INSTRUCTION MANUAL

MANIPULATORS

Care and Maintenance

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CONTENTS

ABOUT THIS MANUAL

The following symbols are used in this guide:

This symbol indicates a CAUTION. Cautions warn against actions that can cause damage to equipment. Please read these carefully.

This symbol indicates a WARNING. Warnings alert you to actions that can cause personal injury or pose a physical threat. Please read these carefully.

NOTES and TIPS contain helpful information.

INTRODUCTION

Your micromanipulator is a precision instrument. It has been calibrated at the factory and is ready for use. As with any delicate mechanical device, it needs your care and attention for long term accurate performance. The following are some helpful hints to make this possible.

Notes and Warnings

CAUTION: When handling a micromanipulator, set it down gently. Dropping it (even a short distance) can be damaging to the general alignment and adjustment.

CAUTION: When not in use, adjust the three (X-Y-Z) guide surfaces in such a way that they are not exposed and cover the manipulator with a plastic bag. Dirt is your biggest enemy.

CAUTION: If the manipulator is not in use for a prolonged time, occasionally work the three surfaces repeatedly back and forth to keep the grease pliable. Never oil the guide surfaces and under normal use you should not have to apply grease for many years.

CAUTION: When using the motorized version always be sure to check that the edge of the micrometer is aligned with the red dots on the motor housing in each axis before using the manual control for coarse positioning. Running the motorized axes repeatedly against either end limit can damage the motor. Be advised that this damage is not covered by any warranty.

CAUTION: When using the dual tool holder micromanipulators, Models **MD4R** and **MD4L**, be careful not to twist the revolving, spring-loaded axes too hard or too far. This may damage the spring.

INSTALLING THE TILT BASE

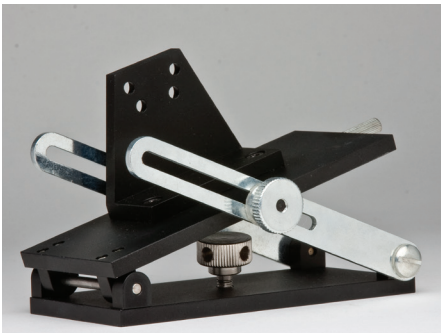


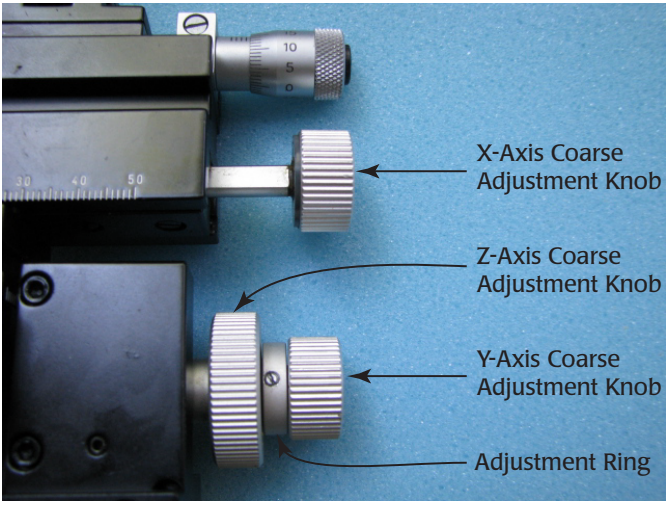
Fig. 1—(Left) M3 Tilting Base.
Fig. 2—(Right) The M3301 is installed on an M3 Tilting Base with an optional 5 lb. weight (WPI# 5464).

To install the **M3** Tilting Base, remove the ring clamp by removing the two screws with the Allen wrench provided. Attach the manipulator to the tilting base by using the two screws provided with the **M3**. Only two screws are required, because two holes are used with a right-handed manipulator, and the other two holes in the tilting base are used for the left-handed version.

ADJUSTING THE ANTI-DRIFT TENSION ON MICROMANIPULATORS

Fig. 2 shows a side view of the **M3301L** manual micromanipulator. Depending on the angle of application and the weight carried on any one guide-way, you may experience some drift. This can be easily corrected. Follow the procedure on the following pages to tighten the drag on the coarse manual slides.

