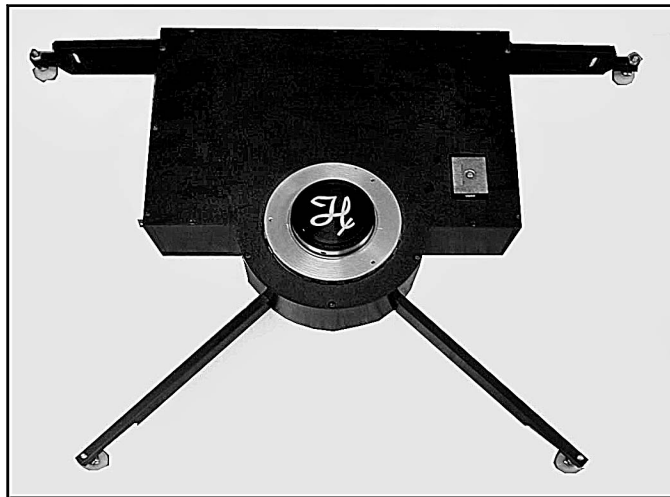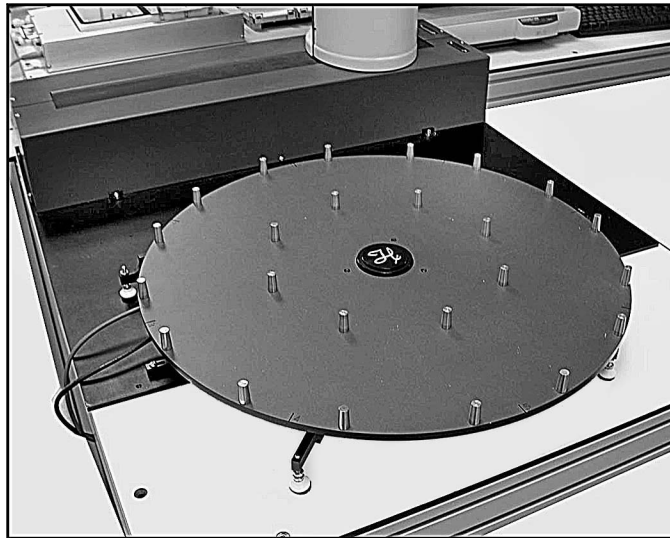# MICROLAB® Carousel

User Guide

Part Number 8534-01 (Rev. A)
June 2003

HAMILT🜨N
THE MEASURE OF EXCELLENCE℠

Contents

About this guide

This user guide is for instructional and reference purposes. It describes the components of the carousel and provides instructions for set up and operation.

About the MICROLAB® Carousel

The MICROLAB® Carousel (figure 1) is a modular component. The carousel is intended for use with the MICROLAB® SWAP application. Multiple units can be placed around a MICROLAB® SWAP (**Sw**ivel **A**rm **P**latehandler) to provide additional plate capacity for a MICROLAB® pipetting workstation. The carousel provides an integrated solution for increased volume for plate based sample processing.

The carousel works with two platter sizes to address multiple capacity requirements. Various SWAP stacks and shelves can sit atop the carousel, providing storage of plates and plate sized consumables.

The carousel can also be used for storage of disposable tips, for some applications and instruments.

MICROLAB® Vector software is used to control the carousel.
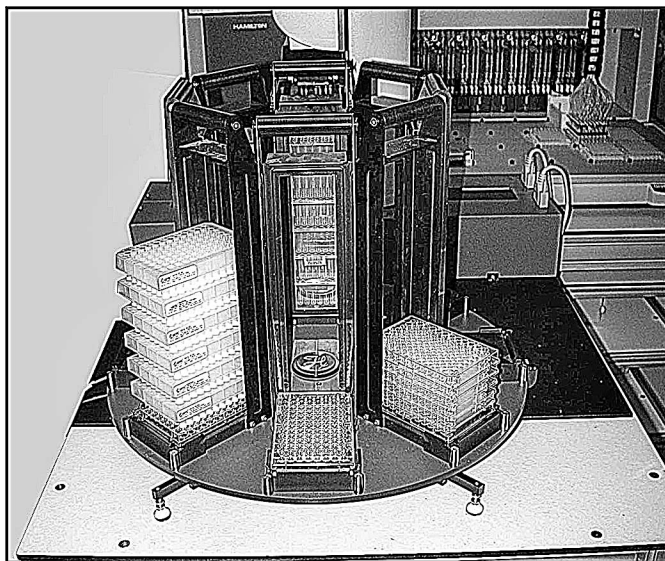
Figure 1:   Carousel accessory

Safety precautions

There are four symbols used in this guide.

The "Warning" symbol contains information that must be followed to prevent personal injury to those operating the equipment.

The "Important" symbol contains information or instructions that must be followed to prevent damage to equipment or loss of data.

The "Note" symbol provides information useful for improving system performance, increasing your understanding of the system, or directing you to supplemental information.

The "Procedure" symbol is followed by a set of installation or operational steps.

FCC compliance

The MICROLAB® Carousel complies with the limits for Class B digital devices by the Federal Communications Commission (FCC). This compliance provides reasonable protection against harmful radio communication interference during instrument installation and operation.

The MICROLAB® Carousel generates, uses, and can radiate radio frequency energy. Hamilton Company cannot guarantee the MICROLAB® Carousel against radio or television communication interference. However, if you use the instrument as directed, you can limit potential interference.

If the MICROLAB® Carousel causes any radio or television interference, we suggest that you:

• Turn the MICROLAB® Carousel off and on to determine whether it is generating the interference.

• Reorient or relocate the receiving antenna.

• Increase the separation between the MICROLAB® Carousel equipment and the receiver.

• Connect the equipment to an outlet on a different circuit than the receiver.

• Contact the instrument dealer or an experienced radio/TV technician for help.

Carousel components

The carousel consists of the carousel platter, carousel housing assembly, cables, and hardware for attaching the carousel to a SWAP base plate.

