

MONSTER IN A BOX

NORTHERN CALIFORNIA HAUNTERS GROUP - 4.18.2015

Materials

Lumber

4 x **Lpost** : 24" long 4x4 (which is actually 3.5" x 3.5")

1 x **Lsupport** : 13" long 4x4 (which is actually 3.5" x 3.5")

2 x **Lside** : 24" x 24" x 0.5" plywood

3 x **Lmiddle** : 48" x 24" x 0.5" plywood (substitute 24" x 24" x 0.5" plywood for a half-sized MIB)

The plywood can be bought in those sizes at Home Depot or Lowe's, or you can have the hardware store cut up a big 4' x 10' sheet into the appropriate sizes.

Hardware



16 **Insert Nuts** (size 1/4 – 20, 20mm length)



4 **Hook Screws** (size #6 – 3 3/8", exact size not important)



3 **Wire Connectors** (Gray – Min 2 #22)



1 **U-Bolt** (5/16" x 1 3/8" x 2 1/2", exact size not important)



2 **Door Hinges** (3")



12 **Sheet Metal Screws** (#8 1/2", pan head)



18 **Hex Cap Screws** (1/4 – 20 x 1")



18 **Washers** (1/4 Flat)



2 **Lock Washers** (1/4)



2 **Hex Nuts** (1/4 – 20)



10-50 feet of **Lamp Wire** (18 gauge, 2 conductor)



6 **Wood Screws** (#8 x 1")



4 **Chains** (Straight Link, #2/0, 38" long [or 33" long for a half-sized MIB])



2 24" x 3/4" **Velcro ONE-WRAP Straps**

Pneumatics (all components available at www.frightprops.com)

Cylinder Hook-Up Starter Kit (Single and Reverse Acting) – 12VDC

(<http://www.frightprops.com/catalog/product/view/id/35310/category/45>)



1 x **Male Connector Push-On Elbow** (1/8" NPT)



2 x **Male Connector Push-On Fitting**



2 x 1 foot of 1/4" polyethylene **Tubing**



1 x **Breather Vent**



1 x 3-Way **Solenoid** with 1/8" Ports (12VDC)

Cylinder and mounting brackets

(<http://www.frightprops.com/pneumatics/cylinders/stainless-steel-body-double-acting-universal-mount-cylinders/1-1-16-inch-bore-double-acting-universal-mount-cylinder-0758-1062.html>)



1-1/16 bore double acting universal mount **Cylinder**, 4" stroke



Clevis Mounting Bracket



Rear Pivot Mount (which is really just 2 Clevis Mounting Brackets)



Rod Clevis



Nipple - 1/8 Threads

(<http://www.frightprops.com/pneumatics/fittings/miscellaneous-fittings/nipple-0737-0122.html>)



Reducer 1/4 Male to 1/8 Female

(<http://www.frightprops.com/pneumatics/fittings/miscellaneous-fittings/threaded-reducer-bushing-0737-0121.html>)



Pressure Regulator (1/4" ports)

(<http://www.frightprops.com/pneumatics/regulators-line-filters/miniature-regulator.html>)



Quick Connect - male 1/4" threads

(<http://www.frightprops.com/pneumatics/fittings/compressor-and-air-tool-fittings/quick-connect-male-threads-0734-0012.html>)

Miscellaneous



12VDC Power Adapter



Manual Trigger (Switchcraft ED903 is a nice one)

