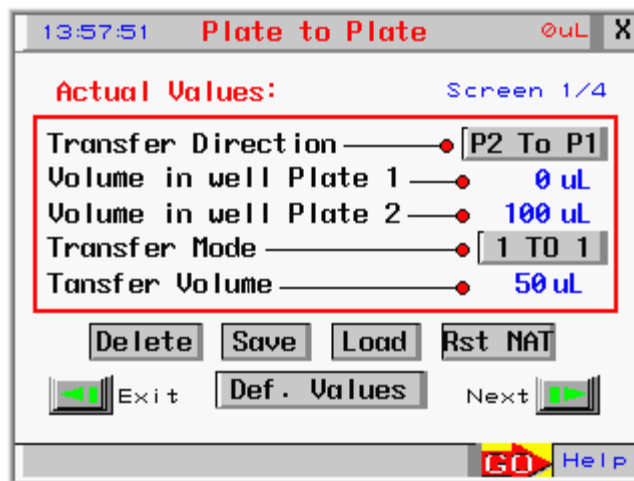


After setting the variables to desired value go back to screen 1 of the plate to plate transfer menu and press the Save button to save the parameters. Enter the desired file name in the Enter Name field and click on enter button then the save button.

The save can be performed after setting the variables and before pressing GO to run the program. Or the program can be saved after running the program by pressing the back button to screen 1 of the plate to plate transfer menu and then press save button.



To load a saved program press the load button and then use the up or down scroll button to select the program to run.

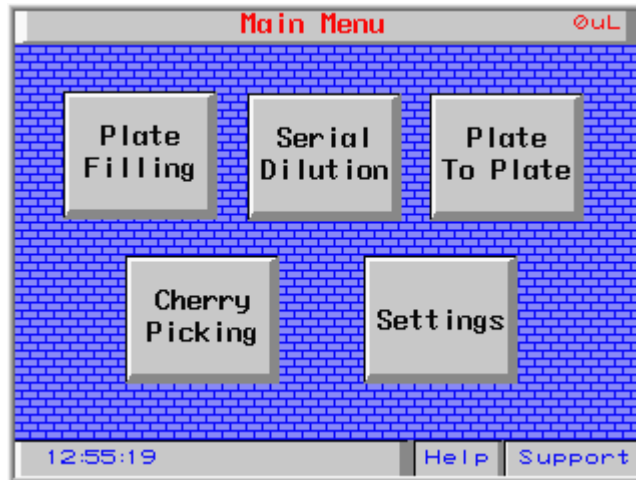


Rst NAT and **NAT** is used to reset the next available tip row to be used in the tip rack. This will set the tip tracking feature and will keep track of last tip row used.

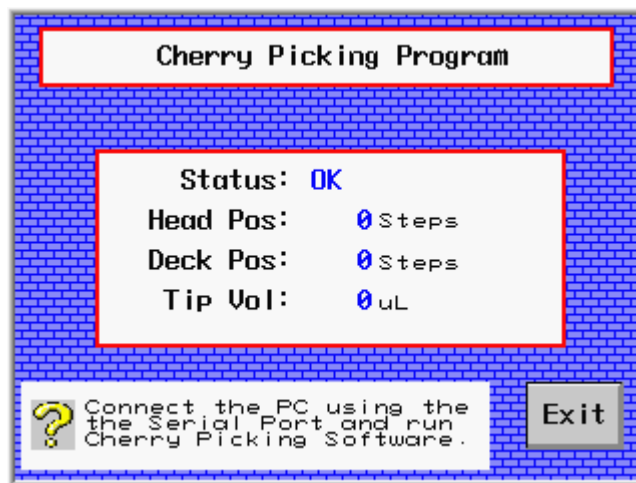
8 HOST CONTROL / CHERRY PICKING

8.1 Overview

Host Control is the process for sending commands from a computer into the serial port of the WellPro. This is also used for sending information from a computer such as excel spreadsheet data to the WellPro for our cherry picker single channel nozzle. Refer to cherry picking manual for more information on the operation of the single channel module.



Pressing the Host Control button will open up the Host Control screen.



Host Control / Cherry Picking Screen allows for connection to a computer or other device via the serial port. Head position, Deck position and Tip Volume can be programmed from software such as hyper terminal, .net and others. This function is used when the WellPro needs to be integrated into a larger platform which controls the software commands.

Implemented Serial Commands

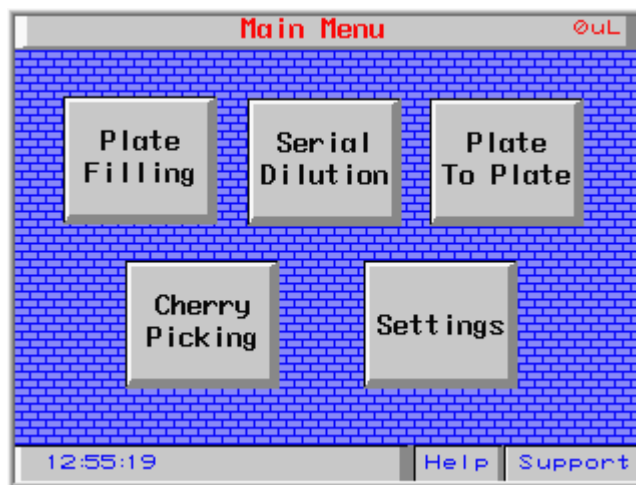
Commands	Example	WellPro Response	Comments
HOME(Arg) Arg: X, Y, Z, ALL	HOME(ALL)\r	HOME(ALL)OK\r	Initialize the WellPro machine. It's also highly recommended that you use it inside your programs to update the remaining volume in the controller and avoid float calculation's offset.
MOVE(Arg,Pos,Spd) Arg: X, Y, Z Pos: 0 to axis limit Spd: 1 - 4	MOVE(X,125,2)\r	MOVE(X,125,2)OK\r	It makes an absolute movement in the specified axis.
FILL_TIPS()	FILL_TIPS()\r	FILL_TIPS()OK\r	Fills the tips to maximum volume from any previous position.
HOME_TIPS()	HOME_TIPS ()\r	HOME_TIPS ()OK\r	Dispense all the remaining volume in the tips from any previous position.
WITHDRAW(value) Value: 1 - 200	WITHDRAW(50)\r	WITHDRAW(50)OK\r	This command indicates to the WellPro the amount of liquid to withdraw in uL. Value must be an integer number in the range of 1 to 200.
DISPENSE(value) Value: 1 - 200	DISPENSE(41)\r	DISPENSE(41)OK\r	This command indicates to the WellPro the amount of liquid to dispense in uL. Value must be an integer number in the range of 1 to 200.
REMAINING()	REMAINING()\r	25\r	Returns the remaining volume in uL.
PICK_TIPS(col, mag) Column: 1- 8 Magazine: LAND - PORT	PICK_TIPS(3,PORT)\r	PICK_TIPS(3,PORT)OK\r	The WellPro will pick up the tips from the specified column. You must specify the orientation of the tip magazine (LAND or PORT).
EJECT_TIPS(column) Column: 1- 8 Column: 0 (eject only, no motion) Magazine: LAND - PORT	EJECT_TIPS(2)\r	EJECT_TIPS(2))OK\r	The WellPro will eject the tips to the specified column. When column=0, the machine will eject the tips in it's actual position. You must specify the orientation of the tip magazine (LAND or PORT).
DELAY_SEC(value) Delay for the number of seconds specified.	DELAY_SEC(5)\r	DELAYSEC(5)OK\r	Causes the program to pause for the number of seconds specified. Seconds must be a whole number in the range of 1 to 1×10^8 .

