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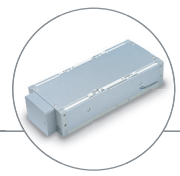
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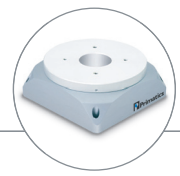
MDM1000



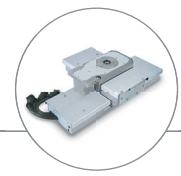
Reference & Maintenance Manual

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MDM1000 Manual
Revision Information

Publication Date	Notes
April 2003	
May 2003	Revised definition and description of Indicator LED's
November 2004	Added information for Copley Accelus drive
March 2004	Added information for 2A step drive
March 2004	Corrected step driver current description
April 2005	Updated look & formatting
May 2006	Describe Import,Export vs ImportSettings/ExportSettings

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For additional specifications, dimensioned drawings and additional information, refer to the MDM1000 Datasheet available from our website at www.primatics.com.

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1) Overview

This user guide is designed to help you install and maintain your MDM Series motion control. Follow these steps to ensure correct installation and maximum life:

Step 1 Review this entire user manual. Become familiar with all installation procedures prior to integrating your system.

Step 2 Review the safety summary to develop an understanding of standard safety practices when installing and operating automated equipment.

Step 3 Review installation procedures. For best results, follow these procedures carefully.

1.1) Conventions

Although this manual specifies NI-7344 compatibility, the MDM will communicate with motion cards that are members of the NI-73xx family. Some restrictions apply, for example the 7320 Series controllers are for stepper only, so the driver card options for servo motors (D1, D3, and D7) would not be compatible with the 7320 Series motion controller.

1.2) Compatible NI Cards

The MDM with NI 7344 communications interface is compatible with the following NI motion controllers:

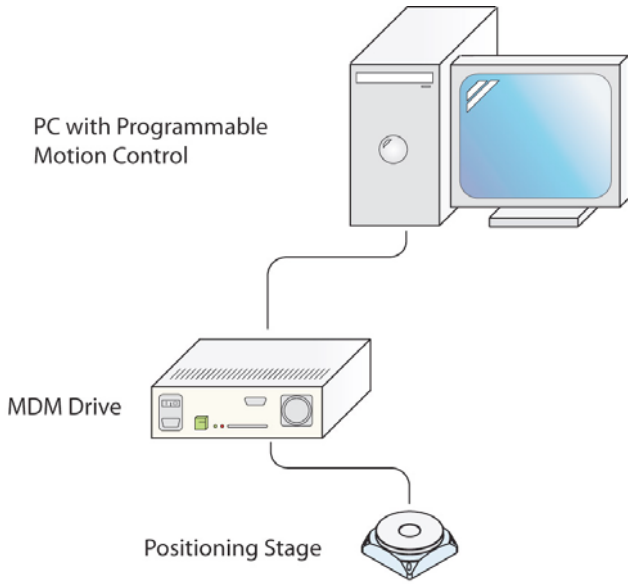
Table 1-1) Compatible NI Controllers

PCI-7332	Stepper motors only
PCI-7334	Stepper motors only
PXI-7334	Stepper motors only
PCI-7342	Stepper & Servo motors
FW-7344	Stepper & Servo motors
PCI-7344	Stepper & Servo motors
PXI-7344	Stepper & Servo motors
PCI-7352	Stepper & Servo motors
PXI-7352	Stepper & Servo motors
PCI-7354	Stepper & Servo motors
PXI-7354	Stepper & Servo motors
PCI-7356	Stepper & Servo motors
PXI-7356	Stepper & Servo motors
PCI-7358	Stepper & Servo motors
PXI-7358	Stepper & Servo motors
NI Ethernet Motion Control	Stepper & Servo motors

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2) Introduction – About the MDM1000

This manual is intended for use by application engineers and technicians involved in using Primatics positioning equipment.



The MDM1000 Motion Drive Module is a single axis motor drive with an integrated interface for a National Instruments 73xx Series Motion Controller. The small package includes a motor drive, power supply, NI-73xx interface, and standard Primatics axis connector. It acts as an intermediary between a user supplied programmable motion controller and the positioning stage(s). A variety of cable assemblies are available to connect a positioning stage or axis to the MDM. The diagram to the left shows the role of a MDM in a motion control system.

Custom versions of the MDM are also available to meet specific applications. Addendums to this manual will be included for custom configurations.

3) Model Configuration

There are three available models of the MDM1000

Model Configuration Number	Drive Type	Current	Motor Voltage
MDM1000D1-170V12AW5-C4-D2	Brushless Servo	12A Cont, 24A Peak	170VDC
MDM1000D1-60V3AW1-C4-D2	Brushless Servo	3A Cont, 9A Peak	60VDC
MDM1000D1-24V2AW1-C4-D5	Micro-Stepper	1.4A RMS, 2A Peak	24VDC

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4) Personal Safety

Please review before installing your motion system

Observe common industrial safety practices when installing and operating automated equipment.

- Have power connections made by qualified personnel.
- Keep fingers and other items out of any opening in the stage while it is in operation since injury or damage may result.
- Provide a safe access route and adequate room for servicing.
- Perform the recommended periodic maintenance described in this document.
- Verify that the work envelope is free of obstructions before the positioning stage is powered.
- Insure that for servo motors the encoder must be working properly and the polarity of the encoder needs to match the polarity of the motor before enabling the servo drive. Improper feedback connections can cause a motor run-away condition that has the potential to damage the stage and injure an operator.
- Only trained operators of the positioning stage should be allowed near the work environment.
- Identify emergency stop circuits and actuators in the workcell. This cuts power to all axes amplifiers.
- Note the places in the workcell where pinch points occur, and provide adequate safety clearance or safety curtain.
- Never operate the motor in a location that could be splashed by water, exposed to corrosive or flammable gases or is near combustible substances since this may cause an electric shock, fire or malfunction.
- Never touch the motor, driver, or peripheral devices when the power is on or immediately after the power is turned off. The high temperature of these parts may cause burns.

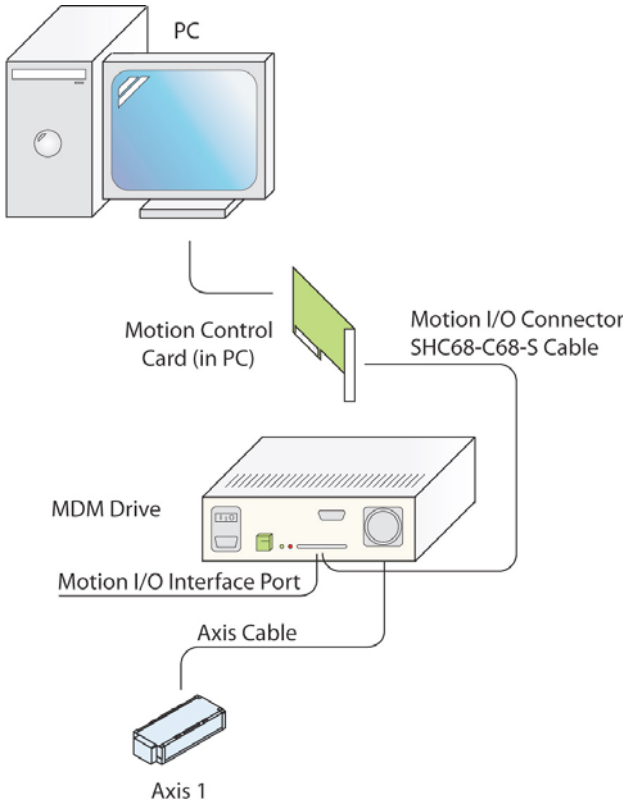
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5) Installation

5.1) Locating the MDM1000

A typical motion system consists of the MDM, motion control card, axis cable and positioning stage. The motion controller card is typically housed inside a PC. This card connects to the Motion I/O interface port in the MDM. Along with the interface port the MDM has an axis connector which connects to the stage or axis.

Figure 5-1: MDM1000 Motion System



The MDM must be placed in a convenient location for connection to both the motion control connectors and your stages.

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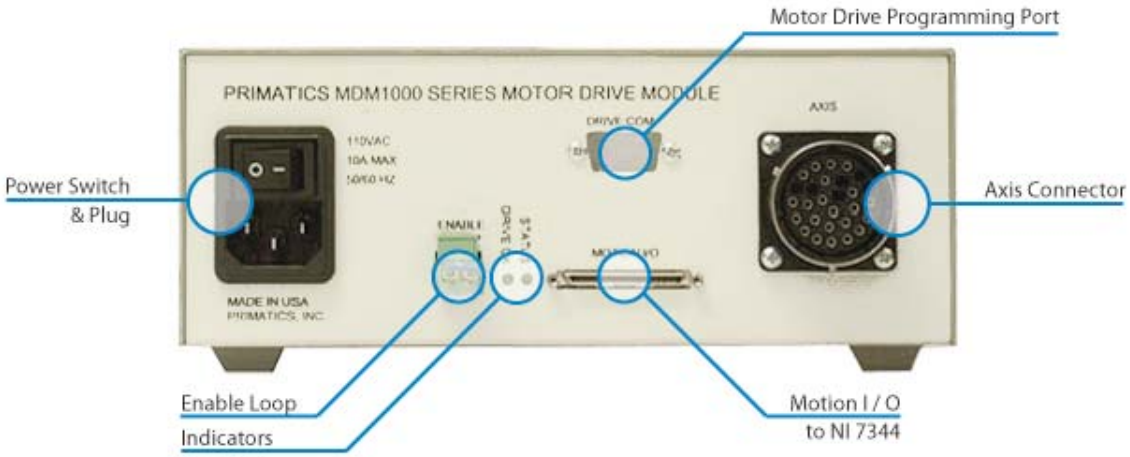
Figure 5-2: Dimensions of MDM1000



5.2) Rear Panel Information

All connections to the MDM are made as shown in Figures 5-3.

Figure 5-3: MDM1000 Connections



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5.3) Configuring the Motion Control Card

There are no jumpers or switches to configure for the NI series controllers. Refer to the documentation that accompanies your NI motion control card for complete information.

5.4) Connecting the NI card to the MDM1000 Chassis

IMPORTANT
ALL CONNECTIONS ARE TO BE MADE WITH NO POWER APPLIED TO THE MDM1000 OR THE NI MOTION CONTROLLER.

Refer to Figure 5-3. Use National Instrument SHC68-C68-S Cable (NI P/N 186380-02) to connect the MOTION I/O connector of the NI motion control card to the MOTION I/O connector of the MDM1000.

5.4.1) Power Switch and Plug

A standard 110VAC power cord is supplied with the MDM1000. Power input to the unit is 110VAC, Single Phase, 50/60Hz. The power inlet also includes the power switch.

5.4.2) Enable Loop

The Enable Loop jumper is part of the Amplifier Enable circuit. This loop must be closed to enable the motor driver amplifier. If no external circuits are part of the Enable Loop, the wire jumper installed at the factory must be maintained for normal operation.

5.4.3) Motion I/O connector

All connections to the NI-73xx controller are made through the Motion I/O connector. A National Instruments SHC68-C68-S Cable (NI P/N 186380-02) is used for this connection. There is no connection from the Digital I/O connector on the NI-73xx control card to the MDM1000.