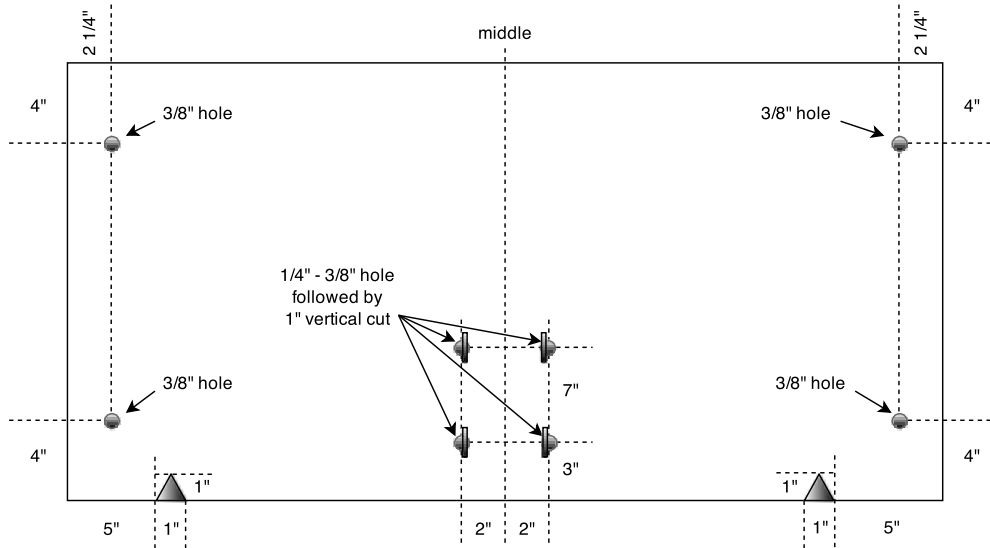
Needed tools

- Gloves (to avoid getting splinters when working with cheap wood)
- Tape measure and pencil
- Awl or nail, to make starting holes for drilling locations
- Drill (drill bits : 3/16", 1/4", 11/32", 3/8")
- Jig saw
- Allen wrench (for **Insert Nuts**)
- Screw drivers
- Pliers
- Small and Medium Crescent wrenches (or 7/16", 1/2", 9/16" wrenches and 7/16" sockets)
- Wire strippers
- Soldering iron (if using the Switchcraft ED903 or other switch that requires soldering)
- Teflon tape
- Sharpie pen

Cutting and drilling the lumber

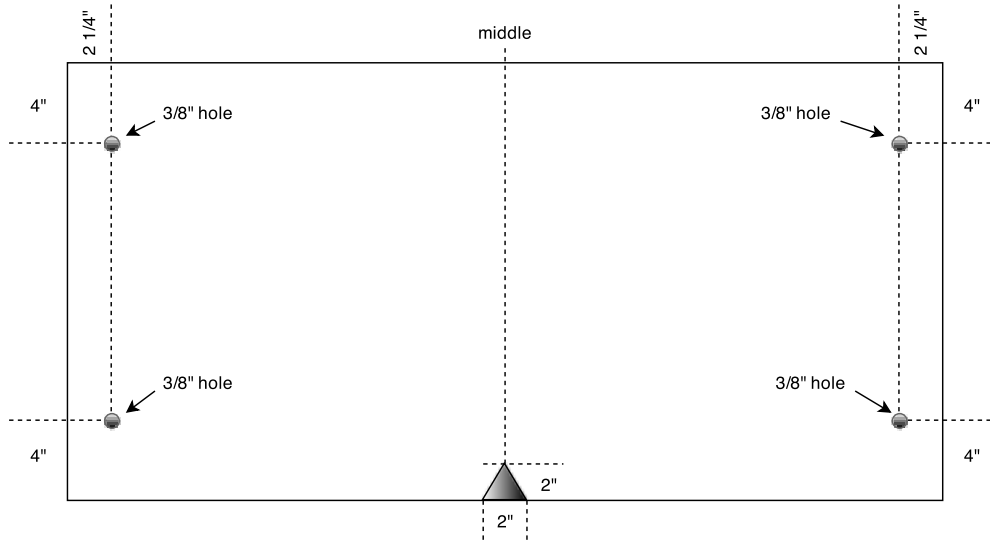
Follow the diagrams and instructions below to make all cuts and drill all holes needed prior to assembling the box. All dimensions are measured from the edges or middle of the plywood sheets. As such, they will work for either the full-sized or half-sized MIB.

Front Lmiddle : Drill the four 3/8" holes at the corners as indicated in the diagram. For the four interior holes, choose a drill bit that is large enough to allow a small jig saw blade to fit inside of it. A 1/4" drill bit would be good, but you could go up to 3/8" if needed. Once the four 1/4" – 3/8" holes are drilled, use a jig saw at each hole to make a 1" long vertical cut. These vertical cuts do not need to be thick, as they'll only be used to slip a **Velcro ONE-WRAP Strap** through. Cut out the 1" x 1" triangular sections using a jig saw or a hand held saw. The exact dimensions are not important, as these cut outs are merely to allow chains to pass from the inside of the box to the outside.