DELAY_MS(value) Delay for the number of milliseconds specified.	DELAY_SEC(5)\r	DELAYSEC(5)OK\r	Causes the program to pause for the number of milliseconds specified. Milliseconds must be a whole number in the range of 1 to 1x10 ⁸ .
RATE(speed) Speed: 1-4	RATE(2)\r	RATE(2)OK\r	Changes the withdraw and dispense speed. 1 is the lowest speed and 4 is the highest speed.
RATE?()	RATE?()\r	2\r	Returns the current rate speed. Returns an integer number between 1 and 4.
BEEP(value) Causes the controller to 'beep' for the number of milliseconds specified.	BEEP(350)\r	BEEP(350)OK\r	Causes the controller to emit a 'beep' sound for the number of milliseconds specified.
WARNING()	WARNING()\r	WARNING()OK\r	Causes the controller to emit a 3-beep tone. Useful as an attention getting warning signal.

9 SETTINGS CONTROL

9.1 Overview

Settings section allows the user to set the internal clock and alter the settings for serial port configuration. It also allows position adjustment for non standard microplates in a custom file and manual moving head and deck positions.



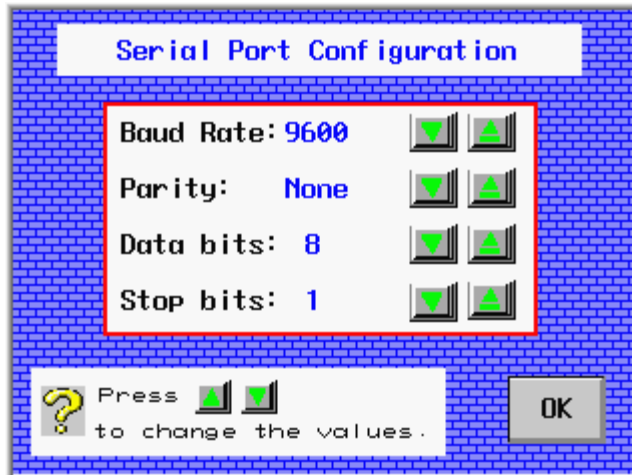
Pressing the Settings button will open the Settings screen.



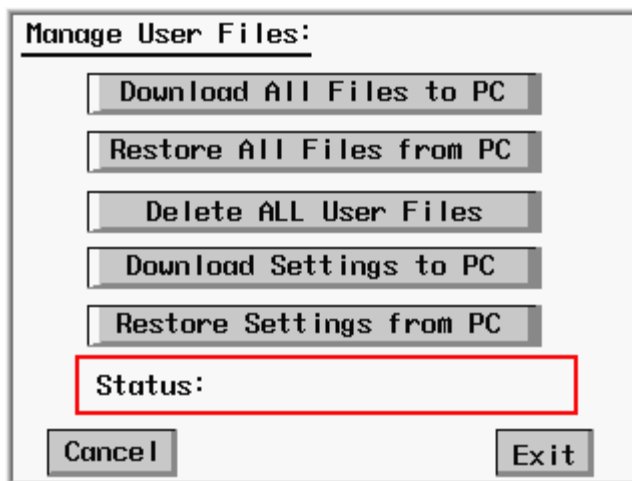
Pressing the Set Clock button will open a screen where the settings can be changed. Pressing the Set Serial Port will open the screen for changing the Serial Port configuration. These settings will be set at the factory.



Pressing the text in blue will allow you to change the variable date settings. Press OK button after changing the variable to accept the change.



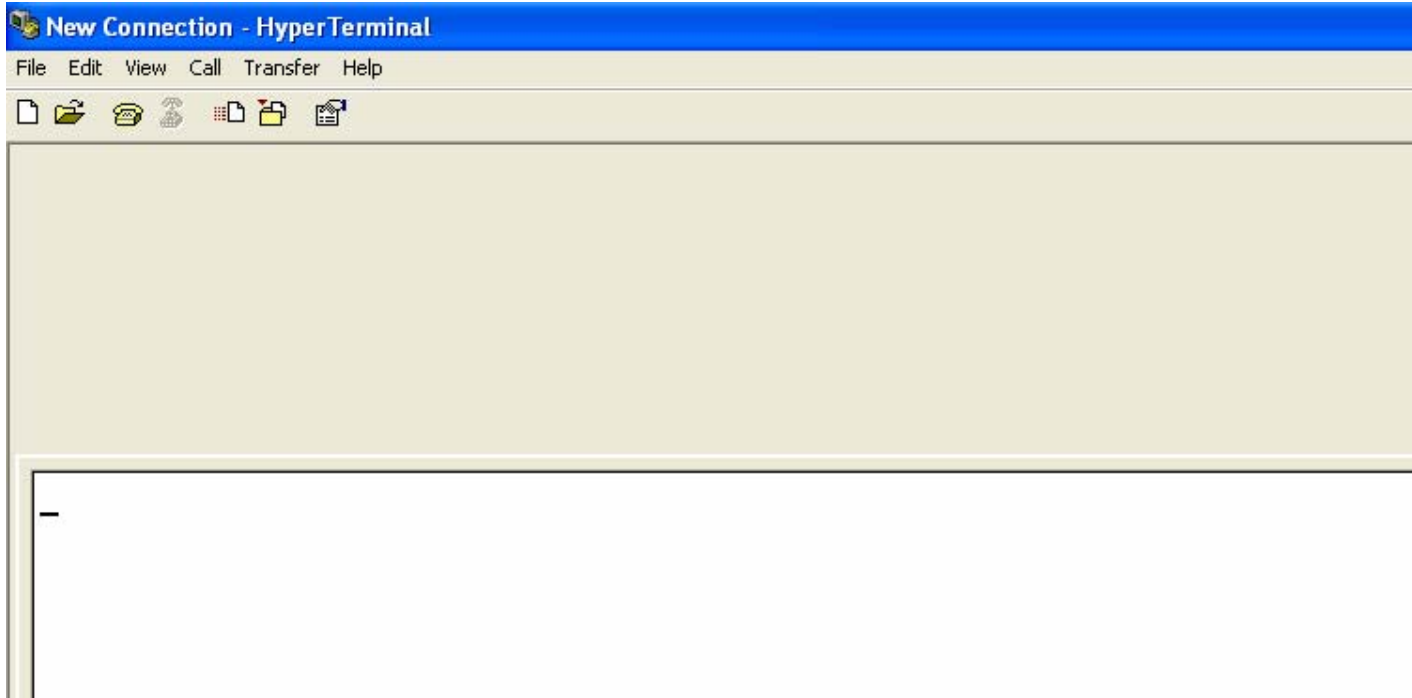
The serial port configuration allows for setting values required to communicate to external computers or other devices. The values are preset at the factory.



