

# Basic Hinge Handout

Pop clasp and other hinge modifications

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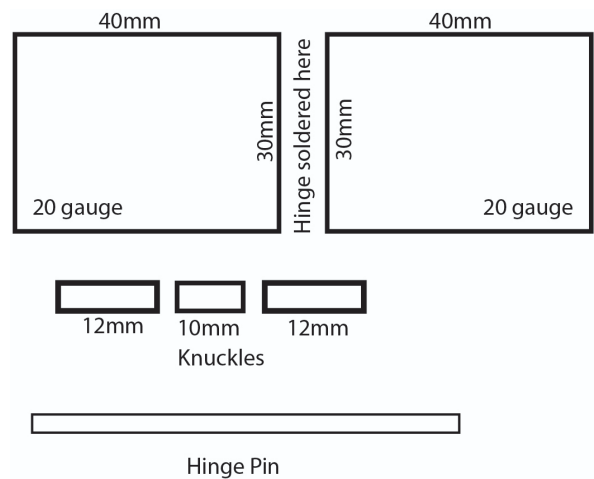
This document is a helpful guide for learning how to make a basic hinge and will guide you through making a small sample. Once the technique is learned, it can be modified and applied to many kinds of projects that need moveable parts.



## Materials Needed

- Wire (for hinge pin)
- Tubing that fits wire perfectly, cut into 3 knuckles (12mm, 10mm, 12mm)
- 2, 30mm x 40mm rectangles, 20 gauge

*Image below is not to scale (use the measurements)*



## Making A Basic HINGE

### HINGE RULES

1. The area that your hinge is being soldered to, **MUST** be PERFECTLY straight.
2. The hinge pin **MUST** be PERFECTLY straight.
3. The hinge knuckles **MUST** be PERFECTLY straight.
4. Your hinge pin must fit snugly into the hinge knuckles. I repeat, **SNUG FIT, NO GAPS.**
5. You need to have an odd number of knuckles, which will be soldered to alternating sides of the hinge. The side with the most knuckles should be the lid, or part that will get the most hand action.
6. When using Yellow Ocher as a solder inhibitor, you must **WASH IT OFF**, before putting your piece in the pickle.
7. Never let the solder flow across more than one knuckle, or to the hinge pin. If you do... start over.

### HINGE TIPS

8. Choose the tubing that is appropriate for the project you are making. Consider the strength, size, thickness, and overall aesthetics. hinges get a lot of action, use a thick wall tubing.
9. There are many styles of Hinge, the basic hinge, is the simplest to start out with, but the principles of the basic hinge will be applied to MANY other styles.
10. If possible, find a piece of tubing that will fit a steel hinge pin, to be used only during fabrication. The dirty steel will want to resist the solder. BUT, the STEEL CANNOT GO IN THE PICKLE.  
Replace steel with non-ferrous metal when ready to set the hinge pin.

## STEP BY STEP

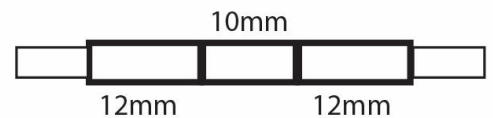
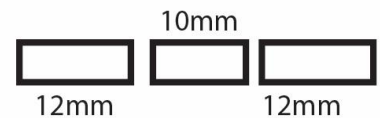
### Prepare knuckles, pin, and sheet

#### Knuckles:

1. Use a Tube Cutter to cut knuckles to the correct sizes (see pg. 1).  
Use a small saw blade (2/o)
2. File ends of tubing sections are totally flat using the flex shaft.  
Remove all burs left behind.
3. Wash the knuckles nice and clean!
4. Dirty the hinge pin with the torch (don't anneal).  
Yellow ocher can also be used.  
*\*If possible, use blackened steel wire as a pin during fabrication.*
5. Straighten hinge wire and slide knuckles on.  
*\*Outer knuckles can be slightly oversized, and will be filed flush to the sheet (10mm) later.*



Dirty hinge pin with flame. Don't anneal.



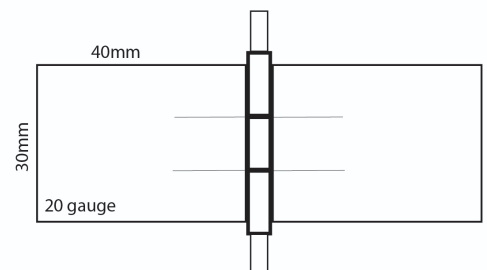
#### SHEET:

6. Use the stomp shear to cut out the sheet to the correct size.

**Edges that will attach to the knuckles MUST be totally flat.**

### Prepare for soldering (STAGE 1)

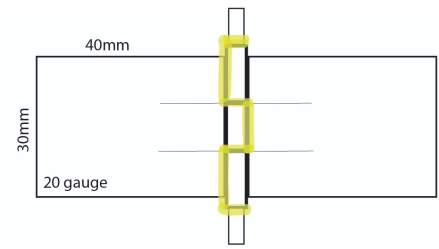
7. Assemble parts on the soldering block.
8. Place the knuckles (with the hinge pin inside) between the two sheets.
9. **SCRIBE**  
Use a scribe and mark on both sheets where the knuckles end. These are registration marks for where the knuckles will connect to your sheet.