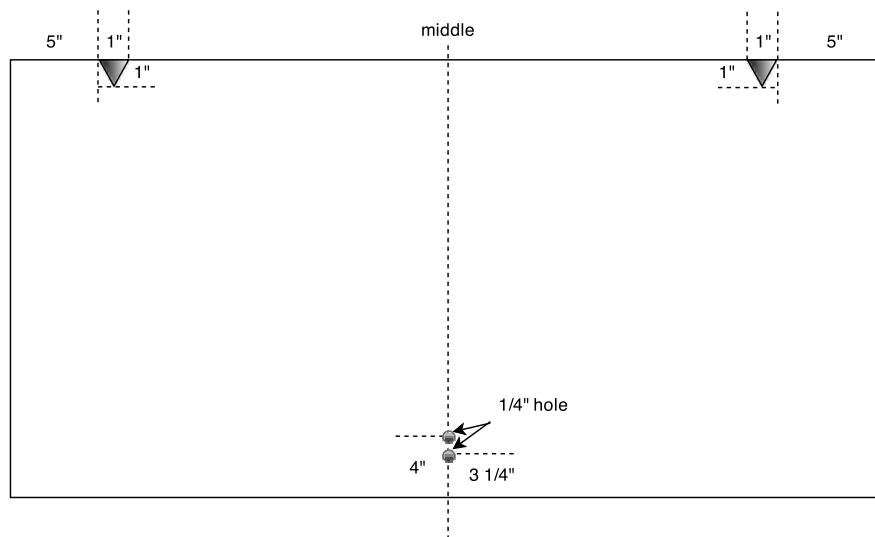
Cutting/drilling diagram for front **Lmiddle** sheet

Rear Lmiddle : Drill the four 3/8" holes as indicated in the diagram. Cut out the 2" x 2" triangular section using a jig saw or a hand held saw. As before, being exact isn't important for this cut out section. It's a hole to allow an air hose and electrical cables to pass into the box.



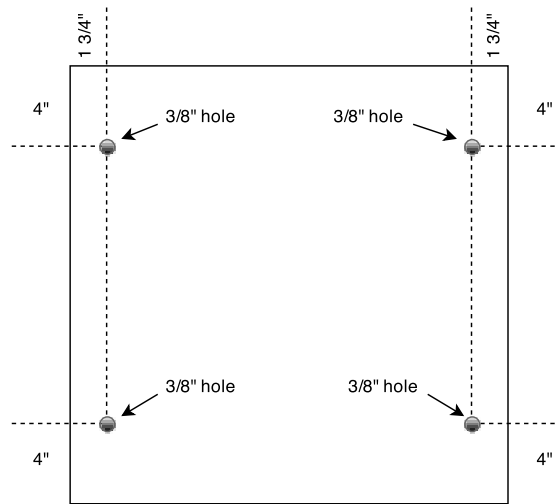
Cutting/drilling diagram for rear **Lmiddle** sheet

Top Lmiddle : Drill the two 1/4" holes as indicated in the diagram. Cut out the 1" x 1" triangular sections using a jig saw or a hand held saw. The exact dimensions are not important, as these cut outs are merely to allow chains to pass from the inside of the box to the outside.



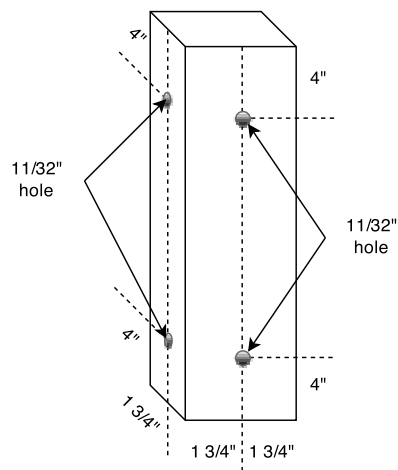
Cutting/drilling diagram for top **Lmiddle** sheet

Both Lside : Drill the four 3/8" holes as indicated in the diagram for both sheets.



