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DC Interface Box

for use with

MM2000 Motion Controller/Driver

ESP6000 Motion Controller/Driver



OPERATOR'S MANUAL

Newport

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DC Interface Box

for use with

MM2000 Motion Controller/Driver

ESP6000 Motion Controller/Driver

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Warranty

Newport Corporation warrants this product to be free from defects in material and workmanship for a period of one 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 office or 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.

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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.

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Section 1 — Introduction and Overview

1.1 Description Summary — DC Interface Box

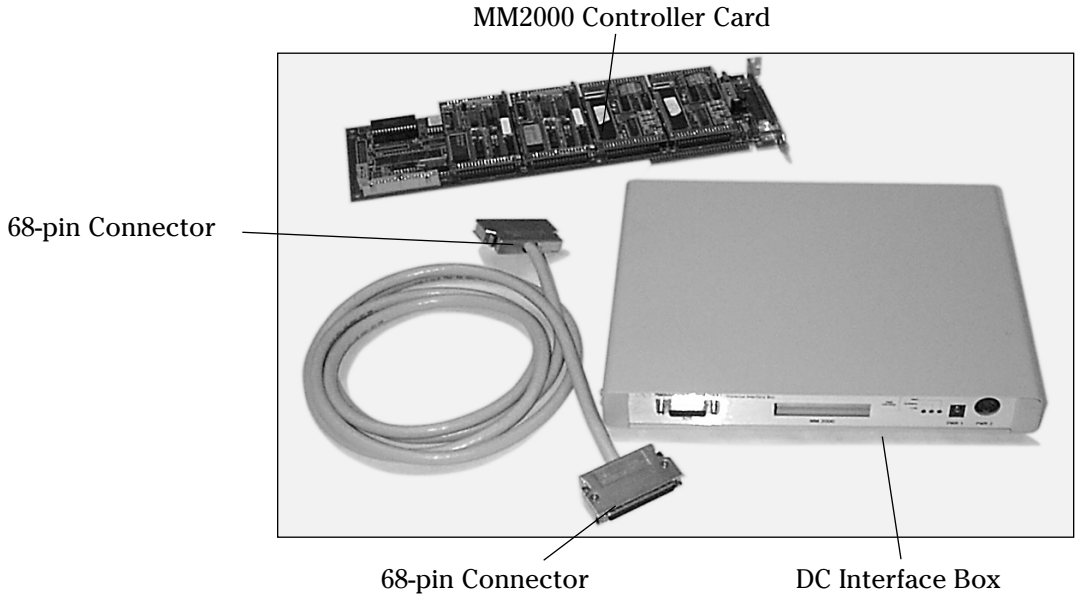


Figure 1-1: DCIB Configuration with MM2000 Controller Card

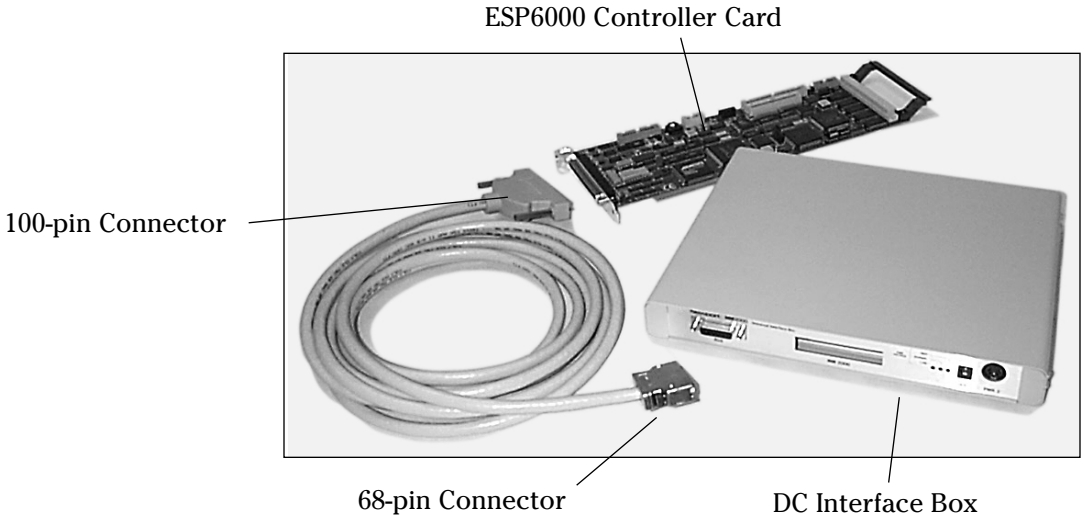


Figure 1-2: DCIB Configuration with ESP6000 Controller Card

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1. Used with small DC Motors

In the current configuration, the DC Interface Box is intended to be used primarily with small DC motors. The motors could be driven directly by the modules of the MM2000 Motion Controller, or by the DC Module of the DC Interface Box. Due to the power supply constrains of the typical PC, the applications with the MM2000, are limited to only two actuators moving at a time. With the **DCIB** DC Module(s), four actuators can be moving at a time.

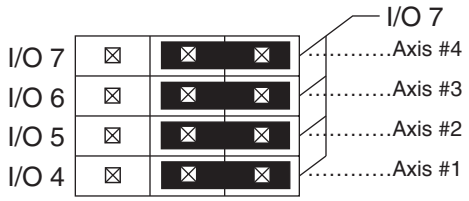
Motor OFF Feature

An important feature of the DC Interface Box is the support for the manual position-adjusting knob. This knob, present on the 850F actuator, needs an open motor circuitry in order to operate with the minimum resistance. The function is implemented with one relay for each axis, controlled by the MM2000 board through the user I/O lines, or ESP6000 board through the Amplifier Enable Output lines.

