

MVS[®]

MULTICHANNEL VERIFICATION SYSTEM



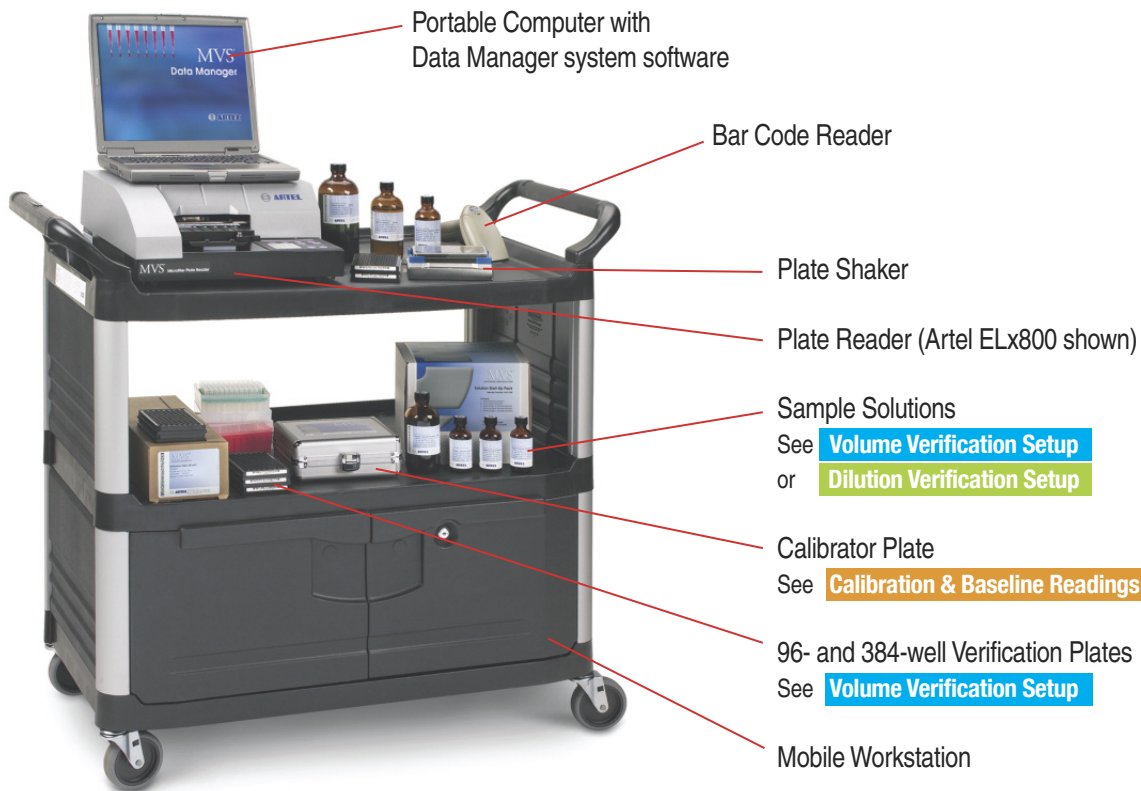
QUICK*Start* **Guide**

For Version 3.0 and higher

MVS QUICK*Start* Guide

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The color-coded bars within the text indicate sections where specific instructions are given.



Connecting the Components

Plate Reader

- Plug one end of the power cord into the power supply for the Plate Reader and the other end into the power strip on the middle shelf of the Mobile Workstation.
- **Artel ELx800:** connect the Plate Reader to one end of the USB cable into the Plate Reader and the other end into the portable computer.
- **Artel PowerWave:** Insert the small end of the serial cable into a USB Serial adapter and connect to the USB port in the back of the Portable Computer.
- Plug the large end of the serial cable into the back of the Plate Reader.
- Insert the remaining plug on the power supply into the power receptacle on the back of the Plate Reader and tighten the attached threaded connector. (Do not over-tighten).

Plate Shaker

Instructions for other plate shakers may be found in section 3.3.3 of the User Guide.

- Connect the Q-Instruments Bioshake 3000 Plate Shaker to its power supply using the single-pronged connector.
- Insert the standard plug of the power supply into the attached power strip on the middle shelf of the Mobile Workstation.
- Connect the standard serial connector to the Portable Computer or use another USB adapter.

Portable Computer

- Plug the three-prong end of the power supply cord into the power strip on the middle shelf of the Mobile Workstation.
- Plug the round end of the cord into the side of the Portable Computer.

Bar Code Reader

- Plug the end of the cord attached to the MVS Bar Code Reader into the USB port on the back of the Portable Computer.

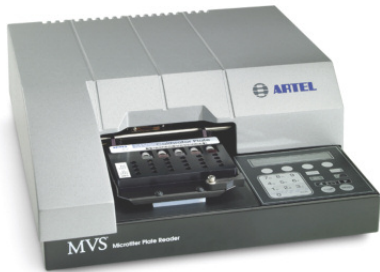
System

Ensure that the power switch on the power strip is off before proceeding.