5.4.4) Motor Drive Programming Port

If the MDM1000 is configured with a Servo Drive, the Motor Drive Programming Port is included for programming the digital servo drive. MDM1000's configured with a stepper motor drive do not include this connector.

The Servo Motor versions of the MDM1000 contain either an AMC DR100EE digital servo drive (12AW5 option) or a Copley Controls Accelus drive (3AW1 option). See sections 8.6 & 8.7 for more information. These drives are programmed at the factory for each application and no user programming is typically necessary. If the drive is to be re-programmed, or the user wants to use some of the drive performance analysis tools, the

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programming is accomplished by using the Motor Drive Programming Port. It is a RS-232 port using only the TX, RX, and COM connections. Connection to a standard COM port on a PC is made with a straight-through DSub 9 pin cable (pins at one end to the MDM1000, sockets at the other end to the PC).

Table 5-1: RS-232 Connector Pinout

Pin	Name	Function
1		Not Used
2	RX	Serial Data Input
3	TX	Serial Data Output
4		Not Used
5	COM	Ground
6		Not Used
7		Not Used
8		Not Used
9		Not Used

5.4.5) Axis Connector

A standard Primatics Servo or Stepper Axis Connector is used for connection to a Primatics stage or other axis mechanism. If the MDM1000 is used with a Primatics stage, a Primatics cable assembly is typically used. If a user supplied axis mechanism is used use the appropriate table below for making connections.

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Table 5-2: Option D2 - Servo Axis Connector (Motor, encoder, limits, home, temp)

Pin	Name	Function
A	Motor A	Motor phase
B	Motor B	Motor phase
C	Motor C	Motor phase
D	Motor Shield	Connection to chassis ground for motor cable shield
E	Encoder 5V	5V power for encoder
F	Encoder A+	Encoder A+ input
G	Encoder A-	Encoder A- input
H	Encoder B+	Encoder B+ input
J	Encoder B-	Encoder B- input
K	Encoder Shield	Connection to chassis ground for encoder cable shield
L	Sensor V+	Power supply for Home and Limit sensors. Factory Default is 12V.
M	DCCOM	Common for Home, Limit, and Temp sensors.
N	Home	Home sensor input
P	Brake Out	Not used on MDM1000
R	Brake Return	Not used on MDM1000
S	Chassis	Connection to chassis ground
T	Hall V+	Power to commutation sensors from motor amplifier. Typically this is 5VDC.
U	Hall V-	Power and signal return for commutation sensors. Typically this is connected to DCCOM
V	Encoder Common	Power supply common for encoder. Connected to DCCOM
W	Encoder Index +	Encoder Index + input
X	Encoder Index -	Encoder Index - input
Y	Forward Limit Switch	Limit sensor that actuates in the defined positive limit of travel for Primatics stages. Connected to DCCOM in normal operation, but actual sense is programmed into motion controller.
Z	Reverse Limit Switch	Limit sensor that actuates in the defined negative limit of travel for Primatics stages. Connected to DCCOM in normal operation, but actual sense is programmed into motion controller.
a		No connection
b	Hall A	Commutation sensor Hall A
c	Hall B	Commutation sensor Hall B
d	TEMP switch	Motor temperature monitor – connect to DCCOM for temperature OK. Open circuit for a motor temperature violation.
e	Hall C	Commutation sensor Hall C

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Table 5-3: Option D5 - Stepper Axis Connector (Motor, encoder, limits, home, temp)

Pin	Name	Function
A	Motor A +	Motor phase A+
B	Motor B +	Motor phase B+
C	Motor B -	Motor phase B-
D	<key>	
E	Encoder 5V	5V power for encoder
F	Encoder A+	Encoder A+ input
G	Encoder A-	Encoder A- input
H	Encoder B+	Encoder B+ input
J	Encoder B-	Encoder B- input
K	Encoder Shield	Connection to chassis ground for encoder cable shield
L	Sensor V+	Power supply for Home and Limit sensors. Factory default is 12V
M	DCCOM	Common for Home, Limit, and Temp sensors.
N	Home	Home sensor input
P	Brake Out	Not used on MDM1000
R	Brake Return	Not used on MDM1000
S	Chassis	Connection to chassis ground
T	Motor A-	Motor Phase A-
U	Motor B common	Motor Phase A common (no internal connection)
V	Encoder Common	Power supply common for encoder. Connected to DCCOM
W	Encoder Index +	Encoder Index + input
X	Encoder Index -	Encoder Index - input
Y	Forward Limit Switch	Limit sensor that actuates in the defined positive limit of travel for Primatics stages. Connected to DCCOM in normal operation, but actual sense is programmed into motion controller.
Z	Reverse Limit Switch	Limit sensor that actuates in the defined negative limit of travel for Primatics stages. Connected to DCCOM in normal operation, but actual sense is programmed into motion controller.
a	Motor Shield	Connection to chassis ground for motor cable shield
b	Motor A Common	Motor Phase A common (no internal connection)
c	DCCOM	Common for Home, Limit, and Temp sensors.
d	TEMP switch	Motor temperature monitor – connect to DCCOM for temperature OK. Open circuit for a motor temperature violation.
e	n/c	No connection

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5.4.6) Limit and Home Signals

The NI motion controller monitors limit and home sensors through the MDM1000. The MDM1000 can be configured to supply either 5V or 12V DC power for the limit and home sensors. The default setting is 12V. For ease of setting the limit switch voltage, jumper JP1 has been provided. JP1 is located inside the MDM1000 on the main printed circuit board near the power switch. The cover must be removed to access JP1.

IMPORTANT! Only qualified personnel should adjust JP1. Disconnect the power cord before removing the top cover. Replace the top cover when the adjustment is complete.

Electrically, each sensor should sink a minimum of 2mA from the sensor input (pins N, Y, or Z) to DCCOM (pin M). The sense or polarity of the signals is programmable in the NI motion controller. Figure 5-4 shows an equivalent schematic for the limit, home, and temperature inputs with the sensor power supply at the factory default setting of 12V.

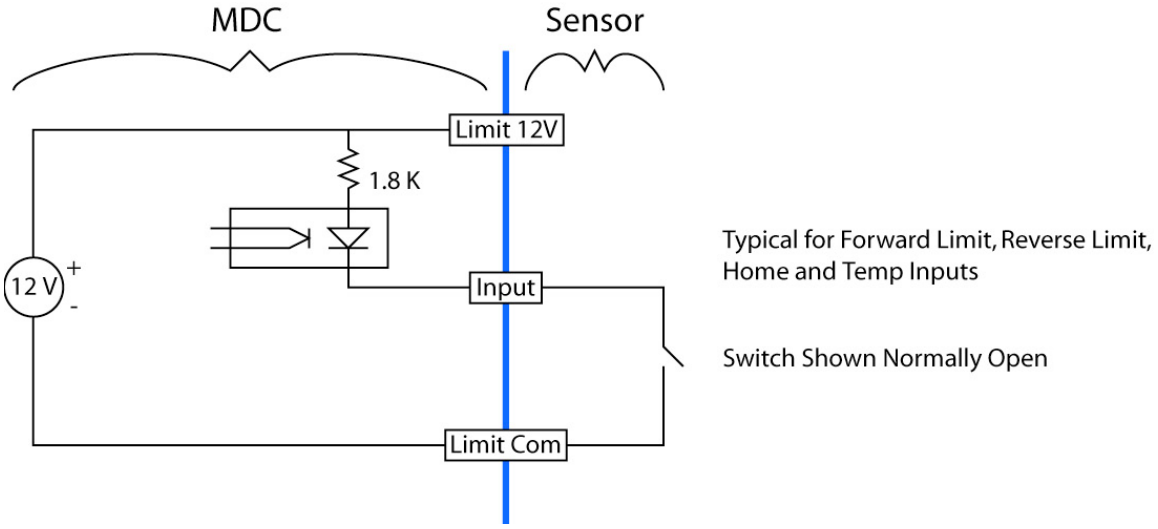


Figure 5-4: Sensor Input Circuit Diagram

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6) Operation

6.1) Overview

The MDM1000 is a single axis motor drive with integrated interface to the National Instruments NI-73xx series motion controller. Several drive options are available including 2 digital servo drives, and one stepper drive. The unit operates directly from line voltage to operate the motor at a bus voltage specified during time of order. The interface to the NI-73xx controller is via the MOTION I/O connector on both the MDM1000 and 73xx controller. Connections to the axis are through the Primatics standard servo or stepper axis connector described in section 5.3.5.

If a servo drive is specified, it is programmed at the factory with parameters specified by the user's application. Two different digital drives are used depending on the MDM model. The 3AW1 configuration option uses a Copley Accelus digital drive. The 12AW5 uses an AMC DR100EE25A20NAC digital drive. Normally, re-programming in the field is not necessary. Either drive can be programmed using software available from the respective manufacturers. Refer to sections 8.2 & 8.3 for programming the Accelus drive, and Appendix B for programming the DR100EE drive.

If a stepper drive is specified, it is configured at the factory with parameters specified by the users application. Step resolution (microsteps per step command), continuous current, and current reduction can be configured. Refer to section 7.2 for more information.

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6.1.1) Drive OK indicator

The operation of the DRIVE OK indicator is dependent on the internal drive. When illuminated, it indicates that the drive has no internal errors. In normal operation, the Drive OK indicator is always on with power applied. Any of the following errors will cause the Drive OK indicator to be off.

3AW1 option (Accelus Digital Servo Drive)
Amp Over Temperature fault
Motor Phasing error
Encoder power error
Under voltage fault
Over voltage fault
Short circuit fault

12AW5 option (AMC DR100EE Digital Servo Drive)
Short circuit fault
Over voltage fault
Under voltage fault
Drive over temperature fault
Start Disable
Drive Internal Error
Parameter Restore Error.

2AW1 option (2A Stepper Drive)
Amp Fault

6.1.2) Status indicator

The STATUS indicator is controlled by an output from the internal digital drive. It is illuminated whenever the drive is enabled with no faults. Any of the conditions listed below may prevent the drive from being enabled:

All drive options
Enable Loop jumper is open
Motor Temp switch is open (through axis connector)
Motion I/O cable disconnected from NI-73xx
Power to the NI-73xx is off

In normal operation, both indicators will be ON when the MDM1000 controlling the attached axis.

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7) Stepper Drives

This section is for reference of Stepper Drives only, Servo Drive information is found in Section 8.

7.1) Software

This section describes how to use MAX (National Instrument's Measurement & Automation Explorer) to confirm that the MDM1000 is operational. Make the hardware connections described in Section 5-4.

