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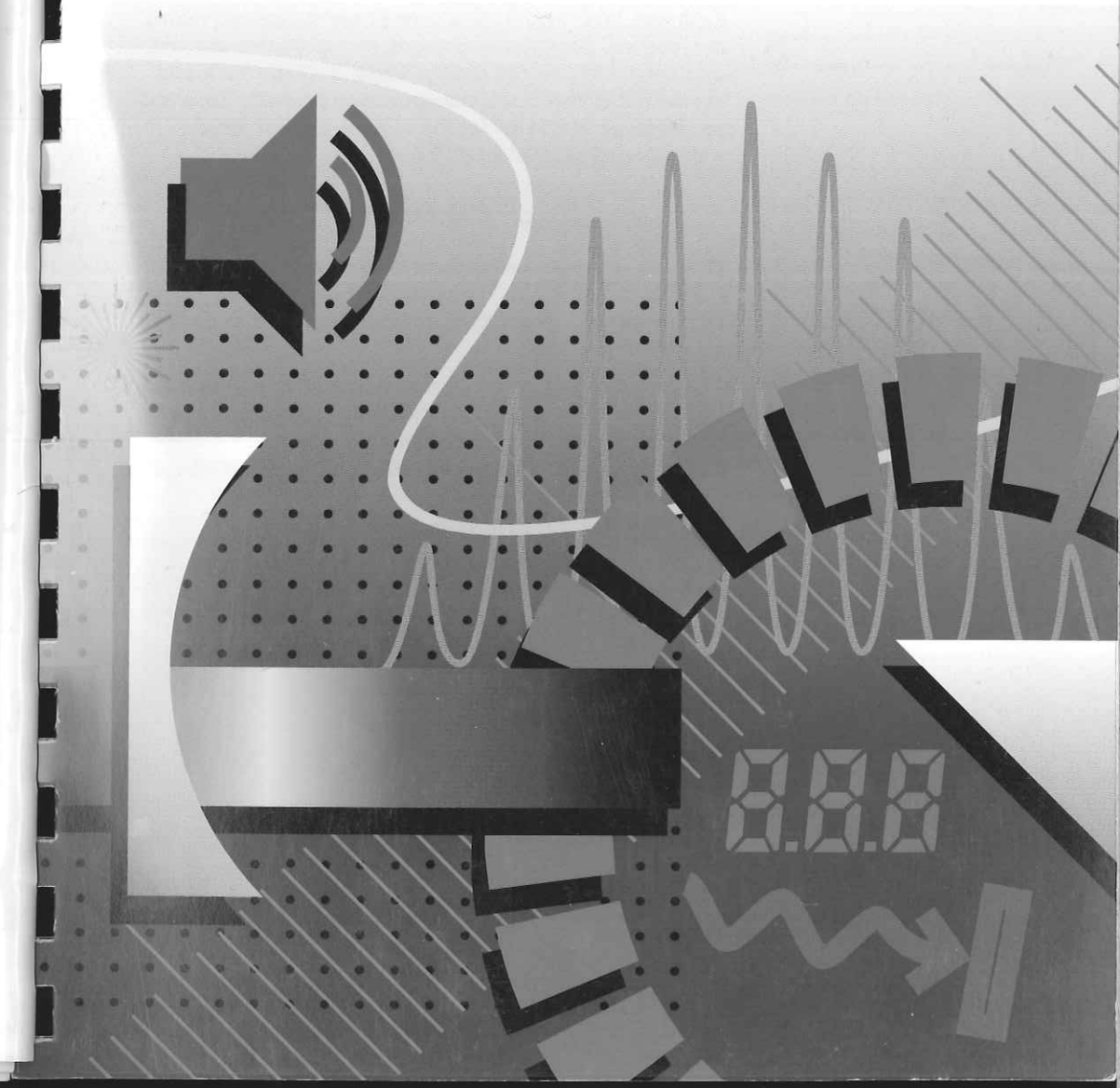
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Newport

PMC100 Single-Axis Motion Controller Operators Manual



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Warranty

Newport Corporation warrants this product to be free from defects in material and workmanship for a period of 1 year from the date of shipment. If found to be defective during the warranty period, the product will either be repaired or replaced at Newport's option.