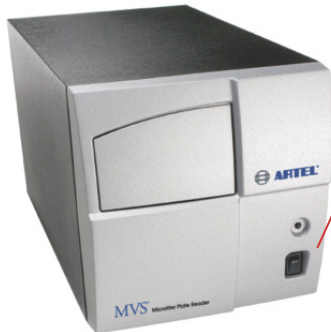
- Plug the power strip located on the middle shelf of the Mobile Workstation into a three-prong electrical receptacle near the instrument under test.
- Check that each individual component is powered off, and then depress the switch to energize the power strip.

Always check the MVS User Guide for more operating information

Powering On



Artel ELx800 Plate Reader

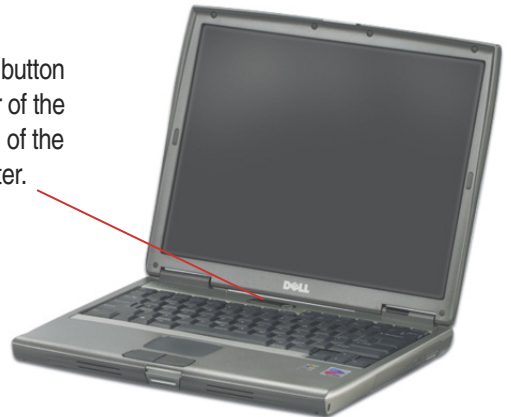


PowerWave Plate Reader

Note: Be sure that the light on the power strip on the back of the Mobile Workstation is illuminated.

- Turn on the power to the Plate Reader by toggling the switch on the right side of the ELx800 Plate Reader or the front of the PowerWave Plate Reader.

- Press the power button on the top center of the keyboard portion of the Portable Computer.



- The ELx800 Plate Reader will perform a 2½ minute self-test after being turned on. The PowerWave Plate Reader is ready for operation immediately.
- The Plate Shaker automatically turns on with the power of the system.
- Wait for the Plate Reader to become ready for operation, then click on the **MVS® Data Manager** software icon on the desktop of the Portable Computer.
- The Data Manager software must be launched after the completion of the Plate Reader self-test (if required) to ensure communication between the components.

Powering Off

- Shut down the Portable Computer (optional).
- Switch the Plate Reader to OFF.
- Pressing the power switch on the power strip on the back of the Mobile Workstation will turn off all components except the portable computer, which will continue to run on battery power.

Calibrating the Plate Reader

Initiate calibration

- Select **File | Plate Reader Calibration** to begin calibrating the Plate Reader. The Calibrator Plate will also be requested if it has not been measured for the last 10 hours.

Scan the bar code on the Calibrator Plate

- Using the Bar Code Reader to scan, highlight the bar code on the Calibrator Plate until the Plate Reader sounds a tone.

Check for bubbles and dirt

- Before testing the Calibrator Plate, position the large bubble in each of the calibrator cuvettes in the top window of the cuvette. If the bubble is not in this position, gently tap the plate in a vertical orientation until all bubbles rise to the top of the cuvette.

Cleaning recommendations

- Always use gloves when cleaning the calibrator plate.
- Clean smudges using the microfiber cloth included in the cleaning kit. Do not use sharp objects on the glass.
- Use the included Mira swabs to clean the edges of the glass close to the Calibrator Plate frame.
- Only use the included cleaning liquid if spots cannot be cleaned with the cloth or swabs. Use sparingly.



Quick Tips:

- Calibrator Plate and Baseline Plate readings are retained for ten hours.
- It is recommended that the Plate Reader calibration be repeated if the temperature changes by $\pm 2^{\circ}$ C or if the MVS is moved to a new location.
- A Baseline Plate reading is required for each Plate Type used, i.e., 96-well or 384-well.
- All MVS components should equilibrate to room temperature for 1 hour before use.

Read the Calibrator Plate

- Gently place the Calibrator Plate onto the Plate Reader tray and secure it into place. The label on the Calibrator Plate will be facing up with the name reading from left-to-right. Click **OK** when complete. The Plate Reader will begin taking readings at the required wavelengths.

If using the PowerWave Plate Reader: Once the first reading is complete, rotate the Calibrator Plate so that the label is upside-down, facing up. Click **OK** again and the Plate Reader will collect additional readings.

- Data Manager will automatically notify the operator if the readings are not within specification. Refer to section 7.2 of the User Guide for troubleshooting if the Calibrator Plate reading fails.

To reset Plate Shaker speed:

- Select **Preferences** from the Options menu.
- In the Plate Shaker Settings area, adjust the speed for the appropriate Plate Type.
- To return to default settings, click the **Default** button next to the speed field.

Measuring the Baseline Plate

• Scan the Baseline Solution

Upon completing the Calibrator Plate reading, Data Manager will prompt the operator to scan the Baseline Solution bar code and the bar code on the Baseline Verification Plate, if applicable. Data Manager requires individual Baseline Plate readings for each Plate Type used.

• Fill the plate with Baseline Solution and shake

Follow the next prompt and fill all wells of the microtiter plate with the requested amount of Baseline Solution.