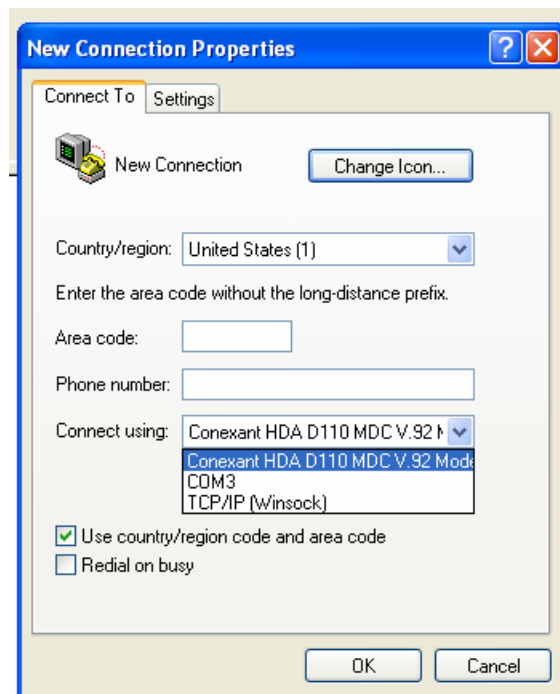
The Manage user files

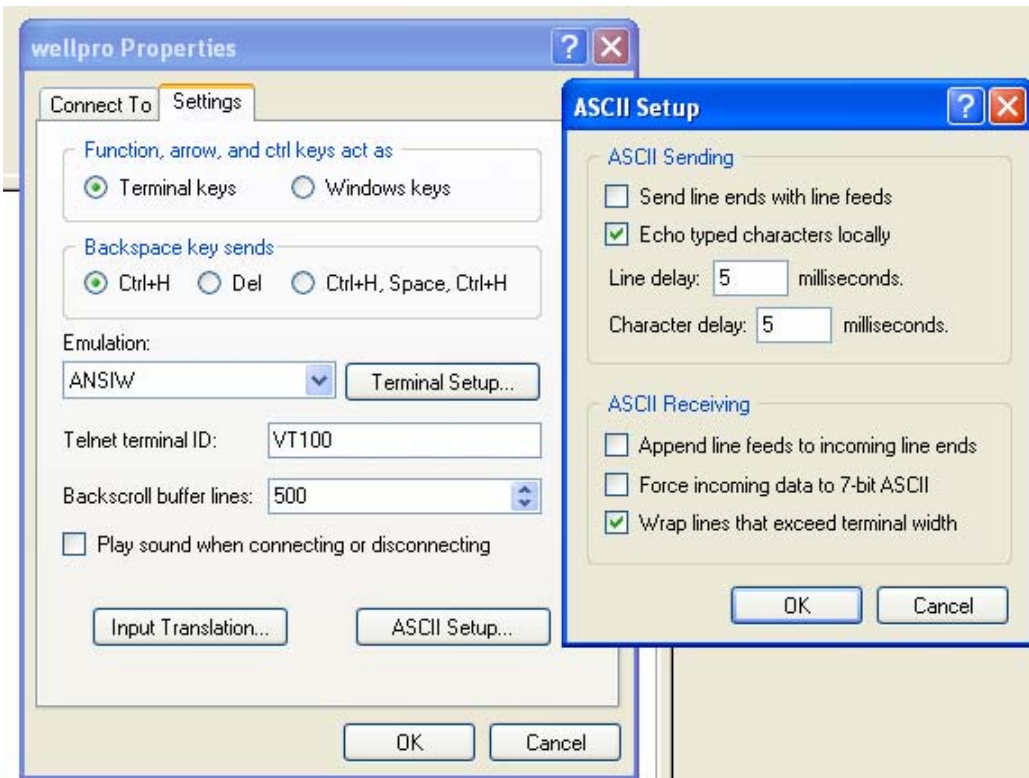
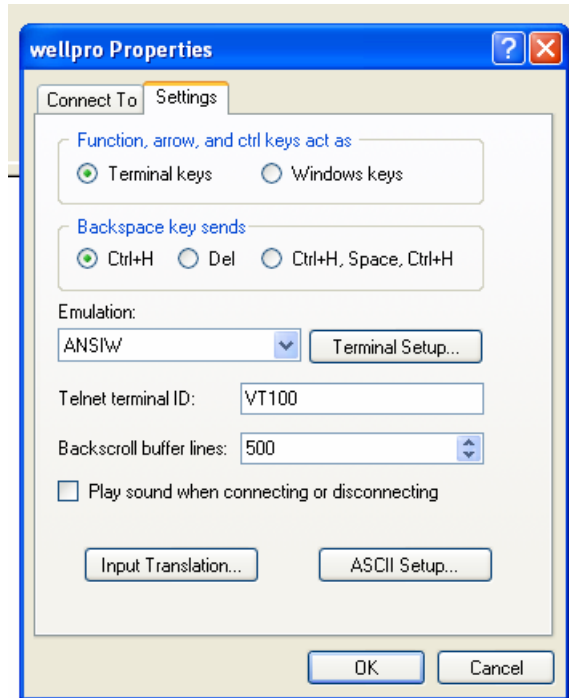
Download Position Settings and Files from Computer to the WellPro

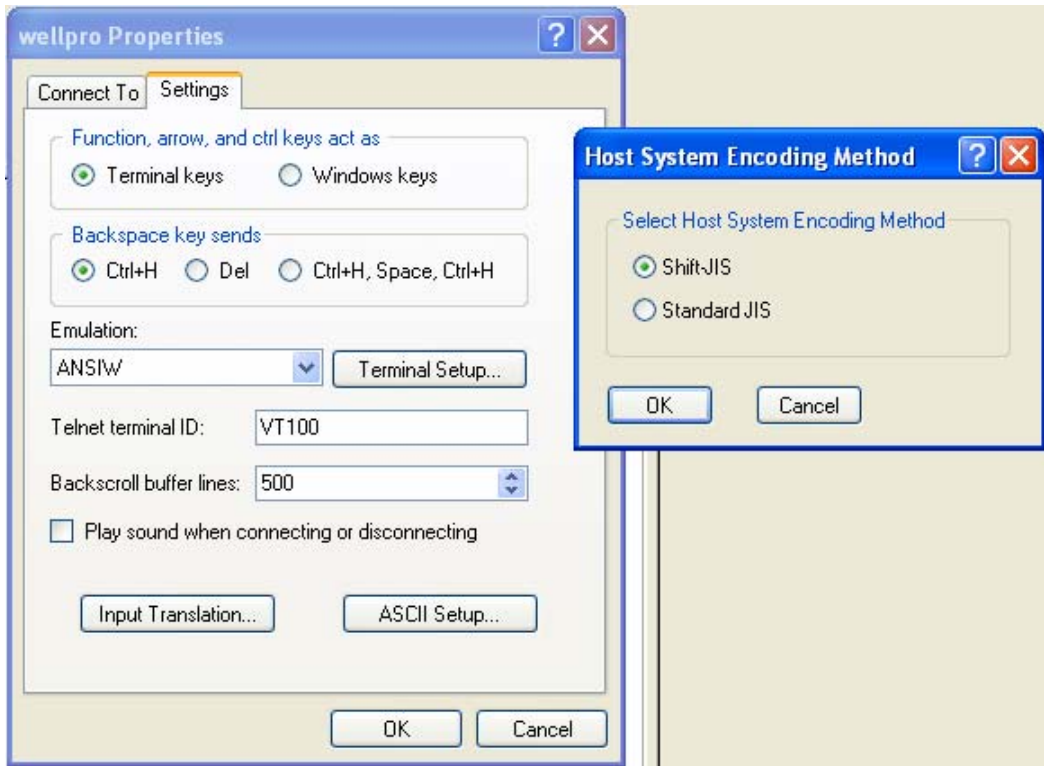
- Connect serial cable to back of WellPro and to Computer
- Confirm on Touch screen that settings are
 Baud Rate: 9600
 Parity: None
 Data Bits: 8
 Stop Bits: 1
- Before performing the procedure the first time you need to setup the Hypterminal parameters located on your computer. Go to start menu/All programs/Accessories /Communications then choose Hyperterminal. A popup up menu will now appear for you to enter a name for this. You can enter a name such as WellPro and continue or give it no name to continue. Now you should see the following popup menu