For MM2000 Only:

Due to the limited number of I/O lines, three modes of relay control are available to allow the user to select the configuration that best fits his application. A bank of four jumpers selects which I/O line, if any, will be used to activate the open-motor relay.

Each axis jumper could set one of the following modes:



- jumpers on the **right** (as shown in the chart above) : The same I/O line controls all relays, number 7. (factory **default** setting)
- jumpers on the **left**: Each relay is controlled by a different I/O line; in this case the relays for axis number 1, 2, 3 and 4 are controlled by the I/O bits number 4, 5, 6 and 7, respectively.
- jumpers **missing**: The relays are always closed and the I/O lines are available for general-purpose interface.

NOTE

The three different modes of operation can be mixed on the four axes.

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NOTE

Once an I/O line is selected to control an open-motor relay, it cannot be used for general-purpose interface.

NOTE

If the interface box is used with MM2000 firmware version 1.4 or earlier, the I/O bits must be toggled manually through the use of the BO, CB and SB commands. A high bit turns the motors off.

For ESP6000 Only:

This information is the same as MM2000, ***with the following exceptions:***

- I/O's 4, 5, 6, and 7 are performed by Amplifier Enable Output lines of their respective axes. Jumpers have the same function of enabling and disabling the operation of the Amplifier.

2. Used as a Pass-Through Box

When used as a pass-through box with a driver unit (MD4 or similar), the DC Interface Box fans out the command and feedback signals to one auxiliary and four axis interface connectors. To eliminate the possibility of unwanted motor movement during the controller's power ON/OFF cycles, special circuitry monitors all voltages and disables the command signals to the driver during all power transactions.

1.2 Motor Power Requirements

DC Module of the MM2000 has a built-in amplifier capable of driving small DC motors up to 200 mA.

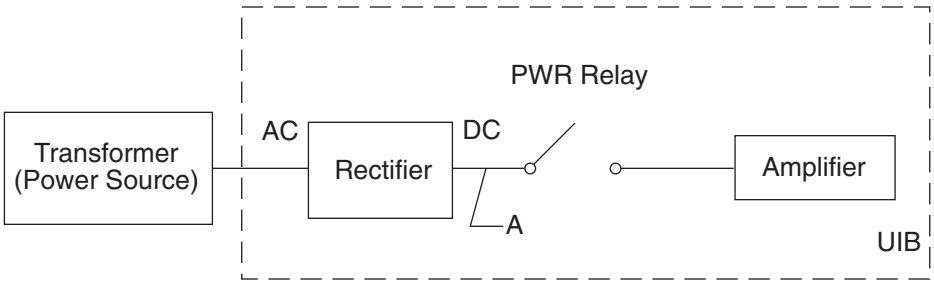
Due to power supply constraints of the typical PC, the applications with the MM2000, are limited to only two actuators moving at a time. The DCIB DC Module is capable of driving small DC motors up to 400 mA.

If increased power requirements are needed by the user, or to avoid drawing power from the PC power supply, the user can drive the system using the Universal Interface Box with plug-in DC Modules.

When DC Modules are used, an external power source is always required.

The **DCIB** has a built-in low voltage power supply, which has advanced voltage monitoring capabilities.

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A = Electronic circuitry is monitoring this point.

If voltage is between 12 -19V, the relay will close and NORMAL (Green) LED will illuminate.

If voltage is under 12 volts, relay will open and LOW (Red) LED will illuminate.

If voltage is over 19 volts, relay will open and HIGH (Red) LED will illuminate.

Summary: The **DCIB** DC Module is NOT operating ***if the Green LED is not illuminated!***

1.3 Description of Panel Functions on DCIB

Front Panel:

The Front Panel of the **DCIB** includes the following items, reading left to right:

AUX — This is a 15-Pin Connector that gives access to the I/O bits or, with simple modifications on the board, to the encoder or pulse train signals. (See Pinouts in Section 3 of this manual).

Main Connector — This is a 68-Pin Connector used for an Interconnect Cable link, from the MotionMaster2000 or ESP6000 motherboard to the **DCIB** (See Pinouts in Section 3 of this manual).

LED's — External Power Voltage status is indicated by three **L**ight **E**mitting **D**iodes (LED): LOW, NORMAL, and HIGH.

- LOW (Red) - This LED is for LOW Power Voltage, and is illuminated when DCIB power is on.
- NORMAL (Green) - This LED is for NORMAL Power Voltage.
- HIGH (Red) - This LED is for HIGH Power Voltage.

PWR 1 — This is an external power supply connector to be used when a DC driver module is present.

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PWR 2

This secondary power connector can be powered by a transformer with a center tap, or by an external dual voltage power supply (See Figure 1-3).

