

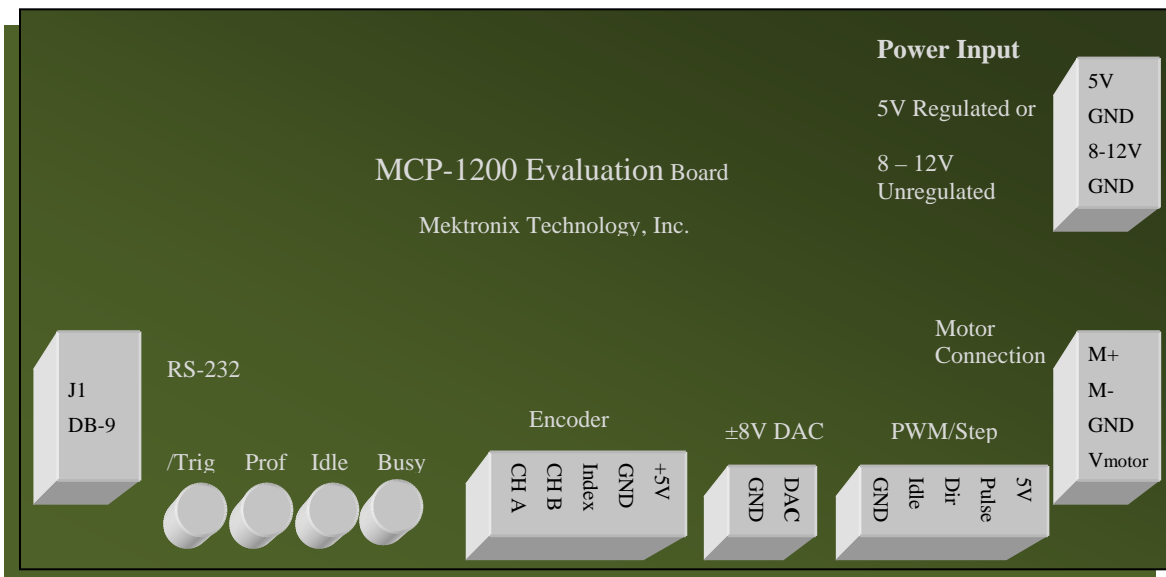
MCP-1200 Evaluation Board Guidance

Overview of the MCP-1200 Eval Board

The MCP-1200 Evaluation Board provides an easy way to send commands to the MCP-1200 control registers using a RS232 serial interface (USB is currently disabled). Using HyperTerminal or any other terminal program will allow ASCII commands to be sent to the board. Sample scripts are given that demonstrate commands sequences. Text files can also be sent to the board using HyperTerminal so that several commands can be sent all at once.

Connections to the MCP-1200 Eval Board

The schematic of the MCP-1200 Evaluation Board can be downloaded at www.mektronixtech.com/evalkit.html. The connections given below are typical of a small DC motor that can be controlled using the onboard 3A H-bridge driver using the motor connections. 24V DC power for the Vmotor/GND connection should be adequate but not higher than 40V. You may also connect an external driver to either the PWM/Step or DAC connectors. Please refer to the Evaluation Board schematic for additional details.



The MCP-1200 Evaluation Board is powered and selected by J15 – USB, J16 – External 5V or J17 – 8V to 12V Unregulated DC. Place the jumper in the proper position for the power source.

The onboard clock runs at 20 MHz and is selected at J13. The Sync pin to the MCP-1200 can be issued internally at J16 or externally at J17 which is routed to the J10 S/C/T header.

Evaluation Board Command Overview

The MCP-1200 evaluation board is controlled by a Silicon Labs C8051F321, 8051-based microcontroller. A simple firmware program allows communication between the evaluation board and a host computer via an RS-232 link. The USB has not been enabled in this release. HyperTerminal was used to send ascii commands to the evaluation board using the following settings.