7.1.1) Start MAX program

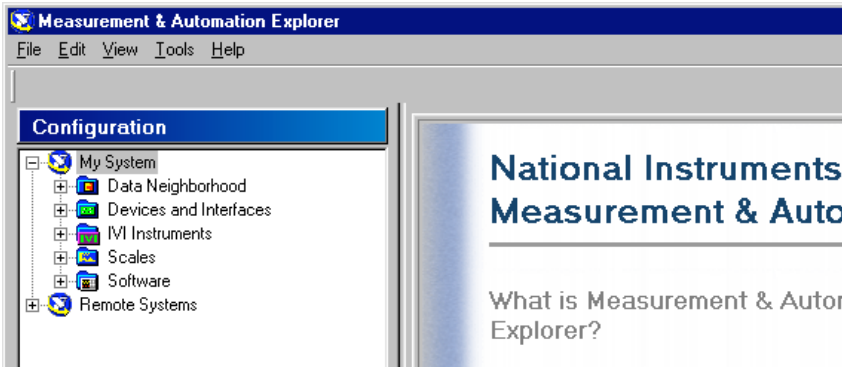


Figure 7-1: MAX Opening Dialog

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7.1.2) Load Settings from Configuration Disk

Open the Devices and Interfaces selection of the Configuration Menu and highlight the PCI-73xx device settings.

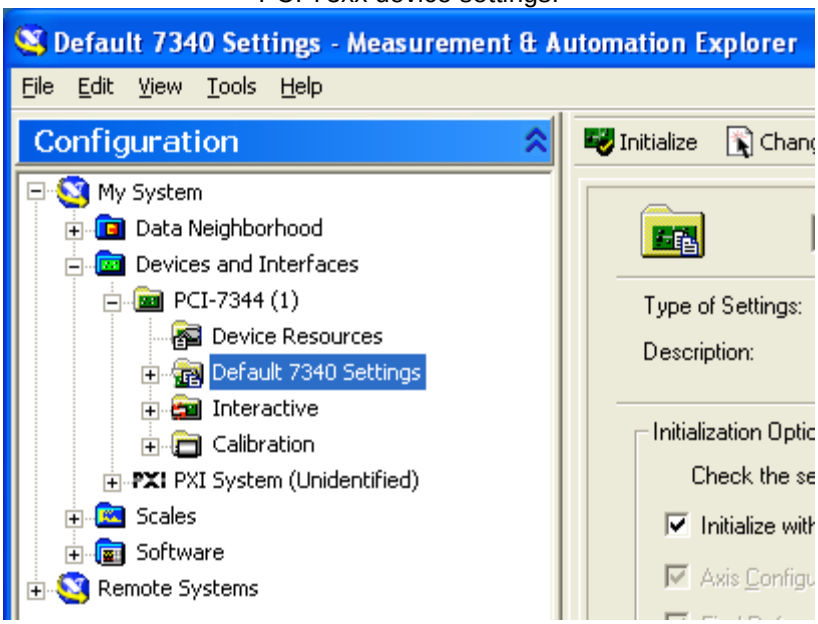


Figure 7-2: Highlight the device settings

From the File Menu select Import. This will start the Import Wizard

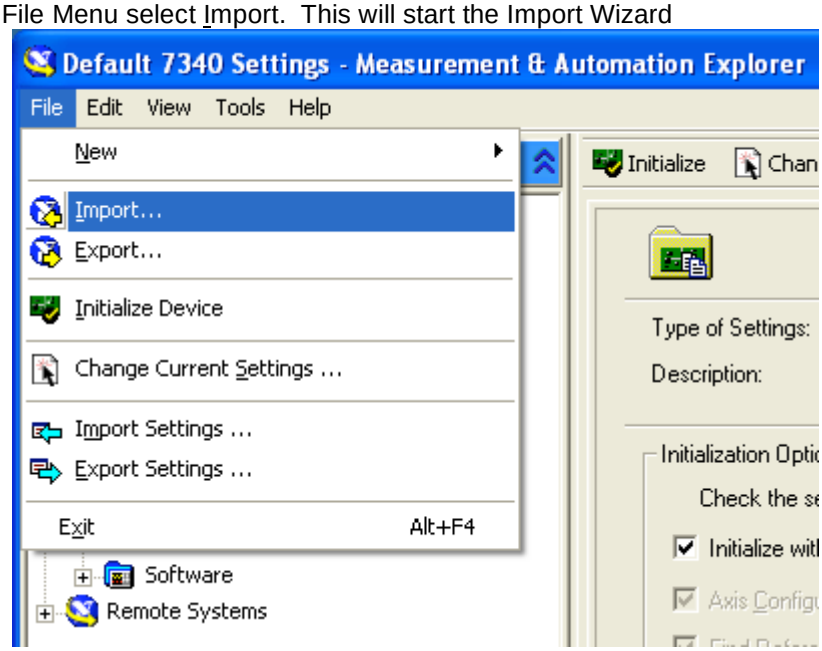


Figure 7-3: Select Import

The settings file is stored on the distribution disk. It has the same name as the serial number of the MDM.

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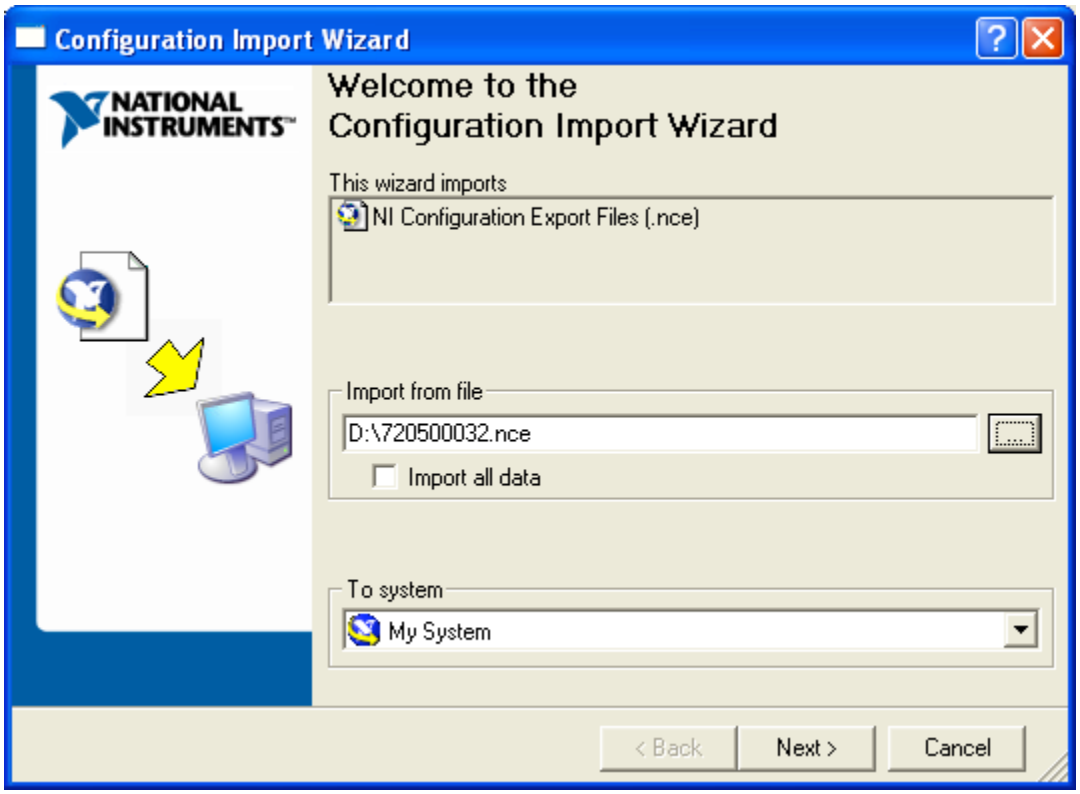


Figure 7-4: Select the settings from the distribution disk

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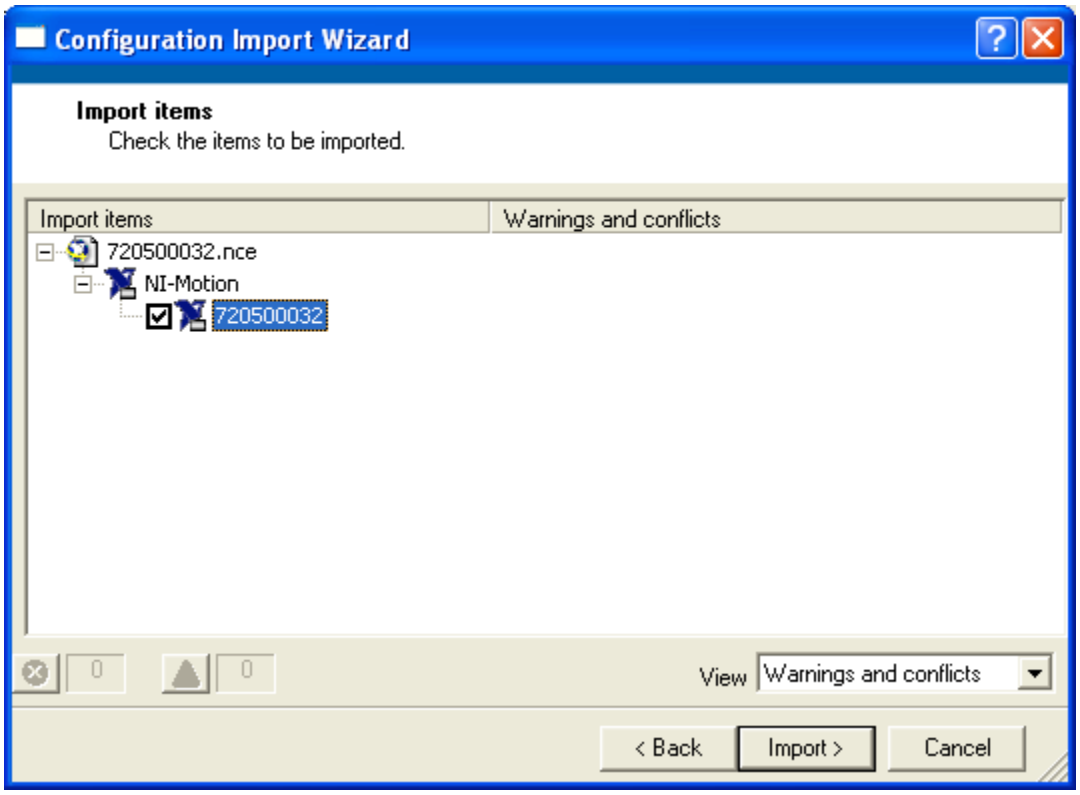


Figure 7-5: Select the items to be imported

Next, the settings need to be selected as the current settings. This is done by choosing the Change Current Settings menu selection from the File Menu (See Figure 7-3 Select Import Settings). From the Change Current Settings Dialog select the settings just imported and press the Change button.