The carousel platter comes in two sizes, 10 position universal and an 8 position portrait (figure 2). Each position is numbered.
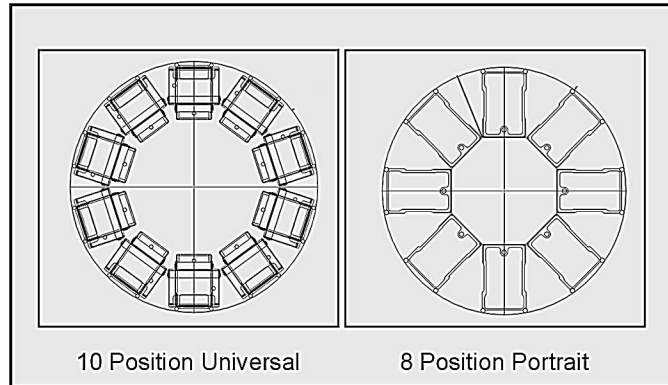

10 Position Universal   8 Position Portrait

Figure 2:   Platter sizes

The carousel housing assembly (figure 3) houses belts, pulleys, motor, and a carousel access interface PCB assembly.
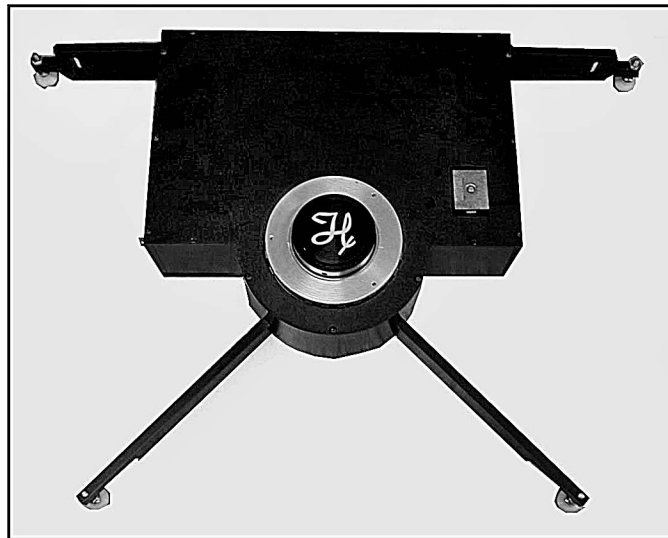

Figure 3:   Carousel housing assembly

Setting up the carousel

The carousel can be place at the right, left, or front of a ML 4000 base instrument. It is integrated with the ML 4000 via a ML SWAP integration kit.

Carousel housing assembly

If the base plate has not been installed, refer to the "Attaching the base plate to the ML 4000" of the ML SWAP/4000 Series Integrated System User Guide (7157-01).

To install the carousel housing assembly to the base plate:

1. Place the carousel housing assembly on the base plate, opposite the ML SWAP. Position the housing assembly so that the front end is near the edge of the base plate. See figure 4.

Front end of housing assembly on the edge of the base plate.
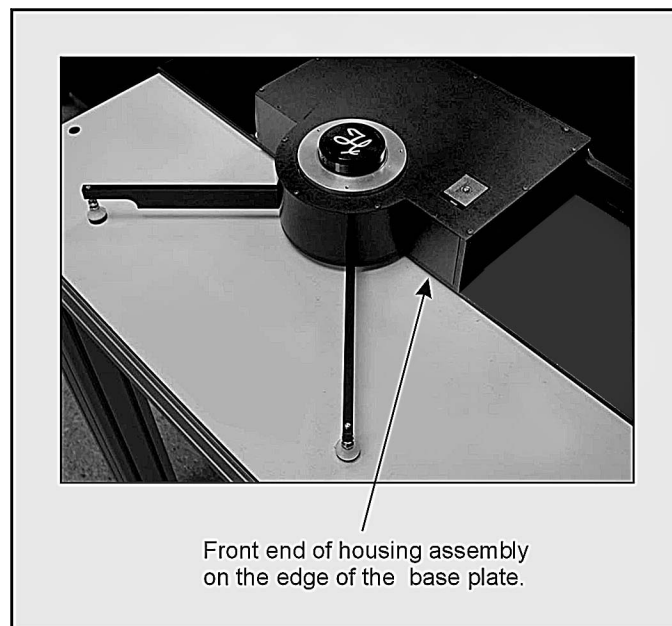
Figure 4:   Carousel housing on base plate

2. Determine how close the housing assembly must be to the ML SWAP. There are three positions possible represented by three threaded holes in each side of the housing assembly (see figure 5).

   Position 1 is closest to the ML SWAP, and Position 3 is the farthest away. If you plan to use the shelves on the carousel, you must use Position 3. If no shelves will be used, you can use any position, but you may wish to use Position 1 to minimize bench space and maximize throughput.

3. Secure the carousel base plate brackets (7918-01) to the left and right sides of the housing assembly, in the desired position (1, 2, or 3), with the washer and screw shown in figure 5.

4. Align the holes of the brackets to the holes in the ML SWAP base plate. Using the screws and washers supplied, secure the brackets to the base plates (see figure 5).
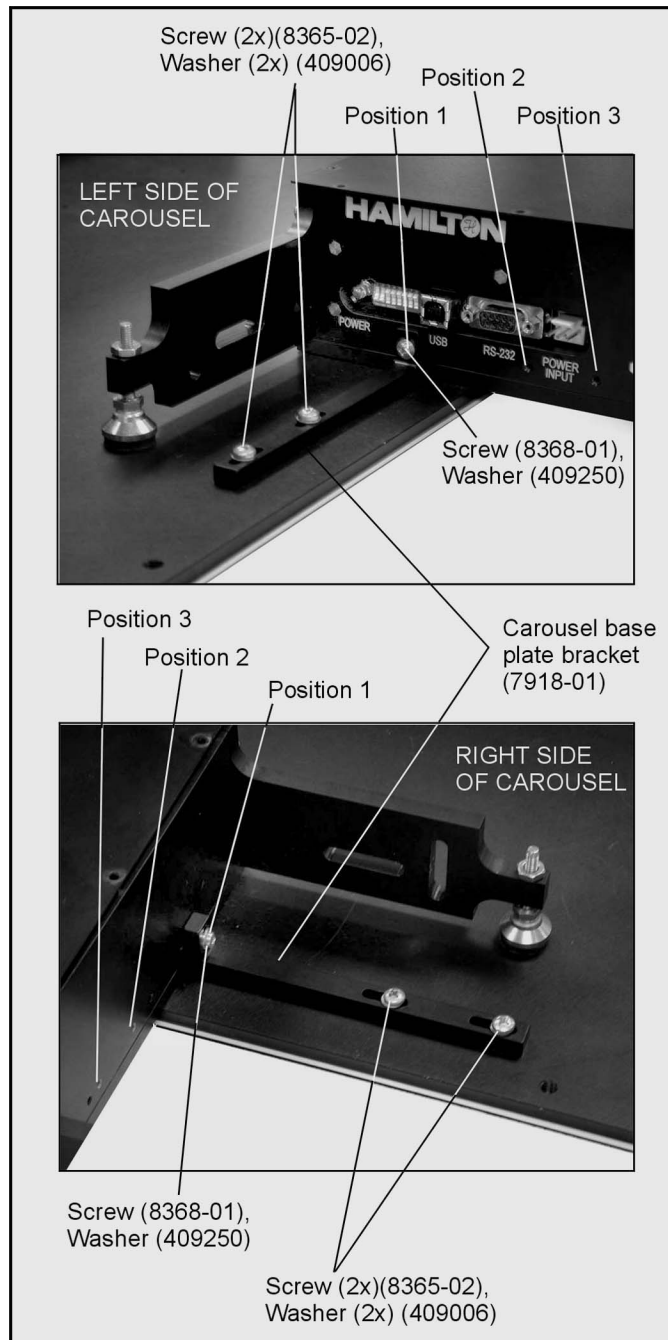
Figure 5: Right and left sides of carousel housing assembly