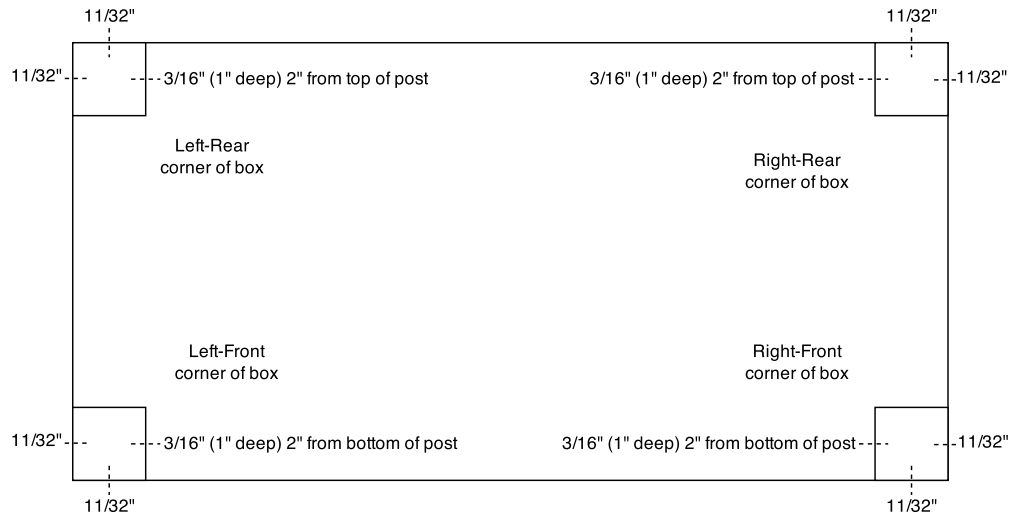
Cutting/drilling diagram for both **Lside** sheets

All Lpost : Drill four 11/32" holes on each **Lpost** as indicated in the diagram below.



Drilling diagram for all **Lpost**

After the 11/32" holes are drilled, each **Lpost** will need to have one more hole drilled, but the position is different for each **Lpost**. Each **Lpost** is positioned at a corner of the MIB. Use the diagram below to drill one additional 3/16" hole into each **Lpost**. The 3/16" hole should be 1" deep, centered along the post, and 2" from either the bottom of the post or the top of the post.



Drilling diagram for additional 3/16" hole for each **Lpost**

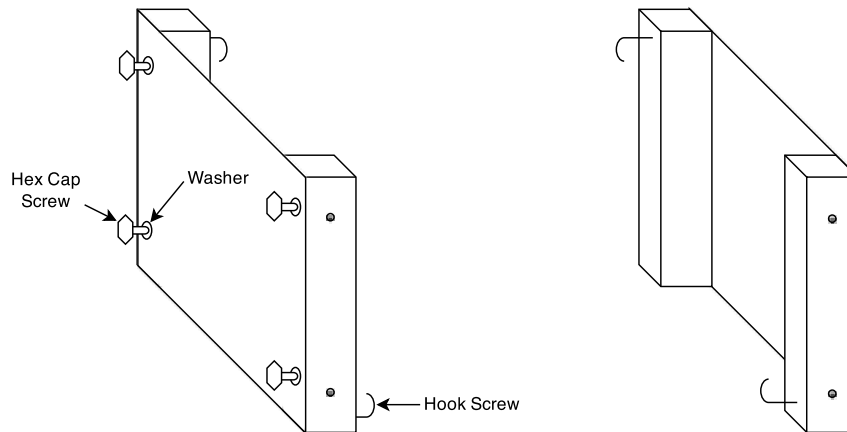
Assembling the box

After all the cutting and drilling is complete, assembling the box is pretty straight forward.

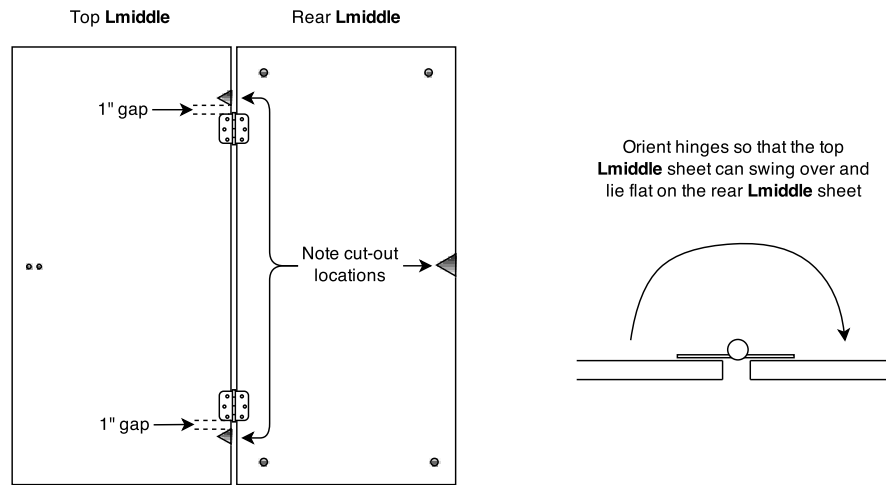
For each **Lpost**, screw four **Insert Nuts** into each of the 11/32" holes using an Allen wrench. Each **Insert Nut** should end up being flush with the surface of the **Lpost**.

