

PMB Electronics (Net-Tech Developments)

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PRODUCT NOTE

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CPU_3A2 + Development Board Connections

INTRODUCTION

This document describes the input, output, power and communications connections to the CPU_3A2 and Development board.

Power Connector

This is a standard DC power jack on the development board.

- Center pin is +ve.
- A series diode protects the CPU_3A2 from reverse voltage connection.
- Input voltage should be nominally 12 Volts DC, but can be within the range 9 to 15 volts DC.
- The development board includes a 5 volt regulator for the on-board logic.
- The input supply is passed directly to the CPU_3A2 module and to the 2 screw terminals labeled +12V.

RS-232 Connector

This is a 9-pin D connector on the development board.

- Normally used with a straight-through male to female extension lead to connect the development board to a PC.
- The signal levels are true RS-232 as generated by the MAX232 level converter on the development board.
- The RXD and TXD indicator LEDs provide an indication of data transfer between the HC11 and the PC.
 - RXD indicates data from the PC to the CPU_3A2
 - TXD indicates data from the CPU_3A2 to the PCThese can be very useful when developing or debugging serial communications software.

Expansion Header

This is the 40-way header socket on the development board.

- The 26-way header on the CPU_3A2 module also matches this configuration.
- Pin-1 is at the reset-button end (diagonal numbering, left to right).

2 4 6 8 22 24 26
1 3 5 7 21 23 25

pin	function	comments
1	+5V	power +5V
2	com	power common, 0V
3	reset	reset, active low
4	A10	HC11 address bus
5	A9	"
6	A8	"
7	A7	"
8	A6	"
9	A5	"

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10	A4	"
11	A3	"
12	A2	"
13	A1	"
14	A0	"
15	CE2	chip enable from HC11 CPU
16	Vbat	battery +ve for RTC & SRAM
17	E-clock	HC11 E-clock
18	R/W	HC11 R/W (0=W)
19	D0	HC11 data bus
20	D2	"
21	D3	"
22	D4	"
23	D5	"
24	D1	"
25	D7	"
26	D6	"
27	n.c.	.
40	n.c.	.

HC11 Bus Expansion

The address and data buses are used to connect additional peripheral devices to the HC11 microcontroller. These buses are already connected to the Flash and RAM memory on the CPU_3A2 board. This means that they cannot be used to directly act as input or output lines.

The references to Ports B, C and F can be ignored because the CPU_3A2 should always run the HC11 in expanded mode (requiring the external buses) or Bootstrap/Special-test modes which can also require the external buses.

Adding external peripheral devices to the HC11 buses involves connecting the busses as well as the R/W, E-clock and CS2 lines. Address decoding may be required depending upon what is being added.

Typical external bus devices include additional analog and/or digital I/O expansion or communications devices such as one or more UART controllers.

I/O Header

This is the 26-way header socket on the development board.

- The 26-way header on the CPU_3A2 module also matches this configuration.
- Pin-1 is at the buzzer end of the development board (diagonal numbering, left to right).

2 4 6 8 22 24 26
1 3 5 7 21 23 25

pin	function	comments
1	E6	HC11 PORT E BIT 6 analog input
2	E2	HC11 PORT E BIT 2 "
3	E5	HC11 PORT E BIT 5 "
4	E1	HC11 PORT E BIT 1 "
5	E4	HC11 PORT E BIT 4 "
6	E0	HC11 PORT E BIT 0 "

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7	E3	HC11 PORT E BIT 3	"
8	E7	HC11 PORT E BIT 7	"
9	XIRQ	XIRQ interrupt	
10	IRQ	IRQ interrupt	shared with KBD,I/O
11	A0	HC11 PORT A BIT 0	digital I/O
12	A1	HC11 PORT A BIT 1	"
13	A2	HC11 PORT A BIT 2	"
14	A3	HC11 PORT A BIT 3	"
15	A4	HC11 PORT A BIT 4	"
16	A5	HC11 PORT A BIT 5	"
17	A6	HC11 PORT A BIT 6	"
18	A7	HC11 PORT A BIT 7	"
19	D4	HC11 PORT D BIT 4	"
20	D5	HC11 PORT D BIT 5	"
21	D2	HC11 PORT D BIT 2	"
22	D3	HC11 PORT D BIT 3	"
23	D0	HC11 PORT D BIT 0	RXD, SCI, RS-232
24	D1	HC11 PORT D BIT 1	TXD, SCI, RS-232
25	+V	power +9 TO 15 VOLTS DC	
26	COM	power common, 0V	

KBD,I/O Header

This is the 5-way header pin row on the CPU_3A2 module.