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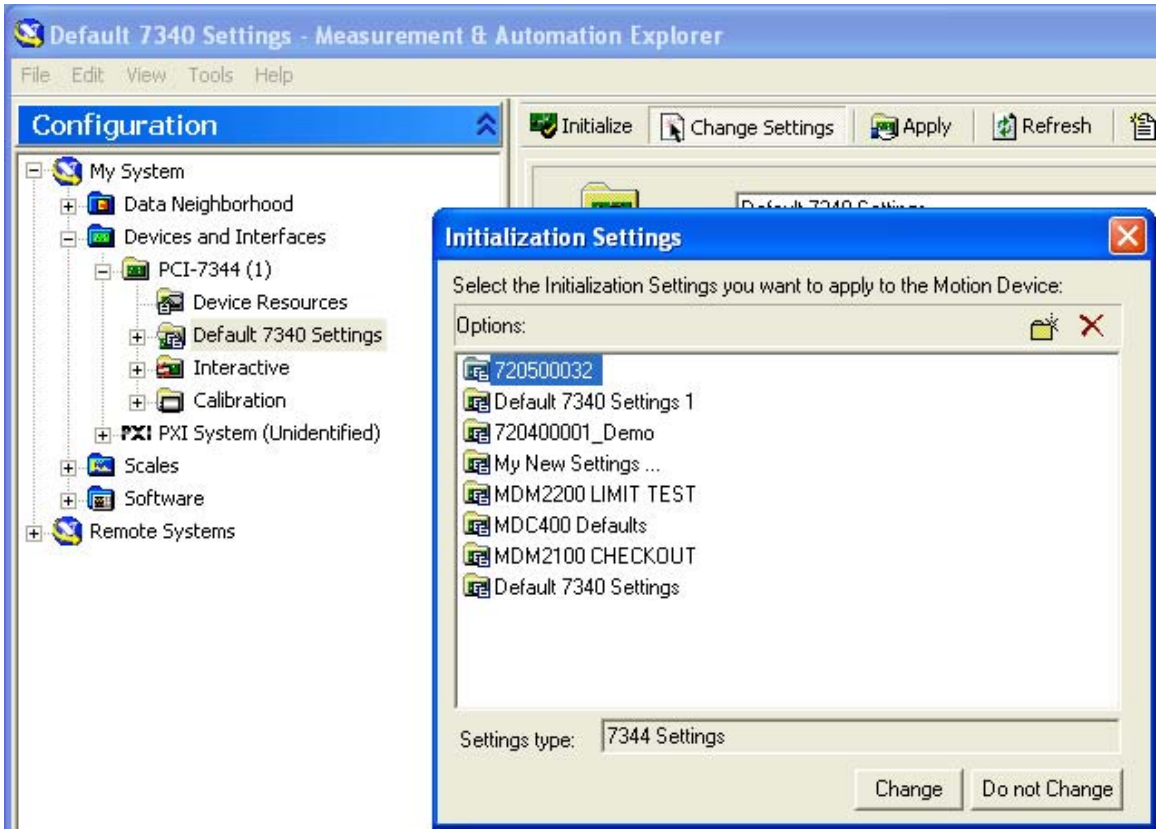


Figure 7-6: Select the settings after importing

7.1.3) Verify Settings

The File README.TXT Describes which stages were assigned to which Controller Axis (This applies to the case where stages are purchased with the MDM). For the controller axes not associated with purchased stages, a stepper motor is connected to the axis for testing at the factory.

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7.1.3.1) Axis Configuration Settings

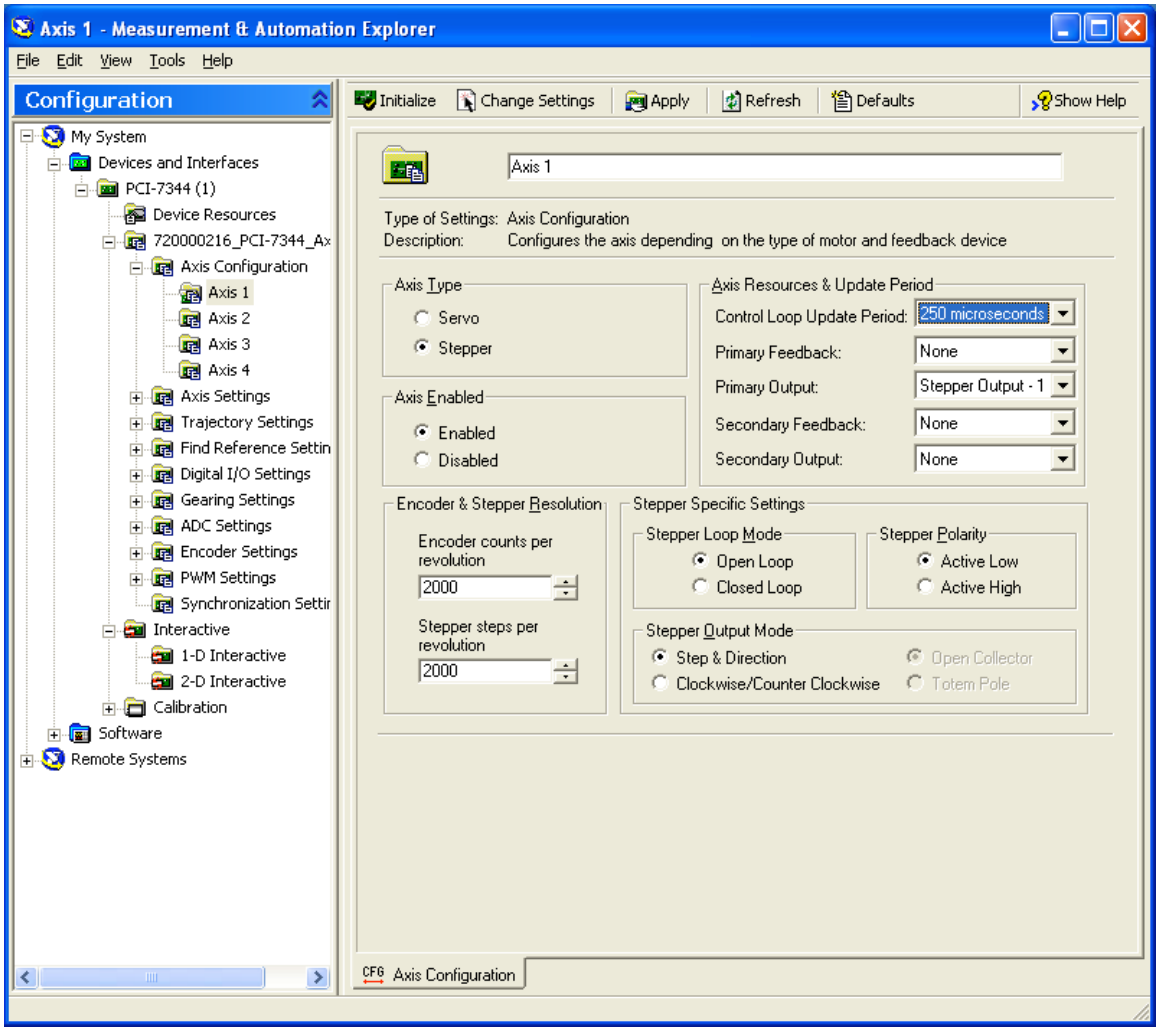


Figure 7-7: Axis Configuration Settings

Each Axis of the controller should be assigned the Stepper Axis Type. Each Axis of the MDM that is connected to a stepper motor should be enabled.

7.1.3.2) Axis Settings

The Motion I/O Axis Settings will need to be set to match the Stepper Motor connected to the axis. This has already been done for stages that are purchased with the MDM.

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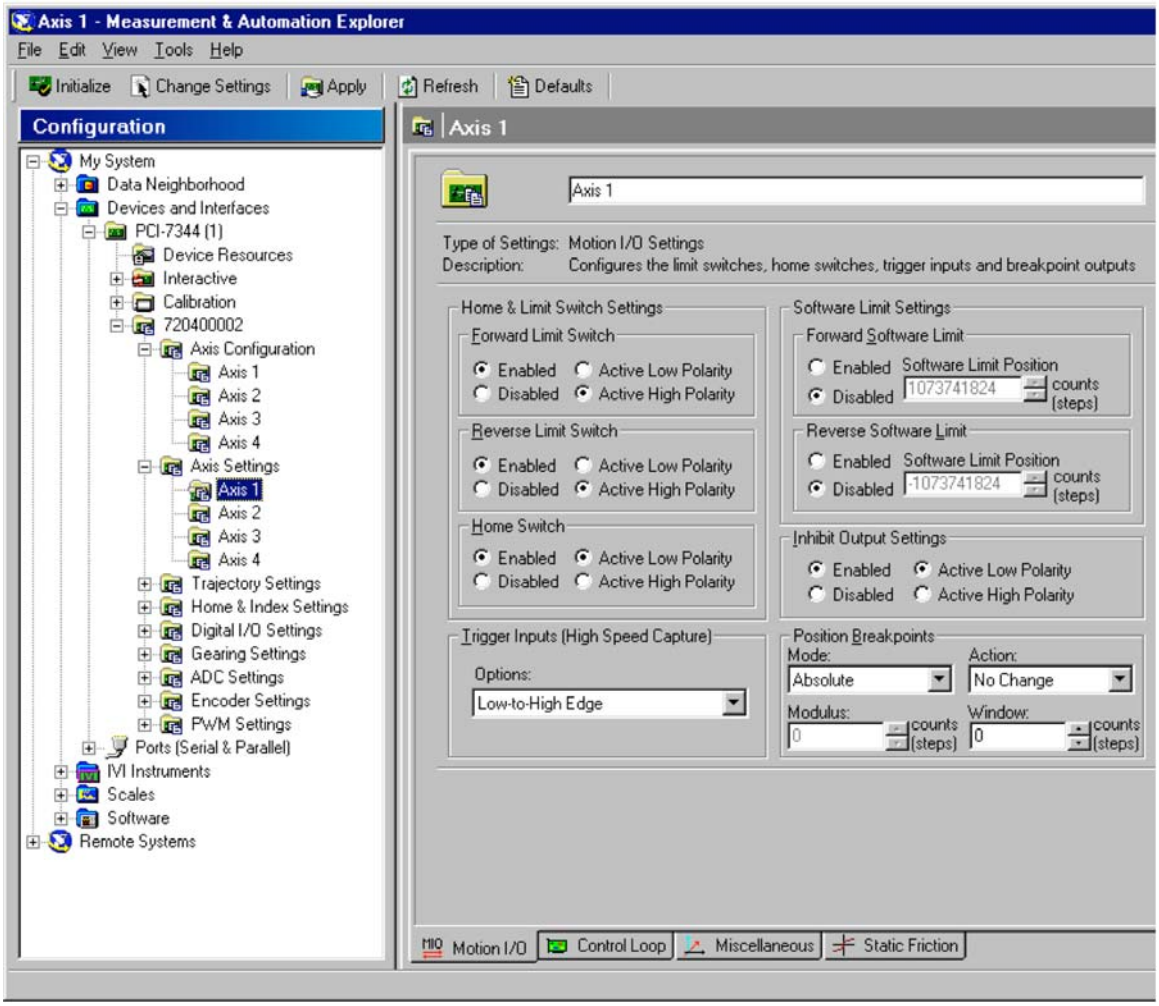


Figure 7-8: Motion I/O Settings

7.1.4) Cycle Axes

The 1-D Interactive Dialog can be used to cycle the axis between two points.

