## **HiCON and THC Instruction Document**

## I. Prerequisites

## A. Hardware

Please make sure that the components are complete.

### HiCON Setup:

- HiCON CPU Board and Breakout Board 7775 (already attached together)
- THC Adapter Board (small board with 26pin and DB25 connector)
- THC Controller.

#### DspMC Setup:

- DspMC Motion Controller pn7762
- THC Adapter Board (small board with 26pin and DB25 connector)
- THC Controller.

#### **B. Software**

dspMacro or HiCON Basic Download:

- THC HiCON Macro.bas
- THC DSPMC Macro.bas

Please make sure that the following additional features have been enabled on the **HiCON** Device:

- HiCON BASIC Language Internal Programming Feature.
- Extended I/O Feature (Enable Ports 12 and 13).

#### NOTE: The **DSPMC** already has these features as a factory default.

#### **IMPORTANT:**

- Make sure that the HiCON or DspMC has the latest firmware from the vitalsystem website.

## **II. HiCON Setup**

Follow the setup diagram below to setup HiCON with the THC. For instructions on the individual setup of the HiCON or the THC, refer to their respective setup instructions.

- Connect the 26pin flat cable from the THC Adapter Board to the HiCON CPU Board J11.
- Connect the DB25 cable from the THC adapter board to the THC Control Board.



HiCON and THC Setup

### **IMPORTANT**:

The THC HiCON-Basic Macro uses the values in from Mach3 Motor Tuning, namely acceleration and velocity for the THC axis.

The HiCON-Basic macro automatically monitors the up and down command signals from the THC and issues the corresponding motion command to the Axis. To achieve hi-speed machining, it is recommended that the acceleration is given a large value so the axis motion can respond quickly.

## A. Loading the HiCON-Basic Macro:

After completing the setup, load the provided HiCON Macro Program (THC\_HiCON\_Macro.bas) on the HiCON. This can be done with the HiCON Basic Loader Program.

The HiCON Basic Loader Program can be downloaded from:

http://www.vitalsystem.com/web/hicon/HiCONbasic.zip

- Click the "Connect" button to connect to the HiCON.
- Click the "Download Program" button and navigate to the "THC\_HiCON\_Macro.bas" file.
- Click on Run/Stop when Mach3 is running.

- The program should also be put to auto start at power-up by Clicking "Autorun ON/OFF". This will have the device run the HiCON-Basic macro at startup.

## **B. Running the HiCON-Basic Macro**

Make sure THC Mode is enabled in the System tab of HiCON plugin configuration as shown below. To allow testing Z axis motion using keyboard emulation, turn on "THC Test using emulated up/down inputs".

HiCON Configuration			
System X(0) Y(1) Z(2) A(3)	B(4) C(5)		
HiCON Serial 0	six-character serial number, or leave blank		
Threading	MPG #1	MPG #2	- MPG #3
RPM Sync Source Undefined	Type Undefined	Type Undefined	Type Undefined V
RPM Sync Index 0	▼ Index 0	▼ Index 0	Index 0
RPM Count/Rev 1 RPM Sampling (ms) 50	Max Buffer Level 1 ~ 5000 millisec	Spindle Axis Spindle Tyj	Analog Spindle Scale pe 10-200%
Hardware Encoder Polarity			Step Pulse Width (0.02 ~ 650 micro sec)
Channel 0 Positive	Channel 3 Positive	Channel 6 Positive	StepGen 0 13.947 StepGen 3 5.000
Channel 1 Positive	Channel 4 Positive 💌	Channel 7 Positive	StepGen 1 13,947 StepGen 4 232,500
Channel 2 Positive	Channel 5 Positive	Channel 8 Positive	StepGen 2 6.976 StepGen 5 5.000
Hardware Encoder Debounce			▼ THC Mode
Channel 0 20ns(4.17Mhz) 💌	Channel 3 20ns(4.17Mhz)	Channel 6 20ns(4.17Mhz)	✓ THC Test using emulated up/down inputs
Channel 1 20ns(4.17Mhz)	Channel 4 20ns(4.17Mhz)	Channel 7 20ns(4.17Mhz)	_

When running the system, make sure that the "CTRL MACRO" LED on the THC Adapter board is blinking as this indicates that HiCON is currently running the THC Macro.

Turn on the TORCH ON output from Mach3. The TORCH ON output is mapped to **P13, pin 4**. Use spindle ON/OFF (M3/M5) commands.

The HiCON macro will **ONLY PERFORM Z MOTION** if all of the following conditions are met:

- 1. THC Correction is enabled in Mach3 (LED24)
- 2. The ArcOK signal is ON from the THC controller
- 3. X or Y axis are moving.

In the THC Test Mode, Z motion can be generated without axis velocity and ArcOK.

NOTE: Make sure the spindle Output (Torch On Output Signal) is mapped to Port 13, pin 4
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ArcOK signal can be read directly from hardware input Port 13, pin 2.

## C. Mach 3 Ports and Pins Config

Signal	Туре	Port	Pin	Active Low
Torch (Spindle M3)	Output	13	4	TRUE
Torch Up	Input	13	1	TRUE
Torch Down	Input	13	0	TRUE
Arc OK (Torch ON)	Input	13	2	TRUE

## **III. DSPMC Setup**

Follow the setup diagram below to setup DSPMC with the THC. For instructions on the individual setup of the DSPMC or the THC, refer to their respective setup instructions.

- Connect the 26pin flat cable from the THC Adapter Board to the DSPMC Board J11 Connector.
- Connect the DB25 cable from the THC adapter board to the THC Control Board.



#### **IMPORTANT**:

The THC dspMacro uses the values in from Mach3 Motor Tuning, namely acceleration and velocity for the THC axis.