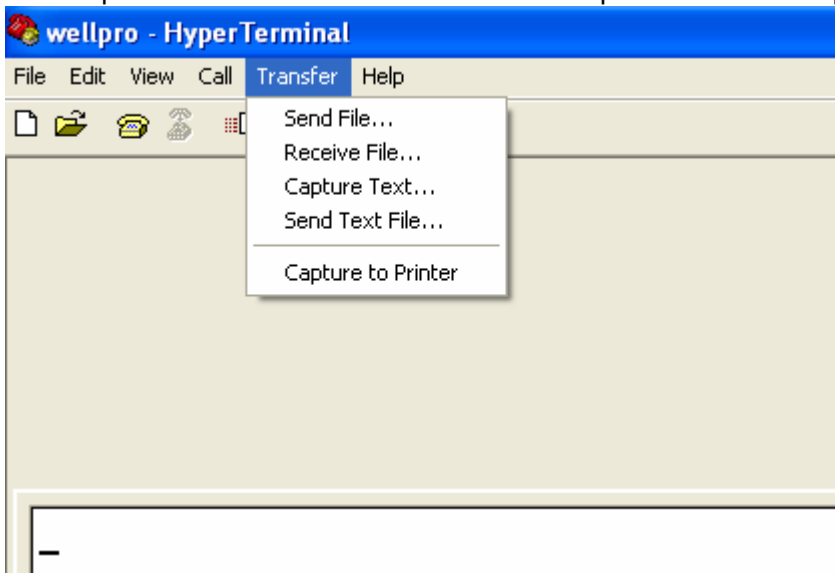
- Hyperterminal -

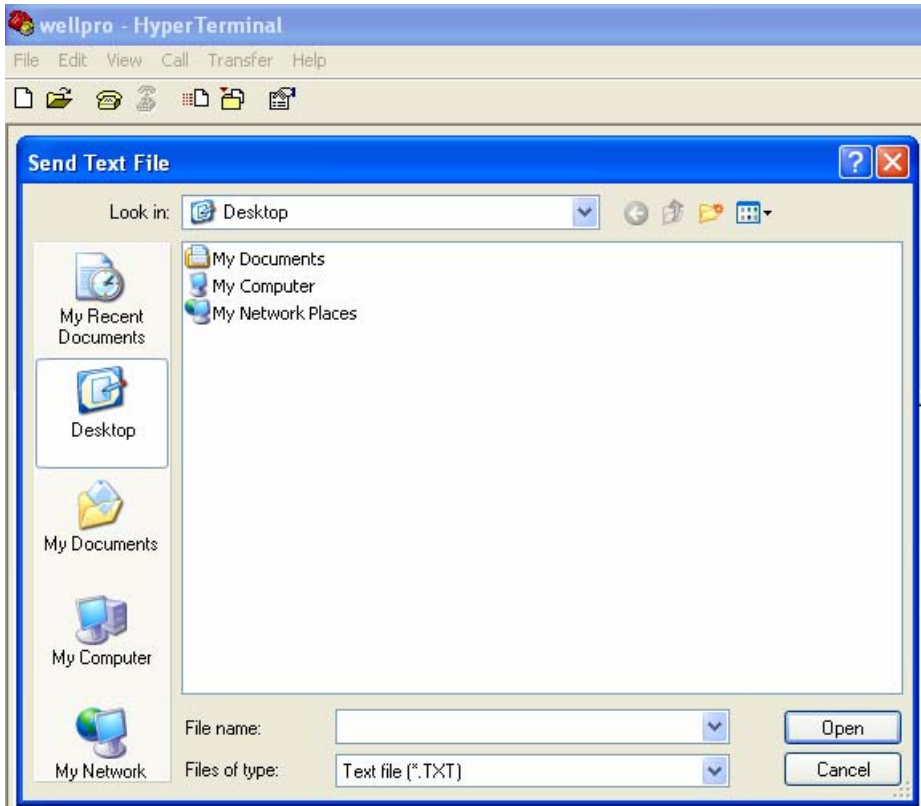






- Go to Touch Screen and into Manage Files
- Click on “Restore settings from PC”
- Go back to Hyperterminal menu on computer and “Transfer” then Click on “Send Text File” and pick the file to send from “WellPro Backup” folder on desktop.