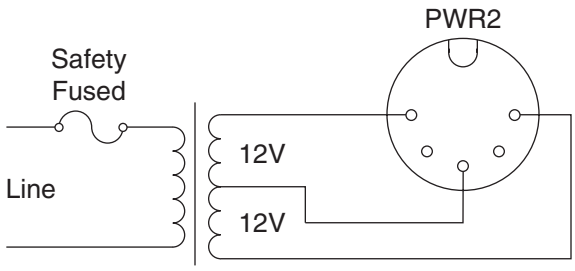


Figure 1-3: PWR2 AC Powered

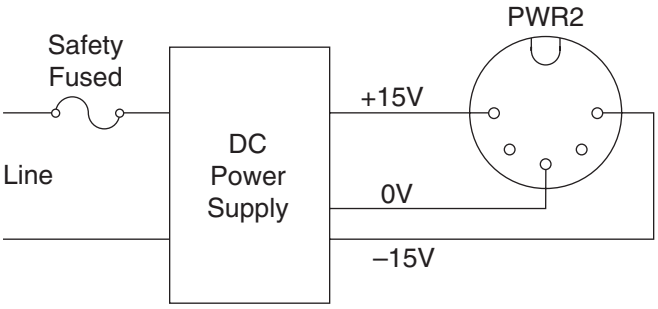


Figure 1-4: PWR2 - DC Powered

NOTE

Polarity Orientation not important!

Recommended transformer to be used with the DCIB:

- AC-AC Wall Mount Adapter with the following specifications: 12VAC at 2 amps (To be connected to PWR1 on the front panel of the DCIB). An AC – AC wall mount adapter (P/N 22588-01 for 110V line) is included if at least one driver module is installed.

Rear Panel:

The four (4) connectors on the rear panel are labeled: AXIS 1, AXIS 2, AXIS 3, and AXIS 4. These connectors are used for connections to DC Servo Motors, or MD4 Driver.

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1.4 DCIB DC Module Specifications

The DCIB DC Module is a low power DC motor driver designed to work with the DC Interface Box. Its main specifications are:

- Drives both 12V and 24V DC motors. Voltage is selectable via a jumper.
- Drives DC motors up to 400mA.
- Capable to generate limit switch signals or limits the motor current when motor current exceeds a preset value. Mode of operation is selectable with a jumper. When the jumper is missing, both functions are disabled.
- The current setting for both modes of operation is done with an eight position rotary switch, having the following settings:

Table 1-1: Settings for an eight position rotary switch

Position	Current Limit/Trigger
0	Disabled
1	400 mA
2	200 mA
3	133 mA
4	100 mA
5	80 mA
6	66 mA
7	57 mA

1.5 Application for MM2000 and ESP6000 Motion Controllers

Introduction - MM2000 Motion Controller

The MotionMaster 2000 is an advanced motion controller which plugs directly into any **IBM** PC / XT / AT and compatible computers. This includes computers with 8088, 80286, 80386, and 80486 microprocessors, and which are not PS/2 model types. In addition to the PC-bus interface, the unit includes a full duplex RS-232-C serial interface and supports an optional IEEE-488 interface. Using “piggy-back” plug-in modules, one (1) MotionMaster 2000 main-board supports up to four (4) axes of motion consisting of any combination of stepping, or brush DC servo motors.

The hardware that comprises the MotionMaster 2000 system is:

1. A motherboard that plugs into an expansion slot of an **IBM** PC / XT / AT and compatible computers.
2. A stepping motor module that plugs onto the motherboard and/or...
3. A DC motor or stepper motor module that plugs onto the motherboard.

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Description - MM2000 Motion Controller

The MotionMaster 2000 is “state-of-the-art” technology with two 16-bit microcontrollers and sophisticated internal software to achieve high-speed intelligent positioning. Its capabilities range from simple point to point positioning to elaborate tasks which require multiaxis coordination and velocity and position change ‘on the fly’.

The MM2000 is command driven. With a host computer, the user sends commands that direct it to carry out typical operations in a motion control system. For example, included in its command set, there are commands which tell the MM2000 the distance, the direction, the speed, and the acceleration of the next move, and which direct it to send system status information, typically the position as the move progresses, whether the move is complete or in progress, and whether an error has occurred.

The MM2000 can be set up to interrupt the users host computer when a move is complete or any error or unexpected event occurs. This will greatly improve the user’s execution speeds and processing power because their host computer is free to execute other tasks during a typical move and still know exactly when the move is complete...so that the next one can be initiated, for example.

The MM2000 provides 25,000 bytes of non-volatile memory for program/parameter storage. Sophisticated motions control programs with “IF...THEN” and “WHILE ... WEND” statements, which test the logical levels of 8 I/O bits, can be created. Also system configurations and options such as velocity, acceleration, software limits, and PID compensation parameters are retained during power off and automatically reloaded at power on.

The MM2000 features encoder counting circuitry and commands that enable the user to read the position of the system at any instant of time. The encoder required is an incremental encoder with TTL compatible quadrature outputs.

The MM2000 can be directed to find a home position defined by either the location of a switch or the position where its internal position counter is zero. It also monitors plus and minus direction limits inputs to protect the user’s system from damage.

The MM2000 features an elaborate command interpreter and system monitor. Every command received is analyzed for the correct format. If the command format is incorrect, the MM2000 will not execute the command and will store a descriptive error message in its output buffer.

Description - ESP6000 Motion Controller

The **E**nhanced **S**ystem **P**erformance (ESP) architecture consists of the ESP6000 controller card, UniDrive6000 universal motor driver, and ESP-compatible stages. The ESP6000 controller card is designed for convenient installation in the user’s own PC.

The ESP6000’s Windows-based setup utility provides a full range of functions for configuring and operating from one to six axes.

The system is designed to operate with Newport Corporation’s ESP-compatible stages, but can be configured to function with other stages.

