

MicroScribe[®] M

Portable Measurement Systems



USER'S GUIDE

MicroScribe® M

Portable Measurement Systems

User's Guide



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Chapter 1 - Overview

Congratulations on your purchase of a Revware® MicroScribe® M portable measurement system, model MX or MLX (five or six degrees of freedom). This manual provides you with the information you need to quickly begin inspecting and reverse engineering three-dimensional (3D) objects.

Functional Overview

The Revware MicroScribe M digitizer is a powerful tool for performing 3D inspection and digitizing. Revware's MicroScribe technology employs a unique mechanical linkage system which provides support to its stylus. The MicroScribe M has been designed with the user in mind. The counterbalanced arm and smooth gliding motion ensure hours of fatigue-free and comfortable use. The unique stylus is convenient to hold and allows for easy manipulation between the fingers.

Technical Overview

The MicroScribe M system communicates with a host computer through a standard USB port. The system includes the articulated arm unit (which houses the internal electronics), a USB cable, an input device (hand switch or optional pedal), probes, an external power module, and a probe calibration fixture.

A series of optical encoders inside each of the joints work with internal electronics to send the joint angle data to a host computer, which calculates the position of the stylus probe in 3D space. A hand switch or optional foot pedal can be attached to the rear panel of the unit to trigger data input.

Several software applications currently exist for the MicroScribe M. See our website, www.revware.net, for a list of available software including MicroScribe Utility Software™, or MUS. The well-documented software developer's kit (SDK) is also available from the Revware Inc. website.

Release Notes

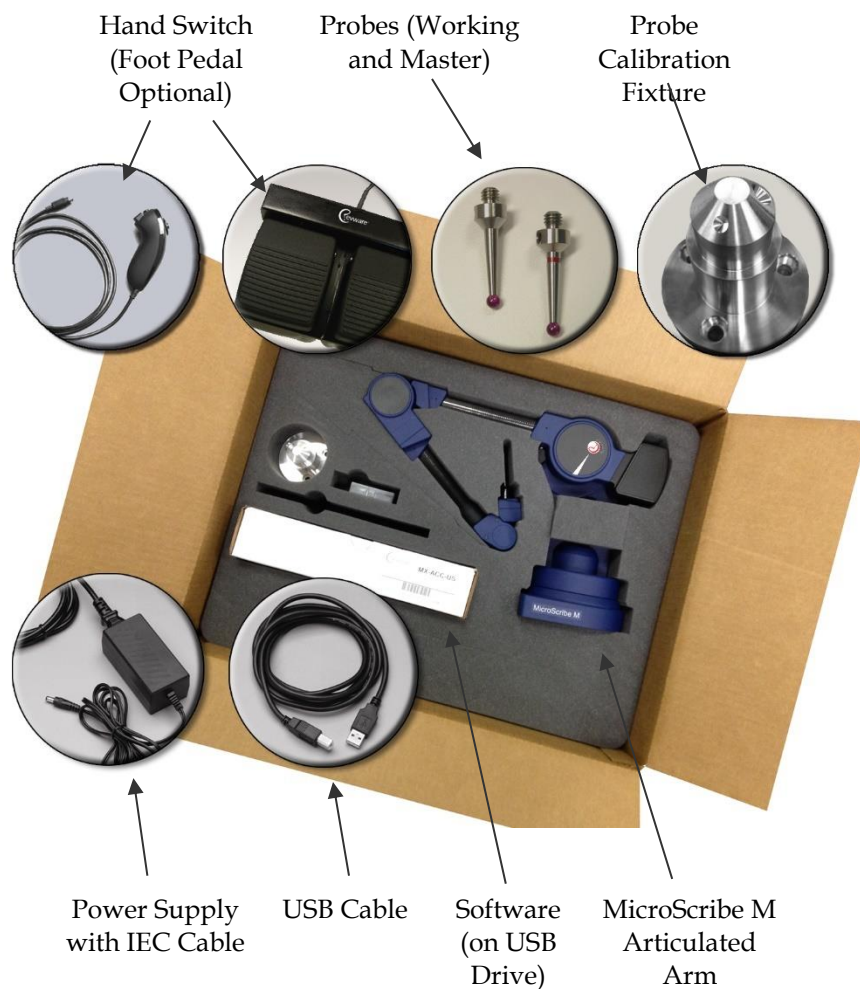
Included in your MicroScribe M system package you will find the following items, shown in Figure 1. If, after setting the system up completely as described in the next chapter, any of these items are missing or defective, please contact your distributor or Revware Customer Service as soon as possible (+1 919-790-0000 or microscribe@revware.net). Please note that other items you may have ordered along with your MicroScribe M system are not listed below.

Included items:

- MicroScribe M articulated arm (MX, MLX, 6MX, or 6MLX)
- USB Cable
- 9-volt power supply module with IEC cable (may vary depending on country of use)
- Hand switch or optional foot pedal
- Two probes: 3mm ruby ball probe, M4 threaded – 1 Master probe, 1 Working probe
- Probe calibration fixture
- Certificate of calibration
- Quick Start card
- User Guide (on USB Drive)
- MUS software utilities

Other software may also be included in the box if sold with the MicroScribe M system as a bundle. Take a moment to make sure that you have received a USB drive with the MicroScribe Utility Software (MUS). Also, verify that the software received is the appropriate format for your computer system. This User Guide is included on the same USB drive.