To exercise this warranty, write or call your local Newport representative, or contact Newport headquarters in Irvine, California. You will be given prompt assistance and return instructions. Send the instrument, transportation prepaid, to the indicated service facility. Repairs will be made and the instrument returned, transportation prepaid. Repaired products are warranted for the balance of the original warranty period, or at least 90 days.

Limitation of Warranty

This warranty does not apply to defects resulting from modification or misuse of any product or part. This warranty also does not apply to fuses, batteries, or damage from battery leakage.

This warranty is in lieu of all other warranties, expressed or implied, including any implied warranty of merchantability or fitness for a particular use. Newport Corporation shall not be liable for any indirect, special, or consequential damages.

Statement of Calibration

This instrument has been inspected and tested in accordance with specifications published by Newport Corporation.

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Part No. 18322-01, Rev. A
IN-03915 (6-92)

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Safety Precautions

The following safety precautions should be observed prior to operation of the PMC100 Single Axis Motion Controller System.

This instrument is intended for use by qualified personnel who recognize shock hazards and are familiar with safety precautions required to avoid possible injury. Read the manual carefully before operating the instrument and heed all written warnings.

For your own safety and that of your equipment, always take the following precautions.

Disconnect the power plug under the following circumstances:

- If the power cord or any attached cables are frayed or damaged in any way
- If the power plug is damaged in any way
- If the unit is exposed to rain, excessive moisture, or liquids are spilled on the unit
- If the unit has been dropped or the case is damaged
- If you suspect service or repair is required
- Whenever you clean the case

To protect the unit from damage, be sure to:

- Keep all air vents free of dirt and dust
- Keep all liquids away from the unit
- Do not expose the unit to excessive moisture (>90% humidity)
- Read the manual before using the unit for the first time

WARNING

All attachment plug receptacles in the vicinity of this unit are to be of the grounding type and properly polarized. Contact your electrician to check your receptacles.

WARNING

This product is equipped with a 3 wire grounding type plug. Any interruption of the grounding connection can create an electric shock hazard. If you are unable to insert the plug into your wall plug receptacle, contact your electrician to perform the necessary alterations to assure that the green (green-yellow) wire is attached to earth ground.

WARNING

This product operates with voltages that can be lethal. Pushing objects of any kind into cabinet slots or holes, or spilling any liquid on the product, may touch hazardous voltage points or short out parts.

WARNING

Opening or removing covers will expose you to hazardous voltages. Refer all servicing internal to this instrument enclosure to qualified service personnel who should observe the following precautions before proceeding:

- Turn OFF power and unplug the unit from its power source
- Disconnect all cables
- Remove any jewelry from hands and wrist
- Use only insulated hand tools
- Maintain grounding by wearing a wrist strap attached to instrument chassis

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Specifications

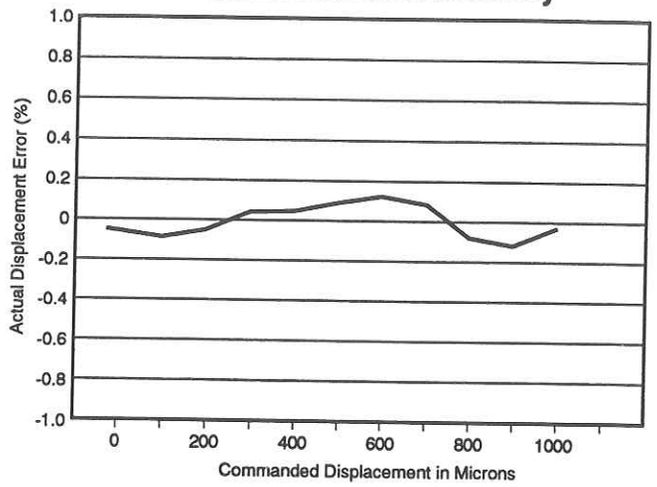
Physical Specifications

Number of axes:	1
Multi-axis provisions:	Joystick port, stackability
Display:	High-legibility 8 mm LED;
Power Supply:	Internal, World-wide compatible
Power Rating:	100-240VAC (switchable) 50-60 Hz, 350 mA RMS max
Dimensions:	3.5 x 7.5 x 8.75 in. (89 x 191 x 223 mm)
Weight:	4.1 lbs (1.8 kg)
Drive Compatibility:	850, 850A, 850B Linear Actuators; 495, 496 Rotation Stages
Display units:	µm or degrees
Display resolution:	0.1 µm, 0.001°
Jog Entry:	5 digit thumbswitch, LSD 0.1 µm/0.001°
Servo technique:	Phase-locked loop and analog velocity servo