Index bracket platter kit

The carousel comes with an index bracket kit (8488-01 or -02). The index bracket is used during calibration.

To install the index bracket to the carousel housing assembly:

1. Mount the index bracket (8322-01 or -02) to the right side of the carousel housing assembly, using the two screws (8365-01) supplied from the index bracket kit. See figure 6.

2. Mount the index pointer (8383-01 or 8527-01) on to the index bracket, using two screws (8375-01) supplied from the index bracket kit. See figure 6.

Figure 6:   8/10 station carousel index bracket components

DIP switch setting

Before connecting the carousel to the PC, the communication settings must be checked and, if necessary, adjusted.
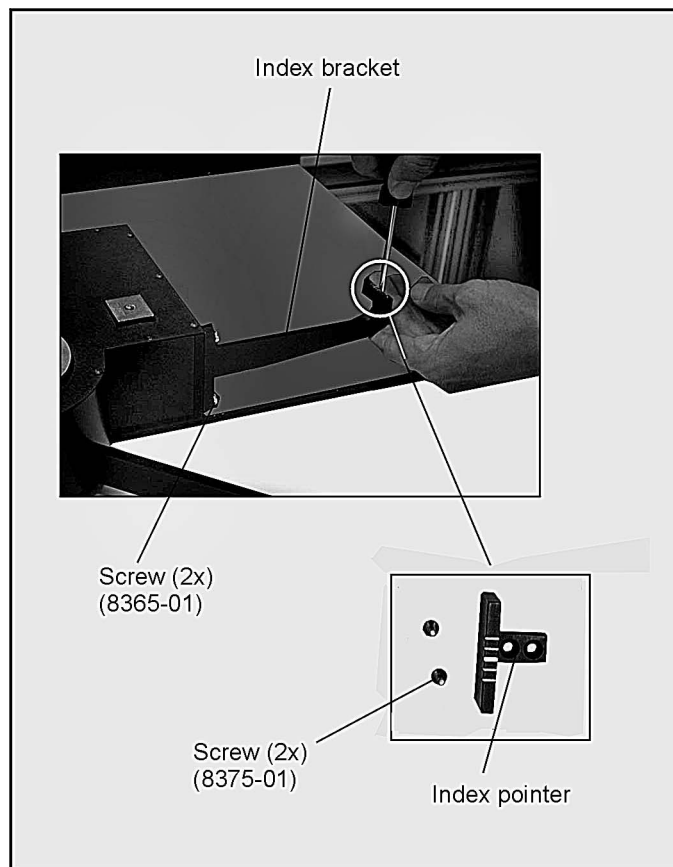
To set the DIP switch settings of the carousel:

1. Locate the DIP switch on the left side of the carousel housing assembly (figure 7).

2. Check and, if necessary, set the switch as needed (figure 8). Table 1 lists the selection options for the switch. Switches 1 through 3 define the platter size. All other settings beside those shown are undefined.

    Switches 4 through 6 define which carousel (up to 8) will be controlled by the PC.

    Switches 7 and 8 should be off for most applications.

Use a screwdriver or a similar tool to adjust the DIP switch settings. A pencil is not advised, as the graphite can affect the operation of the carousel.
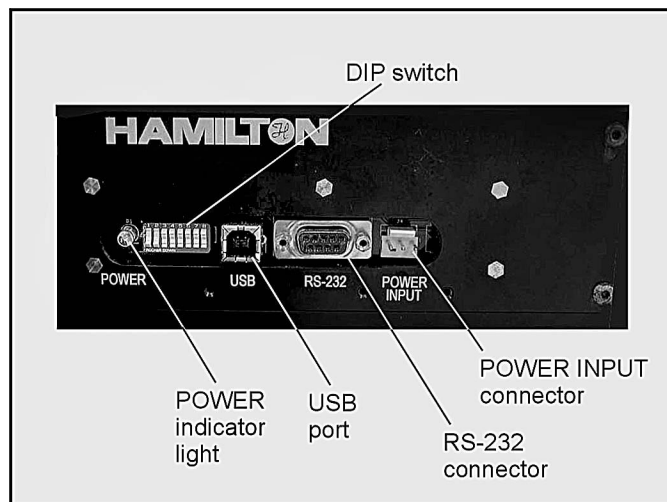
Figure 7:   DIP switch location

Rocker up = ON
Rocker down = OFF
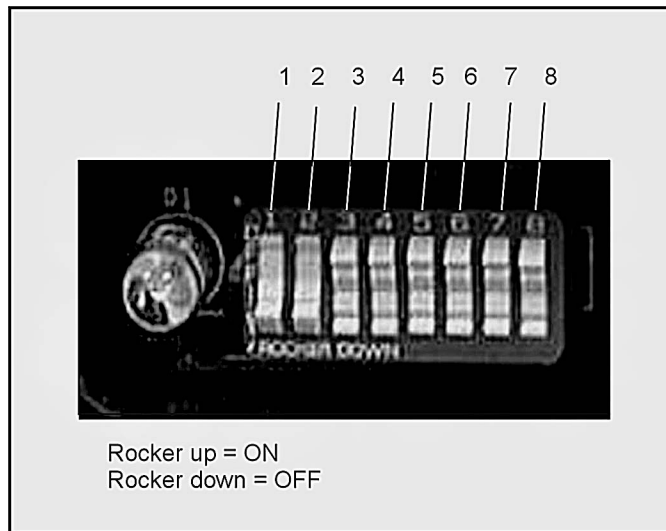
Figure 8: DIP switch (Set for 10 position universal platter)

Table 1. DIP switch selection

PLATTER SELECT			
SW1-1	**SW1-2**	**SW1-3**	**DESCRIPTION**
OFF	OFF	OFF	8 POSITION PORTRAIT (DEFAULT)
ON	ON	OFF	10 POSITION UNIVERSAL
UNIT IDENTIFICATION			
SW1-4	**SW1-5**	**SW1-6**	**DESCRIPTION**
OFF	OFF	OFF	UNIT 1 (DEFAULT)
ON	OFF	OFF	UNIT 2
OFF	ON	OFF	UNIT 3
ON	ON	OFF	UNIT 4
OFF	OFF	ON	UNIT 5
ON	OFF	ON	UNIT 6
OFF	ON	ON	UNIT 7
ON	ON	ON	UNIT 8
SPARE			
SW1-7	**DESCRIPTION**		
OFF	(DEFAULT)		
ON	TBD		
FORCED DOWNLOAD			
SW1-8	**DESCRIPTION**		
OFF	(DEFAULT)		
ON	FORCED DOWNLOAD		

Connecting cables

To install the carousel power and communication cables:

1. Connect the USB cable (4427-02) to the USB port of the carousel housing assembly (refer to figure 7).

2. Connect the other end of the USB cable to one of the USB ports of the computer that will be used to operate the carousel.

3. Plug the power cord into the power outlet in the side of the housing assembly. Orient the plug as shown in figure 9. Plug the power adapter into a wall outlet.

The carousel can be controlled via RS-232 instead of USB. If Vector software will be used to control the carousel, then USB is preferred.
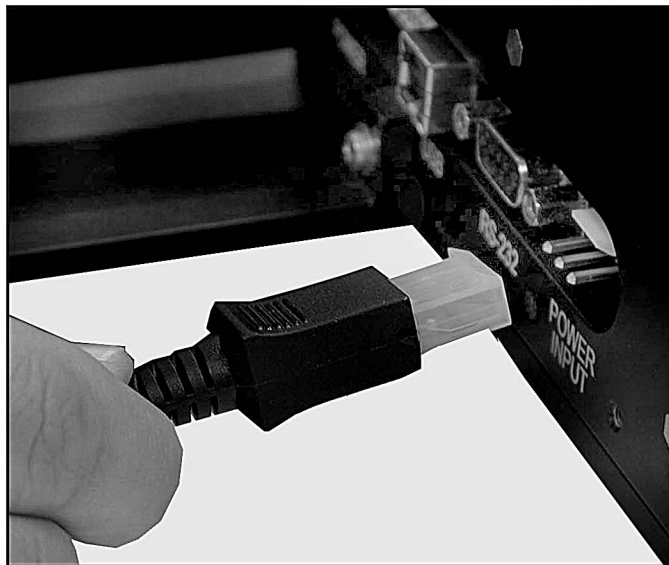
Figure 9:   Plug orientation

Carousel platter

To install the carousel platter:

1. Place the carousel platter on top of the carousel housing assembly. See figure 10. Align the three holes in the platter with the threaded holes in the housing assembly.

2. Attach the carousel platter to the carousel housing assembly using three screws (8372-01), supplied from the index bracket kit, and a 3/32" hex wrench.

Carousel platter

Screw (3x)
(8372-01)

Figure 10:   Carousel platter

3. Use an adjustable wrench to adjust the nuts on all the mounting feet (7419-01), so the carousel platter is level. See figure 11.

Do not rotate the carousel platter by hand.

Figure 11:   Mounting feet locations

Operation

Installing the software
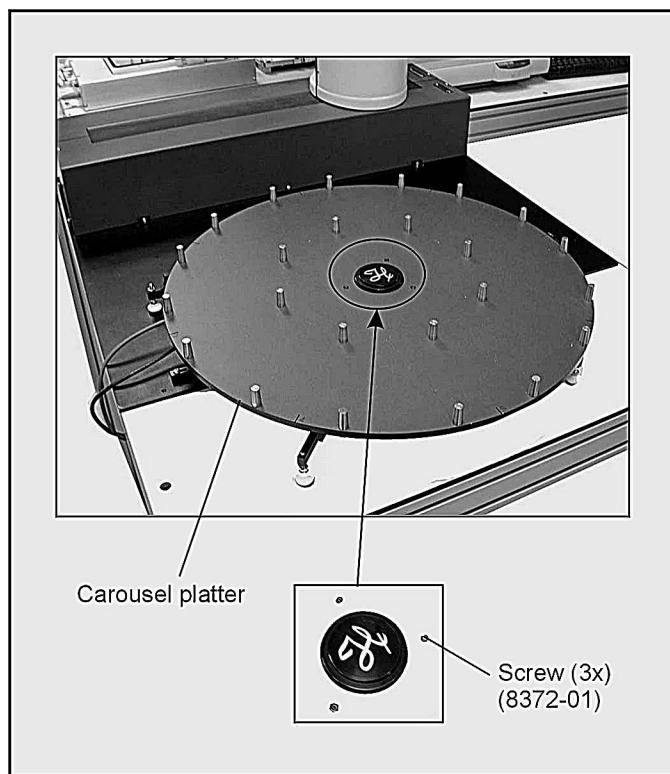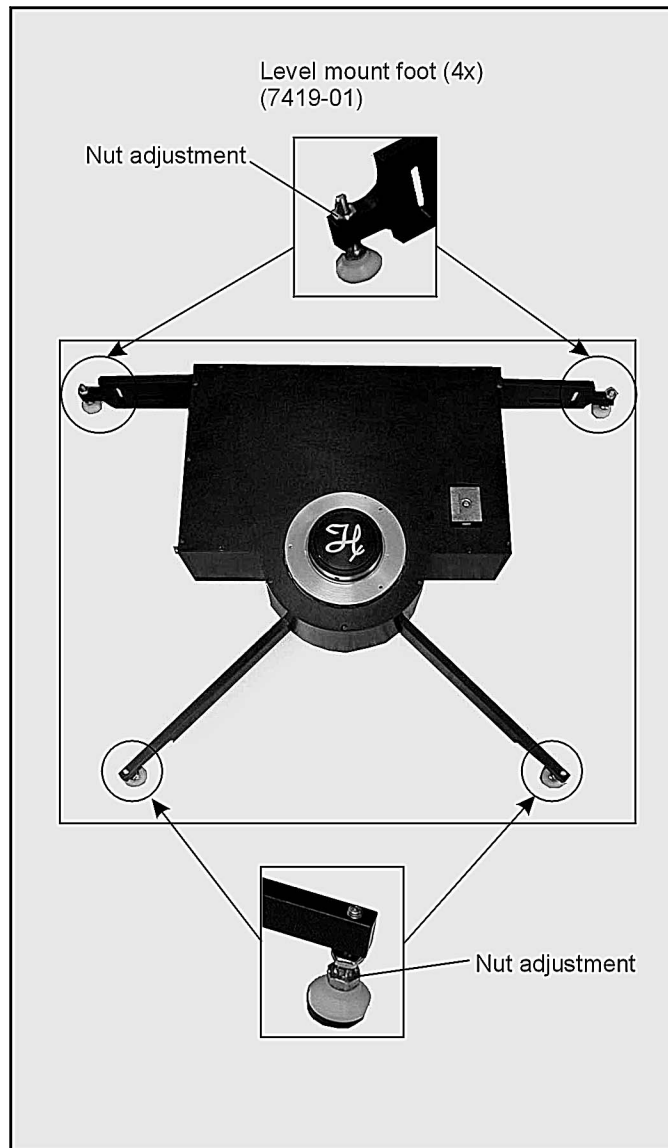
After your MICROLAB® Carousel hardware is installed, you can install the Hamilton MICROLAB® Carousel Software.

Your MICROLAB® Carousel software comes with an installation wizard that guides you through the installation as it copies the program files to your computer.

Before you begin the installation, make sure that you have closed any open applications on your PC. Carousel software requires Windows 2000 (with service pack 2 or higher) or Windows XP Professional, and 128 MB RAM (minimum).

If installing SWAP software also, and SWAP version is 2.0 or less, SWAP software must be installed first.

To install MICROLAB® Carousel software:

1. Place the CD labeled "Hamilton MICROLAB® Carousel Software" into the CD drive on your PC.

2. The install program should run automatically. If it does not, select Start > Run > (the CD-ROM drive identifier on your PC) \ Setup.exe. Click the OK button when the prompt appears.

   The InstallShield Wizard starts when the Welcome to the InstallShield Wizard for Carousel window appears (figure 12).
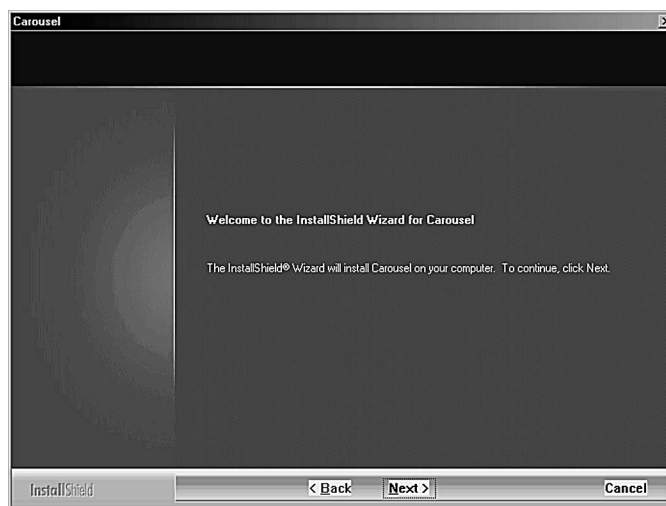
Figure 12:   Welcome window

3. Click Next >. A Question window appears (figure 13) asking whether desks icons are desired.

Figure 13:   Question window

4. Click No. The Instrument Identification window appears. Click Yes only if no other Vector components or instruments will be installed.

5. Click Finish. A Setup Status window appears, and then a Laboratory Name window appears.

6. Type the name of your lab and click Next.

   After MICROLAB® Carousel software has completed its installation, the InstallShield Wizard Complete window appears.

7. Click Finish to exit from MICROLAB® Carousel Setup window.

Calibration

Calibration sets an offset angle from the default initialization position.

To calibrate the carousel:

Do not rotate the carousel platter by hand.

1. Select Start > Programs > Hamilton > Carousel > Service Software from the Windows desktop. The Service Software window appears.

2. Select Communication > Connect. A Select Instrument window appears.

3. Select the Carousel and click OK. The File transfer icon (arrows) on the tool bar should turn from gray to blue if communications are established.

4. Click on Instruments Carousel > Calibration. The carousel will initialize, and a Calibrate Carousel window will appear (figure 14).

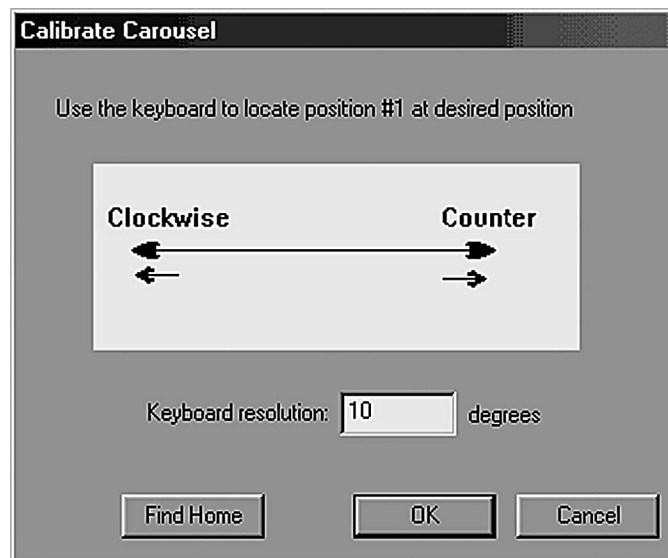*Figure 14:   Calibrate Carousel window*

5. Use the left and right arrow keys to rotate the carousel. Each keystroke will move the platter the number of degrees shown in the window (refer to figure 14). Change that resolution as needed.

Move the platter until position #1 aligns with the intended plate pickup position. In most cases this is 90° counter-clockwise from the index pointer (figure 15).

For the 8-position platter, align the #7 position line with the center line of the index pointer.

For the 10-position platter, align the #9 position line with the center line of the index pointer. Then type 18 into the keyboard resolution field, and hit the right-arrow key once.

6. Click OK. A window appears asking you to "Reset instrument now". Unplug the carousel, wait 5 seconds, and plug the carousel back in. Wait another 5 seconds, and click OK.
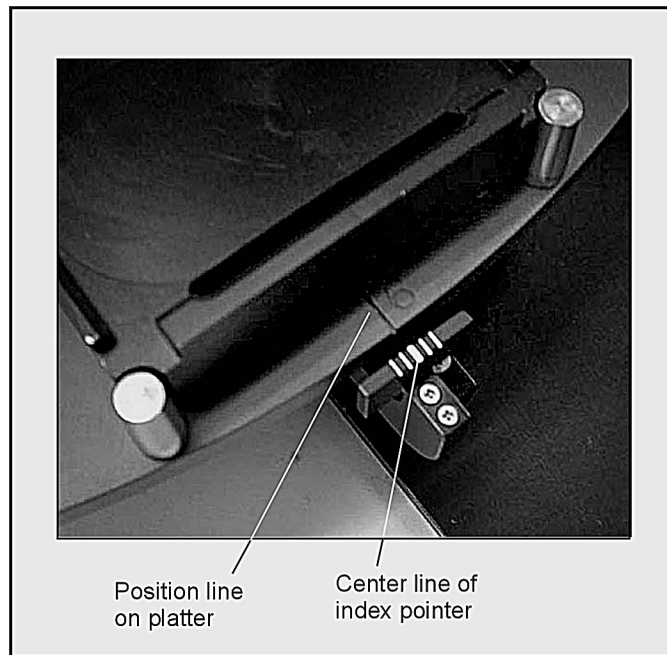

Position line
on platter

Center line of
index pointer

Figure 15:   Calibration alignment

Carousel service software

In addition to the Service Software for the ML 4000 series, you can also access Carousel Service Software. There are three utilities that can be used to troubleshoot the carousel, but which are generally not needed.

To use the Carousel Service Software:

1. Select Start > Programs > Hamilton > Carousel > Service Software from the Windows desktop. The Service Software window appears.

2. Select Communication > Connect. A Select Instrument window appears.

3. Select the Carousel and click OK. The File transfer icon (arrows) on the tool bar should turn from gray to blue if communications are established.

4. Click on Utilities > Analyze log. This brings up the log viewer window. You can use this to open log files for interpretation. Most often, the log files are use by Hamilton company to analyze hardware problems.

5. Click File > Exit to return to the Service Software window.

6. Click on Utilities > File Transfer. The File Transfer Utility window appears. This utility is used to download firmware and retrieve log files from the carousel. You must know the checksum of the new firmware to use this feature. Contact Hamilton Company for more information.

7. Click the Exit button to return to the Service Software window.

8. Click on Utilities > Version Numbers. A version numbers window appears. Use this utility to verify that the carousel firmware is current.

9. Click OK to return to the Service Software window.

Writing a method

To access the Hamilton method editor:

1. Double-click the MICROLAB® Method Editor icon on your desktop. The Hamilton Method Editor window appears.

2. Select File > New. Assign a name to your new method, and click Save.

3. The screen will show a cluster of General command icons on the left and a blank method on the right (figures 16). No instrument specific commands are immediately available. You need to select an instrument from the Hamilton Method Editor window.
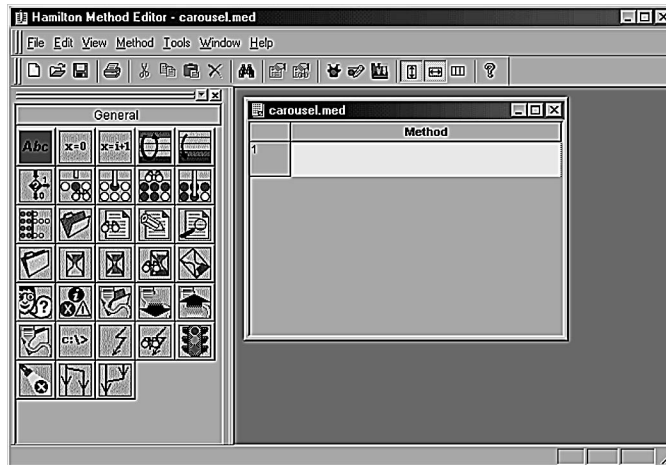
Figure 16:   Hamilton Method Editor - Carousel.med window

4. Select Method > Instruments from the Hamilton Method Editor window. The Instruments window appears (figure 17).

5. Click on the check box for the Carousel and click OK. The Hamilton Method Editor appears (figure 18), but now it has a set of instrument commands for the carousel.

6. Click on the instrument command bar (Carousel). The command set for that instrument will appear (figure 19).

Now it is possible to write a complete method by dragging commands to the white blocks in the method window.

Refer to the MICROLAB Vector software user manual for more information regarding the software in general.
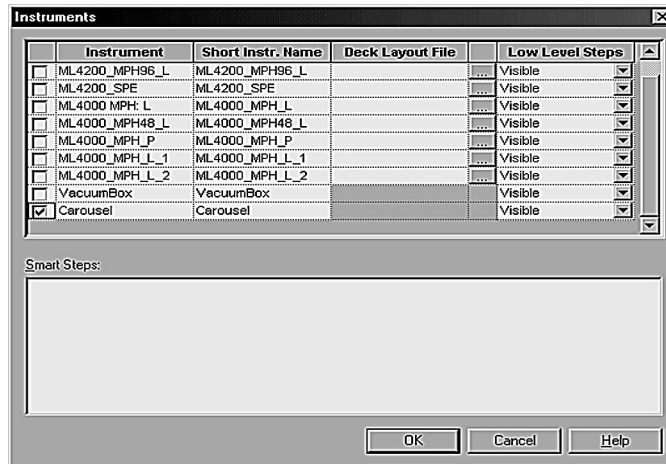
Figure 17:   Instruments window
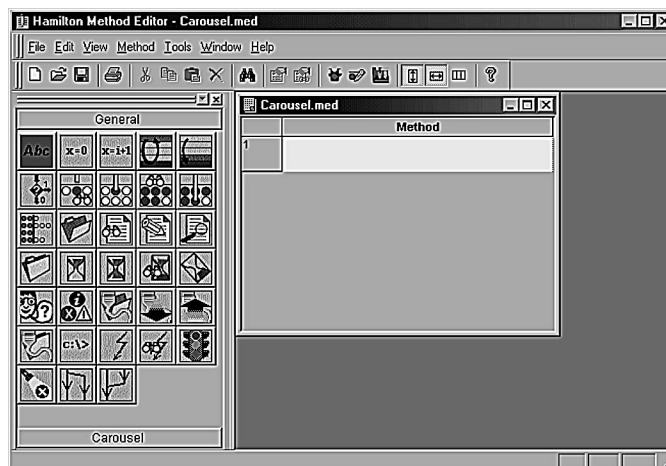
Figure 18:   Hamilton Method Editor with Carousel command bar
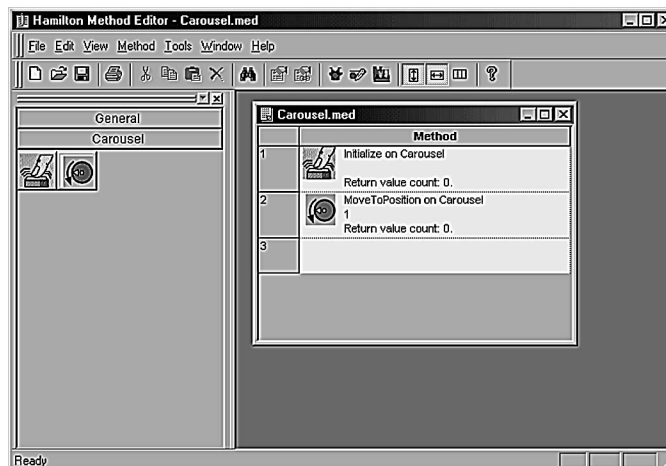
Figure 19:   Method Editor with instrument icons command set

Carousel commands

There are two commands associated with the carousel.