For each **Lpost**, screw one **Hook Screw** into the 3/16" hole.

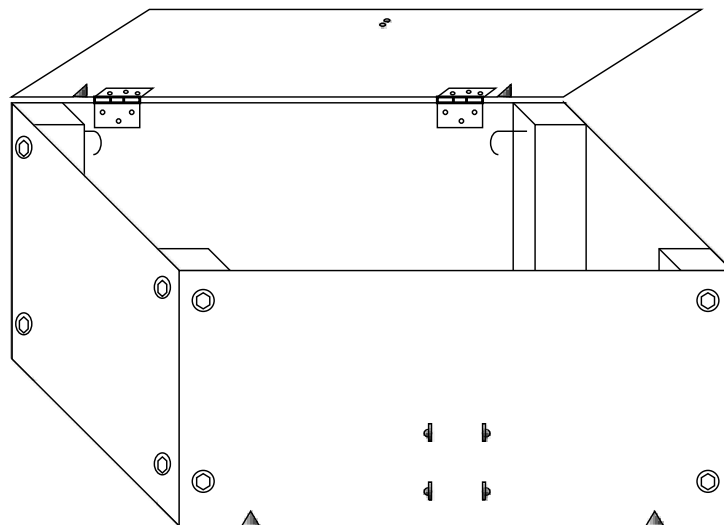
Assemble the two sides of the box. Take one of the **Lside** sheets and attach it to the Left-Rear and Left-Front **Lpost** pieces with four **Hex Cap Screws**. Place a **Washer** between the **Hex Cap Screws** and the **Lside** sheet. Repeat with the other **Lside** sheet and the Right-Rear and Right-Front **Lpost** pieces. The **Lpost** pieces should be flush with the edge of the **Lside** sheets.



Place the rear and top **Lmiddle** sheets on the ground as indicated in the below diagram. It's important that they are oriented correctly, so use the cut-out locations to determine proper placement. Take two **Door Hinges** and place them 1" away from the cut-outs in the top **Lmiddle** sheet. You should be able to swing the **Door Hinges** fully closed when they're lying on the two **Lmiddle** sheets. The screws that come with the **Door Hinges** are too long for our 1/2" plywood sheets. We'll instead use the 12 **Sheet Metal Screws** to fasten the **Door Hinges** to the rear and top **Lmiddle** sheets. Make sure you can swing the top **Lmiddle** sheet all the way over to lie nearly flat on the rear **Lmiddle** sheet.



As was done with the **Lside** sheets, attach the rear **Lmiddle** sheet (which is now hinged together with the top **Lmiddle** sheet) onto the rear **Lpost** pieces using four **Hex Cap Screws** and four **Washers**. Likewise, attach the front **Lmiddle** sheet onto the front **Lpost** pieces using four **Hex Cap Screws** and four **Washers**. The front and rear **Lmiddle** sheets should be flush with the **Lside** sheets, and the top **Lmiddle** sheet should be resting nicely on top of all the **Lposts**.



At this point it's worth doing something that will make reassembly a lot easier. Get a Sharpie pen, climb inside the box, and write the numbers 1 through 8 (or whatever unique symbols you want) on each side of each **Lpost** and the plywood sheets that are attached. This will make reassembly a blissfully thought-free process later on.