In this manual, you can see how to adjust the anti-drift tension on the **M3301**, but the procedure is similar for the **DC3001R**, **DC3001L**, **MD4R**, **MD4L**, **KITE-L**, **KITE-R**, **MMJR** and **MMJL**. A micromanipulator axis may begin to move gradually under its own weight even if it's not being touched. This phenomenon is referred to as mechanical drift. It occurs from normal use of the of the manipulator axes over time. Each coarse axis control (shown below) of the micromanipulator has its own separate adjustment to counteract drift. What follows is the basic procedure to eliminate drift in each of the axes through adjustment of the anti-drift tension.



Adjusting the X Coarse Axis Drift

1. The first step is to rotate the X-Axis Coarse Adjustment knob clockwise until the x-axis reaches the end of its travel in the fully extended position as indicated by the black arrow in Fig. 3. This is necessary, because it provides better access to the knob. In step 2, you will use a pair of pliers to secure this knob while loosening the black locking nut so that the adjustment can be made.

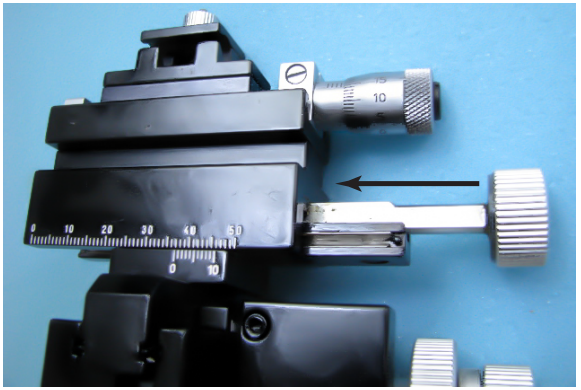


Fig. 3—Fully extend the X-axis away from adjustment knob.

2. If you have an M3301, use the hex key provided and loosen the set screw in the X-Axis Coarse Adjustment knob (Fig. 4). For a KITE, see below.

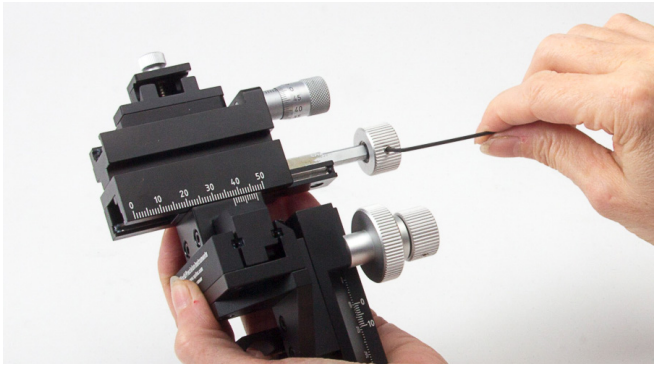


Fig. 4—Loosen the set screw on the M3301.

If you have a KITE, use a pair of pliers to secure the X-Axis Coarse Adjustment knob to prevent it from rotating (Fig. 5). Don't grab the knob with the pliers directly, because the jaws will cut into the aluminum knob. Instead, take a piece of paper and fold it about ½" wide over upon itself 5 or 6 times to make it thicker. Then, wrap it around the knob to protect the knob.

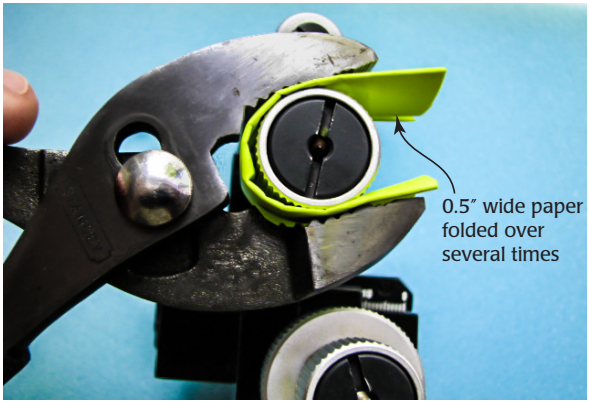


Fig. 5—Wrap the knob with a thick layer of papers so the pliers do not gouge the aluminum knob.

3. If you are right-handed, hold the pliers in your left hand. With your right hand insert the special tool (WPI# **502105**) (Fig. 6) into the black slot on the end of the knob. Prevent the silver knob from turning, and rotate the tool counter-clockwise to unscrew the black locking nut (Fig. 7).

Fig. 6—(Left) 502105 Manipulator Adjustment Tool
Fig. 7—(Right) The outer ring of the knob remains stationary, while you turn the inner screw counter-clockwise.