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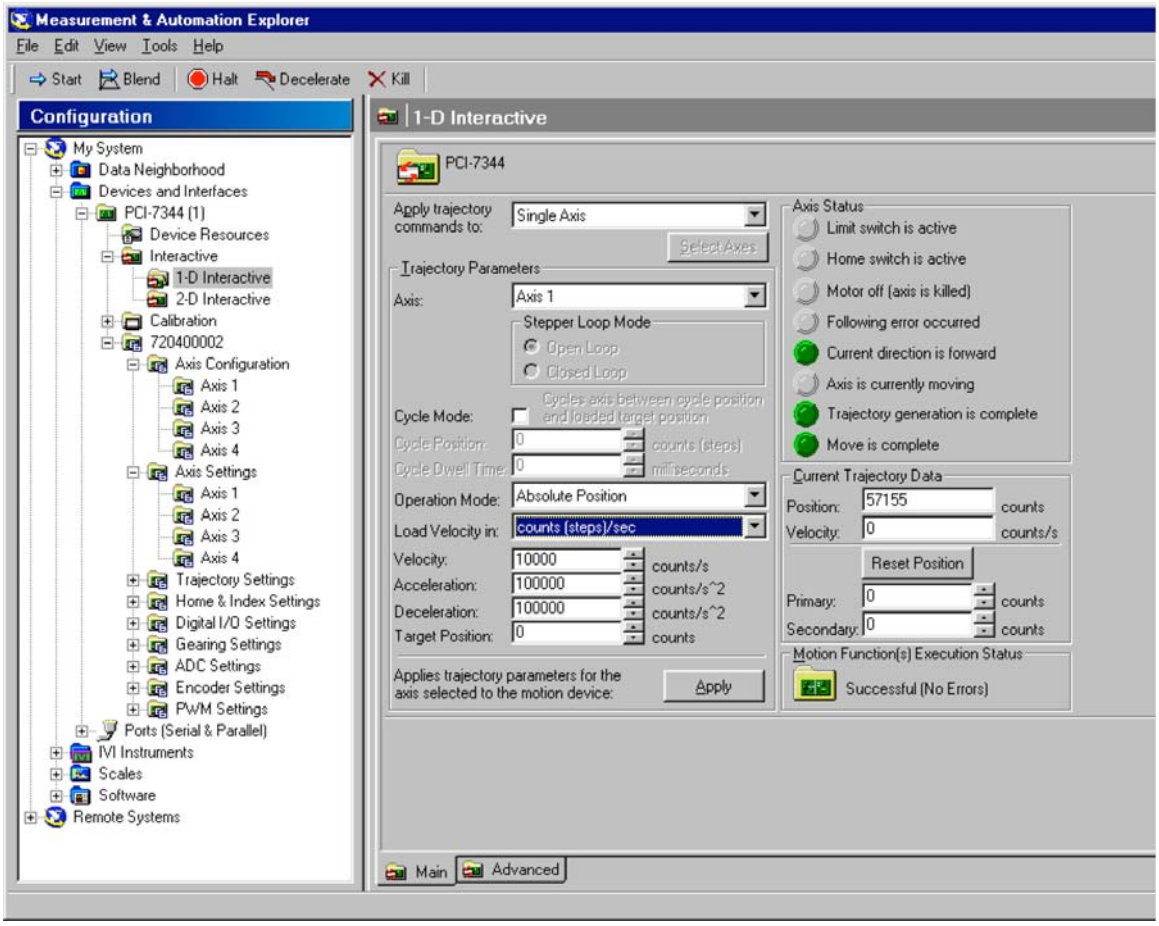


Figure 7-9: 1-D Interactive Utility

The steps to cycling the axes are to move the axis to approximately the center of travel, reset the position, specify the trajectory parameters for cycle mode, apply the parameters and then start cycling.

To command the axis to move, specify the Trajectory Parameters. The README.TXT file specifies the encoder ratios for each axis in counts/mm or counts/degree, depending upon the stage. After specifying the Trajectory Parameters, press the Apply button. Press the Start menu selection at the top of the dialog to initiate the move.

To cycle between two points, check the Cycle Mode check box.

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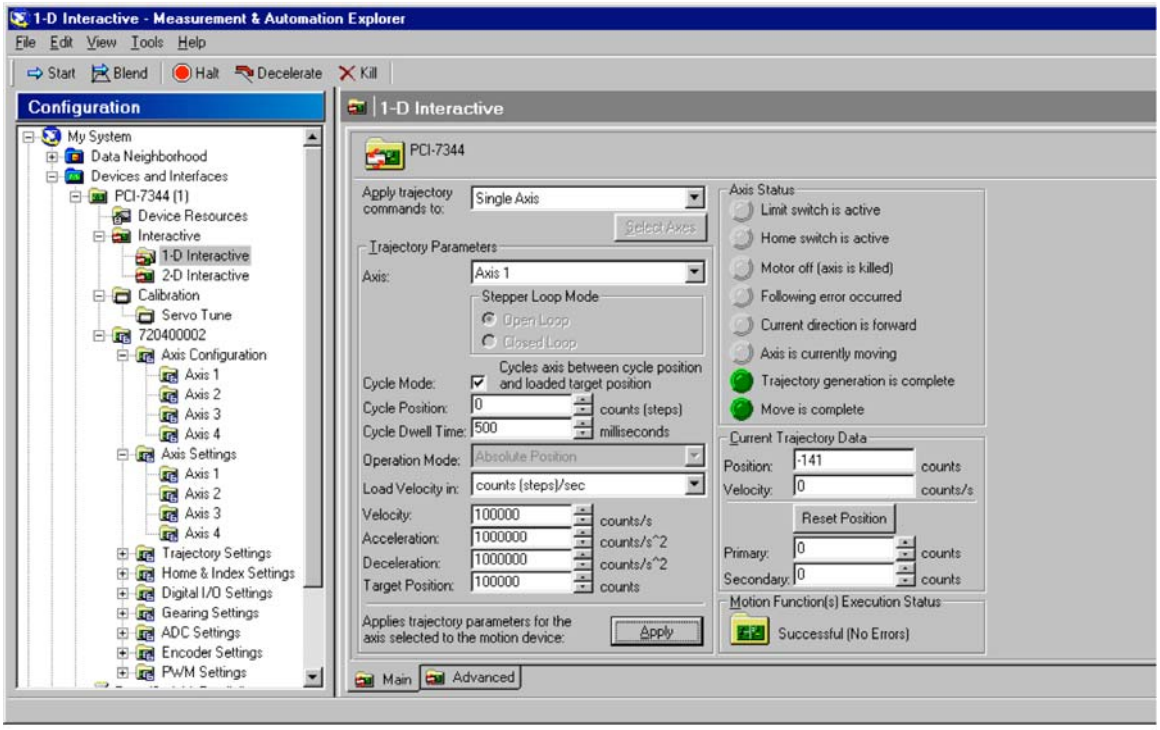


Figure 7-10: 1-D Interactive Cycle Mode

In cycle mode, the axis moves between the Cycle Position and the Target Position. After reaching each position, the program pauses the amount of time specified in the Cycle Dwell Time and then initiates the move to the other position. When the parameters are set press the Apply button and then the Start Menu Item. The Halt menu selection will terminate the cycling.

Note: The program allows several stages to cycle simultaneously. Just start one axis cycling and then, under Trajectory Parameters, select the next Axis.

7.1.5) Saving the Settings

When the session is over, it is advisable to save the settings to disk. This can be done by selecting the Export Settings menu selection from the File Menu (See Figure 7-3 Select Import Settings).

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7.2) Configuring the 2AW1 Step Drive Option

7.2.1) Overview

The 2AW1 Stepper Drive option can be configured for different continuous and reduction current, as well as microsteps per step input. All three of these parameters are configured on the inside of the MDM unit and should be performed by qualified personnel only. The picture below labels the components of interest. Important! – power is to be disconnected to the unit prior to opening the top and making any changes.

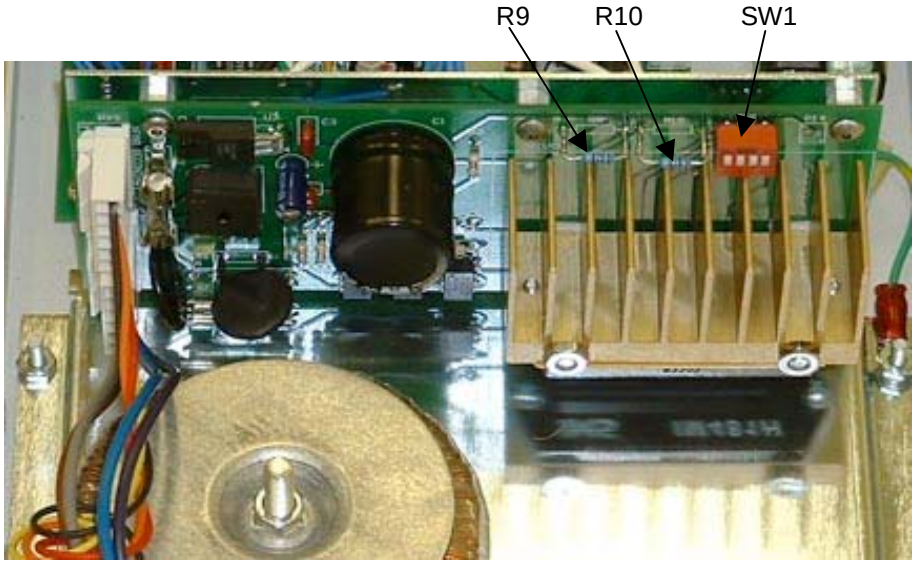


Figure 7-11: Resistor & Dip Switch Location

7.2.2) Continuous Current

The continuous current of the drive is set with resistor R10 by the following formula:

Continuous Current = R10 value * .001, or

R10 value = 1000 * Continuous Current

For 2A continuous current, R10 = 2.00K ohms.

Remarks: a sine/cosine output function is used in rotating the motor. Therefore, the specified phase current of the motor is considered an RMS value. The Continuous Current used to set the output current of the step driver sets the peak output of the sine/cosine waves not the RMS value. Therefore the specified motor current (which is the RMS value) should be multiplied by 1.4 to determine the PEAK value to which the driver will be set.

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EXAMPLE:
If a motor has a specified PHASE CURRENT of 0.75 amps per phase, then:
0.75 amps X 1.4 = 1.05 amps peak
The Resistor Value = Continuous Current X 1000 or in this example:
1.05 X 1000 = 1050 ohms

NOTE: Stepper motors can be configured as 4, 6, or 8 leads. Each configuration requires different currents. Shown below are the different lead configurations and the procedures to determine their output current.

4 Lead Motors:

Multiply the specified phase current by 1.4 to determine the peak output current.

6 Lead Motors:

1) When configuring a 6 lead motor in a half coil configuration (i.e. connected from one end of the coil to the center tap (high speed configuration)) multiply the specified per phase (or unipolar) current rating by 1.4 to determine the peak output current.

2) When configuring the motor so the full coil is used (i.e. connected from end to end with the center tap floating (higher torque configuration)) use the per phase (or unipolar) current rating as the peak output current.

8 Lead Motors:

SERIES CONNECTION: When configuring the motor windings in series, use the per phase (or unipolar) current rating as the peak output current, or multiply the bipolar current rating by 1.4 to determine the peak output current.

PARALLEL CONNECTION: When configuring the motor windings in parallel, multiply the per phase (or unipolar) current rating by 1.96 or the bipolar current rating by 1.4 to determine the peak output current.

7.2.3) Automatic Current Reduction

After 0.5 seconds of receiving the last step pulse, the drive output current will be reduced by a value set with resistor R9. The formula for the reduction current is as follows:

Reduced Current = (.001 * R10 value * R9 value) / (R10 value + R9 value), or

R9 value = (Reduced Current * R10 value) / (.001 * R10 – Reduced Current)

For 0.5A reduced current and 2A continuous current, R9 = 667 ohms. 665 or 680 are closes standard 1% values.