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The ESP6000 includes the following features:

- Combined data acquisition and motion control
- 'Plug-and-play' controller, driver, and stage setup
- Bench-top or rack-mount configuration for the UniDrive6000
- Configured for any combination of motor type (DC/stepper) or size
- Feed-forward servo algorithm for smooth and precise motion
- Multi-axis synchronization
- Powerful motion programming capabilities in Visual Basic/C, and LabVIEW languages. Extensive set of Newport Corporation-provided commands.
- User-selectable displacement units

1.6 General Safety Considerations

The following general safety precautions must be observed during all phases of operation of this equipment. Failure to comply with these precautions violates safety standards of design, manufacture, and intended use of equipment.

Disconnect or do not plug in the power cord in the following circumstances:

- If the power cord or any other attached cables are frayed or damaged.
- If the power plug or receptacle is damaged.
- If the unit is exposed to rain or excessive moisture, or liquids are spilled on it.
- If the unit has been dropped or the case is damaged.
- If the user suspects service or repair is required.

To protect the equipment from damage and avoid hazardous situations, follow these recommendations:

- Do NOT make modifications or parts substitutions.
- Return equipment to Newport Corporation for service and repair.
- Do not touch, directly or with other objects, live circuits inside the unit.
- Do not operate the unit in an explosive atmosphere.
- Keep liquids away from unit.
- Do not expose equipment to excessive moisture (>90% humidity).

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Section 2 — Installation

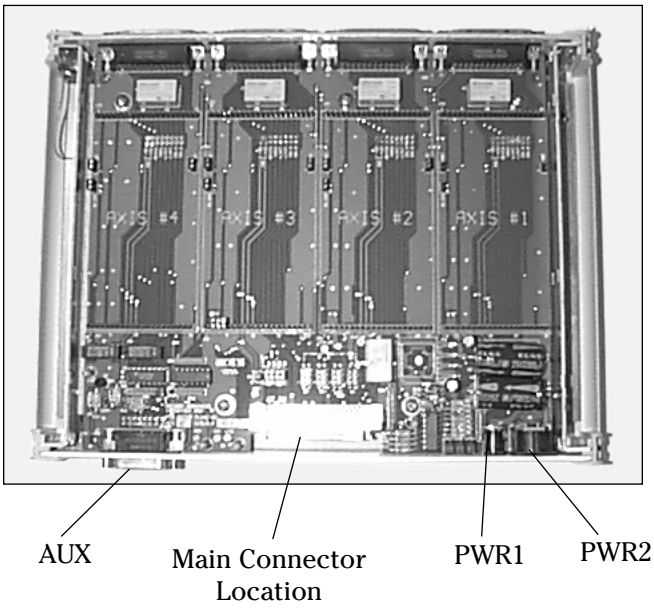


Figure 2-1: View inside the DC Interface Box

2.1 Connecting the DCIB to MM2000 or ESP6000 Motion Controllers

Connect MM2000 to Motors and/or Drivers:

The motor control signals generated by the MM2000 appear at the 68-pin output connector at the back of the user's computer. With the MM2000 the user received a DC Interface Box, which divides the 68 signals into 4 axes of motor control.

Locate the enclosed 68-pin shielded cable, connect one end to the MM2000 output connector, and connect the other end to the DC Interface Box.

The user should connect the motors and motor drivers to the 25 pin output connectors on the rear panel of the DCIB. The connectors are labeled AXIS 1, AXIS 2, AXIS 3, and AXIS 4.

NOTE

See Section 3 of the MM2000 Quick Installation and Start Up Guide, Revision 3.2, for hook-up instructions.

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NOTE

For Start-up of the MM2000, see Quick Installation and Start Up Guide, Revision 3.2, section 5.

Connect DCIB to ESP6000:

The ESP6000 controller card comes with a 100-to-100 or 100-to-68 pin interface cables which connect the UniDrive and DC Interface Box (DCIB), respectively.

1. Driver Interface (100-100 pin) Cable

   The driver interface cable connects the ESP6000 controller card to the UniDrive6000. Connector Pin Assignments are shown in Section 3 of this User Manual.

2. Motor/Driver (100-68 pin) Cable

   The motor/driver cable connects the ESP6000 controller card to the DCIB. Connector Pin Assignments are shown in Section 3 of this User manual.

2.2 Installing The DCIB DC Module Inside The DCIB

To install a DC Module driver in a DC Interface Box, execute the following steps:

1. Turn power off to the MM2000 or ESP6000 and the DC Interface Box.
2. Disconnect all cables from the DC Interface Box.
3. Remove the top cover of the DC Interface Box by removing the four screws, two in each side.
4. Remove the three jumpers that belong to the axes receiving the module (Figure 2-2). The jumpers are located inside the larger rectangle identifying the location of each axis module, clearly marked in silkscreen.
5. If limit switch signals need to be generated from the current sensing circuit, cut the limit switch traces for the desired axes on the DC Interface Box as indicated in Figure 2-2 (See Table 2-1, D).

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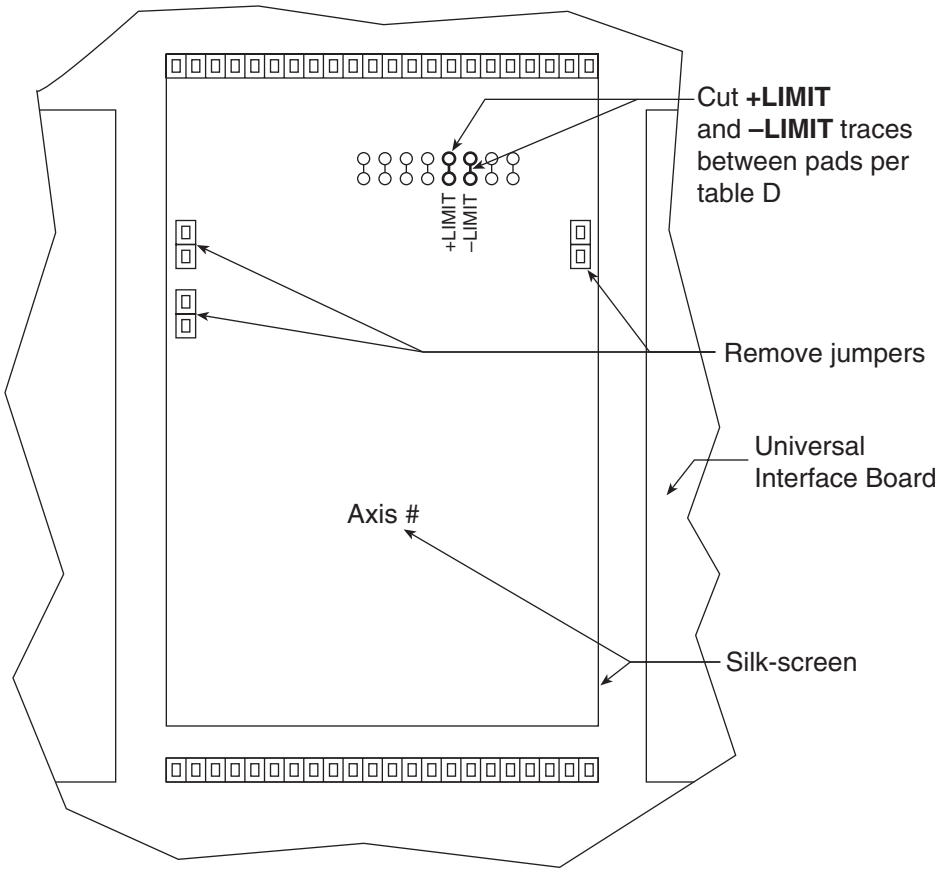


Figure 2-2: Installation View of Jumpers inside the DCIB

6. Set the jumpers and current setting as needed (See Table 2-1, A, B, C, and D) on the DC Module.
7. Insert the DC Module in the appropriate axis location. Observe the three jumper headers on the DC Interface Box are also used as a key for proper module location.
8. Place the DC Interface Box's top cover back on the unit, and secure it with the four screws.
9. The DC Interface Box is now ready to be reconnected and powered on.

NOTE

In order for a DC Module to be functional, an appropriate power supply must be connected to the DC Interface Box.

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Table 2-1: Jumper and Switch Settings

Table A: JP1 Settings

Setting	Description
12V	Driver set for 12V motors
24V	Driver set for 24V motors
Missing	Driver disabled

Table B: JP2 Settings

Setting	Description
LD	Current sensing enabled to emulate limit switches
CL	Current sensing enabled to limit the motor current
Missing	Current sensing disabled

Table C: SW1 Settings

Position	Current limit/trigger
0	Current sensing disabled
1	400 mA
2	200 mA
3	133 mA
4	100 mA
5	80 mA
6	66 mA
7	57 mA

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Table D: Settings for Specific Motors

Motor Type	SW1	JP1	JP2	Cuts on main board
UE16CC	5	12V	CL	None
UE30CC	2	24V	CL	None
UE31CC	5	24V	CL	None
UE32CC	1	24V	CL	None
850G-HS, 850F(-HS)	3	24V	CL	None
850G, 850G-LS, 850F-LS	5	12V	CL	None
850B	4	12V	LD	-LIMIT and +LIMIT
850B-HS	3	12V	LD	-LIMIT and +LIMIT
850B-LS	5	12V	LD	-LIMIT and +LIMIT
495	3	12V	CL	None
496	2	12V	CL	None
850F, CMA-xxCCCL	3	12V	CL	None

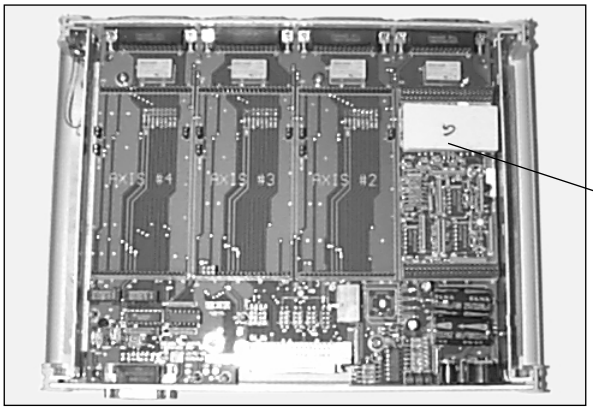


Figure 2-3: View of DCIB DC Module

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Notes

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Section 3 — Connector PIN Assignments

3.1 Connector PIN Assignments For DCIB

Table 3-1: AUX Connector Pinouts (15-Pin Connector)