Motion Performance

Speed Range (850/A/B):	30-375 µm/sec typ.
Speed Regulation (2 kg) load:	9% @ 30 µm/sec 3% @ 375 µm/sec
Typ. Minimum Jog:	0.2 µm typ.
Accuracy:	See figure on next page

PMC100 Motion Accuracy



*Performance measured interferometrically under typical 5-7 lb (2-3 kg) loading using 850-class actuators driving a 421 stage, using recommended system setup, adjustment and backlash elimination procedures.
NOTE: At loads greater than 7 lbs, the ability to jog the preset distance may degrade.

Controls and Interfaces

FWD, REV:	Motion buttons
Jog Entry (µm, degrees):	Digital thumbswitches
Velocity Control:	Rotary knob
FAST/SLOW:	Range button
ABORT/CLEAR:	Stop motion/zero display
RUN/JOG:	Motion Control mode
Joystick Port:	For Model PMC200-J or other IBM-PC compatible game joystick
Actuator Port:	For 850, 850A, 850B actuators and 495/496 rotation stages
Actuator Selection:	3 dip type switches

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Section 1
Introduction

1.1 System Overview

Model PMC100 is a single-axis motion controller with motion increment preset capability and position display. It is compatible with Newport 850/850A/850B Series micrometer-replacement actuators and 495 and 496 rotation stages.

PMC100 incorporates a velocity servo and point-to-point incremental positioning capability. The velocity servo provides a degree of immunity to changes in load and friction. The point-to-point positioning capability allows the user to preset a motion increment (jog), then perform repeatable moves in either direction by the preset amount.

PMC100 provides control of actuator position and velocity from its front panel or via an optional joystick. To neatly accommodate multi-axis configurations, several PMC100s may be stacked atop each other, thereby conserving laboratory real estate. An optional 2-axis joystick cable, Model PMC100-JC, provides simultaneous control and coordination of two PMC100 controllers (and thereby two axes of motion) from a single IBM-PC compatible game joystick, e.g. Newport PMC200-J. A joystick may be connected directly to a single PMC100 for single-axis control.

From this point on in this manual, the generic term "actuator" will refer to both micrometer-replacement 850/850A/850B actuators and 495 and 496 rotation stages.

1.2 Unpacking and Inspection

PMC100 was thoroughly tested before shipping. If you find any damage to the unit or its containers, contact the shipping company immediately and call Newport for further instructions. Retain all shipping materials should transport ever be required.

1.3 Accessories

The following may be ordered separately:

Model	Description
PMC200-J	Joystick
PMC100-JC	2-Axis Joystick Adapter Cable

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Section 2
Operation

2.1 Rear Panel

The back panel of the PMC100 provides connectors for an actuator or rotation stage, a joystick, and power.

2.2 Power Selection

PMC100 is equipped with a universal power supply for operation on any standard 50-60Hz AC line voltage. Before applying power for the first time, be sure to check the PMC100's voltage setting and, if necessary, reset it to accommodate the local voltage.

Warning

Failure to preset the line voltage switch will result in damage to the unit. Such damage is not covered by Newport's warranty.

CAUTION

PMC100 must be grounded. Do not operate PMC100 without connection to a good earth ground. As with most modern instruments, hazardous voltages may be present at the case and at connected equipment (such as actuators) if ungrounded operation is attempted.

Voltage is set by a wheel which may be accessed as follows.

1. Unplug the power cord from its receptacle on the back panel.
2. Use a screwdriver to depress the locking tab at the top center of the power receptacle. Tilt the receptacle assembly out and away from the unit.
3. Remove, rotate and re-insert the voltage wheel until the appropriate local line voltage appears in the window.
4. Press the receptacle assembly back into the unit until it clicks in place.