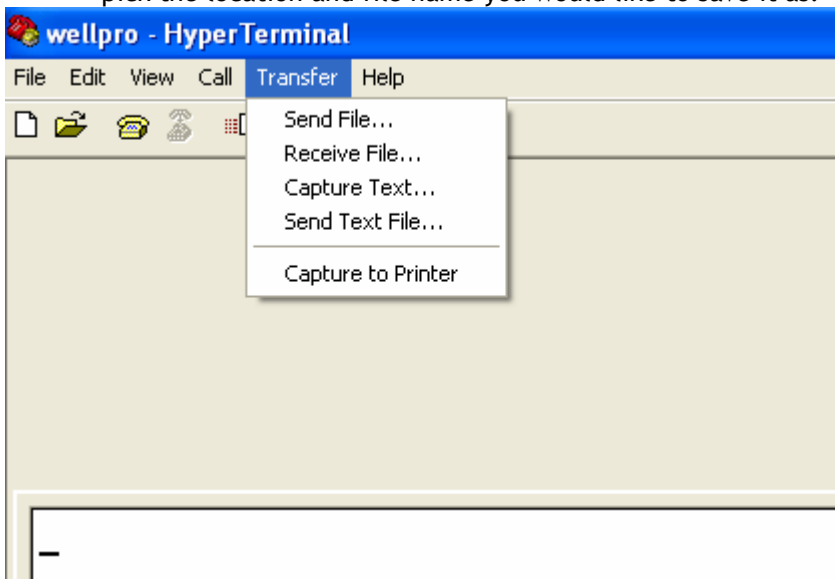


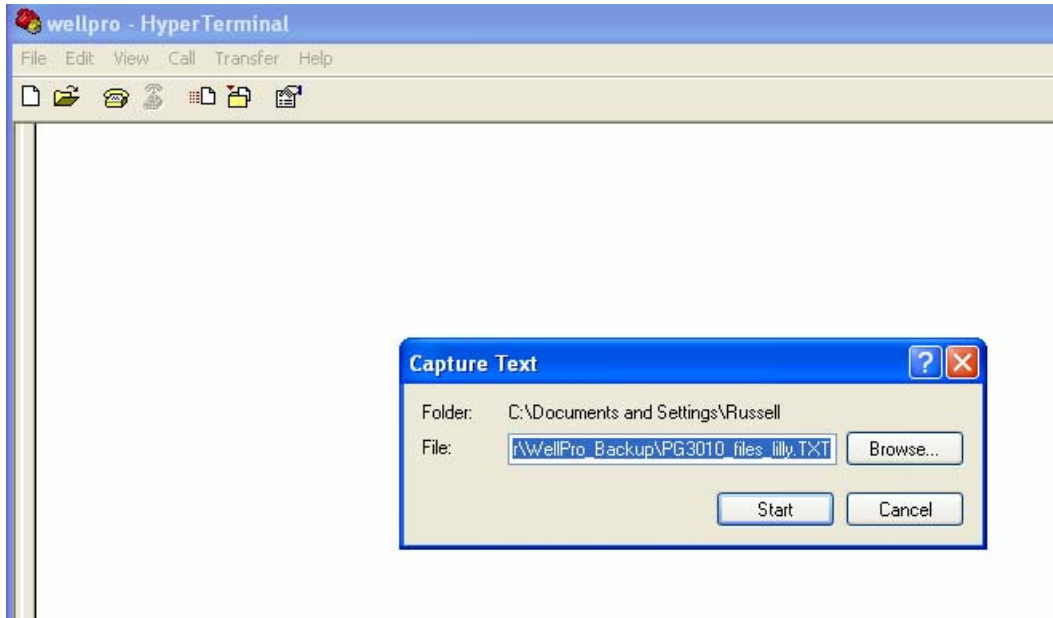


- IMPORTANT WAIT FOR THE END COMMAND TO SHOW IN HYPERTERMINAL MENU AND LISTEN FOR A “BEEP” sound before disconnecting. Now you can press “call” disconnect and close the Hyperterminal menu.
- For downloading the program files to Wellpro repeat the same process used for downloading the settings except for now click on “Restore all files from PC” in the manage user file section of touchscreen instead of “Restore all files from PC”.

Upload Customer Settings and Files from WellPro to a Computer

- Connect serial cable to back of WellPro and to Computer
- Confirm on Touch screen that settings are
Baud Rate: 9600
Parity: None
Data Bits: 8
Stop Bits: 1
- Click on the Hypterterminal Icon located on Desktop
- Go back to Hyperterminal menu on computer and “Transfer” then Click on “Capture Text” and pick the location and file name you would like to save it as.



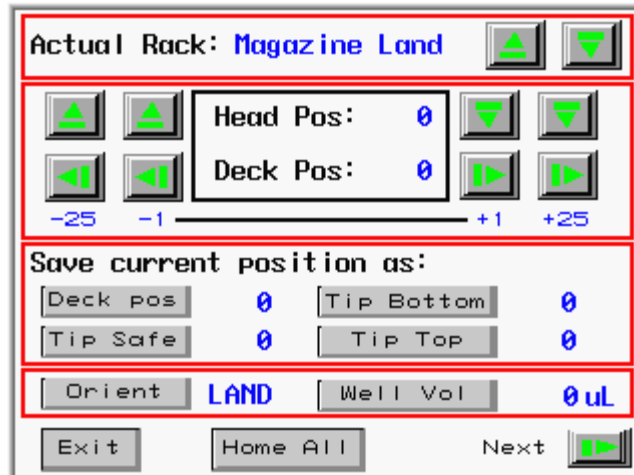


- Press “Start”
- Go to Touch Screen and into Manage Files
- Click on “Download Settings to PC”
- IMPORTANT WAIT FOR THE END COMMAND TO SHOW IN HYPERTERMINAL MENU AND LISTEN FOR A “BEEP” sound (could take a couple of minutes) before you continue. **Now press “capture text” and then “Stop”** (very important) now you can disconnect and close the Hyperterminal menu.
- For downloading the customer backup program files to Wellpro repeat the same process used for downloading the settings except for now click on “Download all files to PC” in the manage user file section of touchscreen.

10 ADJUSTING THE TIP HEIGHT – POSITION ADJUST SECTION

10.1 Overview

The depth of the tips in the wells must be properly set in order for the system to accurately aspirate fluid. When standard microplates are used, this depth is set by choosing one of the preset values --"FLAT", "U", or "V" that is presented in the PLATE TYPE parameter in the various files. However, when other plates are used (in a few special situations), it will be necessary to manually set the tip height using custom file in the settings menu under the **position adjust section**.



This position adjust screen allows for setting of positions for non standard plates. This menu also allows for manual positioning of the head and deck positions.

10.1.1 Editing/Running the Position Adjustment Menu

You can change the value of each parameter as desired to provide the desired program to fill the plates. Positions can be moved at one or at twenty five microsteps at a time.

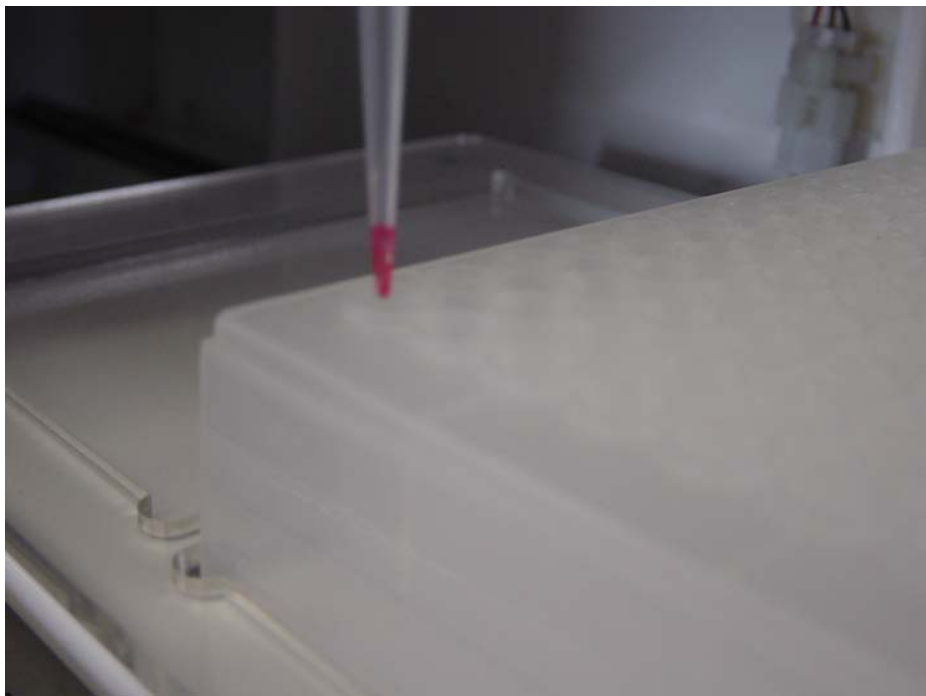
Caution; Only change settings for **Custom** under actual rack. **Do not change settings for any other type of plate under the actual rack options.** All other actual rack options besides custom are set at the factory and changing could result in damage to the instrument and misalignment during operation.

For setting positions of your non standard plate;

1. Press Home All button will home the machine.
2. Place non standard plate onto deck of Wellpro.
3. Manual press a pipette tip onto nozzle one of liquid head.
4. Choose the custom plate number you want associated with this plate. Have option to choose from 1 to 10 custom files.
5. Select land (landscape) or Port (portrait) for the well plate in the Orient button.



6. Using the arrow keys press left or right until deck moves the plate so the pipette tip on head is aligned to center of the plate well. When aligned then press the deck pos button in the “save current position as:” and enter the deck position value.