Pin #	Standard	Option 1	Option 2
Pin 1	I/O Bit 1	Enc. B - 1	- P - 1
Pin 2	I/O Bit 2	Enc. A - 1	+ P - 1
Pin 3	I/O Bit 3		
Pin 4	I/O Bit 4		
Pin 5	I/O Bit 5		
Pin 6	I/O Bit 6	Enc. B - 4	- P - 4
Pin 7	I/O Bit 7	Enc. A - 4	+ P - 4
Pin 8	Reset	Enc. B - 2	- P - 2
Pin 9	Reserved	Enc. A - 2	+ P - 2
Pin 10	Reserved	Enc. A - 3	+ P - 3
Pin 11	Reserved	Enc. B - 3	- P - 3
Pin 12	Reserved		
Pin 13	+ 5 Volts		
Pin 14	N/C		
Pin 15	Ground		

Table 3-2: Pinouts for DCIB

J1 - 25 Pin Connector Pinouts

	MM2000 DC Module		MM2000 Stepper Module	ESP6000 (DC only)
Pin #	**DCIB DC Module**	**No DCIB DC Module**	**No DCIB DC Module**	**DCIB DC Module**
1		DC sig	+ P	DC sig
2				
3				
4				
5	+ mot	+ mot	mot off	
6	+ mot	+ mot		
7	- mot	- mot	- P	
8	- mot	- mot		
9				
10				
11				
12				
13	origin	Origin	origin	origin
14	shield	Shield	shield	shield

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Table 3-2: Pinouts for DCIB (Continued)

	MM2000 DC Module		MM2000 Stepper Module	ESP6000 (DC only)
Pin #	**DCIB DC Module**	**No DCIB DC Module**	**No DCIB DC Module**	**DCIB DC Module**
15	index	Index	index	index
16	ground	Ground	ground	ground
17	+ limit	+ limit	+ limit	+ limit
18	- limit	- limit	- limit	- limit
19	encoder A	encoder A	encoder A	encoder A
20	encoder B	encoder B	encoder B	encoder B
21	+ 5V	+ 5V	+ 5V	+ 5V
22	ground	Ground	ground	ground
23	encoder A\	encoder A\	encoder A\	encoder A\
24	encoder B\	encoder B\	encoder B\	encoder B\
25	index\	index\	index\	index\

3.2 Connector PIN Assignments for MM2000 Motion Controller

Using “piggy-back” plug-in modules, one (1) MM2000 main - board supports as many as four (4) axes of motion consisting of any combination of stepping, and brushless or brush DC servo motors. The motion system related input/output (I/O) signals are available at 68-pin connector J3. The user may tap into the signals here, or they may use the interface box that conveniently divides the signals into 4 axes of motor control.

Table 3-3: Pinouts for MM2000 Motion Controller

J3 - 68-Pin Connector Pinouts

Pin	Module	Stepping Motor	DC Motor
1	1	CW or pulse output	± 10V analog control signal output
2	1	CCW or direction output	– Motor drive output (1 Amp)
3	1	Motor ON/OFF output	+ Motor drive output (1 Amp)
10	1	Top Zero (index) input	Top Zero (index) input
5	1	Top zero (index) NOT input	Top zero (index) NOT input
8	1	Encoder channel A input	Encoder channel A input
9	1	Encoder channel B input	Encoder channel B input
6	1	Encoder channel A NOT input	Encoder channel A NOT input
7	1	Encoder channel B NOT input	Encoder channel B NOT input
11	1	Origin (home) switch input	Origin (home) switch input
14	1	- Travel limit input	- Travel limit input

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Table 3-3: Pinouts for MM2000 Motion Controller (Continued)

Pin	Module	Stepping Motor	DC Motor
12	1	+Travel limit input	+ Travel limit input
37	2	CW or pulse output	± 10V analog control signal output
38	2	CCW or direction output	- Motor drive output (1 Amp)
39	2	Motor ON/OFF output	+ Motor drive output (1 Amp)
46	2	Top zero (index) input	Top zero (index) input
41	2	Top zero (index) NOT input	Top zero (index) NOT input
44	2	Encoder channel A input	Encoder channel A input
45	2	Encoder channel B input	Encoder channel B input
42	2	Encoder channel A NOT input	Encoder channel A NOT input
43	2	Encoder channel B NOT input	Encoder channel B NOT input
47	2	Origin (home) switch input	Origin (home) switch input
49	2	- Travel limit input	- Travel limit input
48	2	+ Travel limit input	+ Travel limit input
16	3	CW or pulse output	± 10V analog control signal output
17	3	CCW or direction output	- Motor drive output (1 Amp)
18	3	Motor ON/OFF output	+ Motor drive output (1 Amp)
25	3	Top zero (index) input	Top zero (index) input
20	3	Top zero (index) NOT input	Top zero (index) NOT input
23	3	Encoder channel A input	Encoder channel A input
24	3	Encoder channel B input	Encoder channel B input
21	3	Encoder channel A NOT input	Encoder channel A NOT input
22	3	Encoder channel B NOT input	Encoder channel B NOT input
26	3	Origin (home) switch input	Origin (home) switch input
30	3	- Travel limit input	- Travel limit input
28	3	+ Travel limit input	+ Travel limit input
50	4	CW or pulse output	± 10V analog control signal output
51	4	CCW or direction output	- Motor drive output (1 Amp)
52	4	Motor ON/OFF output	+ Motor drive output (1 Amp)
59	4	Top zero (index) input	Top zero (index) input
54	4	Top zero (index) NOT input	Top zero (index) NOT input
57	4	Encoder channel A input	Encoder channel A input
58	4	Encoder channel B input	Encoder channel B input
55	4	Encoder channel A NOT input	Encoder channel A NOT input
56	4	Encoder channel B NOT input	Encoder channel B NOT input
60	4	Origin (home) switch input	Origin (home) switch input
62	4	- Travel limit input	- Travel limit input
61	4	+ Travel limit input	+ Travel limit input
31	-	I/O bit 1	I/O bit 1
65	-	I/O bit 2	I/O bit 2
32	-	I/O bit 3	I/O bit 3
66	-	I/O bit 4	I/O bit 4
33	-	I/O bit 5	I/O bit 5
67	-	I/O bit 6	I/O bit 6