- **Initialize**

Use this command to initialize the carousel.

- **Move To Position**

This command rotates the carousel around to the position set in the parameter dialog box (figure 20). The carousel will rotate in the shortest direction.
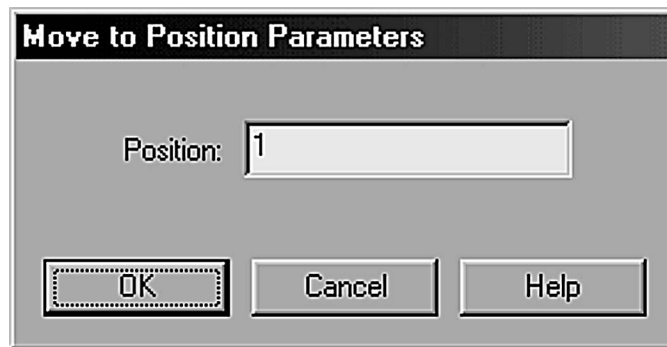
Figure 20:   Move to Position Parameters window

Using the serial interface

The carousel can be run via the serial interface rather than the USB interface. The carousel can then be controlled by the general serial port commands in Vector, by other software utilities such as Hyperterminal, or by customer-specific software interfaces.

A "straight-through" cable, such as Hamilton part number 36786, is required.

Table 2 shows some examples of carousel commands that can be used in serial mode. For the Move command, "w60" asks for the position to move to, "3" sets the position to position 3, and "x61" moves the carousel to the set position.

Command type	Send	Receive
Initialize	0x60<CR>	0r4<CR><LF>
Move	0w60, 3x61<CR>	0r4<CR><LF>
Query position	0q61<CR>	0r,3<CR><LF>

Table 2. Example commands for the serial interface.

Notes:

- For invalid commands, an error code is returned. Refer to table 3 on page 25 ("Troubleshooting").

- The positions are hexadecimal (for example, position 10 is 'a').

- The maximum number of positions is set by the DIP switch on the housing assembly. Refer to table 1 on page 9.

- If a move command is sent before the instrument is initialized, the instrument will first initialize, and then the carousel will move to the designated position.

- The instrument must be calibrated via USB and service software. See "Calibration" on page 15.

- For more information, please contact Hamilton Company.

Installing portrait stackers and shelves

To install a stacker or shelf:

1. Line up the hole in the base and the notched corners of the stacker or shelf with a set of three guide pins on the carousel.

2. Rest the stacker or shelf on the platter (figures 21).

Stackers

Guide pins (3x)
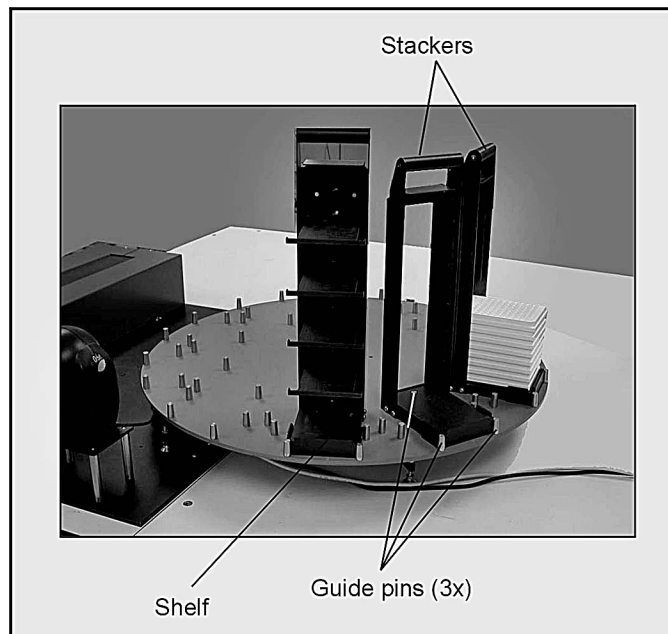
Shelf

Figure 21:   Portrait stackers and shelf

Installing landscape stackers

To install a landscape stacker on the 10-position carousel:

1. Line up the middle of the landscape stacker with numbered position line on the carousel (see figure 22).

2. Rest the stacker on the platter (figure 23).
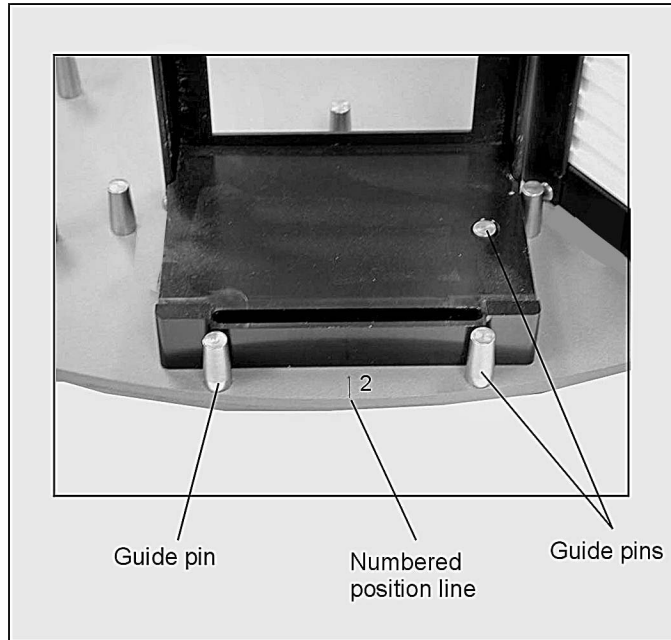
Figure 22:   Location of numbered position line
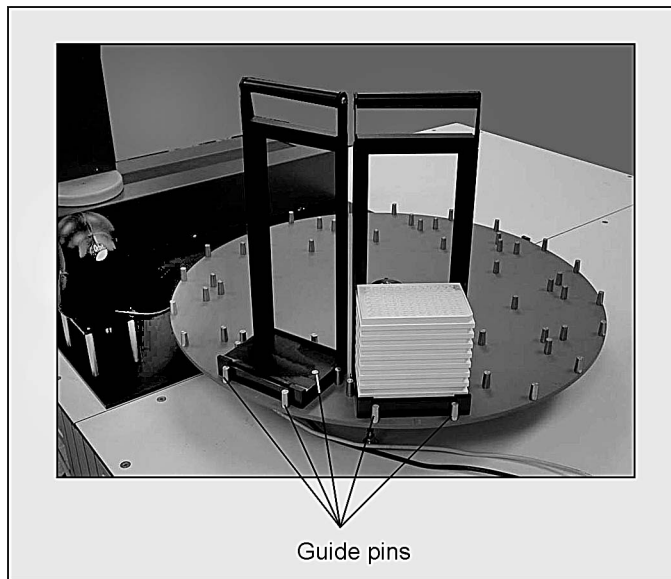
Figure 23:   Landscape stackers

Maintenance

Maintenance of the carousel will assure its long-term operation.

General

- Wipe up spills as soon as possible. Clean according to the applicable MSDS (Material Safety Data Sheets) or laboratory SOP (Standard Operating Procedures).

- No field lubrication is required.

- Motor, belts, and electronics are serviced by Hamilton Company Technical Service personnel.

Troubleshooting

In the event of an error during run time, click on the Help button (if available). The message should provide some clues to the cause of the error and a possible remedy. If not, try to reproduce the error, record the error code and message, and notify Hamilton Company Technical Service. See "Contacting Hamilton Company" section on page 29. In addition, table 3 lists the most common error conditions for the carousel and the associated corrective actions.

Table 3. Common error conditions

Error code	Possible cause	Corrective action
Ox5E 8001	Unable to initialize	Contact Hamilton Service
Ox5E 8002	Unable to initialize	Contact Hamilton Service
Ox5E 8003	Motion not detected	Bad sensor; contact Hamilton Service
Ox5E 8004	Motor stalled	Remove obstacles. Avoid moving platter by hand during motion.

Specifications

Carousel

Parameter	Specification
Power requirements	24V @ 2 Amps maximum
Power Supply	100 - 200V~, 50-60Hz 1A
Communication type	RS-232 or USB
Operating 　　　Temperature 　　　Relative Humidity	5° to 40°C (41° to 104°F) 10% to 90% non-condensing
Storage 　　　Temperature 　　　Relative Humidity	-20° to 70°C (-4° to 158°F) 10% to 90% non-condensing
Speed	Maximum 10 seconds to rotate to any position (Typical 4 seconds).
Altitude (Maximum)	2000 m (6562 ft.)
CSA Certification 　　　Installation category 　　　Pollution degree	 II 2
CE Approval 　　　Safety 　　　EMC	 IEC 1010-1　　　(1990) IEC 1010-1/A1　(1992) IEC 1010-1/A2　(1995) EN 61326-1　　　(1997)
Carousel housing assembly	
Dimensions: 　　　Length 　　　Width 　　　Height	 14.63" (371.6mm) 20.50" (520.7mm) 3.60" (91.4mm)
Weight	11.3 lb. (5.1 kg)
Carousel 8 position platter	
Dimensions: 　　　Diameter 　　　Thickness	 20.717" (526.2mm) 0.313" (8mm)
Weight	10 lb. (4.5kg)
Carousel 10 position platter	
Dimensions: 　　　Diameter 　　　Thickness	 25.5" (647.7mm) 0.375" (9.5mm)
Weight	17.7 lb. (7.9kg)

Indoor Operation and Use Only

SWAP
base plate

Distance

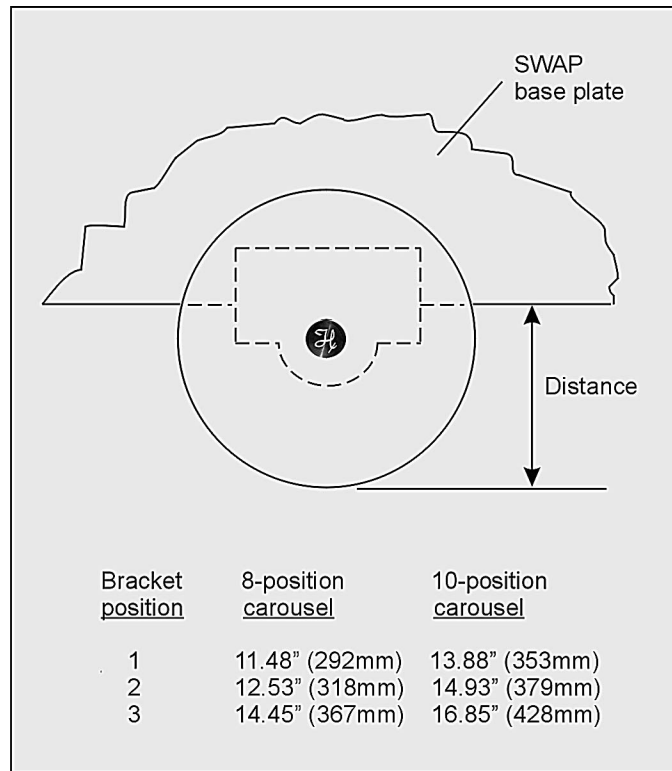| Bracket position	8-position carousel	10-position carousel
1	11.48" (292mm)	13.88" (353mm)
2	12.53" (318mm)	14.93" (379mm)
3	14.45" (367mm)	16.85" (428mm)

*Figure 24:   Overhang distance of platters from SWAP
base plate (refer to figure 5 for bracket positions)*

Parts and accessories

Cable

Part Number	Description
4833-01	Power adapter
6541005	Power cord
36786	RS-232 cable
4427-02	USB cable, 3m

Shelves and stackers

Part Number	Description
180052	Shelf, Portrait
6913-01	Stacker, Landscape
180050	Stacker, Portrait

Software

Part Number	Description
9266-01	CD, MICROLAB® Carousel Software
4060-01	CD, MICROLAB® Vector Software

Manuals

Part Number	Description
8534-01	MICROLAB® Carousel User Guide
7157-01	MICROLAB® SWAP/4000 Series Integrated System User Guide
5606-01	MICROLAB® Vector Software User Manual

Contacting Hamilton Company

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MICROLAB® Carousel

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