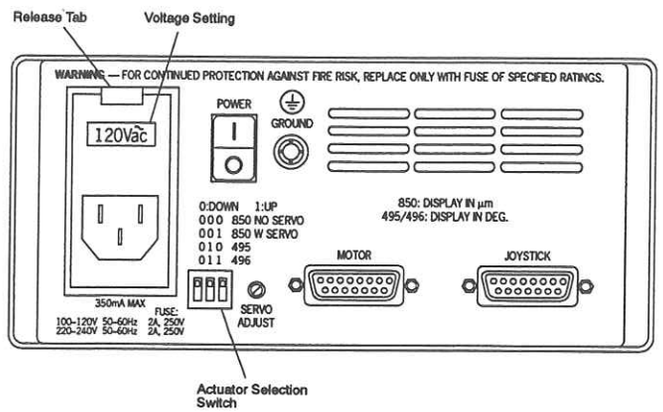


Fig. 1. PMC100 Back Panel

2.3 Actuator Selection

The back panel also has an actuator selection switch. This selects motion control and display parameters which are necessary for accurate operation. A switch setting table is printed on the back panel for easy reference. Use a pen or other pointed instrument to set the switches so that they correspond to the motion device you are using. (Pencils are not recommended for this since they can produce conductive graphite dust.) Note that standard 850 and 850A actuators have a servo circuit installed on their cable and 850B actuators do not; the PMC100 switch setting for "850 w servo" should be used for 850 and 850A actuators; the switch setting for "850 no servo" should be used for 850B actuators. 850-family actuators with a servo are easily identified by the presence of a plastic box on their cable.

Note

495/496 Stages and servo-equipped 850/850A actuators may require servo adjustment for optimum operation with PMC100. This is particularly true for older devices. Refer to Section 3.2 for adjustment instructions.

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Actuator Connection

850B actuators have a 15-pin connector which may be plugged directly into the PMC100 Actuator connector.

495, 496 and earlier 850 and 850A actuators have 9-pin connectors and require an 850IA-10 adaptor cable when used with PMC100 and other PMC-Series Newport controllers.

2.4 Joystick Connection

Single Axis Setups

An IBM-compatible game joystick such as **Model PMC200-J** may be connected to the joystick connector. The "horizontal" motion of the joystick will control operation of the actuator.

Multi-Axis Setups

For 2-axis control, attach the joystick to a **Model PMC100-JC** cable, then connect the two ends of the cable to two PMC100 joystick ports.

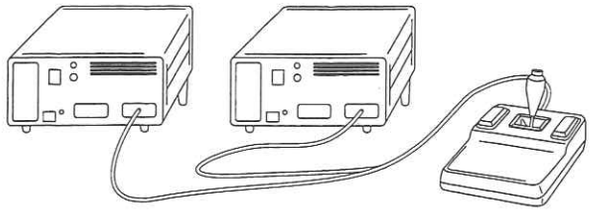


Figure 2 – 2-axis Joystick connection using PMC100-JC adaptor cable. Note that the PMC100 controllers can be stacked if desired.

In general, each joystick axis is equipped with a thumb-slide or rotary zero-offset adjustment which "balances" the joystick zero position. If motion occurs when the joystick is not deflected, refer to the adjustment procedures in section 3.1.

2.5 Front Panel Controls

After the correct voltage settings and connections have been established, power may be applied to the PMC100 by switching the rear-panel power switch on. The display will light up with a zero.

Note

Actuator type and jog settings may be changed when power is on.

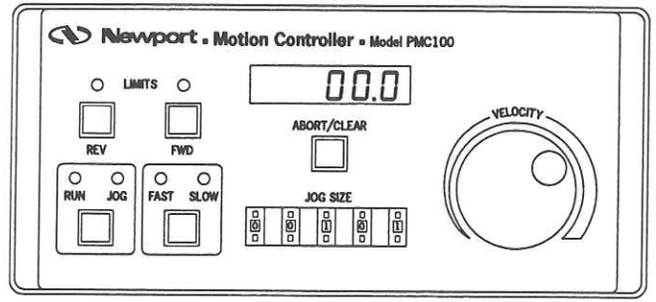


Figure 3 – The front panel.

2.6 Position Display

Depending on whether a linear actuator or rotary stage is being used, the display and jog preset units will be either µm (with a least significant digit of 0.1 µm) or degrees (with a LSD of 0.001°). The display's decimal point will be correctly positioned for the actuator under use. The decimal point for the jog preset is "implied;" that is, it is not explicitly labeled. The five thumbwheel digits correspond to the rightmost five display digits.

Clearing the Display

The display may be cleared (zeroed) by pressing the ABORT/CLEAR button when no motion is occurring. When motion is underway, the ABORT/CLEAR button causes an immediate halt but will not clear the display unless pressed a second time.