- This connector is intended to be used to expand the I/O and/or provide a user interface such as display and keypad via a synchronous serial bus.
- Pin-1 is labeled nearest the corner of the HC11 chip.

1	+5V	power +5V	max load = 50mA
2	com	power common, 0V	
3	DAT	data	
4	CLK	clock	
5	IRQ	interrupt	

- Making use of this connector is a bit more advanced as interrupt driven software routines are needed to control the pin functions.

5-Way Screw Terminal

This is located on the development board adjacent to the RXD and TXD indicators.

- This connector is intended to be used to expand the I/O and/or provide a user interface such as display and keypad via a synchronous serial bus.
- Pin-1 is to the left labeled "+".

1	+12V	power +12V	max load = 200mA
2	com	power common, 0V	
3	IRQ	interrupt	see note 2 below
4	D2	data	see note 2 below
5	D5	clock	see note 2 below

- D2 and D5 can be used as normal low level digital I/O.
- Making use of this connector may require interrupt driven software routines to control the pin functions.

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Main Screw Terminal Row

These screw terminals provide basic input and output connections for experimentation, testing during program development and I/O connections for some user defined applications.

+5	voltage output from CPU_3A2, max-load = 10mA
E7	HC11 port-E bit 7, analog input, see note 1
E3	HC11 port-E bit 3, analog input, see note 1
E6	HC11 port-E bit 6, analog input, see note 1
E2	HC11 port-E bit 2, analog input, see note 1
COM	common 0V
E5	HC11 port-E bit 5, analog input, see note 1
E1	HC11 port-E bit 1, analog input, see note 1
E4	HC11 port-E bit 4, analog input, see note 1
E0	HC11 port-E bit 0, analog input, see note 1
COM	common 0V
A0	HC11 port-A bit 0, digital I/O, see note 2
A1	HC11 port-A bit 1, digital I/O, see note 2
A2	HC11 port-A bit 2, digital I/O, see note 2
COM	common 0V
A3	HC11 port-A bit 3, digital I/O, see note 2
A4	HC11 port-A bit 4, digital I/O, see note 2
A7	HC11 port-A bit 7, digital I/O, see note 2
COM	common 0V
A5	HC11 port-A bit 5, high current output, see note 3
A6	HC11 port-A bit 6, high current output, see note 3
D3	HC11 port-D bit 3, high current output, see note 3
+12	power +12V
+12	power +12V

Note 1:

- Inputs via series resistors 1K + 1K with 5V6 zener diode and 0.1uF filter.
- The series resistors provide some protection to the HC11 ADC inputs on Port-E.
- The maximum voltage that should be applied to these inputs is 5 volts DC.

Inputs devices can be just about anything that provides a voltage for the HC11 to detect. The voltage can be variable (analog) or switched high and low (digital).

The +5 and COM terminals provide convenient connection points.

Note 2:

- I/O via series resistors 100R + 100R with 5V6 zener diode and 0.1uF filter.
- The series resistors provide some protection to the HC11 ports.
- The maximum voltage that should be applied to these points is 5 volts DC.
- Connect LEDs to COM via a series resistor (1K is a good start).

Note 3:

These are open-drain (like open collector) mosfet outputs. Each one is able to sink in excess of 0.5 Amps. Applications include switching small motors, lamps and even speakers or alarms. The adjacent +12 terminals can provide power to loads which are switched to ground. The maximum total load applied to the two +12 terminals must not exceed 0.5 amps. An external power supply connection will be required when switching larger loads.

- Connect LEDs to +12V via a series resistor (4K7 is a good start due to the higher voltage).

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DANGER - DO NOT - NEVER - CAUTION

Do not power the CPU_3A2 or development board from a voltage greater than 15 volts DC.
Do not apply more than 5 volts DC to any port pin connection of the CPU_3A2.

Avoid touching the CPU_3A2 module or the back of the development board. Handle all circuit board modules by touching only the edges. Earth yourself before handling circuit board modules.

Electrostatic discharge can be so quick or small enough not to be seen heard or felt. The discharge may not immediately damage the circuitry. Damage can be minor and have a long term affect on reliability.

It's best to be safe - take all possible precautions.