If filling a 384-well plate, centrifuge to remove any bubbles. Place on the Plate Shaker. After shaking completes, examine the microtiter plate to ensure that no splashing of liquid occurred during shaking. Reduce the speed of the Plate Shaker if needed. If splashing occurs, discard the microtiter plate, press **Cancel** and repeat the test.

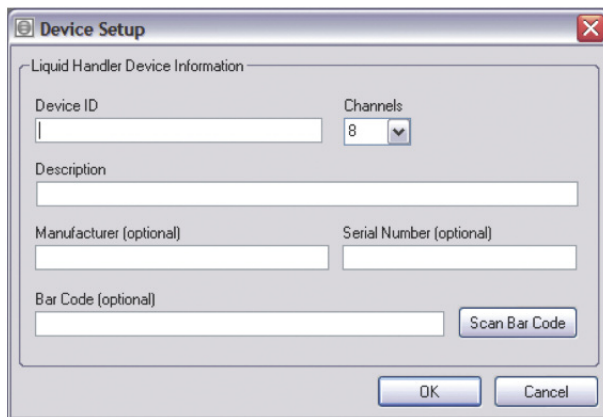
• Read the Baseline Plate

Once the shaking step is complete, secure the Baseline-filled microtiter plate onto the Plate Reader tray. When complete, click **OK**. The Plate Reader will read the microtiter plate and then eject it. Discard this plate after use.

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Liquid Handler Setup

- At the main screen, select **File | Liquid Handler Setup**.
- The Device Manager will open.
- Click **Add** to open the Device Setup window (see screen image at right).
- Enter the required information for the Device ID, number of Channels and a Description.
- Once a liquid handler has been added it will be saved for future verifications.
- Optional fields for Manufacturer, Bar Code and Serial Number may be completed.
- Click **OK** twice to close the Device Manager window and commit the changes to the database.
- Clicking **Cancel** will undo any changes made to the device list since the window was last opened.



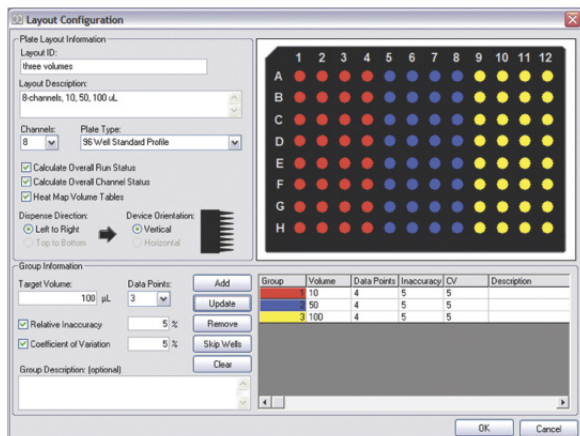
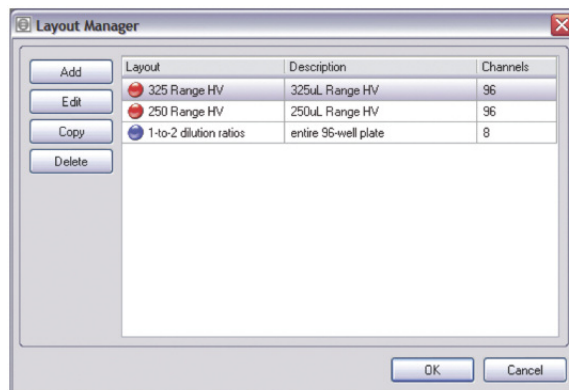
The screenshot shows a 'Device Setup' dialog box with the following fields and controls:

- Device ID:** A text input field.
- Channels:** A dropdown menu currently set to '8'.
- Description:** A multi-line text area.
- Manufacturer (optional):** A text input field.
- Serial Number (optional):** A text input field.
- Bar Code (optional):** A text input field with a 'Scan Bar Code' button to its right.
- Buttons:** 'OK' and 'Cancel' buttons at the bottom right.

Volume Verification Setup

Plate Layout Setup

- At the main Data Manager screen, select **File | Plate Layout Setup**.
- The Layout Manager will open (see screen image at right). Red coded entries indicate volume verification layouts, while blue coded entries indicate dilution layouts.
- Click **Add** and select **Volume Verification Layout** to display the Layout Configuration window (see screen image below).



Add a Volume Verification Plate Layout

- Enter a unique Layout ID, a Layout Description, and then select the number of Channels and the Plate Type for the Plate Layout.
- If desired, check the boxes to calculate the Overall Run Status and/or the Overall Channel Status. If both are unchecked, no pass/fail status will be applied.
- If desired, check the box to display the Heat Map.

- The Dispense Direction and Device Orientation will determine how the statistics are calculated in the Output Report. For more information, see section 5.3.1 of the User Guide.

- Begin entering Group Information: select the Target Volume, the number of Data Points, and set the tolerance limits for Relative Inaccuracy and Coefficient of Variation.