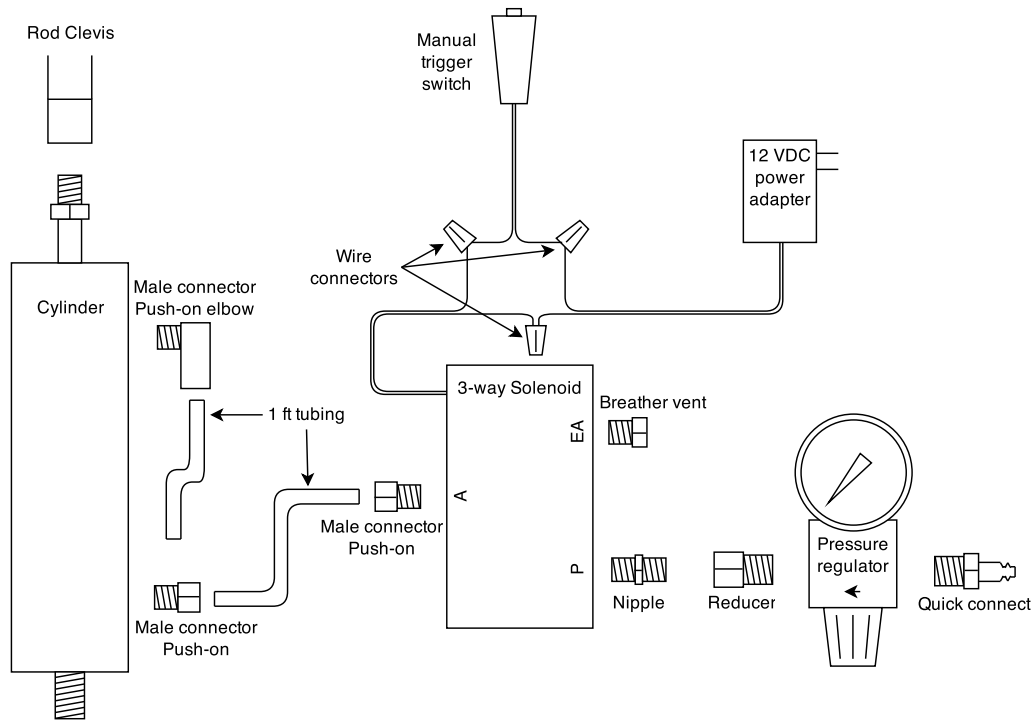
Fasten the **Clevis Mounting Bracket** to the underside of the top **Lmiddle** plywood sheet. Take two **Hex Cap Screws**, put **Washers** on each, and put them down through the two 1/4" holes in the top **Lmiddle** sheet. Fit the **Clevis Mounting Bracket** onto the **Hex Cap Screws** from the underside of the top **Lmiddle** sheet, and then put the two **Lock Washers** followed by the two **Hex Nuts** on the two **Hex Cap Screws**. Tighten the two **Hex Nuts** until the **Lock Washers** are compressed.

Pick one of the sides of **Lsupport** and use a Sharpie to mark it with a star or some other symbol for later identification. Find the **Cylinder** and the **Rear Pivot Mount**. Place the bottom end of the **Cylinder** (the side opposite the movable rod) between the two halves of the **Rear Pivot Mount** and put the peg through all three so they're connected. Place the **Rear Pivot Mount** on the top of **Lsupport** and center it. Make sure that the **Cylinder** can swing freely in the **Rear Pivot Mount**, and that the **Cylinder** is oriented so that it can swing towards the marked side of **Lsupport**. Poke an awl or nail through the screw holes in the **Rear Pivot Mount** to mark four spots in the top of **Lsupport**. Screw the two halves of the **Rear Pivot Mount** into **Lsupport** with four **Wood Screws**. Remove the peg holding the **Cylinder** into the **Rear Pivot Mount**.

Run one **Velcro ONE-WRAP Strap** through the top two holes in front **Lmiddle**. Run the second **Velcro ONE-WRAP Strap** through the bottom two holes in front **Lmiddle**.

Assembling the Pneumatics

The diagram below gives an overview of everything that needs to be assembled. Detailed step descriptions follow the diagram.



There's really no wrong order to hook things up in, but below is an order that is straightforward to follow. It is important for all airflow connections to have a tight seal. If the connections you have are not self-sealing, then apply Teflon tape on each threaded end before screwing it in.

Screw the **Rod Clevis** onto the **Cylinder's** rod. Tighten the nut securely to keep the **Rod Clevis** from coming loose. This is the only screw on connection in this section that does not need to be self-sealing or use Teflon tape.

Screw the **Male Connector Push-on Elbow** into the top port on the **Cylinder** (on the same side as the rod).

Cut 1 foot of air hose **Tubing** and push it into the bottom of the **Male Connector Push-on Elbow**. Nothing is attached to the other end of the **Tubing**. The purpose of this connection is to prevent debris from getting inside the **Cylinder**.

Screw a **Male Connector Push-On Fitting** into the bottom port of the **Cylinder**.

Screw a **Male Connector Push-On Fitting** into the “A” port of the **Solenoid**.

Screw the **Breather Vent** into “EA” (Exhaust for “A”) port of the **Solenoid**.