**Don't make them too deep. You will want to sand them out later.**

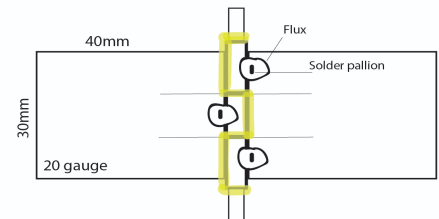
## 10. YELLOW OCHER

Mix up some yellow ochre into a thick paste. Apply the yellow ochre as shown. **Alternating sides and across the ends of tubing.** The purpose of the yellow ochre is to help prevent solder from flowing into areas it shouldn't. If the solder flows across multiple knuckles, all is lost. You will need to start over.



## 11. FLUX

Place a small amount of flux on the alternating areas as shown. **Do not flux the whole length of the knuckle.** We don't want the solder to flow across the whole knuckle.



## 12. SOLDER PALLIONS

Place a small pallion of solder in the fluxed area.

### What kind of solder should you use?

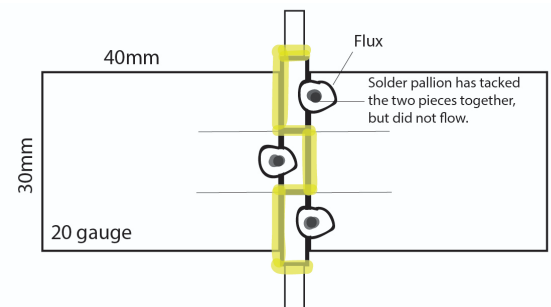
**If the hinge is that very last thing you are soldering, use EASY.**

The hinge should be that last element to be soldered on the piece, to avoid the hinge solder ever flowing again. However, there are always exceptions, such as fabricating a clasp afterwards. In this case, save easy solder for the clasp and **use MEDIUM for the hinge.**

### Tack Solder

13. Heat the entire piece evenly to prepare for soldering.

The challenge is getting the knuckles and the sheet to the same temperature because they are different sizes.



When the flux has become glossy and the metal has a soft glow, you are close to flow temperature and continue very carefully. Zero in on one knuckle at a time, starting with one side of the hinge. (Solder knuckle 1 and 3. Then knuckle 2).

Use a **NERVOUS FLAME**, moving in, but pulling away quickly at the sign of movement in the solder.

14. Heat until the solder slumps or tacks itself.

This happens just after it balls up, but before it fully flows.

DO NOT FLOW the solder at this time. You risk soldering multiple knuckles together, or soldering the hinge pin in place.

15. Allow to cool a few minutes before quenching.

16. Wash off your yellow ochre

17. HANDLE VERY GENTLY!!!

18. Pull the hinge pin out and pickle the pieces. (If a non-ferrous pin is stuck, the pickle may help it release). **DO NOT put a steel pin into the pickle.**

## Prepare for soldering (STAGE 2)

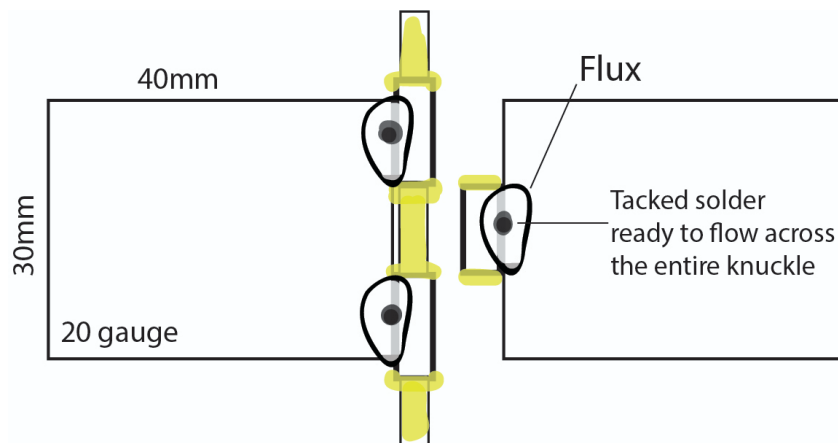
In this stage you will be securing the knuckles by allowing the tacked solder to flow completely.

19. Keep the two sides of the hinge separate, and replace the pin through only one side of the hinge assembly. Now, when the solder flows it will have less chance of the solder flowing onto the knuckles attached to the opposite side. Additionally, the pin will hold the knuckles in place so they do not shift when heated.