Figure 1 –Package Contents



NOTE: Lying inside the package is also the calibration certificate for the MicroScribe M system and a quick Start Card that you should retain for information on unpacking and repacking the unit. Keep the packaging for warranty and calibration returns. (Packaging may differ slightly from photo).

Chapter 2 - Getting Started with the MicroScribe M System

The MicroScribe M: An Overview

Congratulations on your purchase of the portable MicroScribe® M System. The MicroScribe M enables you to digitize and inspect 3D objects quickly and easily. Parts of the MicroScribe M system and important features are labeled in Figure 2.

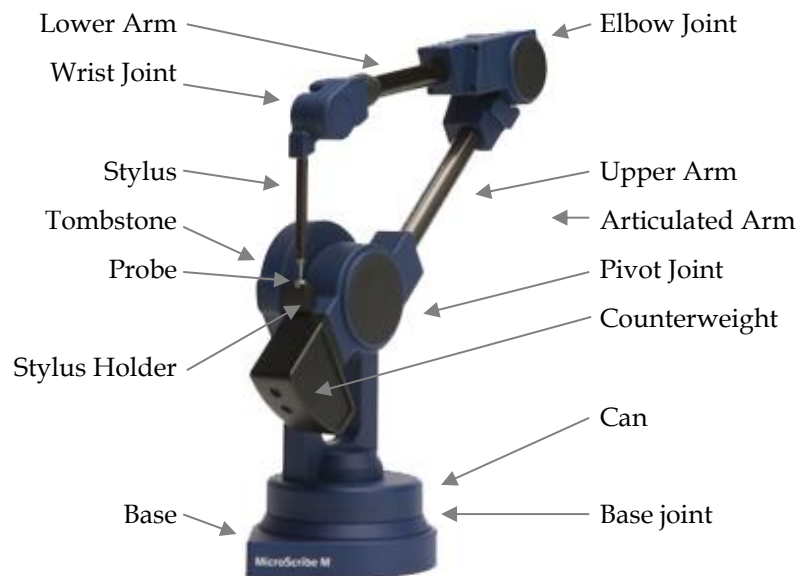


Figure 2 - Guide to MicroScribe M Anatomy

This chapter provides the information you will need to connect and begin using the MicroScribe M system. Please read this section before unpacking your system to make sure that the unit is handled correctly.



WARNING: *If equipment is used in a manner not specified in this manual or is not repaired by Revware Inc., the protection provided by the warranty may be void.*

Unpacking and Assembly

Your MicroScribe® M system is a precision instrument and has been packed carefully to protect the calibrated electronic and mechanical components. Due to shifting during shipment, we ask that you take extra care when removing the MicroScribe M articulated arm and its accessories. We recommend you unpack the MicroScribe M system using the instructions in this section.

PLEASE SAVE ALL PACKING MATERIALS. They are designed to protect your MicroScribe M system, and should be retained if the arm should ever require transportation or service. The foam insert used in the packaging, for example, is a specially designed material which protects your device from contamination and vibration damage during handling and shipping. Should you choose to travel extensively with the MicroScribe M system you may wish to purchase a traveling case from Revware Inc. or from your MicroScribe M system distributor. Damage which occurs during transportation of a MicroScribe M in a non-approved package is not covered by warranty.

You are now ready to unpack the MicroScribe M system. After you remove the top protective sheet of foam, you will find that the system is packed as shown in Figure 1. The MicroScribe M fits into the large cutout, and the accessories such as the USB cable, power supply, and hand switch are found in an accessory box in the other cutout. Lying inside the package is also the calibration certificate for the MicroScribe M system and a quick Start Card that you should retain for information on unpacking and repacking the unit. Optional purchased software is added above the system components and should be located immediately above or below the top protective sheet of foam.

To protect the two included ruby ball probes during shipment, MicroScribe M systems are delivered without the probes attached to the stylus body. When you receive your system, you will need to attach the probes by screwing them into the end of the stylus body as needed.

Unpacking and assembly procedure

1. Remove the top protective sheet of foam, revealing the contents of the package.
2. Remove software packages (may be packed in shrink-wrapped or bubble-wrapped bags containing disks and documentation).
3. Read the Start Card fully before continuing.
4. Remove the MicroScribe M system from its packaging as follows:

- As much as possible, guard against the system's joints or base abruptly turning or jarring. Be aware that the wrist/stylus assembly, the arm, and the base will move freely when unsupported, so have a level surface close by where the system can be quickly placed to reduce possible damage. Collisions with hard objects may cause damage to factory calibration and affect accuracy.
- Firmly grasp the MicroScribe M arm at its "elbow" with your left hand and the base handle with your right hand (Figure 3) and lift straight out.

Figure 3 – Lifting the MicroScribe M Arm out of the Packaging



5. Set the base of the digitizer on a hard, flat surface (not on carpet or fabric) and set the digitizer in the Home position.

