

## Proto-DB (#28310): *Prototyping Daughterboard*

### General Description

The Proto-DB provides the means to build your own circuits that interface with the MoBoStamp-pe and/or the MoBoProp motherboards.

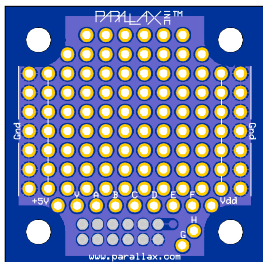
### Features

- Plug-compatible with Parallax motherboards.
- Ground plane for quiet operation.
- 70 uncommitted plated through-holes on a 0.1" grid for your components.
- 14 grounded through-holes.
- 7 plated through-holes each in two uncommitted voltage busses.
- 11 connecting pads for daughterboard connector supply lines and signals.

### Application Ideas

- Robotic Controls.
- Custom Sensors.
- Data Acquisition Circuitry.
- Industrial Control I/O.
- Pushbuttons and LEDs.

### What's Included



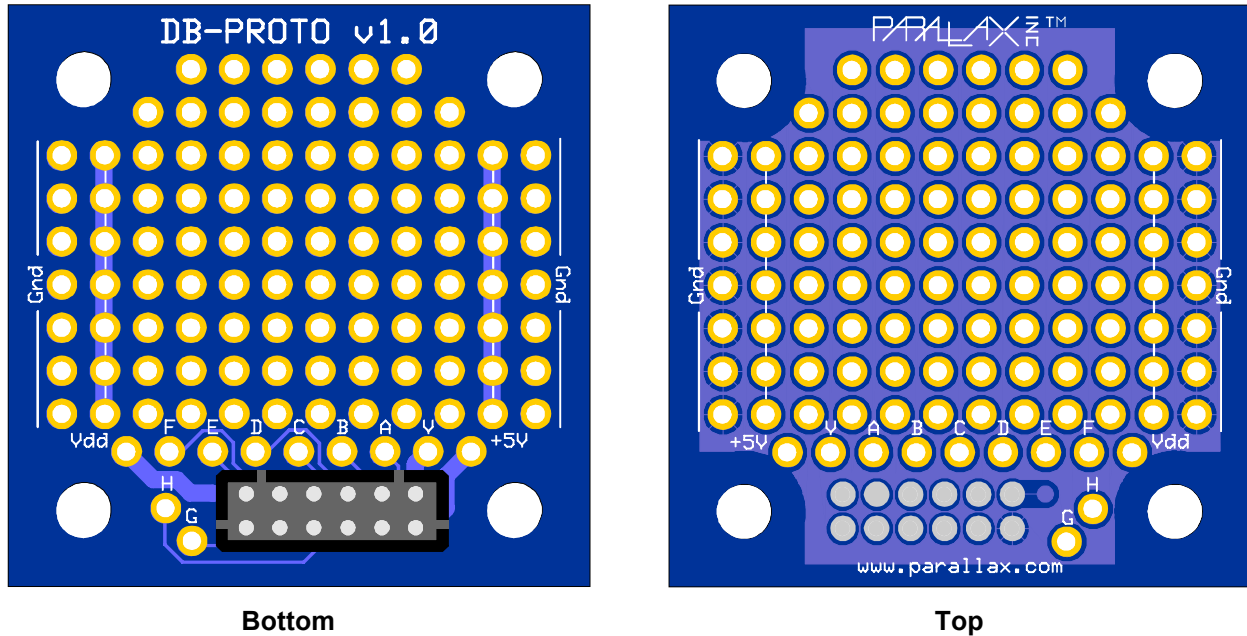
1 ea. Prototyping board with daughterboard connector.

### What You Need to Provide

- Components and wires.
- Filter and bypass capacitors.
- Parallax motherboard or DB-Expander.
- Connector(s) to the outside world.
- Your imagination!

## Connections

The Proto-DB is labeled to identify the pads available for soldering wires and components, as shown below, and described further:



### Ground Busses

Grounding busses run along either side of the board, next to the "Gnd" labels. These 14 holes connect to the daughterboard connector's ground pin through the ground plane.

### Power Busses

Two independent power busses run next to the grounding busses. One end of each is located near one of the voltage sources: +5V on one side; Vdd on the other. But the busses can be used for any voltage supply or signal you wish to connect.

### Daughterboard Connect Points

Eleven pads are dedicated to daughterboard connector signals. These are:

- **Vdd**: Motherboard logic supply voltage. This may be either 3.3V or 5V for the MoBoStamp-pe. It will always be 3.3V for the MoBoProp.
- **+5V**: Nominal five-volt supply from the motherboard. This may either be a regulated 5V from the motherboard's own regulator, when it's being powered externally, or a 4.3-5V supply when it's being powered from the USB port.
- **V**: This is the motherboard's Vin line when plugged into daughterboard socket "A"; a no-connect, when plugged into "B".
- **A-H**: Signal lines from the motherboard.

The signal line connections will depend on which motherboard the Proto-DB is plugged into, as well as which socket. These are shown in the table on the following page.

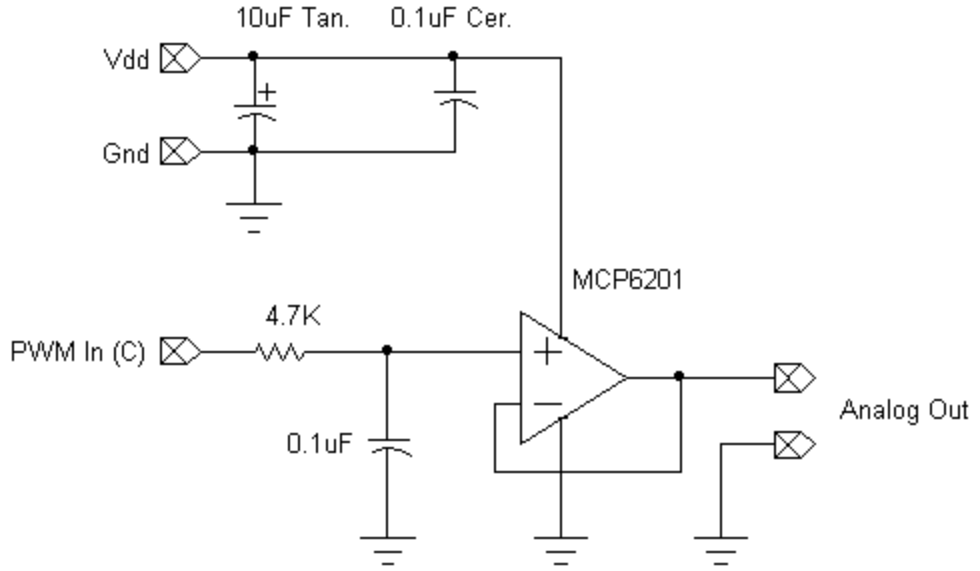
| <b>Proto-DB Label</b> | <b>MoboStamp-pe "A"</b> | <b>MoBoStamp-pe "B"</b> | <b>MoBoProp "A"</b> | <b>MoBoProp "B"</b> |
|-----------------------|-------------------------|-------------------------|---------------------|---------------------|
| <b>A</b>              | A0 (Analog In)          | B0 (Analog In)          | A8 (Analog In)      | A0 (Analog In)      |
| <b>B</b>              | A1 (Analog In)          | B1 (Analog In)          | A9 (Analog In)      | A1 (Analog In)      |
| <b>C</b>              | A2 (PWM Out)/P11        | B2 (PWM Out)/P7         | A10                 | A2                  |
| <b>D</b>              | A3 (PWM Out)/P12        | B3 (PWM Out)/P5         | A11                 | A3                  |
| <b>E</b>              | P9 (SCL)                | P1 (SCL)                | A12                 | A4                  |
| <b>F</b>              | P8 (SDA)                | P0 (SDA)                | A13                 | A5                  |
| <b>G</b>              | P3 (Common 1)           | P3 (Common 1)           | A14                 | A6                  |
| <b>H</b>              | P2 (Common 0)           | P2 (Common 0)           | A15                 | A7                  |

## Hints for Construction

- Use a 10 $\mu$ F tantalum cap on any power supply line from the motherboard that you employ in your circuitry.
- Use 0.1 $\mu$ F bypass caps on the power supply lines to each IC, located near the IC.
- The pads near the top edge of the card are spaced from the edge to properly accommodate a single- or dual-row right-angle header. Employing one of these will allow connection to the outside world without adding significantly to the profile height of the Proto-DB.
- Any parts soldered to the bottom of the Proto-DB should be of very low profile, to avoid conflict with, and possible shorts to, motherboard components.
- Ground connections to high-current devices should be made to a single point, as near to the "Vdd" label as possible.
- Be very careful when soldering not to melt the plastic shroud that surrounds the motherboard connector.
- Do not allow any components or wires to extend outside the white "Gnd" lines. You may wish to slide your board into an extrusion, and keeping parts away from the edges will make this possible.
- Neatness counts! Plan ahead and take your time. The template and signal worksheet on the last page can be printed and used to plan your layout and signal routing.

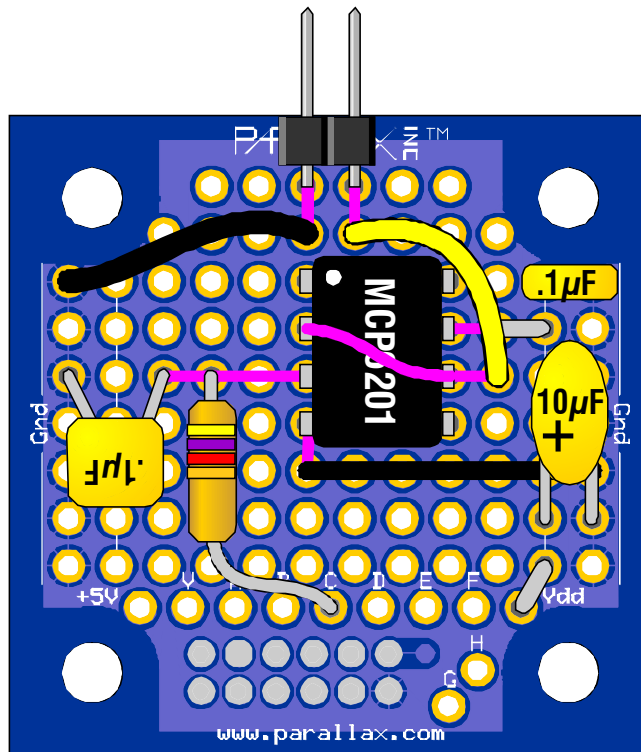
## Example

The following example demonstrates how the Proto-DB might be used. We're going to construct an analog output board that converts a PWM output from one of the MoBoStamp's AVR coprocessors to a voltage, ranging from 0 to Vdd. This is done with a simple first-order low-pass filter coupled to the positive input of a unity-gain op amp. The schematic follows on the next page.

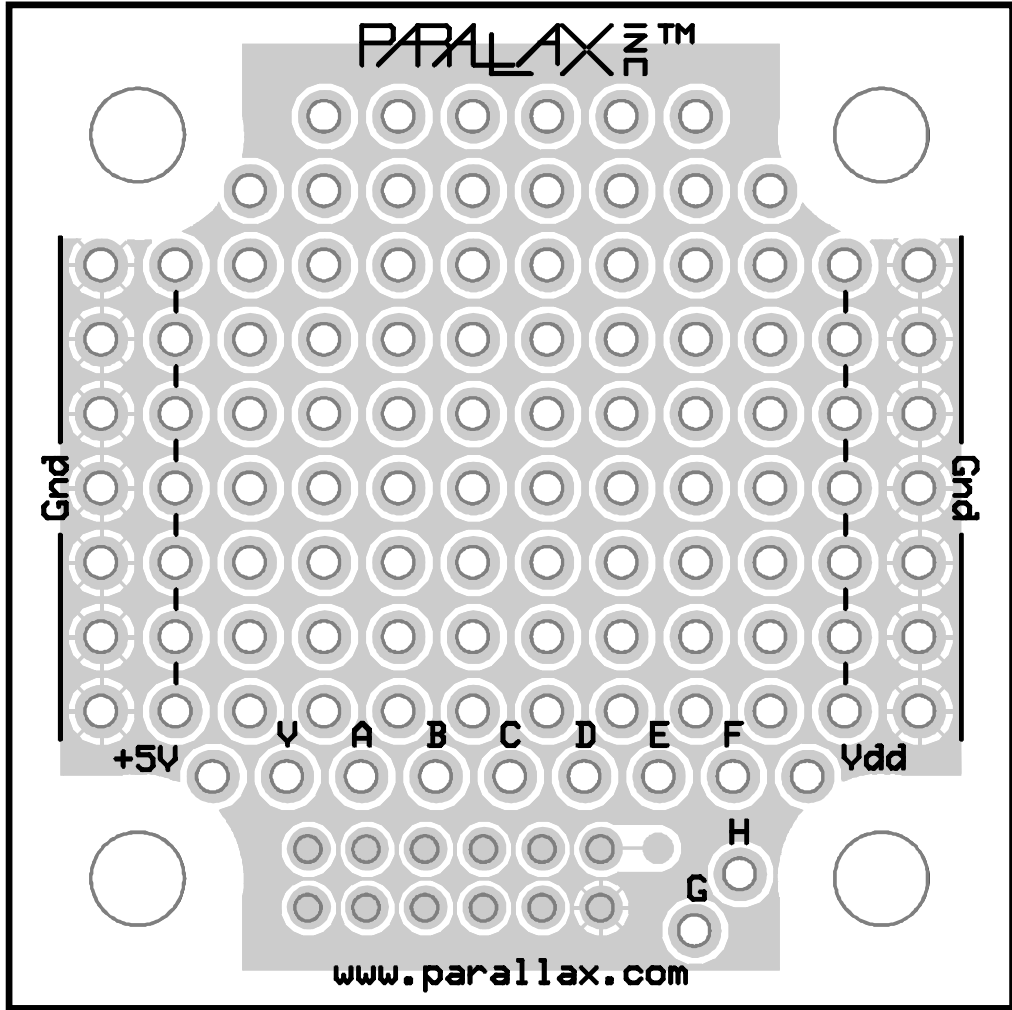


**Schematic of PWM-to-Voltage Converter**

The following illustration shows how this circuit might be realized using the Proto-DB. The magenta lines indicate connections made on the rear of the board.



**Wiring Example of PWM-to-Voltage Converter**



**Proto-DB Wiring Template**

| Proto-DB Connection | Stamp/Propeller Signal (from table on page 3) | Your Signal |
|---------------------|---|-------------|
| A                   |   |             |
| B                   |   |             |
| C                   |   |             |
| D                   |   |             |
| E                   |   |             |
| F                   |   |             |
| G                   |   |             |
| H                   |   |             |

**Signal Cross-reference Worksheet**