7. Using the arrow keys press up or down arrow to move the tip to the top surface of the well plate. Then press the “tip top button” in the “save current position as:” and enter the value shown for the head position.

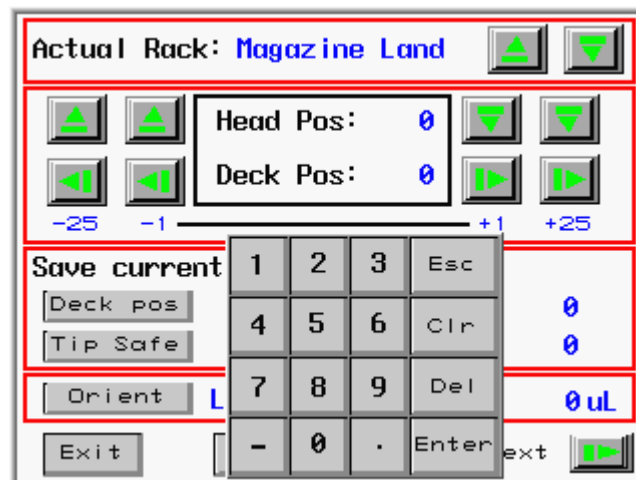


8. Using the arrow down key move the pipette tip head position until the tip touches the bottom of the well. Use caution when moving the head down with arrow key, when nearing the bottom of well use the microstep 1 arrow. When the tip touches bottom of well enter the value shown in head position into the tip bottom value shown under “save current position”.

To determine if tip is at bottom of well try slightly moving plate by hand while moving head down. Once you feel resistance then that means tip has reached bottom of well. At the correct tip bottom position the plate can be moved side to side but not up or down.



9. Using the arrow up key move the head pipette tip above the top surface of plate. The bottom of the tip should be moved to a position above the plate that it has no chance of hitting any objects on the deck if the deck was to be moved. This is the position that the tip will be at while the deck is moving the plate so that it will clear the plate. This is considered the tip safe position. Enter the Head position value into the “save current position as:” tip safe value.
10. Enter the volume of liquid in the wells of the well plate.

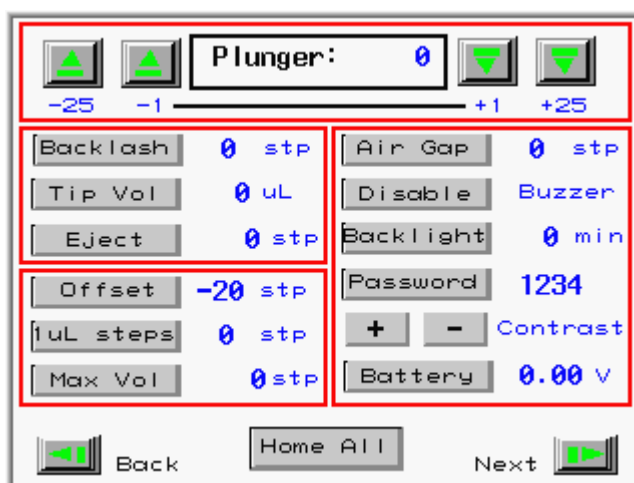


To enter values in the “save current position as:” click on the blue text next to position that requires changing. After clicking on text a pop up screen with numbers will be shown. Click on the numbers of desired value and click on enter when finished.

Calibrating Liquids

For liquids that require an accuracy adjustment during volume dispensing, you can determine the calibration factor that adjusts to the specific gravity of the liquid. The Volumetric Calculation Settings adjusts the movement of the piston motor to improve pipetting accuracy of specified liquids.

WellPro is factory calibrated for distilled water at room temperature; however, you can add calibration values to improve pipetting accuracy of liquids with specific gravity that is significantly different from water.



This is the calibration screen for adjusting settings of pipetting accuracy. These settings should only be changed by an authorized technician or designated quality control technician.

Backlash - This setting will compensate for backlash effects resulting from mechanical components. To set the backlash setting you must first place a pipette tip on a nozzle. Next fill a trough with distilled water and aspirated 5ul. To aspirate 5ul perform the following;

1. Click on the Plunger:
Enter in a 1200 value and press enter (The liquid head will move down)
2. Click on the plunger:
Enter in a 1100 value and press enter (The liquid head will move up)
3. Pick and place the trough so that the end of the pipette tip is submerged into the distilled water.
4. While the tip is submerged enter a value of 1000 in the Plunger setting and press enter. This will aspirate 5ul of water.
5. Next remove the trough and press the -25 (negative arrow key) ONCE. Now take a fine tip felt pin and carefully mark a line where the bottom of water line is located on the tip while still on the nozzle.
6. Now press -25 arrow once and then plus 25 arrow once. Perform this sequence 16 times. After performing this operation the water line should be at the original position and at the felt tip marked line. If it is below the line then the backlash setting needs to be reduced and if water level is above the felt tip marked line then the backlash number needs to be increased. Continue this process until a backlash setting is found so that the water movement distance level is repeatable.

Tip Volume - Volume pipette tip being used. This will usually be 200ul for 96 well plate (12 channel head) WellPro or 50ul for 284 well plate (24 channel head) WellPro.

EJECT - This setting determines how far the tip ejection bar moves to eject tips. This setting should never need adjusting. If tips are not ejecting from nozzle then please contact a ProGroup technician for technical assistance. Adjusting this setting can result in damage to the liquid head.

Offset - Is for adjusting volume for viscous liquids. Contact ProGroup technician for technical assistance.

Max Vol - This will set the upper liquid calibration limit. The max volume should initial be set at 1000 for a 50ul tip (24 channel head) and 4000 for a 200ul tip (12 channel head) and then press home all. Now use the plate filling routine to fill with volume of 50ul (24 channel) or volume of 200ul (12 channel) then use a gravimetric method or reader to determine accuracy. Determine the percentage difference from the actual result to the theoretical value. Now reduce or increase the 1000 for 50ul tip or the 4000 for a 200ul tip setting by the same percentage difference. Run the plate routine again with 200ul or 50ul and record the results. The results should now be in acceptable range.

1 ul Steps- This will set the lower liquid calibration limit. To calibrate this setting the value should be changed to 8 steps for 12 channel head and 20 steps for 24 channel head. Now use the plate filling routine to fill with volume of 1ul and then use a gravimetric method or reader to determine accuracy. Determine the difference from actual result to the theoretical value. If the liquid is low then increase the motor step by 1 if the liquid result is high then decrease the value by 1 step. Run the plate routine again and record the results. Repeat process until acceptable results are produced.

Air Gap - This feature moves the liquid head one extra position after each dispense. This feature helps dispense all liquid that remains in the tip after each dispense. Factory settings should be acceptable for most applications but may need to be changed depending on viscosity of fluid.

A value of 20 steps for 24 channel head will result in approximately 1ul air gap. A value of 8 steps for 12 channel head will result in approximately 1ul air gap.

The air volume should be sufficient to assist the separation of the droplet from the tip to the well bottom, but not so great that air bubbles become a problem. The air gap is parameter that is often optimized by trial and error.

Buzzer - Clicking on the Disable/Enable button will toggle the buzzer to disable or enable. This will enable or disable sound when you touch icons/buttons on the touch screen.

Backlight - This feature will put the touch screen in a sleep mode after not using for a specified amount of minutes. Sleep mode will extend the life of the touch screen.