Figure 4- The MicroScribe M Articulated Arm in the Home Position



Place the stylus into the stylus holder on the MicroScribe M system and make sure that the counterweight rests against the stylus holder stop. Rotate the base joint counter clockwise to line up the two tick marks on the MicroScribe M base.

Figure 5- The MicroScribe M Base Joint in the Home Position



This position is referred to as the Home position (Figures 4, 5, 6 and 7.)

Figure 6 –MicroScribe M 6DoF Wrist Roll Joint Alignment



If you have a six-degrees-of-freedom (6DoF) MicroScribe M system, you must also align the tick marks located at the sixth joint (the wrist roll joint) by rotating the stylus into alignment.

The stylus can only insert one way into the retaining socket. If you find that the stylus is unable to reach the socket, do not try to force it in. Rotate the final joint element in the direction opposite to the hard stop until the stylus can be inserted.

Figure 7 –MicroScribe MLX Model Stylus 180 Degrees Out of Proper Alignment



On MicroScribe MLX models, it is possible to place the stylus in its holder with the wrist roll joint 180 degrees out of proper alignment - this will result in the stylus being at a slightly non-perpendicular angle relative to the desktop.

To correct this, remove the stylus from its holder, rotate it 180 degrees, and place it back in the stylus holder. Once the MicroScribe M is resting in its Home position, continue to remove all of the other system components from the packaging.

Moving the MicroScribe M System

Figure 8 - The Proper Way to Carry a MicroScribe M System



In addition to using the proper packaging materials for transporting the MicroScribe M system to and from various locations, you must also take precautions when carrying it. Be careful not to apply off axis loads to the joints when carrying the system. Off axis loads may damage the factory calibration and thus the accuracy of the system.

Always pick up the MicroScribe M system by the base to prevent damage to the arm and carry the arm with both hands to provide shock absorption for the arm's joints.

To pick up the MicroScribe M system, remove the stylus from the stylus holder, supporting the "wrist" section in one hand. Slip your other hand through the opening and use it as a handle. See Figure 8 for the correct carrying procedure.



WARNING: *Be careful to avoid placing your fingers or hands near the joints of the MicroScribe M system, or pinching may occur.*

System Connections

MicroScribe M systems connect via the USB port of the host computer.

Figure 9 – MicroScribe M System Rear Panel Connections

From left to right: Home button, USB port, power, and accessory port.



! **WARNING:** Make sure the MicroScribe M system is not receiving power while connecting the various components – otherwise damage may occur.

To Connect:

1. Plug the end of the hand switch (or optional foot pedal) cable into the MicroScribe M system's "Accessory" port.
2. Insert the correct end of the power cable into the MicroScribe M port labeled "Power." Plug the other end into a power outlet. **Never use a power supply other than the one provided with your MicroScribe M system, even if the voltage rating appears to be correct.**

3. Plug the appropriate end of the USB cable into the MicroScribe M port labeled “USB.” The other end should be connected to a free USB port on the host machine.
4. Place the MicroScribe M system in the Home position (see Figures 4 and 5 for details). Press the Home button on the back of the device.
5. The MicroScribe M is ready to connect to software. Software utilities are included on the provided USB drive and can test basic MicroScribe M system connection settings.

Homing the Device

Every time the MicroScribe M is powered up it must be homed by pressing the Home button on the back of the base. Before pressing the Home button, ensure the device is in the Home position, the master probe is firmly attached, and that the tick marks on the base and can are aligned. The LED on the system base indicates the current state. See Figure 10 for a guide to the LED status light messages.

! **NOTE:** Probes **CANNOT** be hand-tightened and provide the specified accuracy. It is suggested that you use the holes at the base of the probes to turn and tighten. Do not over-tighten so that damage results.

Figure 10 – LED Signal Light Messages

LED Status	Device State	Details
OFF	Off	The MicroScribe M system is not powered through the external power supply.
RED (Flashing)	Powered	The MicroScribe M system is not homed (the Home button has not been pressed) and is not communicating with the CPU.
RED	Not homed	The MicroScribe M system is communicating with the CPU but has not been homed (the Home button has not been pressed).
GREEN (Flashing)	Connection lost	The MicroScribe M system has been homed (the Home button has been pressed), but is not communicating with the CPU.
GREEN	Normal operation	Normal operation: the device has been homed (the Home button has been pressed) and is communicating with the CPU.
Rapid Flashing (RED or GREEN)	Low battery or power	The voltage supply to the unit is low and should be replaced immediately.

Configuring for Use

Placement of the MicroScribe M System

Now that your MicroScribe M system is connected and ready to use, you should situate it on your desktop, workbench, or other level and flat workspace so that it is optimally configured for use.

Figure 11 shows the recommended workspace set-up. Note that the rear panel of the MicroScribe M system faces away from the user and that the MicroScribe M arm is set up along the side of the workspace at a comfortable distance away. Position the arm so that the center of your workspace about halfway from full extension. This is only a suggestion since the MicroScribe M arm can measure within any volume it can reach. We suggest that you first try a configuration like the one in Figure 11, then customize the positioning of the MicroScribe M system based on your experience and your specific needs.