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Table 3-3: Pinouts for MM2000 Motion Controller (Continued)

Pin	Module	Stepping Motor	DC Motor
34	-	I/O bit 7	I/O bit 7
68	-	Reset	Reset
13	-	+5V DC	+5V DC
27	-	+5V DC	+5V DC
35	-	+5V DC	+5V DC
63	-	+12V DC	+12V DC
64	-	-12V DC	-12V DC
15	-	Ground	Ground
29	-	Ground	Ground
36	-	Ground	Ground
4	-	Reserved	Reserved
40	-	Reserved	Reserved
19	-	Reserved	Reserved
53	-	Reserved	Reserved

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3.3 Connector PIN Assignments For ESP6000 Motion Controller

ESP6000 Controller Card

The EPS6000 controller card interfaces with the DC Interface Box via a 100-to-68 pin cable. The connector functions are defined as follows:

Motor/Driver Interface (100-to-68 PIN) Cable

This cable interfaces the ESP6000 controller card to the DC Interface Box (DCIB). Connector pin-outs are listed in Table 3-4, and functional descriptions are provided in the following paragraphs.

Table 3-4: Motor/Driver Interface (100-to-68 pin) Cable Connector Pinouts (ESP6000 Motion Controller)

68-Pin Connector	100-Pin Connector	Function
1	99	Servo DAC Output, Axis-1
2	47	Analog Ground
8	91	Encoder B (+) Input, Axis-1
9	92	Encoder A (+) Input, Axis-1
10	90	Index (+) Input, Axis-1
11	87	Home Input, Axis-1
12	88	Travel Limit (+) Input, Axis-1
13	02	+05V, 250 mA (maximum)
14	38	Travel Limit (-) Input, Axis-1
15	43	Digital ground
16	97	Servo DAC Output, Axis-3
17	48	Analog Ground
23	78	Encoder B (+) Input, Axis-3
24	79	Encoder A (+) Input, Axis-3
25	77	Index (+) Input, Axis-3
26	74	Home Input, Axis-3
27	03	+05V, 250 mA (maximum)
28	75	Travel Limit (+) Input, Axis-3
29	46	Digital Ground

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Table 3-4: Motor/Driver Interface (100-to-68 pin) Cable Connector Pinouts (ESP6000 Motion Controller) (Continued)

68-Pin Connector	100-Pin Connector	Function
30	25	Travel Limit (-) Input, Axis-3
33	36	Amplifier Enable Output, Axis-2
34	23	Amplifier Enable Output, Axis-4
36	46	Digital Ground
37	98	Servo DAC Output, Axis-2
38	45	Digital Ground
44	84	Encoder B (+) Input, Axis-2
45	85	Encoder A (+) Input, Axis-2
46	83	Index (+) Input, Axis-2
47	80	Home Input, Axis-2
48	81	Travel Limit (+) Input, Axis-2
49	31	Travel Limit (-) Input, Axis-2
50	96	Servo DAC Output, Axis-4
51	44	Digital Ground
57	71	Encoder B (+) Input, Axis-4
58	72	Encoder A (+) Input, Axis-4
59	70	Index (+) Input, Axis-4
60	67	Home Input, Axis-4
61	68	Travel Limit (+) Input, Axis-4
62	18	Travel Limit (-) Input, Axis-4
63	50	+12V, 250 mA (maximum)
64	49	-12V, 250 mA (maximum)
66	86	Amplifier Enable Output, Axis-1
67	73	Amplifier Enable Output, Axis-3
68	93	Reset Output From Controller

+5V, 250 mA (maximum)
+5V supply available from the PC.

+12V, 250 mA (maximum)
+12V supply available from the PC.

-12V, 250 mA (maximum)
-12V supply available from the PC.

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Amplifier Enable Output, Axis 1, 2, 3, 4
Open-drain output with 1KΩ pull-up resistor to +5 volts. This output is asserted active True when the axis is in the motor ON state and False for the motor OFF. The actual TTL level is user-configurable.

Analog Ground
Servo digital-to-analog (DAC) ground.

Digital Ground
Ground reference used for all digital signals.

Encoder A (+) Input, Axis 1, 2, 3, 4
The A (+) input is pulled-up to +5 volts with a 1KΩ resistor. The signal is buffered with a 26LS32 differential receiver. The A (+) encoder encoded signal originates from the stage position feedback circuitry and is used for position tracking.

Encoder B (+) Input, Axis 1, 2, 3, 4
The B (+) input is pulled-up to +5 volts with a 1KΩ resistor. The signal is buffered with a 26LS32 differential receiver. The B (+) encoder encoded signal originates from the stage position feedback circuitry and is used for position tracking.

Home Input, Axis 1, 2, 3, 4
This input is pulled-up to +5 volts with a 1KΩ resistor. The Home signal originates from the stage and is used for homing the stage to a repeatable location.