4. Once the black locking nut is loose, the silver knob can be freely tightened or loosened to adjust the amount of resistance to drift. To prevent the axis from moving while making the tension adjustment, use your left hand to hold the body of the axis securely while adjusting the silver knob (clockwise to increase tension) with your right hand. At some point you will feel the resistance of the knob increase as it begins to compress against the spring steel and nylon friction components. Adjustment is somewhat arbitrary. When the amount of tension feels about right, use the **502105** tool to re-tighten the black locking nut to secure the adjustment. Then, test the anti-drift tension.

5. Test the drift resistance of the axis by pushing on it with your hand to see how easily it moves. A good technique for doing this is to push on the axis body with your left thumb while providing a counteracting force on the lower part of manipulator using your right hand (Fig. 8). When the tension is adjusted correctly, it will not be easy to move the axis by pushing it.

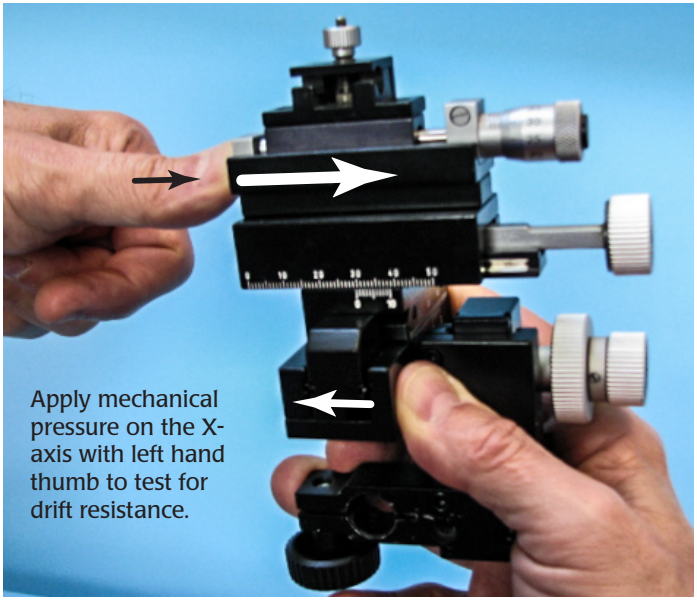


Fig. 8—To test the drift resistance, press on the x-axis. It should not move easily.

NOTE: The correct amount of drift resistance depends upon the working orientation of the manipulator, the load on the axis, and personal preference.

6. If the action feels too tight or too loose, unscrew the black locking nut again and re-adjust the tension accordingly. It may be necessary to repeat this procedure several times. Typically, the goal is to get the tension just tight enough to prevent the axis from drifting under its own weight (while loaded), but not any tighter than necessary to achieve this end. The correct amount of tension often occurs within a narrow range of adjustment. If you make it too tight, the knob will be harder than necessary to turn and the friction components will wear faster. This procedure requires patience!

Adjusting the Y-Axis Drift

The adjustment of the Y-axis tension is performed with essentially the same techniques as that described for the X coarse axis. The Y-axis is controlled by the Y-Axis Coarse Adjustment knob shown in Fig. 9.

If the manipulator is operated in standard position (with the electrode clamp located above the manipulator body as shown in Fig. 2, then the Y-axis does not typically have a tendency to drift unless the manipulator body is tilted to the left or right relative to the vertical plane passing parallel through the X-axis.

Adjusting the Z Axis Drift

The Z-axis is notorious for drifting, since it is subject to gravitational forces generated by the weight of the entire manipulator body and the load.

The adjustment to counteract drift on the Z-axis is performed differently than either the X or Y axes. The Z-axis is controlled by the Z-Axis Coarse Adjustment knob shown in Fig. 9. However, the tension is adjusted by rotating the Adjustment Ring.

1. Locate the set screw on the Adjustment Ring (Figure 6).

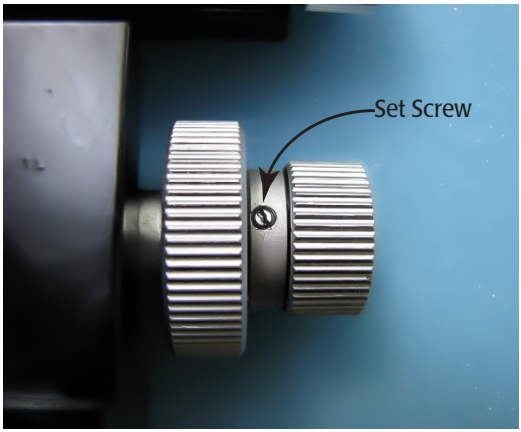


Fig. 9—The set screw is located on the adjustment ring.