Screw the **Nipple** into the “P” (Pressure) port of the **Solenoid**. Screw the **Reducer** onto the **Nipple**. Look for an arrow on the **Pressure Regulator**. This is the air flow indicator. Screw the **Pressure Regulator** onto the **Reducer** so that the air flow indicator arrow points towards the **Reducer**. Screw the **Quick Connect** onto the open port on the **Pressure Regulator**.

Decide how much distance you’d like between the **Manual Trigger** and the MIB, and cut that amount of the two conductor **Lamp Wire**. Err on the side of making the cable too long. You can easily shorten it later if you want to. Use wire strippers to strip off 1/2" of insulation from both ends. Attach each lead on the **Manual Trigger** to a different conductor on one end of the **Lamp Wire**. If you’re using the Switchcraft ED903, you’ll need to solder each wire into place and wrap the solder point with a bit of electrical tape.

On the **12VDC Power Adaptor** cut off the connector that would normally plug into a phone, tablet or other device. Use the wire strippers to separate the two small wires, and strip off 1/2" of insulation. On the two wires coming out of the **Solenoid**, likewise strip off 1/2" of insulation. Use one **Wire Connector** to fasten together one wire from the **Lamp Wire** with one wire from the **12VDC Power Adaptor**. Use another **Wire Connector** to fasten the other wire from the **Lamp Wire** to the one wire from the **Solenoid**. Use the last **Wire Connector** to fasten the remaining **Solenoid** wire to the remaining **12VDC Power Adaptor** wire. Notice that we weren’t careful about which wires the **12VDC Power Adaptor** wires connects to. That’s because it doesn’t matter. The **Solenoid** will work with the power connected either way. Plug the **12VDC Power Adaptor** into a power outlet and see if pressing the **Manual Trigger** makes the **Solenoid** click. If it does, then it’s working correctly. If the **Solenoid** isn’t clicking, look back at the diagram and try to track down a missing or bad connection.

Now that your **Solenoid** is happily clicking, it’s time to test out the pneumatics with air pressure applied. This is a potentially dangerous situation, as when even moderate air pressure is applied to the **Cylinder**, the rod can shoot out with a lot of force. Therefore being extra careful about safety is important.

- First thing is to make sure the **Solenoid** is not powered. Unplug the **12VDC Power Adaptor** from the power outlet.
- For this initial hookup, we also want to make sure that there is no air hose **Tubing** connecting the **Solenoid** to the **Cylinder**. The instructions so far haven’t mentioned hooking this up, but it’s understandable if you’ve spotted the obvious and have already done so. If this is the case, this **Tubing** should be disconnected.
- Plug a pressurized air hose into the **Quick Connect**. The needle on the **Pressure Regulator** should jump up to some value. Unlock the **Pressure Regulator** by pulling its knob outward. Twist the

knob until it reads around 20 PSI. Lock the **Pressure Regulator** by pushing the knob in until it clicks. You can increase the pressure later if you'd like, but 20 PSI is a reasonable starting point.

- Plug the **12VDC Power Adaptor** into a power outlet and press the **Manual Trigger** a few times. You should get bursts of air out of the **Solenoid**. If you don't, try unlocking the **Pressure Regulator** and dialing up the pressure a bit (but you definitely shouldn't need to go over 30 PSI). If you cannot get any air out, go back and check both the electrical and air connections. Lock the **Pressure Regulator** to its current setting.
- Now hook up a 1 foot length of air hose **Tubing** between the **Solenoid** and the **Cylinder**. Press the **Manual Trigger** and the **Cylinder** rod should extend. When you release the **Manual Trigger**, the **Cylinder** rod will NOT retract. That's because we're using a cheap 3-way **Solenoid**. We're relying on the top of the MIB to push the **Cylinder** rod down via gravity when everything is put together.

Take the locked **Pressure Regulator** and place it on the marked side of **Lsupport**. Position the **Pressure Regulator** so that all of the connected pneumatic components are at least 3 inches from both the top and the bottom of **Lsupport**. Notice the two holes that go through the mounting bracket on the **Pressure Regulator**. Poke an awl or a nail through these holes to mark two spots in the marked side of **Lsupport**. Screw the **Pressure Regulator** onto **Lsupport** with two **Wood Screws**.

Attach the bottom end of the **Cylinder** (the side opposite the movable rod) to the **Rear Pivot Mount** (which is on **Lsupport**) by putting the peg through them. Insert the cotter pin through the peg and bend it so that it won't fall out.

If you're gotten to this point, then all your electrical and pneumatic hookups are working correctly. All that's left now is to put all the pieces together. This is described in the next section.