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2.7 Velocity Setting

The velocity knob allows continuous adjustment of actuator or stage velocity. The "FAST/SLOW" range switch selects either of two speed ranges. For a standard 850 family actuator, the speed range is approximately 30 µm/sec–375 µm/sec. (Depending on load, friction and other operating conditions, the effective range may differ.)

The velocity control setting affects both the continuous running speed when the "RUN/JOG" mode switch is set to RUN and the maximum speed during point-to-point moves when the mode switch is set to JOG.

A velocity servo is incorporated in the PMC100. This provides a degree of immunity to changes in velocity arising from changing load. Velocity regulation is typically 9% at the lower end of the speed range and 3% at the upper end.

2.8 Operating Modes

The motion mode is selected by depressing the RUN/JOG button so that the desired mode indicator light is illuminated. For continuous motion, select RUN mode. For point-to-point motion over a preset distance, select JOG mode.

Pressed once, the ABORT/CLEAR button causes motion to halt immediately in either mode of operation. If no motion is occurring when the ABORT/CLEAR button is depressed, the display is zeroed.

Run Mode

When in RUN mode, PMC100's FWD and REV buttons latch to provide continuous operation after being depressed. Pressing the button a second time will stop motion. The ABORT/CLEAR button will also cause motion to cease. Velocity and speed range may be adjusted during motion.

Jog Mode

When in JOG mode, PMC100 moves the actuator the distance pre-set on the Jog Entry thumbswitch display. Each digit is incremented or decremented by pressing its setting-buttons, which are marked with small "+" and "–" symbols. The least-significant-digit of the Jog Entry setting is equal to the rated resolution of the actuator or stage.

After pre-setting the desired jog increment, motion is initiated in the desired direction by pressing either the FWD or REV buttons. The velocity knob may be adjusted before or during motion. Holding the buttons depressed or depressing them several times during motion actuation has no effect aside from the initial jog motion.

Motion can be halted immediately by pressing the ABORT/CLEAR button or by changing to RUN mode.

2.9 Joystick Operation

For single-axis setups, an IBM-PC compatible game joystick (e.g. Newport model PMC200-J) may be attached directly to the joystick port on the PMC100 back panel.

For dual-axis setups, the joystick may be attached to two PMC100s via a Model PMC100-JC cable as shown in Fig. 2.

In RUN and JOG mode, the direction of position of the joystick with respect to its center position corresponds to forward or reverse motion. The amount of angular deflection corresponds to the velocity.

In either mode, motion is initiated by depressing the joystick's "fire" button, which ordinarily is wired in parallel with its right-hand button. The left-hand button on most joysticks toggles between FAST and SLOW speed ranges. In RUN mode, motion stops when the "fire" button is released or the joystick is returned to its center (zero velocity) position. In JOG mode, motion stops when the preset jog increment is reached (or if a limit condition occurs).

In general, each joystick axis is equipped with a thumb-slide or rotary zero-offset adjustment which "balances" the joystick zero position. If motion occurs when the joystick is not deflected, refer to the joystick centering procedures in section 3.1.

2.10 Limit Conditions

Two LEDs situated above the FWD and REV buttons indicate if a limit or stall condition occurs. An audible alarm also sounds.

Warning

Limits and stalls are hard on your actuators. Avoid limit and stall conditions if possible. Do not use the actuator's built-in hard-limits as "absolute position" indicators.

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Actuators with low-speed/high-resolution gearbox options are particularly sensitive to limit and stall conditions. Be especially careful if you are using these.

2.11 Actuator Speed Options

Like most inexpensive display controllers, PMC100 provides calibrated operation for standard motion devices. Standard 850/850A/850B actuators are equipped with gearboxes with a ratio of 1:262; that is, 262 turns of the motor result in one turn of the leadscrew. Consequently standard actuators produce 20,000 encoder quadrature transitions per millimeter of travel.

For higher or lower speed ranges, Newport offers optional gearbox ratios other than 1:262. For these non-standard gearbox ratios, it is easy to convert PMC100's displayed position to actual position via the following formula:

*Actual distance = display * (262/actual ratio)*

That is, if you are using an 850A-1HS actuator (which has a 1:22 ratio), the actual distance is 11.6 times the displayed distance.

850B Model	Gear Ratio	Display Correction Factor
850B	1:262	1
850B-HS	1:22	11.6
850B-LS	1:1,670	0.157

2.12 About Backlash

For bi-directional motions in critical applications, any backlash introduced by the actuator or other mechanical components should be considered. Backlash has the effect of reducing the actual motion by a consistent amount whenever motion direction is reversed. Successive unidirectional motions are not affected by backlash.