2. Using a small flat blade screwdriver, loosen the set screw by turning the screw counterclockwise. This will free the Adjustment Ring to allow it to be rotated.

3. Adjust the tension on the Z-axis. The Adjustment Ring may be difficult to turn manually, because access is limited by the larger diameter Z-axis and Y-axis Adjustment knobs which surround it. Once the set screw has been loosened, It may be easier to turn the Adjustment Ring if you keep the screwdriver blade inserted into the screw and orient the flat blade perpendicular to the direction of the turn. (Fig. 10).

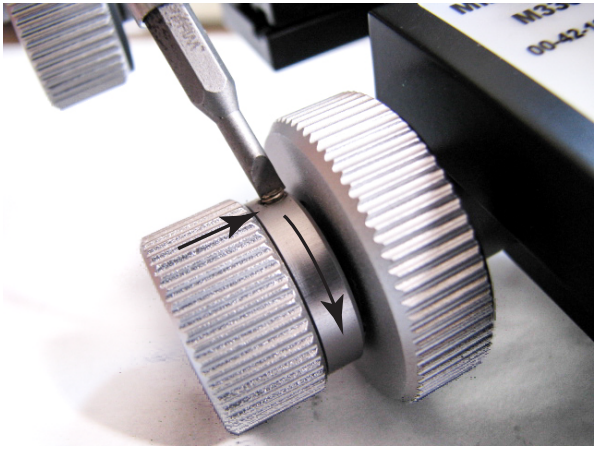


Fig. 10—The flat blade of the screwdriver should be positioned perpendicular to the adjustment ring to make the ring easier to rotate.

4. The perpendicular position of the screwdriver creates a leverage point for using the screwdriver to amplify the force applied to turn the ring.

CAUTION: Don't unscrew the setscrew too much or it will fall out.

CAUTION: Be careful not to let the screwdriver blade slip out of the screw slot, which could damage the slot or cause personal injury.

TIP: With older manipulators, the Adjustment Ring may be too tight to turn, even using the screwdriver technique just described. If this is the case, remove the Y-axis Adjustment knob to gain better mechanical access for the use of pliers.

To remove the Y-axis Coarse Adjustment knob, remove its black locking nut with the **502105** tool. Then, turn the knob counter-clockwise to remove it altogether. Note the order and orientation of the nylon and spring washer friction components. When the Z-axis tension adjustments are complete, re-install the friction components and the Y-axis Coarse Adjustment knob in reverse order of disassembly. Then, re-adjust the Y-axis tension.

ACCESSORIES

Manipulators

KITE-R (or L)	Kite Manual Manipulator, right (or left)
KITE-M3-R (or L)	Kite, right (or left) + Tilting Base Combo
M3301R (or L)	Manual Manipulator, right (or left)
M3301-M3-R (or L)	Manual Manipulator, right (or left) with Tilting Base
MD4R (or L)	Double Holder Micromanipulator, right (or left)
MD4-M3-R (or L)	Double Holder Micromanipulato, right (or left) & Tilting Base
MMJR (or L)	Joystick Micromanipulator, right (or left)

Optional Accessories

5464	5-lb Weight for Tilting Base Shipping weight: 7 lb (3 kg)
15873	Optional Angled Electrode Holder (13 cm long)
500475	Ball Joint, 7 cm long, for Ø 8mm Holder
500476	Ball Joint, 4 cm long, for Ø 4mm Holder
501607	Cable for MS314 and DC3001
502105	Axis Adjustment Tool
M3301EH	Replacement Electrode Holder (14 cm long)
M2	Additional Clamp, Ø 12mm
M-3	80° Tilting Base, M6 x 1mm screw
M4C	Microscope Stage Adapter
M5	Additional Clamp, Ø 10mm
M6	Additional Clamp Ø 0.5"
PM5	Remote Controller for MS314 and MPM-10
STM3	Joystick Controller for DC300
TBS	Tilt Base with Screw Adjustment

A variety of magnetic stands are also available from WPI.