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7.2.4) Step Resolution

The resolution of the step drive can be set with a 4-bit switch, SW1. Refer to the table below for setting these switches.

Resolution (Microsteps/Step	Steps/Rev with 1.8° motor	SW1-1	SW1-2	SW1-3	SW1-4
Binary					
2	400	ON	ON	ON	ON
4	800	OFF	ON	ON	ON
8	1600	ON	OFF	ON	ON
16	3200	OFF	OFF	ON	ON
32	6400	ON	ON	OFF	ON
64	12800	OFF	ON	OFF	ON
128	25600	ON	OFF	OFF	ON
256	51200	OFF	OFF	OFF	ON
Decimal					
5	1000	ON	ON	ON	OFF
10	2000	OFF	ON	ON	OFF
25	5000	ON	OFF	ON	OFF
50	10000	OFF	OFF	ON	OFF
125	25000	ON	ON	OFF	OFF
250	50000	OFF	ON	OFF	OFF
Invalid					
--	--	ON	OFF	OFF	OFF
--	--	OFF	OFF	OFF	OFF

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8) Servo Drives

This section is for reference of Servo Drives only, Stepper Drive information is found in Section 7.

8.1) Software

This section describes how to use MAX (National Instrument's Measurement & Automation Explorer) to confirm that the MDM1000 is operational. Make the hardware connections described in Section 5-3.

8.1.1) Start MAX program.

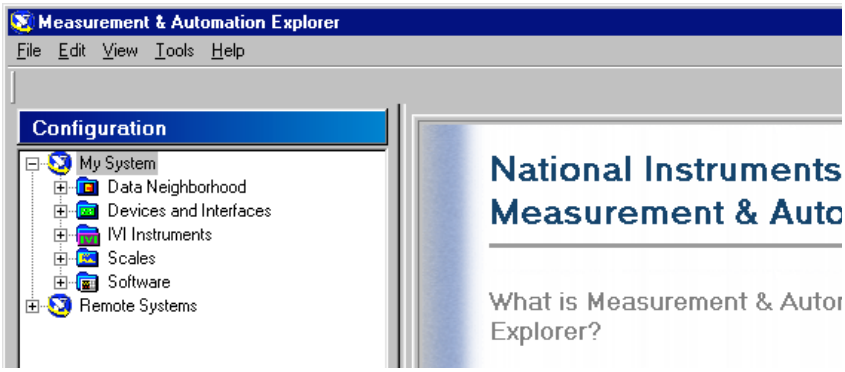


Figure 8-1: MAX Opening Dialog

8.1.2) Load Settings from Configuration Disk

Open the Devices and Interfaces selection of the Configuration Menu and highlight the PCI-73xx device.

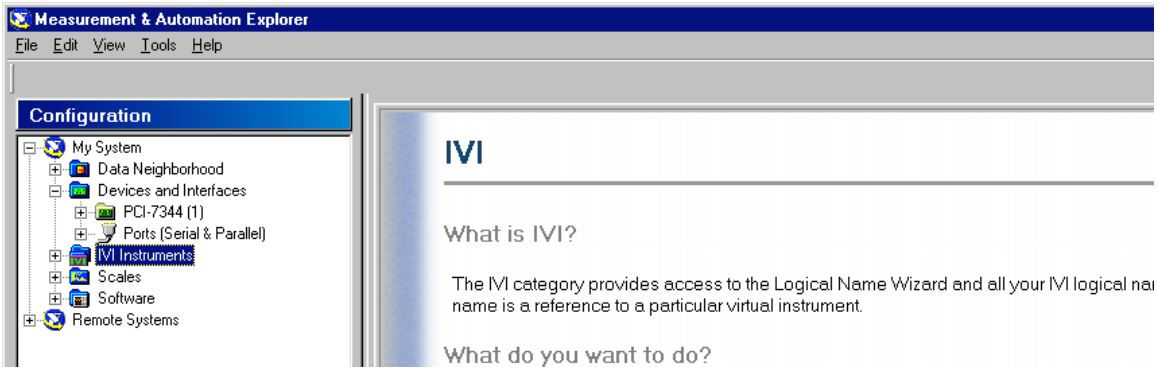


Figure 8-2: Select the PCI-73xx Device

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Load the settings file from the configuration disk sent with the controller. This is done by selecting the Import Settings selection from the File Menu.

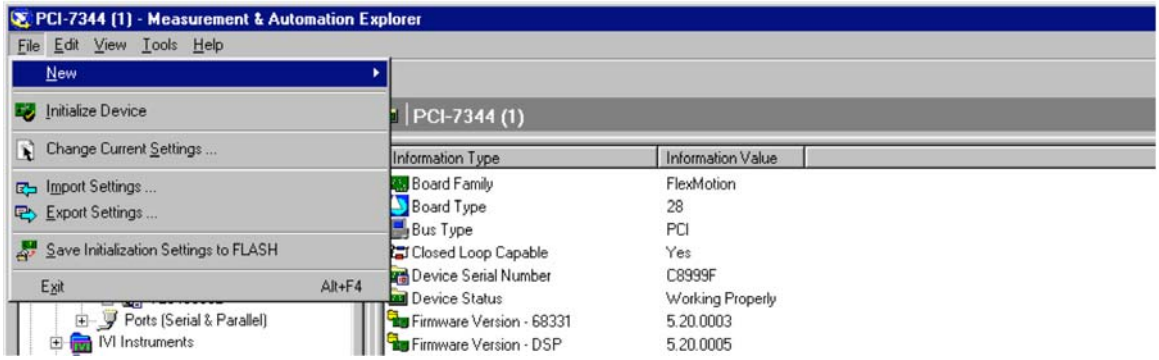


Figure 8-3: Select Import Settings

The settings file has the same name as the serial number of the MDM.

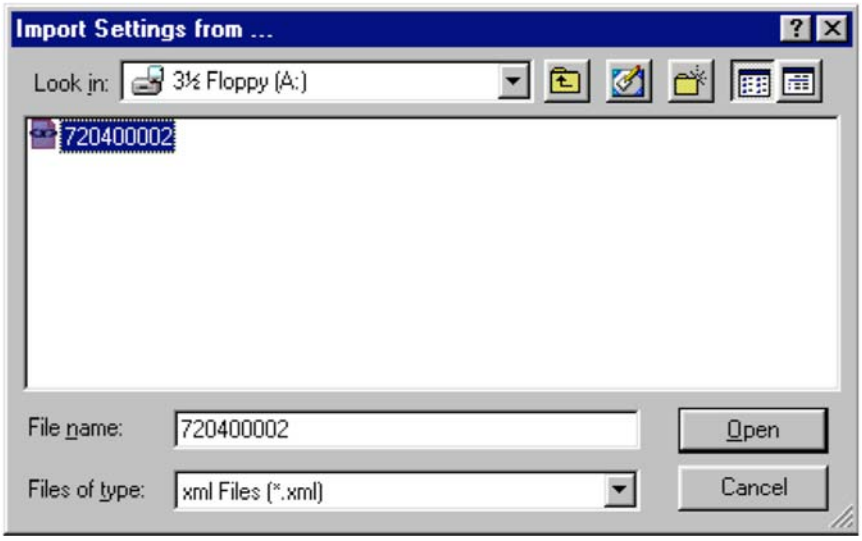


Figure 8-4: Selecting the Import Settings File

Next, the settings need to be selected as the current settings. This is done by choosing the Change Current Settings menu selection from the File Menu (See **Error! Reference source not found.**). From the Change Current Settings Dialog select the settings just imported and press the Change button.

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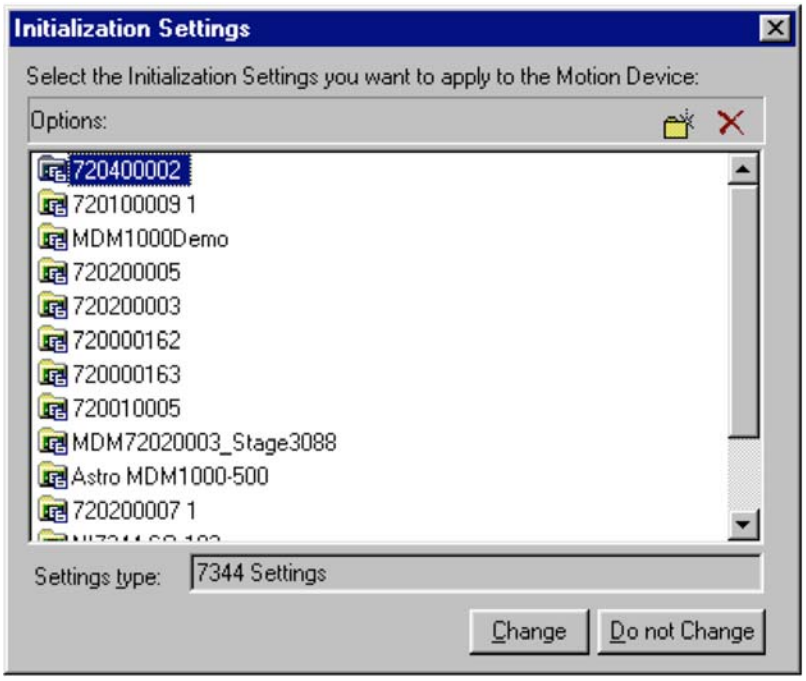


Figure 8-5: Select Initialization Settings

Apply the settings to the Motion Controller by choosing Initialize from the File Menu (See **Error! Reference source not found.**).

8.1.3) Verify Settings

The File README.TXT Describes which stages were assigned to which Controller Axis (This applies to the case where stages are purchased with the MDM). For the controller axes not associated with purchased stages, a servo motor is connected to the axis for testing at the factory.