Backlash may be measured by viewing the shaft of an actuator or a point on stage with a microscope or loupe and performing small, µm-scale back and forth motions via the PMC100 jog function. Little or no motion will be seen for reversal increments less than the mechanical backlash. By gradually increasing the reversal increment, motion will eventually be seen in both directions. The jog setting which barely produces motion in each direction is equal to the backlash.

Section 3
Adjustments and Service

3.1 Joystick Adjustment

Quick Method

Single Axis Setups:

1. With actuator and Newport PMC200-J (or equivalent) joystick connected, turn the PMC100 on.
2. Ensure the joystick spring-lock slide switches are engaged (horizontal switch: slide to right; vertical switch: slide down.)
3. Deflect the joystick to the left and right and let it spring back to center.
4. While taking care that the joystick is centered and not deflected, press the "fire" button on top of the joystick. If the actuator moves, proceed to step 5. Otherwise, no adjustment is necessary.
5. Turn the small adjustment knob *above* the joystick so that steps 3 and 4 can be performed several times without actuator motion.

Dual-Axis Setups:

1. Perform the above Single-Axis steps (1)–(5) with the joystick connected directly to the controller. This centers the joystick's horizontal axis.
2. Disconnect the joystick. Connect it to the PMC100-JC Joystick Adaptor Cable. Connect the PMC100-JC plug labelled "B" to the controller.
3. Repeat the above Single-Axis steps (1)–(5), using the adjustment screw to the *left* of the joystick and deflecting the joystick *up and down*. This adjusts the vertical axis of the joystick.
4. The PMC100-JC connectors labeled "A" and "B" may now be connected to the desired controllers.

Exact Method

This method is intended for especially accurate centering of the joystick. Ordinarily, the "Quick Method" described

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above is perfectly adequate, especially considering the relatively low-precision designs of commonly-available game joysticks. The following procedure is intended for critical applications only.

WARNING

The following adjustments involve removal of covers and exposure to electrical shock hazards. Only service personnel who are aware of necessary safety precautions when working around electrical shock hazards should attempt these adjustments.

Single-Axis Setups:

1. Turn off the PMC100.
2. Remove the screw from each end of the front and rear panel brackets (four screws in all) and remove the brackets from the controller. Remove the top cover from the controller.
3. Connect an oscilloscope ground lead to TP2 on the PMC100 motherboard. Connect the probe lead to TP4. Select DC coupling, 2V/div and 5 ms/div settings on the oscilloscope. With the Newport PMC200-J or equivalent joystick connected, turn the PMC100 on.
4. Make sure the spring-lock slide switches on the joystick are engaged (horizontal switch: slide to right; vertical switch: slide down.)
5. Without pressing the joystick "fire" button, deflect the lever to the left and right. You will see the oscilloscope trace move up and down accordingly.
6. Allow the joystick to spring back to its center position.
7. Turn the small joystick adjustment knob (above the joystick lever) to bring the scope trace to ground level.
8. Select the 200 mV/div setting on the oscilloscope. Adjust the joystick adjustment knob to bring the scope trace to ground level.

9. Deflect the joystick lever to the left and right, letting it spring back to its center position. Repeat steps (8)–(9) until the scope trace returns to ground level when the lever springs back to center.
10. Turn off the PMC100, remove the scope leads, and re-install the top cover, brackets and screws.

Dual-Axis Setups:

1. Perform the above steps (1)–(10) for the Single Axis Procedure. This centers the horizontal axis of the joystick.
2. Disconnect the joystick from the PMC100. Plug it into the PMC100-JC joystick adaptor cable. Connect the PMC100-JC plug labeled "B" to the same PMC100 controller.
3. Perform steps (4)–(10) of the above Single Axis Procedure while using the adjustment screw located to the *left* of the joystick lever and deflecting the joystick *up and down*. This centers the vertical axis of the joystick.
4. The PMC100-JC connectors labeled "A" and "B" may now be connected to the desired controllers.

3.2 Actuator Servo Adjustment

(495, 496, 850 and 850A)

Note

Standard 850 and 850A actuators are equipped with servo circuits in a box on their cable. These actuators periodically require adjustment of their servos.

Note

850B actuators do not have servo circuits and do not require adjustment. Instead, these actuators utilize a more advanced servo internal to the PMC100. This servo is factory-adjusted and rarely needs field adjustment. If you note any of the symptoms listed below, refer to the section on "PMC100 Internal Servo Adjustment."

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Note

Servo adjustment is somewhat controller-specific. Actuators previously used with controllers other than PMC100 may require adjustment for optimum performance with PMC100.

Note

Servo adjustment should be made under typical load conditions for your application to ensure optimum performance.

When servo adjustment ("tuning") is necessary, symptoms can include:

- "Cogging" or hesitant operation at very low speeds;
- Overshoot;
- Gentle oscillation when perturbed,
- Excessive noise and vibration when motion is occurring;
- Significant difference in speed in the forward versus the reverse direction which cannot be attributed to mechanical causes (spring forces, etc.)

Once a device has been optimized for use with a particular controller, the need for tuning is infrequent — typically on intervals of greater than one year.

Note that the phase-locked-loop velocity servo incorporated in the PMC100 offers superior velocity regulation versus load compared to older, analog velocity servo designs.

Note

Servo adjustment should be made under typical load conditions for your application to ensure optimum performance.

850/850A Servo Adjustment Procedure:

Refer to your 850/850A actuator manual for location of servo trim-pots.

1. With PMC100 turned off, set the rear-panel DIP switches to their proper settings (850 w servo).
2. Remove the four screws from the 850/850A servo case, located on the actuator cable. Remove the lid.

3. Connect the oscilloscope ground lead to TP1 and the probe lead to TP5. Select DC coupling, 5V/div and 5 ms/div settings. Turn on the PMC100 controller.
4. Locate the R14 potentiometer and turn it counter-clockwise until oscillations are observed on the oscilloscope.
5. Turn R14 clockwise **only enough to stop oscillations – no more**. Excessive clockwise adjustments will degrade jog accuracy.
6. Select the 100 mV/div setting on the oscilloscope. Locate the R12 potentiometer and adjust until the scope trace is within 100mV of ground level.
7. Return the oscilloscope to the 5V/div setting. On the PMC100 front panel select JOG mode, FAST speed range, enter 01000 to the thumbwheel switches and turn the VELOCITY knob full clockwise.
8. JOG the actuator forward then reverse, clearing the display after each jog. If oscillations are observed, turn R14 clockwise **only enough to stop oscillations – no more**.
9. Repeat step 8 several times until there are no oscillations and jogs go within 3 counts of ±100.0.
10. Turn off the PMC100, remove the scope leads, and re-assemble the 850/850A servo box case.

495/495A Servo Adjustment Procedure:

Refer to your 495/495A Rotation Stage manual for location of servo trim-pots.

1. With PMC100 turned off, set the rear-panel DIP switches to their proper settings (495).
2. Remove the four screws from the servo case, located on the stage cable. Remove the lid.
3. Locate the R11 potentiometer (next to colored wires). Turn R11 completely counter-clockwise.
4. Connect an oscilloscope ground lead to TP1 and the probe lead to TP2. Select DC coupling, 100mV/div and 5 ms/div settings. Turn on the PMC100 controller.
5. Locate the R10 potentiometer and adjust it to bring the scope trace as near to ground level as possible.

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6. Turn R11 clockwise until oscillations are observed on the scope or until the trace begins to move away from ground.
7. Using the FWD and REV switches on the PMC100 in RUN mode, rotate the stage in one direction and then the other. If the scope trace does not return to within 100 mV of ground, adjust R10 until it will. When the trace will return to within 100 mV of ground after motion, the adjustment is complete.
8. Turn off the PMC100, remove the scope leads, and re-assemble the servo box case.

496 Servo Adjustment Procedure:

Refer to your 496 Rotation Stage manual for location of servo trim-pots.

1. With PMC100 turned off, set the rear-panel DIP switches to their proper settings (496).
2. Remove the four screws from the motor/servo housing (the part with the cable socket). Carefully remove the lid. Connect the 496 to the PMC100.
3. Connect an oscilloscope ground lead to TP2 and the probe lead to TP3. Select DC coupling, 5V/div and 5 ms/div settings. Turn on the PMC100 controller.
4. Turn R4 clockwise until oscillations are observed on the scope. Turn R4 counter-clockwise until oscillations cease. Turn R4 an additional 5 complete turns.
5. Select 100 mV/div on the scope. Adjust R5 until the trace is centered at ground potential.
6. Turn off the PMC100, remove the scope leads, and re-assemble the servo box case.