RS-232 Parameters: 9600 baud, 8 data bits, no parity, 1 stop bit

Commands:

Command	Description	Format	Example
R	Read a Register	R address	R 1A
W	Write to a Register	W address value	W 03 F6
X	Hardware Reset	X	X
I	Interface Mode	I mode	IN
	Mode: N=non-overlapped, W=ALE within CS, O=overlapped		
P	Start Profile & Log	P	P
	Log: Profile Mode, Command Position LSB		
E	Start Profile & Log	E	E
	Log: Position Error Mid, LSB		
V	Start Velocity & Log	V	V
	Log: Profile Mode, Command Position LSB		
D	Display Log Memory	D	D
;	Comment Line	; Comment	; Comment
?	Help	?	?

- Commands are case sensitive.
- Addresses and Byte Values must be entered as 2-character hexadecimal numbers with leading zeros (if needed) and capital letters for hex nibbles A-F. Example: W 03 F6 is a valid command – W 3 F6 or W 03 f6 are not.
- The R and W command require a space between the command, the address, and (in the case of writes) the value.
- The I command should have NO space between the command and the mode. The default is IN (non-overlapped).
- Comment lines must have a semicolon as the first character.

- Any characters on a line following a valid command are ignored and may be used for comments.
- Maximum line length is 80 characters.

Evaluation Board Sample Scripts

```

; ***** Trapezoid Profile Example *****
;
W 05 01  Idle Mode
W 02 01  Enable extended addressing
W 11 A6  Set prescale for 500uS sample (with 20MHz
clock)
W 1A 07  PWM rate = 16.67KHz
W 27 00  Accel = .03;  MSB
W 26 08  Accel LSB (fraction)
W 28 20  Max Velocity
W 13 00  Zero Position Counter
W 2B 01  Final Position = 100,000 (0186A0)
W 2A 86
W 29 A0
W 05 03  Enter Control Mode
W 00 08  Start Profile
R 14
R 13
R 12
; -- Motor performing 100,000 count move
; -- Check final position by reading Reg. 14,13,&12

; ***** Trapezoid Profile with Breakpoint *****
;
W 05 01  Idle Mode
W 02 01  Enable extended addressing
W 11 A6  Set prescale for 500uS sample (with 20MHz
clock)
W 1A 87  PWM rate = 16.67KHz; Encoder Ch A/B swap
W 27 00  Accel = .03;  MSB
W 26 08  Accel LSB (fraction)
W 28 20  Max Velocity
W 13 00  Zero Position Counter
W 2B 01  Final Position = 100,000 (0186A0)
W 2A 86
W 29 A0
W 3F 00  Set Breakpoint = 50,000 (00C350)

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W 3E C3
W 3D 50
W 02 11  Enable Breakpoint Feature
W 05 03  Enter Control Mode
W 07 00
W 00 08  Start Profile
;
; -- Motor performing 100,000 count move...
; -- "/Trig" LED should extinguish when midway
breakpoint is
; --  reached. Reset by writing any value to STATUS
reg 07
; -- Check final position by reading Reg. 14,13,&12
;

; ***** Velocity Control Example *****
;
W 05 01  Idle Mode
W 02 01  Enable extended addressing
W 11 A6  Set prescale for 500uS sample (with 20MHz
clock)
W 1A 07  PWM rate = 16.67KHz
W 27 00  Accel = .03;  MSB
W 26 08  Accel LSB (fraction)
W 3C 10  Command Velocity
W 05 03  Enter Control Mode
W 00 0D  Start Velocity Mode
;
; -- Motor now running at a speed of 10(hex)
; -- Adjust velocity by writing values to register 3C
; -- Remember to use 2's complement values (FF = -1)
;

; ***** PID Response using DAC Diag View *****
;
W 05 00  Soft Reset
R 07      Read Status (Killing time to insure reset)
W 10 00
W 11 63  Set prescale for 500uS sample (with 20MHz
clock)
W 0F 63  Set sample timer for 500uS
W 1A 07  PWM rate = 16.67KHz
W 02 01  Enable extended addressing
W 13 00  Zero Position Counter
W 05 03  Enter Control Mode