Figure 11 - The Recommended Workspace

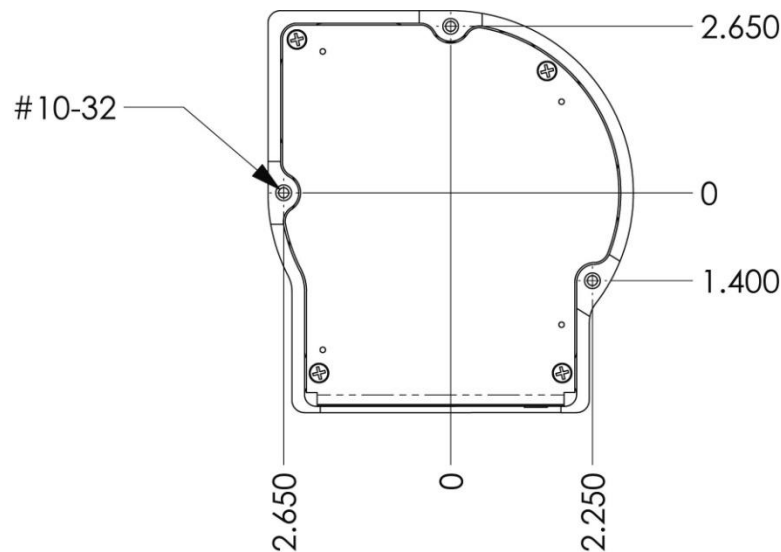


We suggest that you work on one side of the unit, with the center of your workspace about halfway from full extension of the arm.

Securing the MicroScribe M System (Recommended)

The MicroScribe M system is designed to sit securely on a flat, level, and rigid surface. You may also mount it rigidly to your work surface by using three 10-32 bolts inserted through the work surface to the MicroScribe M base. See Figure 12 for the hole pattern. Be sure that the bolts you use do not extend too far into the base. The bolts used should extend NO MORE than 3/8" (0.95 cm) from the surface to which the MicroScribe M system is being mounted. The bolt lengths should be the thickness of the surface you are mounting to plus up to 3/8" (0.95 cm).

Figure 12 – The Hole Pattern for the Base of the MicroScribe M (In Inches).



! WARNING: Do NOT mount the MicroScribe M system to an electrically conducting surface unless that surface is grounded and not subject to electrical interference or noise.

Revware also offers an optional mounting plate for the MicroScribe M system. The plate is designed so that the weight of the system rests on the edge of the base. For more information visit www.revware.net or inquire with your local distributor.

! WARNING: Do not use clamps to hold your MicroScribe M to a work surface using its base –damage may occur.

The Home Position and Use

With everything unpacked, connected, and configured, it is time to activate the system and begin measuring.

Checking the Home Position

The MicroScribe M needs to be in the Home position when the Home button is pressed. Otherwise, it may appear that the unit is inaccurate or non-functional. In the Home position, the stylus is perpendicular to the surface on which the MicroScribe M system rests. The master stylus probe is completely and firmly seated in the stylus holder. The counterweight is pressed up against the bottom of the stylus holder. The base of the system is rotated so that the two tick marks match up. See Figure 14 for details. The device may not home properly if not situated on a flat, level surface. If you find that your Home position appears to be non-repeatable, try placing the device on a more level surface.

Each time the Home button is pressed, the MicroScribe M system performs a self-calibration. The Home position is the one position that can be consistently repeated; therefore it gives the MicroScribe M a reference point against which all other points can be measured.

In Figures 13 and 14, notice that the stylus is fully inserted and the counterweight section is held up against the stylus holder. For information on using custom probes that do not allow the system to be placed in the Home position, see the MUS help files.

Figure 13 - Correct Home Position for the Stylus



Figure 14- Correct Home Position for the Base Joint



The Default Coordinate System

The default coordinate system of the MicroScribe M is reflected in the way the arm is placed in the workspace, see Figure 11.

Figure 15 - Default MicroScribe M Start-Up Orientation



At power-up, the default origin (0,0,0 point) is set directly below the center of the base joint axis, flush with the bottom of the base plate.

The default X axis runs parallel to the shoulder upright, with positive X being in the direction that the counterweight points (opposite the direction the elbow points.) The default Y axis runs perpendicular to the shoulder upright, with positive Y extending straight out from the face (front) of the tombstone. The Z-axis is vertical (from the desktop.) See Figure 2 for the MicroScribe M component naming conventions.

Starting the MicroScribe M

With the MicroScribe M system in the Home position and all connections (USB cable, input device, and power) completed, press the Home button on the back of the device. The power-indicator light on the back of the base should illuminate. The color and frequency of the LED can signal the current state of the MicroScribe M system. See Figure 10 for more information on the LED status.

Loading Software

The MicroScribe M is now ready to use with your software of choice. Complete the preparation for use by following the instructions provided with the software. If you plan to use MicroScribe

Utility Software from Revware Inc., follow the installation instructions on the USB drive that accompanied the MicroScribe M system.

Always begin digitizing projects by establishing reference points. That way, if you can't complete the project within one session, you can continue where you left off. If you are using MUS:

1. Mark an origin, X, and Y reference point near the model
2. Open the MUS Reference Frame menu and select the Custom Reference Frame radio button.
3. Using the MicroScribe M stylus, capture the reference points you've marked. Click OK.