SPECIFICATIONS

KITE	**TRAVEL RANGE**	**RESOLUTION**
X-axis Fine	10mm	0.01mm
X-axis	35mm	0.1mm
Y-axis	20mm	0.1mm
Z-axis	20mm	0.1mm

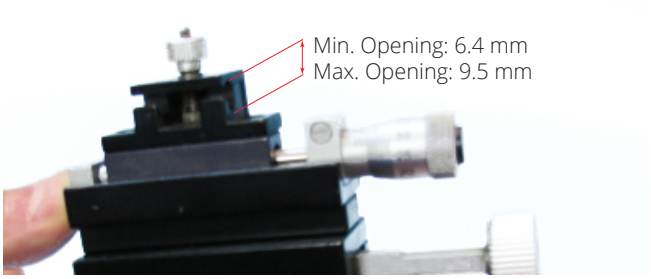
Electrode Holder Clamp Min. Opening	6.4 mm
Electrode Holder Clamp Min. Opening	9.5 mm
Shipping Weight	3 lbs. (1.4 kg)

M3301	TRAVEL RANGE	RESOLUTION
X-axis Fine	10mm	0.01mm
X-axis	37mm	0.1mm
Y-axis	20mm	0.1mm
Z-axis	25mm	0.1mm

Electrode Holder Clamp Min. Opening 6.4 mm
Electrode Holder Clamp Min. Opening 9.5 mm
Shipping Weight 3 lbs. (1.4 kg))

MD4R	TRAVEL RANGE	RESOLUTION
X-axis Fine	10mm	10µm
X-axis	37mm	100µm
Y-axis	20mm	100µmm
Z-axis	25mm	100µmm

Electrode Holder Clamp Min. Opening 6.4 mm
Electrode Holder Clamp Min. Opening 9.5 mm
Shipping Weight 3 lbs. (1.4 kg)



WARRANTY

WPI (World Precision Instruments, Inc.) warrants to the original purchaser that this equipment, including its components and parts, shall be free from defects in material and workmanship for a period of one year* from the date of receipt. WPI's obligation under this warranty shall be limited to repair or replacement, at WPI's option, of the equipment or defective components or parts upon receipt thereof f.o.b. WPI, Sarasota, Florida U.S.A. Return of a repaired instrument shall be f.o.b. Sarasota.

The above warranty is contingent upon normal usage and does not cover products which have been modified without WPI's approval or which have been subjected to unusual physical or electrical stress or on which the original identification marks have been removed or altered. The above warranty will not apply if adjustment, repair or parts replacement is required because of accident, neglect, misuse, failure of electric power, air conditioning, humidity control, or causes other than normal and ordinary usage.

To the extent that any of its equipment is furnished by a manufacturer other than WPI, the foregoing warranty shall be applicable only to the extent of the warranty furnished by such other manufacturer. This warranty will not apply to appearance terms, such as knobs, handles, dials or the like.

WPI makes no warranty of any kind, express or implied or statutory, including without limitation any warranties of merchantability and/or fitness for a particular purpose. WPI shall not be liable for any damages, whether direct, indirect, special or consequential arising from a failure of this product to operate in the manner desired by the user. WPI shall not be liable for any damage to data or property that may be caused directly or indirectly by use of this product.

Claims and Returns

Inspect all shipments upon receipt. Missing cartons or obvious damage to cartons should be noted on the delivery receipt before signing. Concealed loss or damage should be reported at once to the carrier and an inspection requested. All claims for shortage or damage must be made within ten (10) days after receipt of shipment. Claims for lost shipments must be made within thirty (30) days of receipt of invoice or other notification of shipment. Please save damaged or pilfered cartons until claim is settled. In some instances, photographic documentation may be required. Some items are time-sensitive; WPI assumes no extended warranty or any liability for use beyond the date specified on the container

Do not return any goods to us without obtaining prior approval and instructions from our Returns Department. Goods returned (unauthorized) by collect freight may be refused. Goods accepted for restocking will be exchanged or credited to your WPI account. Goods returned which were ordered by customers in error are subject to a 25% restocking charge. Equipment which was built as a special order cannot be returned.

Repairs

Contact our Customer Service Department for assistance in the repair of apparatus. Do not return goods until instructions have been received. Returned items must be securely packed to prevent further damage in transit. The Customer is responsible for paying shipping expenses, including adequate insurance on all items returned for repairs. Identification of the item(s) by model number, name, as well as complete description of the difficulties experienced should be written on the repair purchase order and on a tag attached to the item.

** Electrodes, batteries and other consumable parts are warranted for 30 days only from the date on which the customer receives these items.*

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