```

```

R 00      <-- Confirm Idle Flag Inactive (Bit 1 = 0)
;W 01 88  DAC Diagnostic Output (motor on PWM), PID
Filter
W 01 08  PID filter without DAC output
W 0B 64  Increment Current Position by 100 counts
R 61     Kp
R 62     Ki
R 63     Kd
R 64     K (D span)
R 65     ILimit LSB
R 66     ILimit MSB
R 69     Ka (ff)
R 6A     Kv (ff)
W 0B 64
W 0B 64
W 0B 64
W 0B 64
W 0B 64
W 0B 64
;
; Profile Response
W 27 01  Accel MSB
W 26 00  Accel (fraction) = 1.00
W 28 30  Max Vel = 48
W 2B 00  Final Position MSB
W 2A 00  Final Position Mid
W 29 00  Final Position LSB
W 00 08  Profile move (return to zero)
R 00     <--- Confirm Profile Finished (Bit 2 = 0)
;
;W 2A 10  Final Position Mid (001000h=4096 move)
;W 00 08

; ***** Position Increment Example *****
;
W 05 00  Soft Reset
R 07     Read Status (Killing time to insure reset)
W 05 01  Idle Mode
W 02 01  Enable extended addressing
W 11 A6  Set prescale for 500uS sample (with 20MHz
clock)
W 1A 07  PWM rate = 16.67KHz
W 05 03  Enter Control Mode
W 0B 64  Increment Current Position by 100 counts
R 07     Read Status
R 14     Read Actual Position (LSB First)

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R 13
R 12
W 0B 9C Increment Current Position by -100 counts
R 07 Read Status
R 14 Read Actual Position (LSB First)
R 13
R 12
;
; -- The first increment should move position to 100
(64h).
; -- The second increment should move the position
back to zero.
; -- Repeat the increment command as desired by
writing 8-bit
; -- two's complement value (-128 to 127) to Reg 0B.
;
W 0B 7F Increment Current Position by 100 counts
W 0B 7F
W 0B 7F
W 0B 7F
W 0B 7F
W 0B 7F
W 0B 81
W 0B 81
W 0B 81
W 0B 81
W 0B 81
W 0B 81
W 0B 81
R 14

; ***** Stepper Motor Mode *****
; ***** Profile Move *****
;
X Reset
W 10 82 Set Sample Timer & Prescale for
W 11 35 100mS sample loop (@ 20MHz)
W 0F 3B
W 02 03 Enable Step Mode & Extended Addr.
W 1B FF Pulse Width = 12.8 uS
W 13 00 Zero Position Counter
W 2B 00 Set Final Position = 100(hex)
W 2A 01
W 29 00
W 27 04 Accel = 4.0
W 26 00
W 28 0A Max Vel = 10

```

```

W 05 03  Enter Control Mode
W 00 08  Start Profile

; ***** Stepper Motor Test *****
;
X          Reset
?          Delay
W 10 01  Set prescale to 014Ch (332)
W 11 4C
W 0F 3B  Sample Timer = 11mS (20 Mhz Clock)
W 1A 87  Encoder Ch A/B swap
W 01 00  8-bit velocity, trapezoid profile
W 13 00  Zero Position Counter
W 02 03  Step Mode, Positive Pulses
W 1B FF  Pulse Width Max
W 05 03  Enter Control Mode
R 00  <-- Confirm Idle Flag inactive (Reg 00,Bit 1 =
0)
;
; Encoder Follower Operation
W 1C 00  Set encoder/step ratio to 0.5
W 1D 80  Encoder/step fraction
W 07 00  Clear status flags
W 2B 00
W 2A 01  Set final position to 256 (100h)
W 29 00
W 27 0A  Set Accel = 10.0
W 26 00
W 28 0A  Max Velocity = 10 steps/sample period
W 07 00
W 00 08  Start Profile Move
; Wait for move to complete (approx 6.5 seconds)
; Manually enter the following
;R 00      <-- Confirm Profile Complete; Reg 00,Bit 0 =
0
;R 07      <-- Confirm No Max Error Fault; Reg 07,Bit 4
= 1
;

```