Avoiding Singularities

When using the MicroScribe M system, it is important to avoid taking points in positions which may cause the unit to flex and record inaccurate data. These positions are known as singularities. Incorrect and correct examples are shown below. In general, it is best not to take "bound" points (such as in a divot, corner, or channel) while the stylus and the forearm of the device are aligned.

Figure 16- Correct and Incorrect Positioning



Correct way to take a bound point - the joint is bent intentionally.

Incorrect way to take a bound point - the stylus and forearm are aligned which may cause the links to flex inadvertently.

Calibrating Probes

To allow the MicroScribe M system to supply high accuracy measurements, it's important that you follow the procedures for probe calibration. These procedures call for you to maintain a master probe against which all new probes can be calibrated using the Probe Calibration Fixture.

This fixture lets you calibrate nearly any M4 threaded probe of your choice, and, using MicroScribe Utility Software (MUS) provides a way to compensate for specific probe geometries. In addition, third-party software may also support custom probe calibration for MicroScribe M systems.

Figure 17- Standard probes included with the MicroScribe M system



Figure 18 – Probe Calibration Fixture



NOTE: *Revware does not guarantee device accuracy for all custom probes that may be used with MicroScribe M systems. Accuracy will likely be close, but may not be the same as when the system is used with the standard working probe. To use an alternate probe, the probe must be calibrated.*

Replacement and alternate probes are available from Revware Inc. authorized distributors. Please contact Revware or your local distributor for additional details.

Using Master and Working Probes

The MicroScribe M system comes with two 3mm-diameter, 20mm-long, ruby ball, M4 threaded probes. One of these probes is labeled “Master” and designated with a red dot or ring. It is the probe used for certifying the MicroScribe M. The second probe is the working probe.



NOTE: *Keep the master probe in a safe place and use it only for these calibration procedures.*

If the master probe becomes damaged, you’ll need to return the MicroScribe M unit to Revware, Inc. for recalibration with a new master probe at your expense.



WARNING: *You should always calibrate the working probe before using it to collect data.*

General Calibration Steps

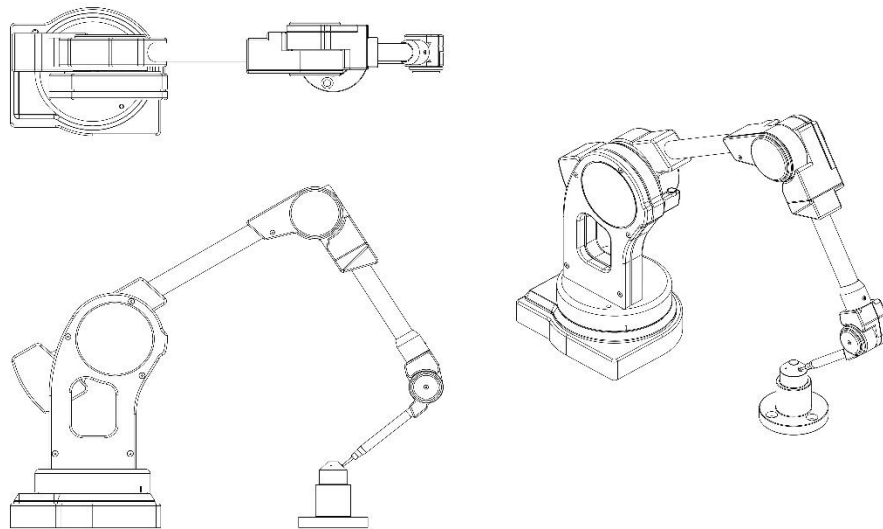
1. Install the master probe on your MicroScribe M system and tighten firmly using the holes located at the base of the probe. Do not over-tighten, or damage may result. (The probe cannot be hand tightened and provide expected accuracy.)
2. Place the MicroScribe M system in the Home position and press the Home button. (See also Home Position and Use.)
3. Replace the master probe with the working probe and tighten as described in step 1.
4. Proceed with the probe calibration procedure using the probe calibration fixture and by referring to the embedded help file in MicroScribe Utility Software (MUS) or the data capture software you are using.
5. Should you wish to replace the working probe, unscrew it in a counterclockwise direction. Only the silver colored portion of the probe can be removed. Do not attempt to unscrew the entire stylus assembly.

Custom Probe Calibration with MicroScribe Utility Software (MUS)

After the MicroScribe M is homed with the master probe, you must install the working or custom probe and follow this process to assure high accuracy measurements:

1. Position the Probe Calibration Fixture so that it accepts the working probe while the MicroScribe M system's elbow and wrist joints are approximately at 90 degrees. This will be a distance of approximately 3.5 in. (8.9 cm) for the MicroScribe M and slightly further for the MicroScribe MLX model (See Figure 19).

Figure 19 – The MicroScribe M system with probe calibration fixture




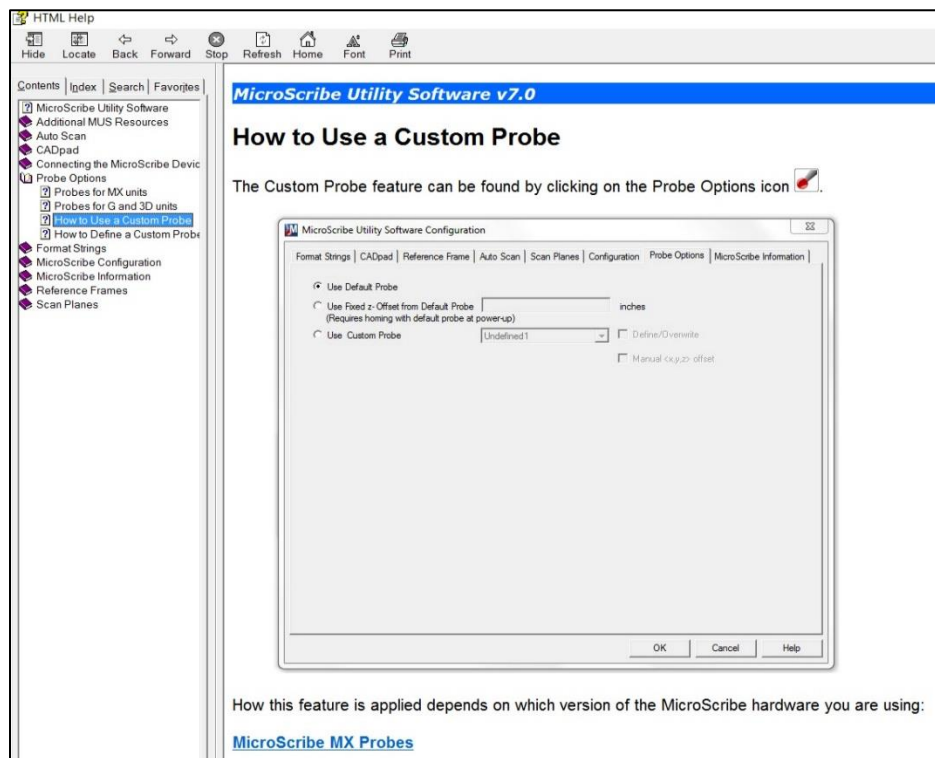
2. Start MicroScribe Utility Software (MUS) and select the  icon to access the Help file.
3. Once the Help file has opened, select the Contents tab, expand the Probe Options folder and click on "How to use a Custom Probe."
4. Click on MicroScribe M Products and follow the procedures to properly calibrate the MicroScribe M with the new attached stylus probe.

Figure 20 – MUS Embedded Help File



Achieving Optimal Accuracy with the MicroScribe M

The MicroScribe M is factory calibrated using Revware's Tri-Test™ calibration method. This method is comprised of three distinct calibration test routines:

- Effective Diameter Performance Test
- Single Point Cone Test
- Volumetric Length Accuracy Test

These calibration tests ensure that the published accuracy specifications for the MicroScribe M are met. To meet or exceed these specifications, it is recommended to allow a minimum of 40 minutes of acclimation time for the instrument. Best and optimal results are observed after 60 minutes of warm up and acclimation time under normal room temperature conditions. It is good practice to leave your MicroScribe M turned on for this amount of time before starting any measurements.

Chapter 3 - Maintenance and Troubleshooting

This section contains technical specifications and information on how to care for your MicroScribe® M System and troubleshoot problems.

Caring for Your MicroScribe M System

Your MicroScribe M system has been designed to require little maintenance. Because it is a high-precision instrument, it is strongly recommended that you have it recalibrated by Revware once a year. This section contains suggestions for maintaining your Revware MicroScribe M digitizer and servicing it, if necessary.

NOTE: *The MicroScribe M system is a precision measurement device and should be handled with care. Dropping, jarring, or otherwise abusing the MicroScribe M device may result in damage to the factory calibration and this treatment is not covered under warranty.*

Protect the MicroScribe M portable measurement system from the following dangers:

- Excessive heat. The MicroScribe M system is designed to work at room temperature, 59 to 95°F (15 to 35°C), and be stored at a temperature between -4 to 158°F (-20 to 70°C).
- Using or storing the unit in direct sunlight.
- Physical shock, particularly to any of the three instrumented joints or the shafts joining them.
- Improper air circulation that prevents cooling around the device. We recommend an air gap of at least 3 inches (7.62 cm) around the device.
- Moisture and all contaminants.

In addition, please observe the following precautions:

- Never connect any external cables while the power supply or USB cable is connected.
- Clean off any spills immediately using a sponge or other absorbent material. Avoid liquid cleaners or abrasive materials, as these may create a risk of electric shock or damage the surface finish of the product.

- Use the same care you would with other precision instruments when handling a MicroScribe M system.
- Please save and use the original packing materials or otherwise identical packaging when transporting the system. The foam insert used to ship your MicroScribe M is a special material. No other type of foam should be used when packaging your MicroScribe M. Use of non-approved packaging for shipping voids your warranty.
- Never pack the system with the stylus inserted into the holder (i.e. never ship the system in a bound state such as the Home position).
- Never ship the system with the stylus probe attached. Failure to remove the stylus probe before packaging can permanently damage the system. Always include your master probe when returning your MicroScribe M for regular calibrations or repair. Failure to return your master probe will delay maintenance or result in additional charges.
- Do not use a power supply different from the one provided by Revware Inc., even if it has the same voltage and amperage specification.

! **WARNING:** *Never remove the bottom circuit board, never open up the MicroScribe M unit housing, and never attempt to service the device yourself. Doing so will void your warranty and could potentially be hazardous due to residual electrical charges potentially present in the device.*

Final Notes and Precautions

Never try to force the MicroScribe M system beyond its physical limits. If the MicroScribe M device requires excessive force to move, it is because a mechanical limit has been reached.

Forcing beyond these limits can result in damage, which would constitute negligence not covered under the warranty. This is especially critical if the MicroScribe M is bolted to a work surface, as the device cannot shift in the event of the application of excessive force.

Service and Technical Support

Before calling for technical support, we encourage you to check the troubleshooting section in this chapter. If you cannot determine and correct the source of the problem, first contact your distributor for technical support. If it is determined that your MicroScribe M needs service, they have been trained to prepare diagnostic information for Revware so that your incident may be addressed quickly and efficiently.

If you do not know your MicroScribe M distributor, you can reach Revware technical support staff by visiting the support section of the Revware Inc. web site at www.revware.net, via email



by writing to microscribe@revware.net, or calling Revware Inc. at +1 919-790-0000. A Revware representative will work with you to identify the problem and determine if your MicroScribe M needs servicing.

Depending on the problem, you may need to return your MicroScribe M system to Revware for service or repair. If this is the case, you will be issued a Return Merchandise Authorization number (RMA #) and given information on how to send the device back to our maintenance facility. Once the unit has been received and inspected, an estimate of the repair costs will be provided to you. We do not recommend or authorize any other agents to service MicroScribe M systems, and such repair will void the Revware Inc. warranty.

Troubleshooting

If the MicroScribe M fails to operate normally, check the following points to determine whether the fault can be corrected with the simple measures suggested. If it cannot be corrected, or the fault is not listed below, disconnect all the cables and contact Revware for service information or technical support.

SYMPTOM	CAUSE	REMEDY
LED on base does not illuminate when power supply is plugged in.	Power cord is not plugged in properly.	Ensure that the power cable is firmly plugged in at both ends and that the connection between the IEC cable and the power “brick” is not loose. The MicroScribe M cannot be powered from the USB cable alone.
Computer fails to communicate with the MicroScribe M device.	Improperly connected USB cable.	Check that an appropriate USB cable is in use and is attached securely to both the computer and the MicroScribe M, and that the MicroScribe M is receiving power via the power supply.
	The MicroScribe M system is already in use by another application.	Make sure the MicroScribe M system is disconnected from any other program. Try closing any program that could be using the MicroScribe M device.
	Windows does not recognize the MicroScribe M system as a USB device.	Check the Windows Device Manager and look for two entries under the Human Interface Devices section; “USB Human Interface Device” and “HID Compliant Device.” The Device Manager is available in Windows via <i>Start > Settings > Control Panel > System</i> .

If only one or if neither of those entries is there, or the Human Interface Devices section is not present, then Windows is not recognizing the device. All cables should be removed; then only the USB cable should be plugged back in.

If the status in the Device Manager doesn't change, shut down the computer and unplug the USB cable from the computer. Power on the system again and then plug in the USB cable.

If Windows still doesn't recognize the device, try "Scan for new Devices" from the Windows Device Manager.

The MicroScribe M system is transmitting inaccurate data.	Mis-initialized system.	Be sure to follow all MicroScribe M system initial configuration procedures in Chapter 2 of this manual.
	Improperly homed	Return Stylus to Home position and press Home button to re-home. Ensure MicroScribe M system is on a flat and level surface.
	Excessive force applied to stylus probe.	Retake data using minimal contact force.
	Misconfigured software.	Please check with the software documentation provider to ensure proper use.
	Incorrect use of custom stylus probe.	If you are using multiple probes, make sure that you started the unit with the correct probe and followed probe replacement procedures outlined in MicroScribe Utility Software. If you are using a third-party application, make sure you are following the necessary probe replacement procedures.
Possible radio or television interference.	Improperly set-up MicroScribe M system.	Turn the television or radio antenna until the interference stops.
		Move the television or radio farther away from the MicroScribe M device.
		Use only shielded cables to connect the MicroScribe M device to its attachments.
		Plug the MicroScribe M device into an outlet that is on a different circuit than the radio or television.

Chapter 4 - Hardware Reference and Specifications

This section contains information on the MicroScribe® M hardware. Further information is contained in the MicroScribe SDK, which is available to developers through your local distributor or directly from Revware Inc.

This section details all physical connections on the outside of the MicroScribe M and provides general specifications for the system.

Connection Ports

In this section connection points for external connectors on the Revware MicroScribe M system are presented.

! **WARNING:** *Be sure to use only the appropriate connector with each port. Any incorrect device attached or otherwise improper use of external connections voids the warranty. Never make connections while the MicroScribe M is plugged in to an electrical socket.*

The following connectors are found on the rear panel of the MicroScribe M system:

- Digital Accessory port (no pin outs given)
- Power port
- USB port

Power Port

- Use a Revware-supplied power supply. Revware can provide power supplies for international use; please call for details. *Revware Inc. is not responsible for any damage resulting from the use of a non-Revware Inc. authorized power supply.*
- Revware part number CPS6-U is designed to accommodate worldwide voltages.

USB Port

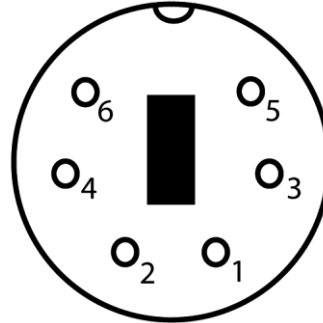
- USB 2.0 compliant.

Digital Accessory Port

- Used to connect the MicroScribe M to an input accessory.
- Uses Mini-DIN 6 type connector.
- Use only with Revware-approved digital input device.

Figure 20 - Accessory Pin Number, Signal Name, Signal Description

- | | | |
|----|-----|-------------------|
| 1. | NC | Not connected |
| 2. | NC | Not Connected |
| 3. | Tx | Transmit Data |
| 4. | GND | Electrical Ground |
| 5. | Rx | Receive Data |
| 6. | NC | Not connected |



Specifications

MicroScribe M System	MX	MLX
Position Accuracy:	+/- 0.002 in (0.0508 mm)	< 0.003 in (0.0762 mm)
As specified in the ASME B89.4.22 draft specifications	Calibration tests used in production of the MicroScribe M series devices are based on the draft specifications produced by the B89.4.22 Committee of the American Society of Mechanical Engineers (established October 1994). The committee is responsible for setting standards for the performance evaluation of articulated arm coordinate measuring machines (AACMMs). Three tests are used in production of MicroScribe M systems, for more information visit the MicroScribe section of the Revware website: www.revware.net	
Reach of Digitizing Arm:	50" diameter (1.27 m)	66" diameter (1.67 m)
Weight	12.0 lbs (5.4 kg)	13.3 lbs (6.0kg)
Footprint Size:	6" x 6" (.15 m x .15 m)	
Interface:	USB 2.0C	
Data Rate::	500 points per second	
Button Options:	Hand switch, optional foot pedal	
Power Requirements:	External 110V - 240V power supply. Uses +9V DC, 2.5Amax. (Revware Inc. power supplies are part number CPS6-U	
Ambient Temperature Range, Operating:	59 to 95°F (15 to 35°C)	
Ambient Temperature Range, Storage:	-4 to 158°F (-20 to 70°C)	
Relative Humidity:	10-90% non-condensing	

All specifications subject to change by Revware Inc.

Appendix - Regulatory Notices

FCC Compliance

This device complies with Part 15, Sub Part B of the Federal Communications Commission (FCC) Rules and has been tested and certified that the energy emitted by this device complies with the FCC Class A limits. Operation of the MicroScribe M is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

You can find more information regarding FCC requirements at the FCC website: www.fcc.gov.

Radio and Television Interference

The equipment described in this manual uses and generates radio-frequency energy. Because of this, improper use and/or installation may cause interference with radio and television reception. This equipment is certified to comply with Chapter 15 of the FCC Rules. Changes or modifications not expressly approved by Revware Inc. void the user's authority to operate the equipment:

If you suspect interference from the Revware™ MicroScribe® M unit, please turn off the unit and check for the interference. If the unit appears to be causing interference to television and/or radio reception, attempt to correct the problem by trying the following.

- Turn the television or radio antenna until the interference stops.
- Move the interfering device to one side or the other of the television or radio.
- Move the television or radio farther away from the interfering device.
- Use only shielded cables to connect the device to its attachments.
- Plug the interfering device into an outlet that is on a different circuit than the radio or television.

If problems persist, contact Revware Inc. or an experienced radio/television technician for additional suggestions. For further information, you may find the following booklet informative: "How to Identify and Resolve Radio-TV Interference Problems" (ISBN 9997515927). This booklet



is published by the Federal Communications Commission and is available from the U.S. Government Printing Office, Washington, DC 20402.

European Product Safety Directives (CE)

The MicroScribe M has been tested and certified to comply with all applicable product safety directives and standards required to carry the CE mark.

European RoHS Standard

The MicroScribe M equipment has been constructed in compliance with applicable requirements of Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment ("the Directive") and applicable European Union Member State implementing laws and regulations, and if subject to the Directive at the date of supply by Revware Inc. does not contain hazardous substances restricted by the Directive in quantities exceeding the maximum permitted concentration value levels, save to the extent expressly permitted by and under the Directive.

European Union's Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE)

The WEEE Directive seeks to minimize the impact of end-of-life electrical and electronic equipment on human health and the environment. Any product bearing the WEEE symbol must not be included with unsorted municipal waste. Instead, it must be separately collected, treated and recycled.

For proper disposal of this equipment, please contact the local distributor of Revware Inc. products from whom you purchased the equipment. If you do not know your local distributor you can contact Revware Inc. at contactus@revware.net or from the Revware website at www.revware.net.

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