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8.1.3.1) Axis Configuration Settings

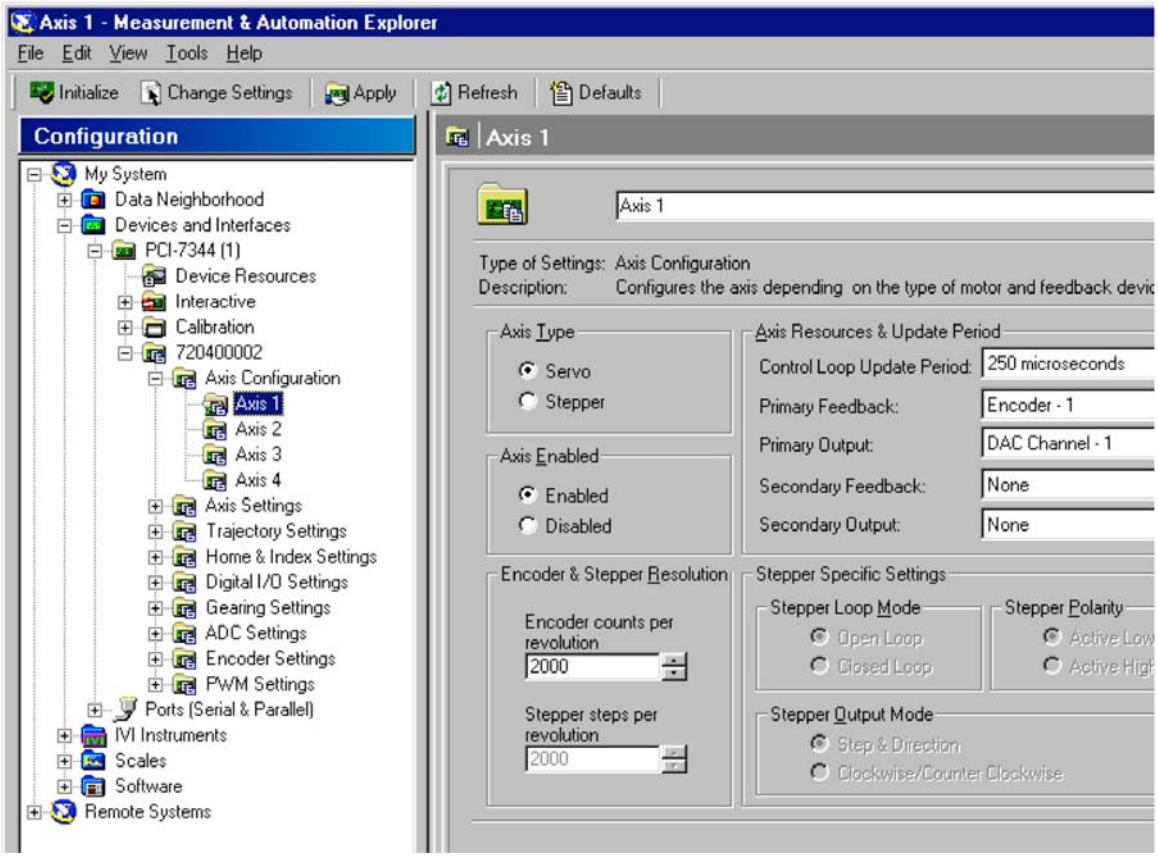


Figure 8-6: Axis Configuration Settings

Each Axis of the controller should be assigned the Servo Axis Type. Each Axis of the MDM that is connected to a servo motor should be enabled.

8.1.3.2) Axis Settings

The Motion I/O Axis Settings will need to be set to match the Servo Motor connected to the axis. This has already been done for stages that are purchased with the MDM.

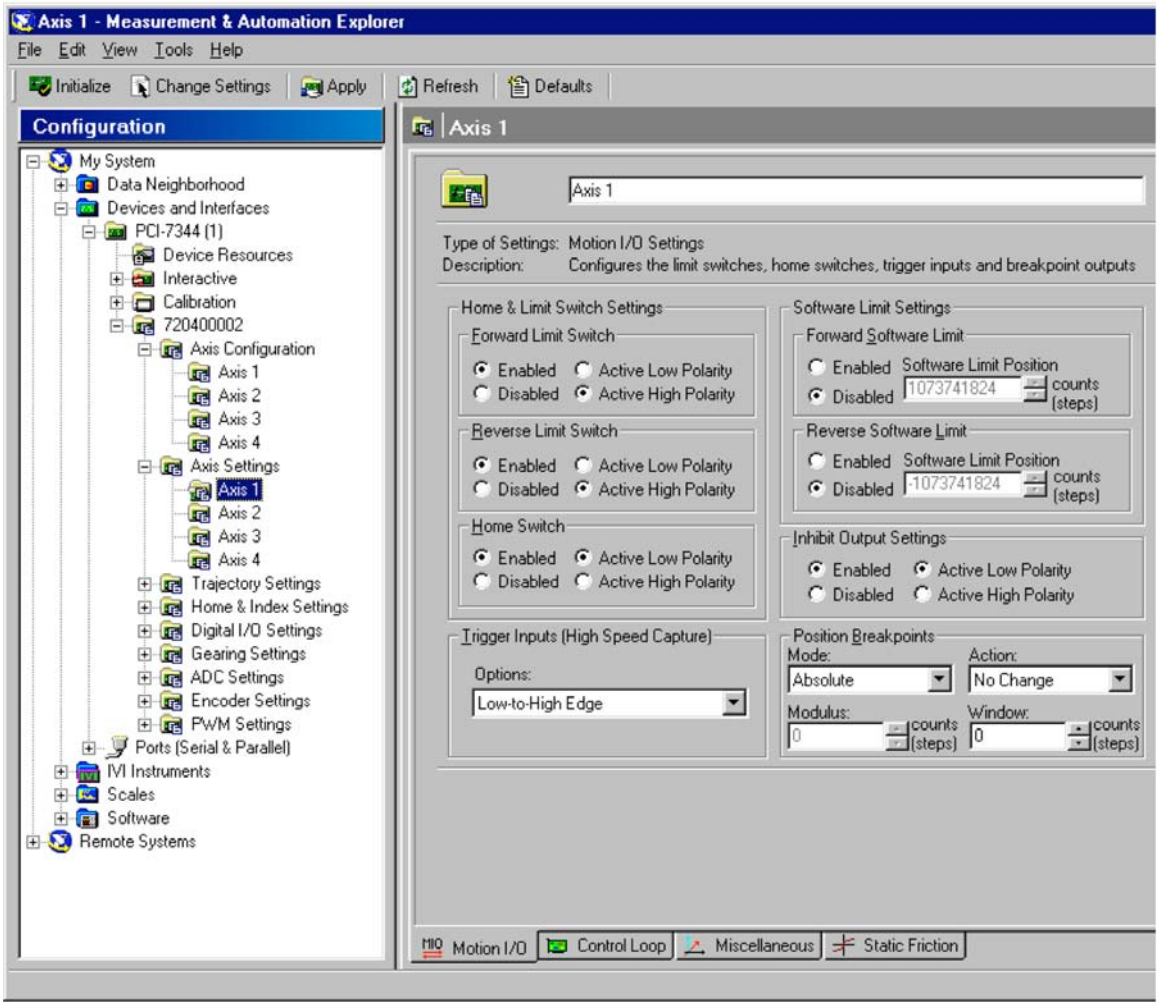


Figure 8-7: Motion I/O Settings

The Control Loop Parameters may also need to be modified. Under the Calibration Menu, MAX provides a servo tuning utility to aid in determining these parameters.

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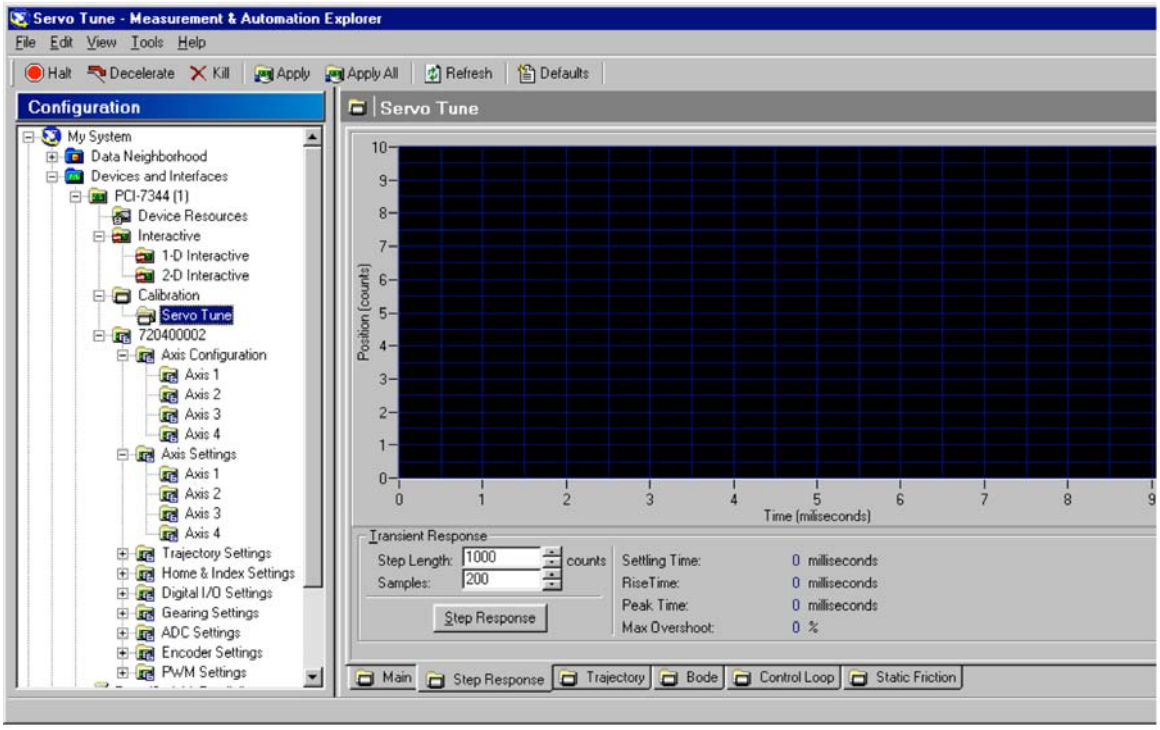


Figure 8-8: Servo Tune Utility

8.1.4) Cycle Axes

The 1-D Interactive Dialog can be used to cycle the axes between two points.

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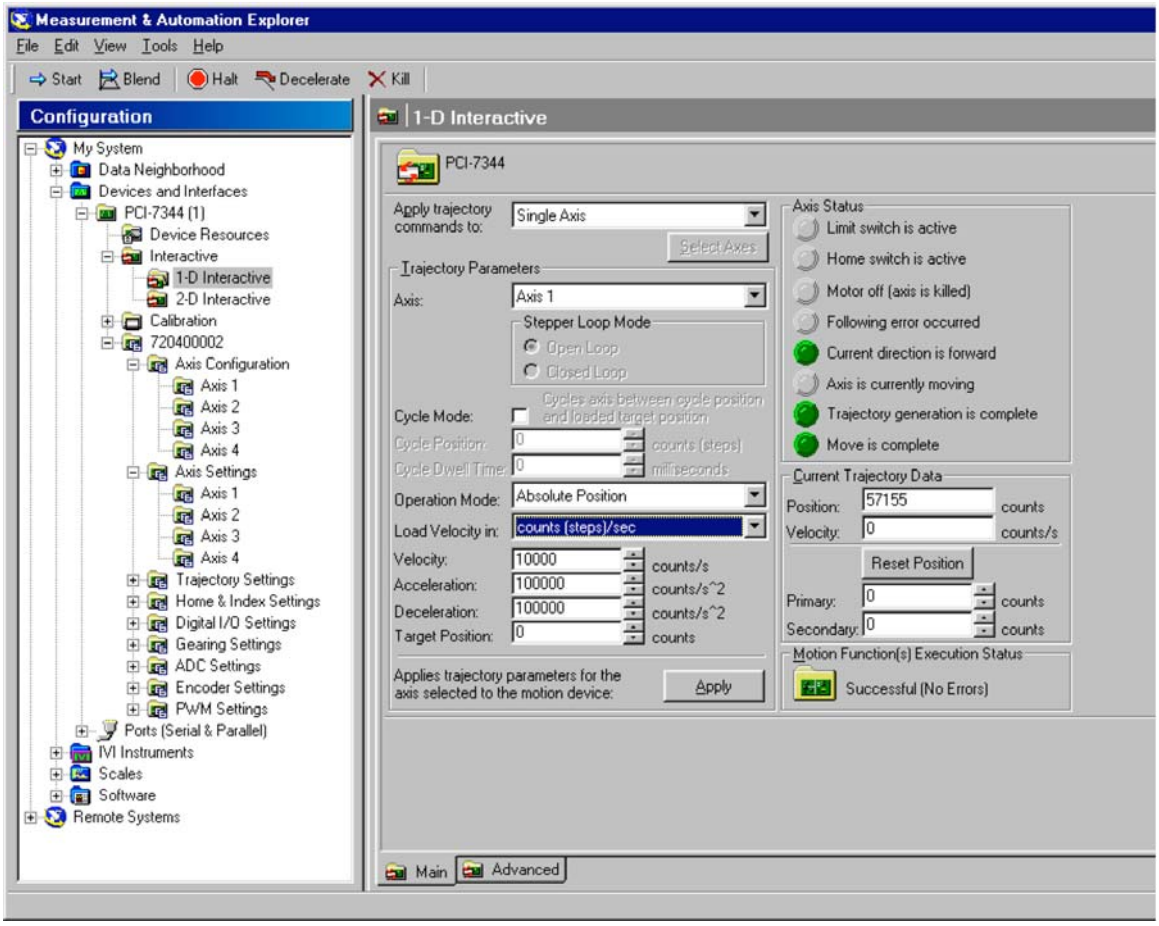


Figure 8-9: 1-D Interactive Utility

The steps to cycling the axes are to move the axis to approximately the center of travel, reset the position, specify the trajectory parameters for cycle mode, apply the parameters and then start cycling.