**If the knuckles shift at this stage, the pin will never fit again. Start over.**

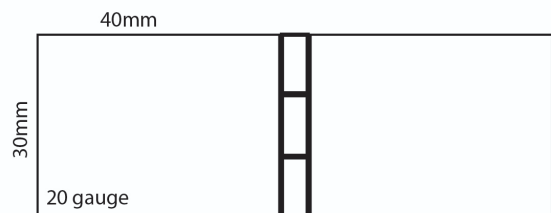
20. You may carve into your fire brick a little so that the knuckles are held perfectly in the right spot.
21. Add yellow ocher and flux as shown. The solder must run across the entire knuckle, but it **MUST NOT** flow on the end of the tube or onto the pin wire.
22. Flow solder one knuckle at a time.
23. Insert the pin wire back into the other side of the hinge and solder in the same fashion.

*\*If there is only one knuckle, it's not totally necessary to add the pin.*



## Setting Your hinge Pin

24. File down the excess knuckle material so it is flush with the sheet.
25. Assemble all your hinge pieces together again, with the non-ferrous hinge pin.

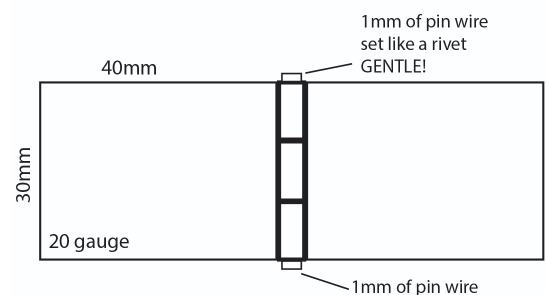


### Option 1: Riveted Hinge pin:

File the ends of your hinge pin flat with 1 mm exposed on each side.

GENTLY tap with a riveting hammer.

*\*If your pin is not snug to the tubing it will collapse and your hinge knuckles with it!  
Find a pin that fits appropriately. Use*



thicker wire and draw it down if you need to.

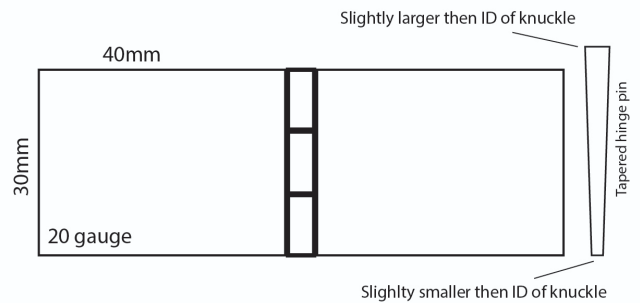
Tubing can also be used, flare as you would a tube rivet!

## Option 2: Tapered Hinge Pin

Good for very small objects and jewelry. This is a pressure fit pin.

Create a VERY SLIGHT TAPER on the hinge pin by filing or sanding.

When inserted into the knuckles, it will be wedged into the final knuckle, but will move freely in the other knuckles.  
File ends flat.



This style can also be used as a removable catch! Solder a chain to the wide end and then you will be able to take it out.

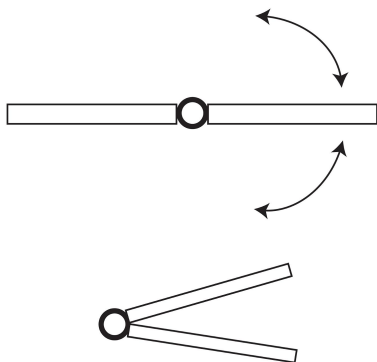
**So many more styles of hinge pins exist! Do some research!**

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## HINGE Movements and Modifications:

**Basic hinge:** (as explained above) will rotate freely.

The thickness of metal will prevent the sheets from lying completely flat. But it can get close.

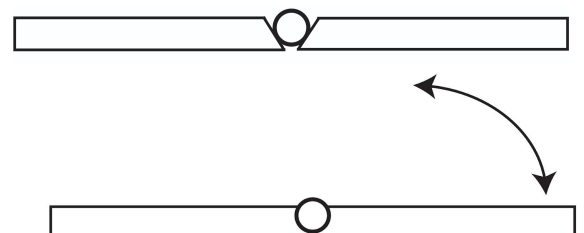


**Works well with a pop clasp.**



**Stop Hinge:** Will open flat only.

Bevel the edge of the sheet or, **even better**, file a seat with a chainsaw file. Solder knuckles into the seat created by the round file.



## Making the Pop Clasp

1. Cut out two small circles (for this sample, use 10mm, 20 g sheet)
2. Center punch and drill a hole into the center of your sweat soldered circles. Use a drill bit that fits the wire you will be inserting.
3. Ball up the end of your wire (silver balls best, but use copper if you don't have silver)
4. Solder the wire, ball end up, into the drill holes. Make sure that you have left one thickness of metal between the ball and the sheet below it. No more, no less.
5. Apply some paint to the top of the balls and then attempt to close the hinge. There would be a little paint mark where contact was made. This is where you will drill your holes to accommodate the wires. Start with the drill size that matches the wire thickness, then slowly size up until you can close the clasp (without a ton of force).