Password - The password comes with a factory setting of 1234. The password can be changed to your personal preference. After choosing a password you should document the password and store in a safe place. The password is required to access the settings area of the software.

+/- Feature increases or decreases the contrast of the touch screen display.

Battery - Tracks the battery life of the touch screen display

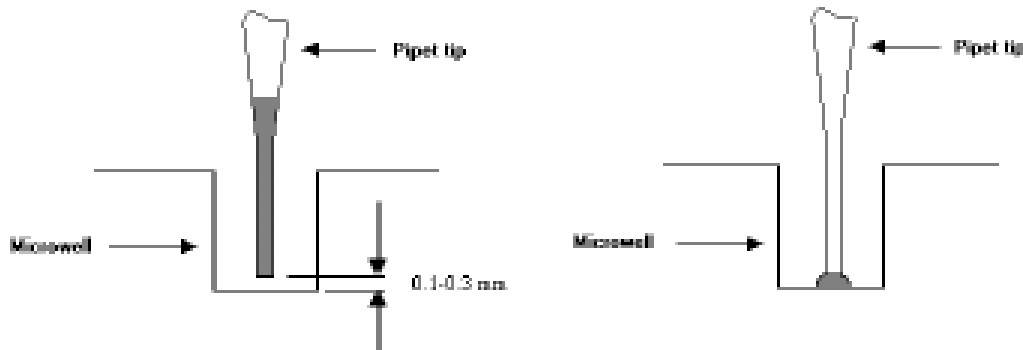
Optimizing Pipetting Performance for Small Volumes

Precision and accuracy can be difficult to obtain when pipetting small liquid volumes, such as 1.0 μ L.

Critical parameters affecting performance included: **Pipetting speed** (slower is better for small volumes), **Plate height** (tip should be 0.1-0.3 mm above the well bottom). Slower pipetting speed prevented droplets that formed at the ends of the tips from contacting the sides or top of the wells as the plate was raised. Optimal plate height ensured that the droplets made contact with the well bottom and were removed from the tip during the dispense step.

Piston Speed: Slow piston speed is recommended for small volume aspiration and dispensing.

Plate Height: Plate height requires some trial and error to determine the optimal distance from the well bottom. A height that places the tips too deep in the wells will seal the tip to the well bottom and not allow the liquid to leave the tip. If the tips are not deep enough, the dispensed droplet will not make contact with the well bottom and will not remove the droplet from the tip (see the following diagrams).



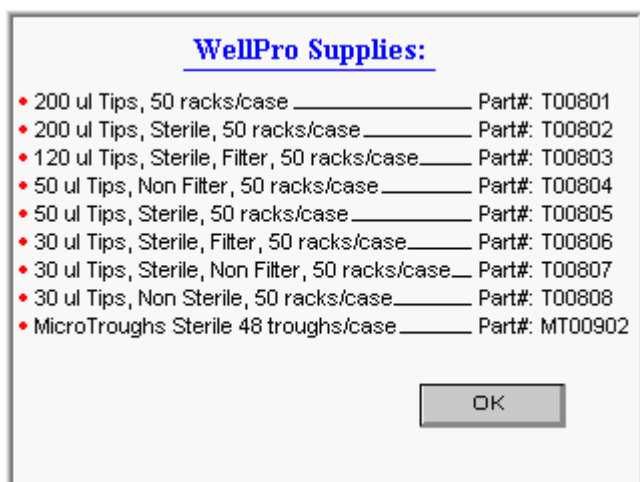
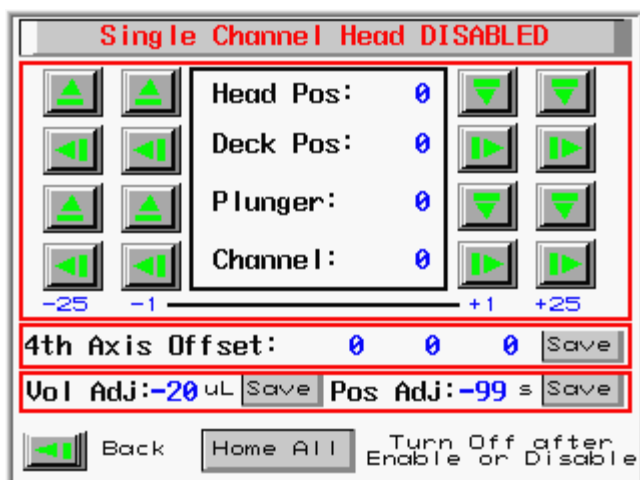
Position of the tip in the plate before dispense

Position of the pipet tip during dispense of Liquid and air blowout/ air gap

When positioning the plate under the tips for a small volume dispense, allow approximately 0.1-0.3mm of space above the well bottom prior to executing the dispense step to allow the droplet to contact the bottom of the well.

Air Gap:

The air volume should be sufficient to assist the separation of the droplet from the tip to the well bottom, but not so great that air bubbles become a problem. The air gap is parameter that is often optimized by trial and error. Approximately every 20 steps = 1ul of air gap for 24 channel head and 8 steps = 1ul of air gap for 12 channel head.

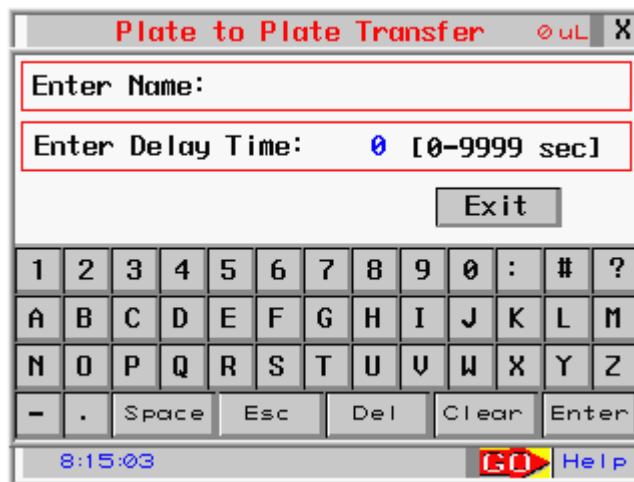
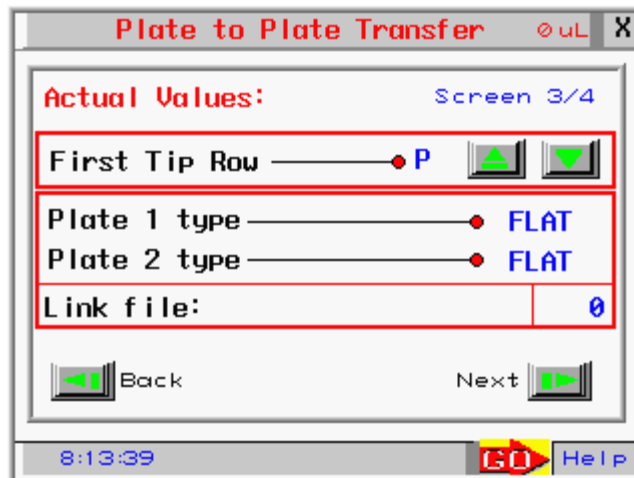


WellPro Support screen can be accessed from the support button located in lower right corner of the main menu. This screen lists available pipette tips and troughs with corresponding part numbers. Please use these part numbers when ordering supplies.