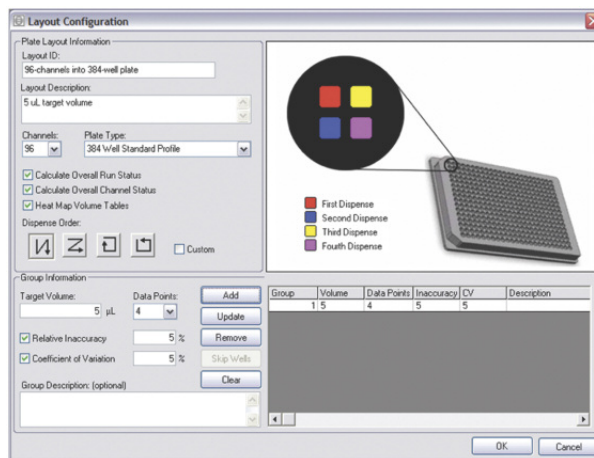
- The Data Points drop-down list will only contain numbers which follow the two rules for Layout Groups in Plate Layouts (not including 96- or 384-channel devices):

- 1) Each must contain at least 3 data points, and
- 2) Each must span an entire row or column.

- In the Advanced edition of Data Manager, 96-, 8-, and 16-channel devices can also be set up to index into a 384-well microtiter plate for Plate Layouts.

When dispensing with 96-channel devices into 384-well plates:

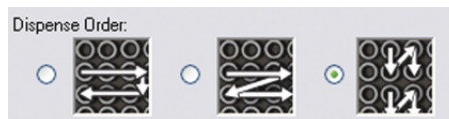
- To create a custom dispense order, using the mouse, click the **4 quadrants of the large circle** in the picture in the order that the liquid dispense will occur (see screen image at right).



- Each quadrant will be highlighted with the color indicating the First, Second, Third or Fourth Dispense, as shown in the key below the circle.

When dispensing with 8-channel devices into 384-well plates:

- Select, from the three options, the dispense order that matches the liquid handler dispense pattern.



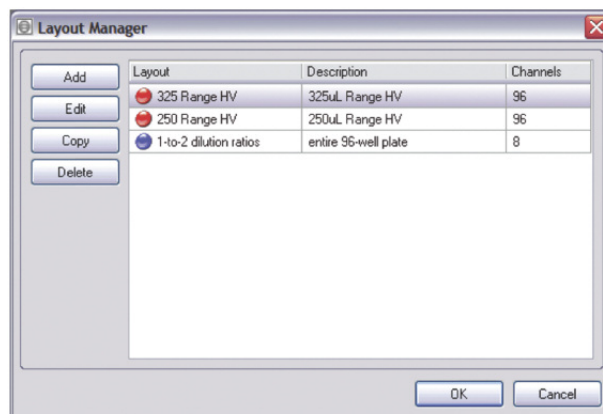
Dilution Verification Setup

Plate Layout Setup

- At the Main Screen, select **File | Plate Layout Setup**.
- The Layout Manager will open (see screen image at right).
- Click **Add** and select **Serial Dilution Layout** to display the Layout Configuration window.

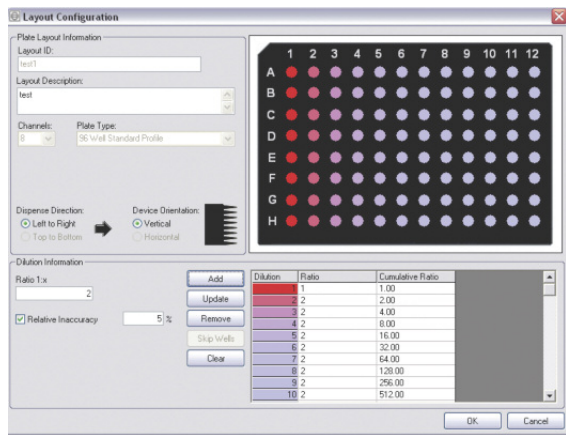
Add a Dilution Plate Layout

- Enter a unique Layout ID, a Layout Description, and then select the number of Channels and the Plate Type for the Plate Layout.
- The Dispense Direction and Device Orientation settings are automatically set as Left-to-Right and Vertical for the 8-channel, and Top-to-Bottom and Horizontal for the 12-channel dilutions respectively in 96-well plates.
- The dispense direction settings must be defined when using an 8-channel dispenser and a 384-well plate. Choose the correct dispensing pattern from the options by clicking the button next to the appropriate icon. The settings are automatically set as Top-to-Bottom and Horizontal for 12-channel dilutions in 384-well plates.



- In the Dilution Information section, enter a target dilution ratio and set the tolerance limit for Relative Inaccuracy, then click **Add**. Repeat for each dilution step (see screen image at right).
- The Relative Inaccuracy setting will be used for all dilutions in the Plate Layout and, if enabled, ratios exceeding the tolerance limit will be highlighted on the Output Report.
- For Plate Layouts with multiple dilution steps and an overall dilution ratio greater than 1:4, multiple Sample Solutions and microtiter plates will be required.
- The table to the right will assist with determining which Sample Solutions will be needed to accurately measure the target dilution ratios.

Note: Total volume in plate wells must be between 100 and 200 μL in a 96-well plate, or 28 and 55 μL in a standard 384-well plate after dilution steps have been completed.



Sample Solution	Dilution Range
Range A	1 – 1:3.99
Range B	1:4 – 1:19.99
Range C	1:20 – 1:99.99
Range D	1:100 – 1:399.99
Range E	1:400 – 1:2048

Always check the MVS User Guide for more operating information

Running a Verification

The color-coded bars within the text indicate sections where specific instructions are given.

► A: MVS Data Manager (Main Screen)

Select **File | Start New Verification** or click the **green circle icon** on the toolbar to begin the verification process.

*If there are no liquid handler devices entered into the program, the operator will be prompted to add a device. Press **Enter** or click **OK** to open the Device Manager and **add a device**.*

*If the Plate Reader has not been calibrated, the software will prompt for **Calibrator and Baseline plate readings**.*

► B: Device List Window

Highlight the device to be tested or scan the bar code on the device. Click **OK**.

*If the Device ID is not listed, proceed to File | Liquid Handler Setup and **add a new device**. A **Layout** with the same number of channels must be created through File | Plate Layout Setup.*

► C: Verification Setup Window

Choose a Plate Layout and a Plate ID from the corresponding drop-down lists. To select an Alternative Solution for a group in the layout, check the box at the bottom of the window. Click **OK**.

*To add a new **Plate ID**, cancel the Verification window, select **File | Plate Library** and click **Add**. To add a new **Alternative Solution**, cancel the Verification window, select **File | Alternative Solution Library** and click **Add**.*

► **D: Please scan the bar code on the bottle of MVS Range ____ Sample Solution.**

Using the Bar Code Reader, highlight the bar code on the Sample Solution bottle to be used until a tone sounds.

The software will prompt to scan all required Sample Solution bar codes depending on the layout and target solutions used. This prompt will be skipped if the Plate Layout uses only Alternative Solutions.

► **E: Please scan the bar code on the bottle of MVS Diluent Solution.**

Using the Bar Code Reader, highlight the bar code on the Diluent Solution bottle to be used until a tone sounds.

The Diluent will not be requested for groups with a Target Volume greater than 200 μ L in a 96-well plate, or volumes equal to the total volume allowed in a 384-well plate (55 μ L in a 384-well Standard Profile plate, etc.).

► **F: Please scan the bar code on the MVS Verification Plate.**

Using the Bar Code Reader, highlight the bar code on the MVS Verification Plate to be used until a tone sounds.

This prompt will not appear if a Plate ID other than “MVS Verification Plate” is chosen in the Verification Setup window.

Running a Verification (continued)

▶ **G: Please scan the bar code on the appropriate box of MVS Verification Plates.**

Using the Bar Code Reader, highlight the bar code on the appropriate box of MVS Verification Plates until a tone sounds.

This prompt will only appear once per lot of MVS Verification Plates.

▶ **H: Please fill the (Plate ID) 1 of ___ with solutions as specified in the table below.**

Using the device under test, fill the plate according to the displayed layout.

It is recommended that 384-well plates be centrifuged after filling (e.g. 1 minute @ 1200 RPM) to remove bubbles in the wells and to flatten the menisci. On-board mixing is also recommended for 384-well plates if using the Variomag Plate Shaker.

▶ **I: Please place the plate on the Titer Plate Shaker.**

When the plate is affixed to the shaker, click **OK**.

*Check the plate to ensure that no splashing of liquid occurred during shaking and that the liquid is thoroughly mixed. **Adjust the speed** of the Plate Shaker accordingly. Refer to the table below for more information.*

Default Plate Shaker Speed & Duration (for Standard Profile Plates):

	Variomag		Big Bear		Q. Instruments	
	96-well	384-well	96-well	384-well	96-well	384-well
Speed (RPM)	1300	1800	1300	2700	1500	2600
Duration (s)	60	180	60	120	60	120

► **J: Please insert the (Plate ID) into the Plate Reader.**

Gently secure the plate on the Plate Reader tray with well A1 in the top-left position of the reader. Click **OK**.

For 96- and 384-channel devices only: The number of data points set in the Plate Layout will determine the number of times the software will repeat steps H through J.

Always check the MVS User Guide for more operating information

Alternative Solution Preparation

Use the Alternative Solution Helper to Determine Preparation Protocol:

- Launch the Alternative Solution Helper software from the desktop icon or through the installation folder.
- Select **New Solution File** from the File menu and choose one of the four Plate Types.
- Enter the Target Volume to test.
- Refer to the Alternative Solution Table below for the approximate Target Volume limits for each Plate Type.
- Enter the Batch Volume. Artel recommends a Batch Volume of at least 30 mL.
- Enter the Solvent Density. This value will also need to be entered into the Data Manager software.
- Click **DONE** and a report will be generated detailing the target weights of both the appropriate MVS Stock Solution and the solvent in order to achieve the Target Volume entered above (see screen image at right).
- The report will include usable volume ranges for the solution in each Plate Type. Follow the Dilution Instructions and record the actual weights that will be entered into Data Manager.

Solution 031607120139

Alternative Solution Reference Sheet

This guideline should be printed and utilized as a reference to create an Alternative Solution for verifying the performance of a liquid handler at the defined target volume. The actual weights, in grams, of each component of the Alternative Solution should be collected and recorded during the weighing process on an analytical balance.* The actual weights must be entered into the Alternative Solution Library of the MVS Data Manager software prior to usage. For more information on preparing and using Alternative Solutions, please refer to Appendix C of the MVS Procedure Guide or search for topics related to Alternative Solutions in the Help menu of the MVS Data Manager software.

*Note: The actual weight of each component has a direct effect on the usable volume range of the prepared Alternative Solution. To ensure the usable volume range agrees with the formulation in this reference sheet, care should be taken when weighing each component.

Plate Type: 96
Target Volume (µL): 5
Batch Volume (mL): 50
Solvent Density (g/mL): 1.1

	MVS Stock 1 Solution	Solvent Solution
Desired Weight (g)	4.9436	49.6036
Actual Weight (g)		

Approximate 96 Channel Volume Range: 1.8-11.0
Approximate 384 Channel Volume Range: 0.5-2.9

Alternative Solution Volume Range per Plate Type

Plate Type	Supported Volume Range (µL)	MVS Stock Solution
96 Well Standard Profile	0.4 – 9.9	1
	10 – 49.9	2
384 Well Standard Profile	0.1 – 2.49	1
	2.5 – 9.9	2
384 Round Well Low Volume	0.05 – 1.49	1
	1.5 – 3.99	2
384 Well Low Profile	0.04 – 1.49	1
	1.5 – 3.99	2

Prepare Alternative Solution:

Note: Record weights, in grams, of MVS Stock Solution and solvent during sample preparation.

- Place a clean, amber bottle with cap on the balance pan and press tare.
- Add the amount of MVS Stock Solution determined using the Alternative Solution Helper instructions above. Replace the cap on the bottle.
- Record the weight once the balance reaches equilibrium.
- Remove the cap, place it on the balance pan and press tare.
- Add the appropriate amount of solvent determined using the Alternative Solution Helper.
- Replace the cap on the bottle and record the weight of solvent when the balance has reached equilibrium.
- Mix each Alternative Solution by inversion approximately 20 times.
- Label the bottle with the Stock and Solvent weights, the Solvent Density and the date.
- Allow the solution to equilibrate to room temperature before using in any tests.
- **Add the Alternative Solution** to Data Manager.

Always check the MVS User Guide for more operating information

Alternative Solution Verification

Add the Alternative Solution to the Library:

- Select **Alternative Solution Library** from the File menu and click **Add**.
- Enter a unique ID and Description. Click **Select Stock Solution** and scan the appropriate MVS Stock Solution with the Bar Code Reader.
- Enter the Solvent Solution density.
- Enter the weights of the solutions used to prepare the Alternative Solution into the Stock Solution and Solvent Solution fields.
- Click **Calculate** to determine the appropriate volume ranges for the solution (see screen image at right).
- Click **OK** twice to save changes and start a new verification, as described in the flowchart below.

Alternative Solution Setup

Alternative Solution Information

Alternative Solution ID: DMSO test 3 Date Prepared: 2/11/2008

Alternative Solution Description: test

MVS Stock Solution Lot Number: T1051305060126589 Stock Solution Type: Stock 1

Solvent Solution Density (g/mL): 1.1

	Weight (grams)	% of Component (vol/vol)
MVS Stock Solution	1.055	2.2%
Solvent Solution	50.12	97.8%

Plate Type Useable Volume Range (µL)

96 Well Standard Profile	8.0-48.3
384 Well Standard Profile	2.1-9.9
384 Round Well Low Volume	1.1-3.9
384 Well Low Profile	1.1-3.9

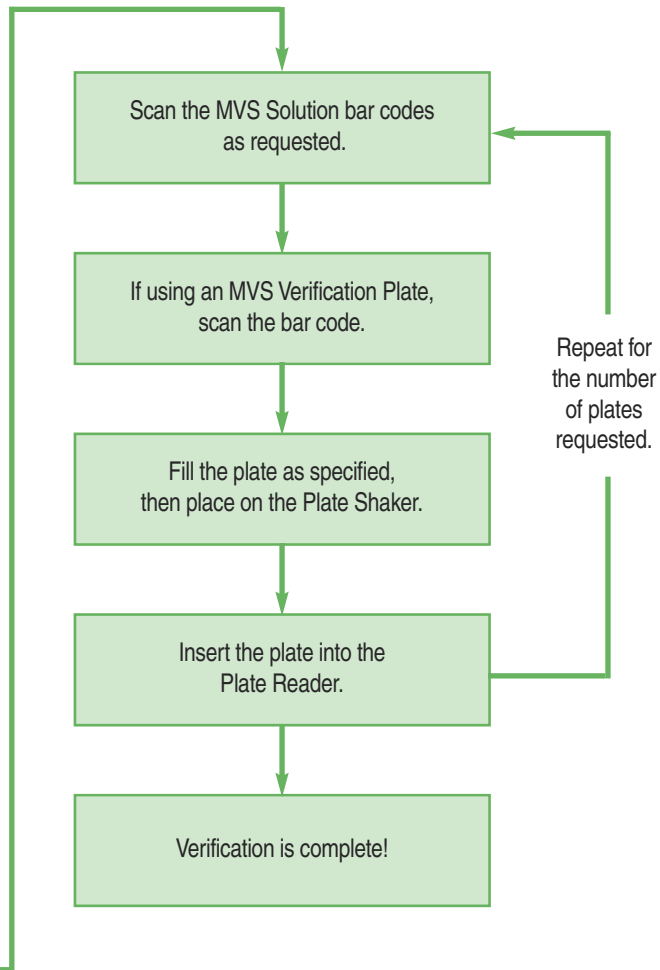
* No System Specifications are provided for verifications using Alternative Solutions.

MVS Data Manager (Main Screen):
Select **Start New Verification** from the file menu.
Highlight the Device ID to be tested and click **OK**, or scan the bar code on the device.

Verification Setup:
Choose the Plate Layout and Plate ID from the drop-down lists. Check the box for "Run Verification with Alternative Solution."

Alternative Solution Verification Setup:
Choose the target solution for each group from the corresponding drop-down list.

(Skip if a valid Baseline reading is stored for the selected plate type)
Scan the MVS Baseline Solution bar code.
Fill the plate as specified with the Baseline Solution and place on the Plate Shaker.



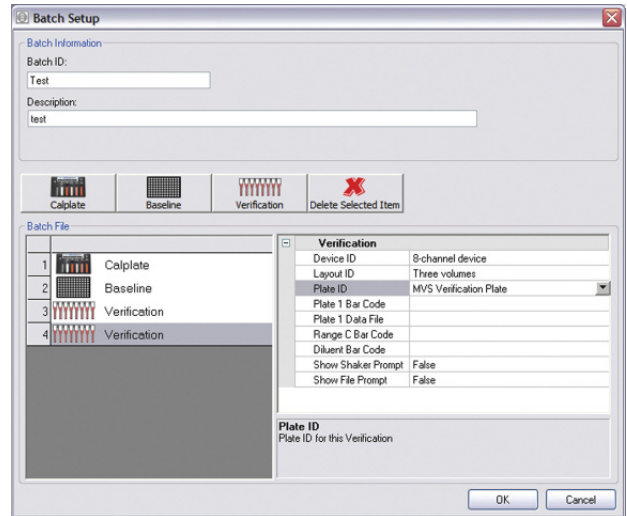
Always check the MVS User Guide for more operating information

Batch Verifications Function

Note: the Plate Reader Type must be set to **None/Import from file** within the Preferences window in order to see the **File Prompt**.

Batch Verification Setup:

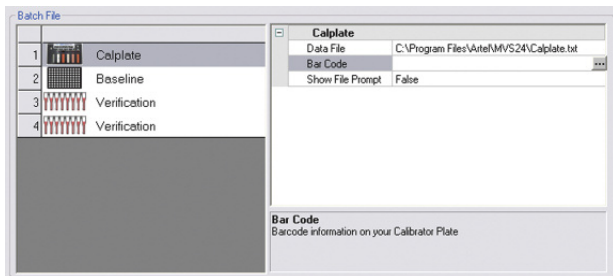
- From the Batch menu, select **Batch Manager**.
- Click **Add** to open the Batch Setup window (see screen image at right).
- This window requires a unique Batch ID and a Description.
- The Calibrator Plate (Calplate), Baseline and Verification items can then be added to the Batch File by clicking the corresponding button.
- Items can be deleted from a Batch File by selecting them from the list on the left, and clicking **Delete Selected Item**.



Calibrator Plate:

Properties for the Calplate item can be modified by populating the following fields (see screen image at left):

- **Data File:** Select a data file to import absorbance values.
- **Bar Code:** Scan and store the bar code.
- **Show File Prompt:** Select **True** to prompt for a data file at run-time.



Baseline Plate:

Properties for the Baseline item can be modified by populating the following fields:

- **Plate Type:** Select the Baseline Plate Type. The Plate Type must match the Plate Type used for the corresponding verifications.
- **Data File:** If importing, browse for the data file.
- **Baseline Bar Code:** With the Bar Code Reader, scan and store the bar code from the bottle of Baseline Solution.
- **Show Plate Shaker Prompt:** The property **Show Plate Shaker Prompt** allows the operator to either pause the Batch to shake each plate or, by choosing **False**, to skip the shaking step and run the Batch without interruption.
- **Show File Prompt:** Select **True** to display the prompt at run-time, pausing the run. Select **False** to enable the batch to import the data file at the location set for that property.

Notes:

- *When new solutions and/or plates are used, the stored bar codes must be updated.*
- *The Plate Shaker Control window within the Options menu can be used to shake the plate(s) before beginning the batch.*
- *Alternative Solutions and Serial Dilution Layouts are not currently supported in the Batch Verification function.*
- *Any required information that is not entered will be requested during run-time.*

Verification:

Properties for the Verification item can be modified by populating the following fields:

- **Device ID:** Choose a Device ID from the drop-down list.
- **Layout ID:** Choose a Layout ID from the list of compatible layouts.
- **Plate ID:** Choose a Plate ID from the list of compatible plates.
- **Bar Codes | Data Files:** Required bar codes can be scanned in advance and data files can be pre-selected for importing.
- **Show Plate Shaker Prompt:** Select **True** to display prompt at run-time, or **False** to run the batch without interruption.
- **Show File Prompt:** Select **True** to display the prompt at run-time, pausing the run. Select **False** to enable the batch to import the data file at the location set for that property.

Save and Run:

- Click **OK** to save the new Batch Verification or **Cancel** to discard it.
- Once a Batch Verification is created, select **Start Batch Verification** from the Batch menu and then choose the appropriate Batch Verification from the list.

Always check the MVS User Guide for more operating information

Test Reports

- After all required microtiter plate readings have been collected, Data Manager will display a Test Report (see screen images below) similar to those shown in Appendix F of the MVS User Guide. Reports may also be automatically exported by checking the box in the Options menu.
- The Test Report can be exported in HTML or XML format and may be imported to a spreadsheet program for further analysis.
- The yellow or orange colored cells represent dispensed volumes or dilution ratios that exceed the user-defined limits for Relative Inaccuracy and/or Coefficient of Variation.
- If the Heat Map was enabled in the Plate Layout, the Test Report will display colored data points representing the variation in volumes within that Layout Group.
- If the Security System is active, Data Manager will prompt for a password once all scans are completed. This process attaches an electronic signature to the end of the Test Report and logs the action in the Audit Trail.
- The electronic signature should be considered the equivalent of a dated, handwritten signature applied to the test result.
- Comments that are added to the report are saved, but any changes to the way data is viewed, such as **Change Limits**, will not be saved.

ARTEL MVS TEST REPORT

Data Manager 3.0.0.13

Date: 06 Sep 20XX
 Time: 1:21:40 PM GMT-4
 Liquid Handler Device ID: test
 Liquid Handler Device Description: test
 Layout ID: test
 Layout Description: test
 Channels: 8
 Dispense Direction: Left to Right
 Device Orientation: Vertical

MVS Specifications

Plate Legend

1	2	3	4	5
---	---	---	---	---

Relative inaccuracy pass/fail limit 5%

Step-Wise Dilution Ratios

	1	2	3	4	5	6
A	0.966	2.173	2.019	2.012	2.045	2.006
B	0.963	2.008	2.003	2.007	2.037	2.012
C	0.967	1.972	1.989	1.986	2.014	1.997
D	0.967	1.975	1.984	1.993	2.004	1.994
E	0.967	1.989	1.982	1.995	2.007	1.987
F	0.964	1.979	1.984	2.003	2.000	1.999
G	0.977	1.967	1.986	1.995	2.014	1.996
H	0.974	2.039	2.005	2.007	2.033	2.004

Test Report (partial)

Full report also contains lot numbers, materials used, expiration dates, electronic signatures, comments, etc.

ARTEL MVS TEST REPORT

Data Manager 3.0.0.15

Date: 21 Sep 2011
 Time: 4:02:40 PM GMT-4
 Liquid Handler Device ID: 12-channel
 Liquid Handler Device Description: test
 Layout ID: 12-channel test
 Layout Description: 10 uL
 Channels: 12
 Dispense Direction: Top to Bottom
 Device Orientation: Horizontal

Traceable Results* MVS Specifications

Volume Range	Inaccuracy	Imprecision
0.1000 µl to 0.1999 µl	3.0%	0.5%
0.2000 µl to 350.0 µl	2.0%	0.4%

Group 1 Statistics

Target volume (µL) 10
 Target solution Range B
 Number of data points per channel 4
 Mean volume for all channels (µL) 12.496
 Relative inaccuracy for all channels 24.96%
 Standard deviation for all channels (µL) 0.294
 Coefficient of variation (CV) for all channels 2.35%
 Relative inaccuracy pass/fail limit 5%
 Coefficient of variation pass/fail limit 5%
 Status based on channel results Failed
 Status based on run statistics Failed

Group 1 Well Volumes (µL)

	1	2	3	4	5	6	7	8	9	10	11	12
A	13.047	12.074	12.672	12.609	12.282	12.865	12.266	12.365	12.554	12.940	12.225	12.447
B	12.536	12.440	12.478	12.312	12.893	12.070	12.295	12.517	12.370	12.775	12.941	13.031
C	12.835	12.532	12.370	12.717	12.657	12.525	11.995	12.044	12.009	12.743	12.229	12.768
D	12.185	12.254	12.429	12.697	12.627	12.454	12.707	12.298	12.420	12.103	13.059	12.125



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