The dspMacro automatically monitors the up and down command signals from the THC and issues the corresponding motion command to the Z Axis. To achieve hi-speed machining, it is recommended that the acceleration is given a large value so the axis motion can respond quickly.

## A. Loading the dspMacro

After completing the setup, load the provided dspMacro Program (THC\_DSPMC\_Macro.bas) on the DSPMC controller. This can be done with the DspMacro Loader Program.

The DspMacro Loader Program can be downloaded from:

http://www.vitalsystem.com/web/motion/dspMacroSetup.zip

- Click the "Connect" button to connect to the DSPMC.
- Click the "Download Program" button and navigate to the "THC\_DSPMC\_Macro.bas" file.
- Click on Run/Stop when Mach3 is running.
- The program should also be put to auto start at power up by Clicking "Autorun ON/OFF". This will have the device automatically run the macro at power up.

#### **B. Running the Macro for DSPMC**

Make sure the THC Mode is enabled in the System tab in the DSPMC plugin configuration. To allow testing Z axis motion using keyboard emulation, turn on "THC Test using emulated up/down inputs".

DSPMC Configuration	
System X(0) Y(1) Z(2) A(3) B	(4) C(5) D(6) E(7)
Spindle Type Undefined	<ul> <li>To Ignore Limit switches while homing, make the home sensor same as the ++ and limit inputs in the Ports and Pins window.</li> <li>THC Mode</li> <li>THC Test using emulated up/down inputs</li> </ul>
Threading Feedback Sync Source Undefined	Probing     Type Single Cycle     Indefined

When running the system, make sure that the "CTRL MACRO" LED on the Adapter board is blinking as this indicates that HiCON is currently running the THC Macro.

Turn on the TORCH ON output from Mach3 using M3/M5 spindle commands. The TORCH ON output is mapped to **J11, pin16 (Mach3 output pin 20)**.

The macro will **ONLY START MOTION** if all of the following conditions are met:

- 1. THC Correction is enabled in Mach3 (LED24)
- 2. The ArcOK signal is received from the THC controller
- 3. X or Y axis is moving.

In the THC Test Mode, Z motion can be generated without XY motion and ArcOK.

# **NOTE**: <u>Make sure the spindle Output (Torch ON Output Signal) is mapped to J11, pin16 (Mach3 output pin 20)</u>.</u>

ArcOK signal can be read directly from hardware input J11, pin19 (Mach3 pin 34).

## C. Mach 3 Ports and Pins Config

Signal	Туре	Pin	Active Low
Torch (Spindle M3)	Output	20	TRUE
Torch Up	Input	33	TRUE
Torch Down	Input	32	TRUE
Arc OK (Torch ON)	Input	34	TRUE

## **IV. THC IO Connections**

J11 on DSPMC & HiCON	HiCON J11 Pins		_	<u>THC – DB25</u>
GND	<b>1</b> (1)		21 25	GND
SetDSPData(60), SetPIN(13,4)	6 (16)	Opto Coupler	1	TORCH ON
GetDSPData(140), GetPin(13,0)	10 (18)	Opto Coupler	11	DOWN
GetDSPData(141), GetPin(13, 1)	11 (6) -	Opto Coupler	12	UP
GetDSPData(142), GetPin(13, 2)	12 (19)	Opto Coupler	15	ARC OK
SetDSPData(61), SetPIN(13,5)		N LED		THC301b Texas Micro
DSPMC and HiCON Macro Commands	(?) = DSPMC J11	Pin Numbers		

## V. THC Test Mode Setup

## Up/Down Signal Emulation via Keyboard

Up/Down signals emulation may be accomplished by mapping OEMTriggers to OEMLED:2028 and OEMLED:2029 respectively via a Mach3 Brain. The OEMTriggers can then be mapped to keyboard using ports & pins input setting. Below is an example:

OxyTorch Keybo	d Keys.brn -						
ile ⊻iew Commands	Scroll <u>H</u> elp						
🗅 🚅 🔒 🤋 🕇	<b>—</b> <u>1</u>						
	Invort						
OEMTRIGGER #14	Flip Signal						OEMLED:2028
	Invert	=					
OEMTRIGGER #15	- Flip Signal						OEMLED:2029
ngine Configu	ration Dorts	& Dine					
ngine conngi	notion Ports	u Pilis					
Port Setup and A	xis Selection 📗 Mol	tor Outputs Inpu	t Signals   Output	: Signals   Encod	ler/MPG's ∫ Spin	dle Setup 🛛 Mill Op	tions
			'				
Signal	Enabled	Port #	Pin Number	Active Low	Emulated	HotKey	►
OEM Trig #1	) 🗶	0	0	X	X	0	-
OEM Trig #1	. 🗶	0	0	X	X	0	
OEM Trig #1	2 🗶	0	0	X	X	0	
OEM Trig #1	× ×	0	0	2	2	0	
OEM Trig #1	ŧ 🖌	0	0	X	4	85	
OEM Trig #1	5 🖌	0	0	X	4	68	
Timing	¥	0	0	¥	¥	0	
Jog X++	×	0	0	×	×	0	
Jog X	¥	0	0		×	0	
Jog Y++	×	0	0	4	×	0	-
10g Y	×	0	0	4	×	0	<b>~</b>
	Dia 10.10	F					
	Fins 10-13 and 1	o are inputs. Unly	these b pin numb	ers may be used	on this screen		
					Automa	ted Setup of Input	.
					Automa	sted Setup of Impat	s
					ПK	Cancel	Applu .
							Shhià

## **Max and Min THC Correction Values**

The maximum and minimum THC correction values must be set to DROs 27 and 65 respectively. This can be done by writing a script as shown below.



While in Test Mode, after setting the min/max DROs, the values can be refreshed in the controller by toggling the "THC ON/OFF" button (LED 24).