11 LINKING FILES

11.1 Overview

The FILE LINK feature is provided to allow you to join two (or more) stored files as a sequence enabling the user to automate very complex liquid-handling operations. This prompt permits you to direct the WellPro liquid handler to transfer control to another file immediately after completing the file that it is currently running instead of terminating the operation of the file.



11.2 Using Linked Files

When the system is operating using a linked file sequence, the sequence will use the tips indicated in the ENTER FIRST TIP ROW prompt for the first file in the sequence. This prompt appears regardless of whether the tips are to be changed in the first file. The user should respond by specifying the row of tips that you want the WellPro liquid handler to select first.

The WellPro uses the same "counter" to keep track of which tips have been used, whether you have specified tip changes or not. Accordingly, each time the WellPro liquid handler links to the next file in a chain, it sequences through the tip magazine to select the next row of fresh, uncontaminated tips. Likewise, if you start a new file, or restart the same file, the counter automatically increments, causing the WellPro liquid handler to select the next row of unused tips.

When the last row of tips (row A) has been used, the WellPro liquid handler stops automatically and displays the ENTER FIRST TIP ROW prompt again. Change the magazine and specify the row of tips that you want to start with.

Pause - Enter Delay Time: Instead of a time delay you also have the option to have a pop up screen prompt you to press continue before starting the next program. This is done by entering the number "9999" which will create the pause before proceeding command

12 OPERATING HINTS AND MAINTENANCE

12.1 Overview

The WellPro 3000 Liquid Handler is designed to be used with a minimum of maintenance. In this chapter, we describe routine operations that can be performed by the operator



CAUTION: Do not open the "Backpack Electronics" or disassemble the controller unit. There are no operator serviceable components in the instrument other than those describe in the *SERVICE AND MAINTENANCE* and *OPERATING INSTRUCTIONS* sections.



WARNING: For protection from injury by the WellPro liquid handler moving parts, *Do Not Remove* the blue plastic cover while the WellPro liquid handler is operating or the power is on.

12.2 Tips

The WellPro liquid handler has been calibrated using WellPro 96 or 384 disposable tips. The design of the tips and the manufacture of their internal volumes, orifice diameters, lengths, etc. to tight tolerance limits, assure the accuracy and precision of the liquid handler system. The length of the tips is of particular importance, since the proper "draw-off" of liquid from the tip depends heavily on its depth in the liquid that it is in contact with. Tips not manufactured by ProGroup Instrument Corporation may decrease the accuracy and precision of the system.

12.3 Power Interruptions

If the power supplied to the WellPro has been interrupted, the following actions will happen when the power is restored:

1. If you were editing a file, you will lose the file and will have to re-edit the file.
2. If you had just stored a file, the WellPro will store the file.
3. If you are in the middle of a run, you will lose the run. Homing the instrument will sequence it back to a point where you can start over.

12.4 Maintenance

12.4.1 Preventive Maintenance

To ensure trouble-free operation, keep the WellPro liquid handler clean and free of chemicals, dirt, and dust. To ensure trouble-free operation, you should keep your WellPro liquid handler clean and free of chemicals, dirt, and dust. Any liquids spilled on the WellPro liquid handler should be wiped off immediately.

Keep your WellPro liquid handler free of any corrosive reagents. Wipe spills immediately. Clean non contaminated work surfaces regularly with a damp cloth

12.4.2 Cleaning up Spills

If solution is accidentally spilled on the instrument, clean them up immediately. Although all electrical components within the instrument have been either shielded or sealed against fluid contact, there may be long-term deleterious effects from corrosion or salt accumulation. To ensure maximal safety and trouble-free operation, clean up spills immediately. Turn off and unplug the WellPro liquid handler before wiping up spills

12.4.3 Piston Plungers

On a periodic basis, gently apply a light silicone grease to the piston plungers of the 12 or 24-channel liquid head using a clean cloth or lint-free towel. This will keep them sealing well and inhibit corrosion.

12.4.4 Table Rails

The rails on which the WellPro table runs must be kept clean and free of foreign matter to ensure smooth operation. Periodically clean these by wiping with a clean cloth. **ALWAYS BE CERTAIN POWER IS TURNED "OFF" BEFORE CLEANING THE TABLE RAILS.**

12.4.5 Cleaning the Plastic Cover

The plastic covers should be cleaned using a nonabrasive cleaner, and then rinsed with a soft clean damp cloth.

Decontamination may be performed by chemical means. Chlorine bleach is an acceptable decontamination solution. Ethanol and gluteraldehyde **should not** be used on the plastic surfaces. **DO NOT AUTOCLAVE.**

12.4.6 Fuse Replacement

Turn the power switch off and disconnect the power cord from the power outlet before replacing the fuse. This procedure will insure against electrical shocks.

For continued protection against electrical overload and fire hazard, replace the fuse only with one of the same type and rating (3 amps, 250V, Normal blow.)

12.5 Troubleshooting

If you encounter difficulties in the use of the instrument, please contact your local ProGroup Technical Service Department. A ProGroup Instrument Corporation technical service representative may be able to resolve the problem over the telephone using a basic check-out procedures. If the problem cannot be resolved in this manner, the technical service representative will arrange for a field service representative to visit your lab to repair the unit. If the unit cannot be repaired in your lab, arrangements will be made to return the unit to ProGroup for factory repair.

Only qualified personnel should attempt service or repair work on the WellPro operating circuits or mechanism.

Performance Specifications		
	3000 (12 way format)	3000 (24 way format)
<i>Pipetting Channels</i>	12 way format	24 way format
<i>Volume Range</i>	1µl to 200µl in 1µl increments	1µl to 50µl in 1µl increments
<i>Precision</i>		
@ 100µl	<1.0% CV	
@ 50µl		<1.0%CV
@ 10µl	<2.0% CV	
@ 5µl	< 3.0% CV	< 3.0% CV
@ 1µl		< 5.0% CV
<i>Accuracy</i>		
@ 100µl	< +/- 1.0%	
@ 50µl		< +/- 1.0%
@ 10µl	< +/- 3.0%	
@ 5µl	< +/- 3.0%	< +/- 2.0%
@ 1µl		< +/- 3.0%
<i>Throughput</i>		
Serial Dilution		
50µl Transfer Volume No Mixing, No Tip Change Landscape Format	25 seconds	40 seconds
Plate to Plate Transfer		
50µl Transfer Volume No Mixing, With Tip Change on each row Landscape Format	1 minute, 25 seconds	2 minutes, 50 seconds
Plate Filling		
100µl Transfer Volume No Mixing, No Tip Change Landscape Format	50 seconds	1 minute, 30 seconds
Plate Formats	96 well standard, shallow, deep well, microtube, V, U, and flat bottom	384 well standard, shallow, deep well, V, U, and flat bottom
Functions	Serial dilution, reagent addition, mixing, plate replication, sample transfer (plate to plate and within plate)	Serial dilution, reagent addition, mixing, plate replication, sample transfer (plate to plate and within plate)
Technical Specifications		
<i>Dimensions</i>	<i>Controller</i>	<i>Main Unit</i>
Height	6.0"	16"
Width	9.5"	12"
Depth	8.5"	28.5"
Weight	3 lbs.	70 lbs.
<i>Power Requirements</i>	120/220/240 VAC, 47-63 Hz, 2A @	120 VAC, 1A @ 240 VAC
<i>Fuse</i>		3A normal blow
<i>Operating Temperature</i>		23 +/- 3° C (68-79° F)