Index (+) Input, Axis 1, 2, 3, 4
The (+) Index input is pulled-up to +5 volts with a 1KΩ resistor and is buffered with 26LS32 differential receiver. The (+) Index signal originates from the stage and is used for homing the stage to a repeatable location.

Reset Output From Controller
The Reset output is a TTL buffered output that represents ESP6000 hardware reset status of the controller itself. When the controller is held in a reset state this output is a logical LOW. When connected to the UniDrive6000 this output resets all driver channels.

Servo DAC Output, Axis 1, 2, 3, 4
The servo digital-to-analog converter (DAC) output is the ±10 volt control signal used to control DC servo motors. This signal is the output of the 18-bit servo DAC.

Travel Limit (-) Input, Axis 1, 2, 3, 4
This input is pulled-up to +5 volts with a 4.7KΩ resistor and represents the stage negative direction hardware travel limit. The active true state is user-configurable. The default is active HIGH.

Travel Limit (+) Input, Axis 1, 2, 3, 4
This input is pulled-up to +5 volts with a 4.7KΩ resistor and represents the stage positive direction hardware travel limit. The active true state is user-configurable. The default is active HIGH.

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Section 4 — Maintenance and Repair

4.1 Maintenance

The DC Interface Box has been designed to require a minimum of maintenance. If this procedure is followed, excellent instrument life can be expected.

There are no user-serviceable parts or user adjustments to be made to the DC Interface Box.

Newport Corporation recommends that the customer keep careful records at maintenance intervals, noted who maintained the DCIB, when it was maintained, etc.

Newport Corporation reserves the right to inspect such records during the warranty period to verify proper maintenance and validate warranty expenditures.

WARNING

Procedures are to be performed only by qualified service personnel. Qualified service personnel should be aware of the shock hazards involved when instrument covers are removed and should observe the following precautions before proceeding.

- **Turn off power switch and unplug the DC Interface Box from its power source;**
- **Disconnect cables from the connectors on the MM2000 or ESP6000 Motion Controller, if their function is not understood;**
- **Remove jewelry from hands and wrist;**
- **Expect hazardous voltages to be present in any unknown circuits.**

WARNING

Verify proper alignment before inserting cables into connectors. Do not force.

1. Troubleshooting Guide

This section is to used by Newport Corporation qualified service personnel. Fixing the problem should include not only correcting the effect, but also the cause of the problem. The Newport Corporation technician should analyze the problem carefully to avoid repetition. A list of the most common problems and their corrective actions is provided in Table 4.1. Use as a reference, but remember that a perceived error is usually an operator error or has some other simple solution.

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Table 4-1: Troubleshooting Guide

Problem	Cause	Corrective Action
No LEDs illuminate on the front panel of the DCIB.	No electrical power.	Use a tester or other device (Lamp, etc.) to verify that power is present in the outlet. Contact an electrician if not.
	No connection to the Controller Card in the user's PC.	Cable/Connectors not plugged in properly, or there may be defective pins in the connectors. Replace Cable/Connector Assembly, if defective.
Green LED does not illuminate on the front panel of the DCIB.	External Power Supply not connected properly to PWR1 or PWR2 on the front panel of the DCIB.	Re-connect External Power Supply. If defective, replace the power supply.
When External Power Supply is connected to PWR1 or PWR2, LOW (Red) LED illuminates.	Low power is being received from the External Power Supply (less than 12 volts).	Verify connection to PWR1 or PWR2. If defective, replace the power supply.
When External Power Supply is connected to PWR1 or PWR2, HIGH (Red) LED Illuminates.	High power is being received from the External Power Supply (more than 19 volts).	Verify connection to PWR1 or PWR2. If defective, replace the power supply.

2. Cleaning

Clean the exterior metallic surfaces of the DC Interface Box with water and a clean, lint-free cloth. Clean external cable surfaces with alcohol, using a clean, lint-free cloth.

WARNING

Power-down all equipment before cleaning.

CAUTION

Do not expose connectors, LEDs, or switches to alcohol or water.

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4.2 Obtaining Service

This section contains information regarding factory service for the DC Interface Box. ***The user should not attempt any maintenance or service of the DCIB***. Any problem that cannot be resolved should be referred to Newport Corporation. Technical Customer Support in formation is listed in Table 4-2.

Table 4-2: Technical Customer Support Contacts

Telephone	1-800-222-6440
Fax	1-714-253-1479
Email	rma.service@newport.com
Web Page URL	www.newport.com/srvc/service.html

Contact Newport Corporation to obtain information about factory service. Telephone contact number(s) are provided on the Service Form (See next page). Please have the following information available:

- Equipment model number (DC Interface Box)
- Equipment serial number (DC Interface Box)
- Problem description (document using the Service Form, on next page)

If the instrument is to be returned for repair, the customer will be given a Return Authorization Number that should be referenced in their shipping documentation. Complete a copy of the Service Form on next page, and include it with your shipment.

4.3 Recommended Long-Term Maintenance (Service Contract)

1. Buyer will have the choice to purchase a Service Contract. Newport Corporation shall provide details associated with warranty scheduled and unscheduled maintenance.
2. Contract is renewable every 12 months.
3. Newport Corporation is to have contract turnaround response time of no longer than 72 hours.

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4.4 Service Form

Newport Corporation
U.S.A. Office: 949/863-3144
FAX: 949/253-1800

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 below, as appropriate.

Describe problem _____

(Attach additional sheets as necessary).

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