Disassembly and reassembly

The MIB has been designed for easy tear down and set up. You really only have 6 components:

1. The rear and top **Lmiddle** sheets that are attached to each other via **Door Hinges**
2. The front **Lmiddle** sheet which should have both **Velcro ONE-WRAP Straps** running through it
3. Two **Lside** panels which are fastened to the four **Lposts**
4. The **Lsupport** post with all the pneumatics attached
5. The **Lamp Wire** with the **Manual Trigger**
6. Four sets of **Chains** with a **U-Bolt**

The rear and front **Lmiddle** sheets attach to the **Lposts** attached to the two **Lside** sheets via the **Hex Cap Screws** and **Washers**, and then the top **Lmiddle** sheet rests on top of the **Lposts**. Place the **Lsupport** with the pneumatics inside the box against the front **Lmiddle** sheet. Secure **Lsupport** with the two sets of **Velcro ONE-WRAP Straps** so that the marked side of **Lsupport** is facing away from the front **Lmiddle** sheet. If the **Lamp Wire** is separate, then attach it now to the **Solenoid** and **Manual Trigger**. Run the **Lamp Wire** out of the box through the cut-out in the rear **Lmiddle**.

Run your air line and power extension cord into the MIB through the cut-out in the rear **Lmiddle**. Set up any lights, fog, speakers, etc inside the box that you may have. Be careful to not be in the way of the **Cylinder** rod, and then hook up your air line to the **Quick Connect**, and plug in the **12VDC Power Adaptor**.

Take all four **Chains**, attach them to the **Hook Screws**, and run them out of the box via the triangular cut-outs in the top and front **Lmiddle** sheets. Close the top of the box, run all four **Chains** out to the front of the box and connect them with the **U-Bolt**. It is important that you can lift the box lid by more than 4 inches. We do not want the **Cylinder** (which has a 4" stroke) to have to push against a restrained lid. The **Chains** are only there to make noise, not to limit the motion of the lid in any way. Open the lid as far as possible, reach in, and attach the **Rod Clevis** to the **Clevis Mounting Bracket** with the peg and cotter pin. Your MIB is ready for action.

As a general safety guideline, you should have your **Pressure Regulator** set to the lowest possible pressure that provides good motion. The lid and chains for a full size and a half size MIB will weigh different amounts, so adjust your **Pressure Regulator** to a low pressure like 20 PSI, fire off the MIB, and see if the speed of motion is to your liking. Dial up or down the pressure to get the effect you like, and once you're happy, lock the **Pressure Regulator**.

When disassembled into the above parts, the MIB takes up very little floor space. Here's a picture of what it looks like. You can break it down even more if it helps by detaching the **Lside** sheets from the **Lposts**.



Finishing Touches

Although the MIB is loud and proud all by itself, there are lots of things you can do to give it some extra oomph.

Internal Lighting : A simple always-on light inside the MIB helps draw attention when it's not clanking around. A red 13W fluorescent bulb works great.

Fog Machine : Put a basic fogger with an intermittent switch inside. Set the fogger to keep the interior volume of the MIB filled with fog. When the MIB is activated, fog will spew out of the lid. A cheap fogger will also make a hissing sound that works well.

Audio : Add a looping ambient monster growl sound. The MIB is so loud all by itself that a triggered sound is likely to be lost under the noise of the slamming lid and rattling chains.

Claw marks : If you're feeling adventurous, you can cut claw marks into the sides of your MIB. Claw marks work great with internal lighting and a fog machine, as it gives more opportunity for the light and fog to seep out and be visible when the MIB is quiet. Please exercise extreme caution with this modification. Always wear safety glasses when cutting/drilling wood. For each claw mark, use a pencil to draw 4 semi-parallel lines that are 6" – 12" in length, a couple of inches apart. Use a drill to make a starting hole at the top of each claw mark line. Use a jig saw to cut the wood along the drawn lines. Now lift out the jig saw and re-insert into the cut you just made, but at the opposite end of the drilled hole. Work the jig saw back and forth up the line, giving each a nice ragged edge. This is one of those rare occasions where the worse it looks the better it looks, so enjoy the freedom to be sloppy. One big claw mark per 2'x2' section looks pretty good.

Stencils : Use stencils and spray paint to add some personality to your MIB. You can go basic with "DANGER" or "LIVE ANIMAL", or elaborate with recognizable icons.



The works : Here's a snapshot of a tricked out MIB with all of the above:

