#### **Board Support**

The Chameleon 1 enclosure system is designed to precisely fit the following microcontroller development boards:

- Atmel NGW100
- Arduino Duemilanove
- Olimex AVR P28 and like boards
- Olimex SAM7 P256
- ET-AVR Stamp Development Board



Additionally, the Chameleon 1 has baseplate hole patterns for the following RF devices:

- FreeWave MegaMini
- Mini2440 FriendlyARM
- Sparkfun XBee Explorer Regulated



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#### Assembling the Chameleon 1

The Chameleon system is simple:

- Drill the base plate in the pre-center-punched hole pattern for your board
- Attach the board with the included mounting hardware
- Attach the faceplate for your board type and the blank for the other end
- Attach the lid

We've done all the measuring and stamping to let you slide your dev board right into a sturdy, metal enclosure for a perfect fit.

Some boards, like the Olimex AVR-P28 are a standard size and hole pattern, 80mm x 100mm, so many other boards can be anchored to the Chameleon 1 base plate using that same hole pattern. Sparkfun Marsupial prototype boards will fit this enclosure on the 80x100mm hole pattern, however, there's not a marsupial-specific faceplate at this time.

#### **Hole Patterns**

The base plate has pre-center-punched holes for each of the boards above. The purpose of the center punch divot is two-fold. 1) it helps identify the board hole spacing and 2) you can drill it by hand-drill with an **1/8" drill bit** and the bit will resist skating off as you first start to drill the hole. This keeps the alignment of your board perfect for when the face plate is attached.

Using a drill press is the most precise way to get perfect alignment, but it's very possible to hand-drill and get great results. All the boards photographed for the website (esawdust.com and sparkfun.com) were mounted on hand-drilled base-plates, for example.

Another tip for drilling the baseplate is to put a small block of wood underneath the plate where you're drilling so you don't deform the base plate as you press to drill. It just makes a better drilling process to have the block underneath.

The drawings for the hole patterns are included later in this document, but it's easy to just lay your board down on the base plate and quickly identify which center-punch holes need to be drilled to fit your board.

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#### **Faceplates**

Multiple development board faceplates types are compatible with the Chameleon 1 system and sold separately. The basic Chameleon 1 configuration includes a baseplate, lid, one blank faceplate, and fastening hardware and standoffs. Typically, one blank will be used for one end of the enclosure and the faceplate for the board on the other end. However, if you have the need for an entirely different board type, you can use one blank face plate and cut or nip your own connector hole patterns. You could use a production faceplate as a template for laser cutting your custom faceplate.

#### Hardware

The Chameleon 1 is designed to fit the boards and faceplates when specific hardware is



used. This includes, 1/4" standoffs, 4-40 screws and nuts. The photograph above shows a sampling of faceplates available for the Chameleon 1 - sold separately.

Additionally, in order to make the enclosure very sturdy, the faceplates are screwed to the baseplate and lid with 6 sheet metal screws which creates a very solid fit. Besides the faceplate screws, on each side of the lid, two sheet metal screws can be attached.

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The hardware package that comes with the Chameleon 1 includes the following (prior to 8/31/2010)

- 16 self-cutting, self-drilling sheet metal screws
- 10 4-40, 1/4" bolts
- 🥥 10 4-40 nuts
- 4 4-40 female/female standoffs
- 4 4-40 male/female standoffs
- 10 4-40 3/16" bolts

Based on customer feedback, the fastening kit included with units sold by ESawdust after 8/1/2010, contain these items:

- 16 self-cutting, self-drilling sheet metal screws
- 4 4-40, 1/8" screws
- 8 4-40, 3/16" screws
- 4 4-40 female/female standoffs

This combination of hardware will suffice for all boards Chameleon supports.

You may purchase additional hardware packages if the need arises - for example, you may use the same enclosure for different boards over time and have the need for more hardware.

#### **Sheet Metal Screws**

In order to attain the very solid fit that the Chameleon 1 offers, the sheet metal screws are self-cutting and self-drilling which means the first time you screw them in, some metal will be cut from around the existing hole as the screw is driven. This process will result in some metal shavings.

Note: Because metal shavings are produced the first time you use self-cutting screws on a new enclosure, it's very important that you shake these metal shavings out before you fire up your board. This means you'll want to attach the face plates and lid, then remove the lid, shake out the shavings before powering up your board. You will probably want to assemble the enclosure the first time without the board mounted to be sure no metal shavings get lodged in your electronics.

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When you first start driving a self-cutting, self-drilling screw, you'll make several turns where it doesn't seem like it's doing anything (not progressing, not going in), then it will start to cut and you'll feel it begin to pull in with each turn. It's wise to screw these in by hand with a phillips screwdriver first before using electric drivers so you get the feel of the metal bite of the self-cutting screw.

We think you'll appreciate the very sturdy, positive feel when this enclosure is assembled and in your hands.

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### Example Build-out Using an Atmel NGW100

Here's an example assembly progression using an Atmel NGW100. Identify the center-punch holes and drill the holes with a 1/8" drill bit.

Then mount the standoffs through the base plate:



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Depending upon the board, you may want to mount 1/4" female/female standoffs or the 1/4" male/female standoffs. In this case, the male/female standoffs were used with the female side facing down to the base plate and a 1/4" 4-40 screw coming up from the bottom.

Next mount the board on the standoffs and secure the board with nuts or another level of male female standoffs if you have a second level in a stack:



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After mounting the board, attach the face plates with the large pan head, phillips sheet metal screws:



At this point, you'll obviously add any other electronics and internal wiring you need for your project.

This is the state that we like to work on the board. With the project safely mounted, you can prototype with the board mostly in its enclosure. You have access to the board for your logic analyzer, flash programmer, oscilloscope leads. Even though you're in prototype mode, you're practically out the door with it.



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When you're finished programming or with other hardware changes and want to test your device in the field, attach the lid with 2 pan-head phillips sheet-metal screws on either side of the lid.



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#### Mounting

The Chameleon 1 was designed to include mounting options without having to purchase extra mounting legs as many other enclosure systems require. There are two types of mounting for your Chameleon 1 - a screw-hole mount or a slot mount. This picture shows the two mounting options built in to the lid:



This lets you mount the Chameleon 1 just about anywhere - floorboard of a car, ceiling upside down, a wall, an autonomous vehicle and make it easy to install and very secure.

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#### **Appendix - Engineering Drawings**

Follow on subsequent pages.

There are two types of Chameleon 1 - Rev A and Rev B.

The only difference is that Chameleon Rev B faceplates and lid screw sizes changed - they were reduced slight in size for a slightly better cosmetic appearance. The Rev A faceplates will still work on a 1.1 enclosure and vice-versa if the need arises.

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#### **ESawdust - On a Mission**

We build stuff just like you. We know exactly how this works. You put your project in the enclosure, button it up, test it - and something inevitably fails. You open it back up, fix it, test it and repeat the cycle until you have a good working product.

One thing that always happens to us is the enclosure gets in our way. After building many embedded devices and having many frustrating experiences with home-made enclosures, we finally broke down and designed Chameleon 1.

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360VL Incorporated 755 Highway 105 Unit #3 Palmer Lake, CO 80133 <u>esawdust-support@esawdust.com</u> 719-302-3259 With just four screws, the lid lifts off and you have total access to the board and internals. The faceplates remain attached to the base with two screws so you have nice solid ends that you can plug your connectors into it while the lid is off. From project inception, you can have your board mounted in the enclosure, work on it, stick your O-scope probes in it, wire it up...then when it's working, just pop the lid on and you're ready to take it off the bench. This might be one of our favorite things about the Chameleon 1.

Oh, and by the way, Chameleon 1 is an ESawdust original. It's 100% designed and manufactured in Colorado, USA and we're very proud of that.

If you'd like to see other popular development boards supported by Chameleon 1, please send us your request through the contact page on esawdust.com or the email address at the left. We'd like to know what's important to you and you never know – it may be important to others as well.