3.3 Internal Servo Adjustment (850B only)

Note

The PMC100's internal analog servo is used only with 850B actuators. Adjustment of the PMC100 internal servo is needed very rarely.

Note

Servo adjustment should be made under typical load conditions for your application to ensure optimum performance.

When servo adjustment ("tuning") is necessary, symptoms can include:

- "Cogging" or hesitant operation at very low speeds;
- Overshoot;
- Gentle oscillation when perturbed,
- Excessive noise and vibration when motion is occurring;
- Significant difference in speed in the forward versus the reverse direction which cannot be attributed to mechanical causes (spring forces, etc.)

Quick Procedure:

The following simple procedure can provide excellent servo adjustment without requiring an oscilloscope or a qualified electronics technician.

1. With the PMC100 controller turned off, set the rear-panel DIP switches to their proper setting (850 NO SERVO).
2. Connect an 850B actuator and turn the PMC100 on.
3. Using a small, straight-blade screwdriver or trim-pot adjustment tool, turn the SERVO ADJUST screw on the PMC100 rear panel counter-clockwise until oscillations or vibrations are felt or heard in the actuator.
4. Turn the SERVO ADJUST screw clockwise until all oscillations cease. Turn the SERVO ADJUST screw an additional 1/2 clockwise turn.
5. Jog the actuator forward and reverse 100.0 μm or so several times. Check for oscillations after each jog and if necessary repeat step (4).

Note

Adjust the servo trim-pot clockwise only enough to eliminate oscillation. Turning it too much may degrade jog accuracy.

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Exact Procedure:

The Quick Procedure outlined above is adequate for the vast majority of applications.

WARNING

The following adjustments involve removal of covers and exposure to electrical shock hazards. Only service personnel who are aware of necessary safety precautions when working around electrical shock hazards should attempt these adjustments.

1. With the PMC100 controller turned off, set the rear-panel DIP switches to their proper setting (850 NO SERVO).
2. Remove the screw from each end of the front and rear panel brackets (4 screws in all) and remove the brackets from the PMC100 controller. Remove the top cover.
3. Connect the oscilloscope ground lead to TP2 and probe lead to TP1. Select DC coupling, 5 V/div and 5 msec/div settings on the scope. With an 850B actuator connected, turn the PMC100 on.
4. With a small, straight-blade screwdriver, adjust the SERVO ADJUST screw on the PMC100 rear-panel counter-clockwise until oscillations are observed on the oscilloscope. Turn the screw clockwise only enough to stop oscillations — no more. Excessive clockwise adjustments will degrade jog accuracy.
5. On the PMC100 front panel select JOG mode, FAST speed range, enter 01000 to the thumbwheel switches and turn the VELOCITY knob full clock-wise.
6. JOG the actuator foreward then reverse, clearing the display after each jog. If oscillations are observed, turn the SERVO ADJUST screw clockwise **only enough to stop oscillations — no more.**
7. Repeat step 6 several times until there are no oscillations and JOG's go to within 3 counts of ±100.0.
8. Turn off the PMC100 controller, disconnect the scope leads, and re-assemble the PMC100 case.

3.4 Service Form

Newport Corporation
U.S.A. Office: 714/963-9811
FAX: 714/963-2015

Name _____ **Return Authorization #** _____

Company _____ (Please obtain prior to return of item)

Address _____

Country _____ Date _____

P.O. Number _____ Phone Number _____

Item(s) Being Returned:

Model # _____ Serial # _____

Description: _____

Reason for return of goods (please list any specific problems) _____

_____

Please complete the following, as appropriate:

List all control settings and describe problem: _____

_____

_____

_____ (Attach any additional sheets as necessary).

Show a block diagram of your measurement system including all instruments connected (whether power is turned on or not). Describe signal source. If source is a laser, describe output mode, peak power, pulse width, repetition rate and energy density.

Where is the measurement being performed?

(factory, controlled laboratory, out-of-doors, etc.) _____

What power line voltage is used? _____ Variation? _____

Frequency? _____ Ambient temperature? _____

Variation? _____ °F. Rel. Humidity? _____ Other? _____

Any additional information should be included either on back or a separate sheet. (If special modifications have been made by the user, please describe).

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