To command the stage to move, specify the Trajectory Parameters. The README.TXT file specifies the encoder ratios for each stage in counts/mm or counts/degree, depending upon the stage. After specifying the Trajectory Parameters, press the Apply button. Press the Start menu selection at the top of the dialog to initiate the move.

To cycle between two points, check the Cycle Mode check box.

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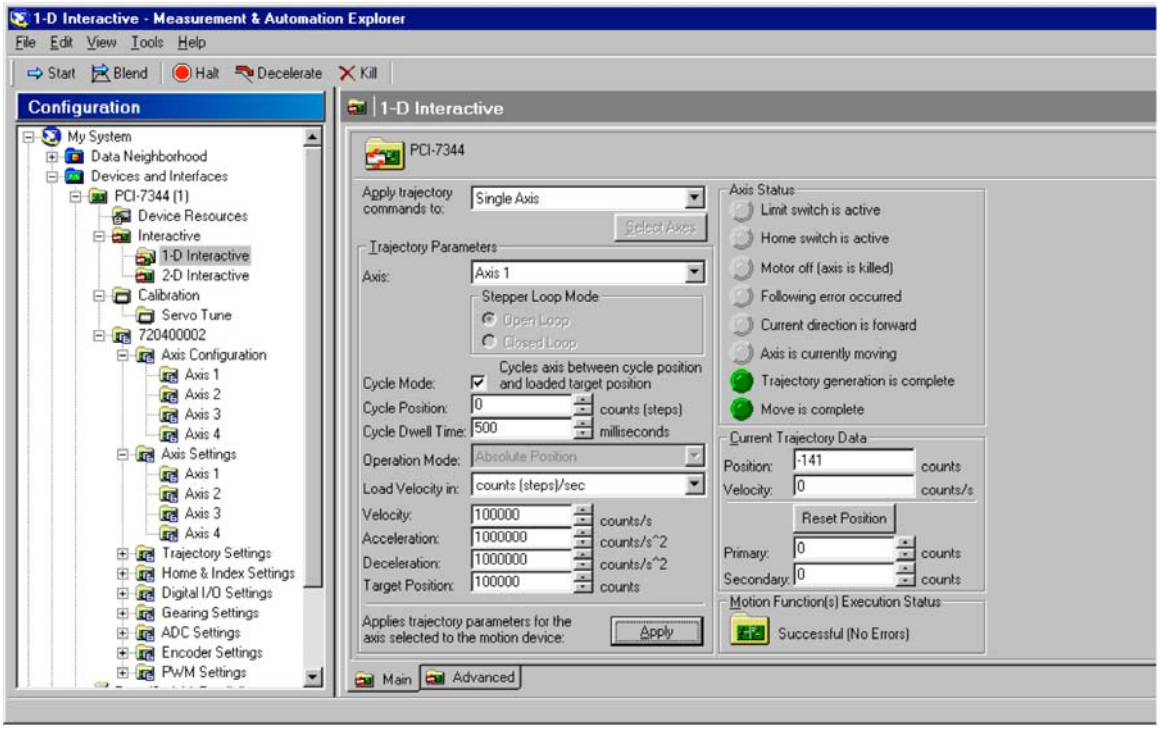


Figure 8-10: 1-D Interactive Cycle Mode

In cycle mode, the stage moves between the Cycle Position and the Target Position. After reaching each position, the program pauses the amount of time specified in the Cycle Dwell Time and then initiates the move to the other position. When the parameters are set, press the Apply button and then the Start Menu Item. The Halt menu selection will terminate the cycling.

Note: The program allows several axes to cycle simultaneously. Just start one axis cycling and then, under Trajectory Parameters, select the next Axis.

8.1.5) Saving the Settings

When the session is over, it is advisable to save the settings to disk. This can be done by selecting the Export Settings menu selection from the File Menu (See Figure 8-3 Select Import Settings)

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8.2) Programming the AMC DR100EE Drive

8.2.1) Overview

An MDM1000 with the 12AW5 option includes an AMC DR100EE Digital Servo Drive. The drive is configurable to match the characteristics and performance of the motor or mechanism to which the drive is attached. The drives are configured at the factor for the intended motor or mechanism. A label with stage S/N or other mechanism identification is affixed to the drive card where necessary. In general, a card is configured for a particular motor, stage, or mechanism and may not operate properly when used with a different motor, stage, or mechanism.

In normal operation the user does not need to re-configure or otherwise communicate with the DR100EE drive. This document describes the process to connect to and re-configure a drive for those circumstances where changes are warranted. The process has 3 major steps: Establishing Communication, Making Changes, Saving Changes.

8.2.2) Necessary Equipment and Tools

- AMC DriveSuite software
  - This is Windows software that is used to communicate with the DR100EE drive. It allows editing drive parameters, loading parameters from files, saving parameters to the drive, and saving parameters to disk. It also has tools that aid in monitoring performance of the drive. This software is available from the AMC website (www.a-m-c.com). The DriveSuite software package includes documents explaining the use of the software.
- A PC running Windows with an RS-232 Port
- A ‘straight-through’ 9P RS-232 cable
  - The serial connector on the DR100EE drive is a 3-wire 9 position DSub connector with sockets. The typical PC RS-232 port is a 9 position DSub connector with pins.

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8.2.3) Procedure

This procedure relies heavily on the DriveSuite documentation included with the DriveSuite software package. Many references are made to that documentation.

- Establishing Communication
  - Servo Power to the DR100EE drive must be on to establish communication to the DR100EE drive. For the MDM1000, the Servo Power is always on.
  - Establish communication with the DR100EE drive using the 'Connect to a Drive' procedure.

- Making Changes
  - Loading Parameters from Disk: The most common operation will be to load a parameter file from disk. These files are created at the factory and are typically called SNnnnn.ccx where nnnn is the serial number of the stage for which the file was created. From the menu bar select File | Open to load the file into working memory.
  - Editing Parameters: Sometimes it may be desirable to change parameters in the existing drive. The process of editing any and all parameters are described in the remaining sections of the DriveSuite Software manual.

- Saving Changes
  - Making changes using the DriveSuite software edits the 'working copy' of the parameters. These parameters are in effect during the editing session, and will remain in effect until the DR100EE drive is reset such as through a power shut down. If the current parameters are to be used after a reset, they must be saved into the non-volatile flash memory of the drive. From the menu bar select Communication | Store to save working memory to the non-volatile memory in the drive.

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8.3) Programming the Copley Accelus Drive

8.3.1) Overview

An MDM1000 with the 3AW1 option includes a Copley Control Accelus Digital Servo Drive. The drive is configurable to match the characteristics and performance of the motor or mechanism to which the drive is attached. The drives are configured at the factor for the intended motor or mechanism. A label with stage S/N or other mechanism identification is affixed to the drive where necessary. In general, a card is configured for a particular motor, stage, or mechanism and may not operate properly when used with a different motor, stage, or mechanism.

In normal operation the user does not need to re-configure or otherwise communicate with the Accelus drive. This document describes the process to connect to and re-configure a drive for those circumstances where changes are warranted. The process has 3 major steps: Establishing Communication, Making Changes, Saving Changes.

8.3.2) Necessary Equipment and Tools

- Copley Controls CME2 software
  - This is Windows software that is used to communicate with the Accelus drive. It allows editing drive parameters, loading parameters from files, saving parameters to the drive, and saving parameters to disk. It also has tools that aid in monitoring performance of the drive. This software is available from the Copley Controls website (www.copleycontrols.com). The CME2 software package includes documents explaining the use of the software.

- A PC running Windows with an RS-232 Port

- A ‘straight-through’ 9P RS-232 cable
  - The serial connector on the Accelus drive is a 3-wire 9 position DSub connector with sockets. The typical PC RS-232 port is a 9 position DSub connector with pins.

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8.3.3) Procedure

This procedure relies heavily on the CME2 documentation included with the CME2 software package. Many references are made to that documentation.

- Establishing Communication
  - Servo Power to the Accelus drive must be on to establish communication to the Accelus drive. For the MDM1000, the Servo Power is always on.
  - If the CME2 software is not yet installed on the PC, install it using the Software Installation procedure of the CME2 Software manual.
  - Establish communication with the Accelus drive.

- Making Changes
  - Loading Parameters from Disk: The most common operation will be to load a parameter file from disk. These files are created at the factory and are typically called SNnnnn.ccx where nnnn is the serial number of the stage for which the file was created. Use the Quick Copy procedure of the CME2 Software manual to load and save the file to the drive.
  - Editing Parameters: Sometimes it may be desirable to change parameters in the existing drive. The process of editing any and all parameters are described in the Quick Setup section of the CME2 Software manual. In general it is advisable to load the existing parameters from flash memory before editing.

- Saving Changes
  - Making changes using the CME2 software edits the 'working copy' of the parameters. These parameters are in effect during the editing session, and will remain in effect until the Accelus drive is reset such as through a power shut down. If the current parameters are to be used after a reset, they must be saved into the non-volatile flash memory of the drive. Use the Save To Flash function for this.

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9) Troubleshooting & Service

9.1) Troubleshooting Help

For further assistance contact the factory:
M-F 8AM to 5PM Pacific Time

Phone:	[541] 791-9678
Fax:	[541] 791-9410
Toll Free:	[888] 754-3111
Web:	www.primatics.com
E-mail:	service@primatics.com

9.2) Service

Should your device require factory service, contact the factory for a Return Materials Authorization (RMA). When inquiring about an RMA please have the following information available:

- Your contact information (name, phone, email, address)
- Unit Serial Number (located on label near the power switch)
- Symptom of problem
- History of troubleshooting steps already taken

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