

HPA-M2 SUPERFLEX Step-by-Step Instructions

What is Included in the Kit

[M00233 MOREZMORE HPA-M2 SUPERFLEX Humanly Posable Armature STARTER Kit](#) includes what you see in these 2 photos:



HPA-M2 SUPERFLEX Hardware:

- 34 pieces [joint compression plates](#) (plates for joints)
- 34 pieces [threaded 6 mm steel balls \(full thread\)](#)
- 19 pieces [M2x10 button hex screws](#) (joint middle screws)
- 1 pieces [M2x20 screw](#) (1 for sitting bone)
- 2 pieces [chest/hip threaded cube connectors](#) (for chest and hip connections)
- 1 piece [30mm threaded rods](#) (for barbell)
- 18 pieces [16mm threaded rods](#) (for barbells)
- 2 pieces [40mm threaded rods](#) (for barbells)
- 2 pieces [60mm threaded rods](#) (for barbells)
- 2 piece of [M2x20 brass connectors](#) (tension regulator)
- 15 pieces of [M2x10 brass connectors](#) (tension regulators)
- 31 pieces [M2x5 brass connectors](#) (threaded ball stoppers, tension regulators)
- 10 pieces [M2 hex nuts](#) (neck and ankle joint nuts, threaded rod stoppers)
- 3 pieces of [30 mm cut tubes 5/32"](#) (1 for head removable module, 2 for arms removable modules)
- 2 pieces of [40 mm cut tubes 5/32"](#) (for leg removable modules)
- 2 pieces [ball screws](#) (for magnetic wrists)
- 2 pieces of [countersunk ring magnets](#) 8mm diameter, 3mm height, 3 mm hole (for magnetic wrists)
- 2 pieces of [cotton-covered finger wire, 32 Ga](#) (to make finger armature)
- 2 piece of [perforated steel slice](#) (for sitting bone and for feet)
- 1 piece of [allen hex key](#) (for assembly)
- 2 pieces of [clear plastic 10-compartment boxes](#) to hold the parts

Must Have Tools: (things you buy once).

- 2 pieces [long nose pliers](#) (to tighten screws)
- 1 pack of [JB Cold Weld Steel Reinforced Epoxy](#) (thread lock)

M00354 MOREZMORE HPA-M2 SUPERFLEX Humanly Posable Armature
HARDWARE Only Kit includes what you see in this photo:



*Click on the photo to zoom,
click again for extra zoom*

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Step by Step Instructions

Part 1 – PREPARING PARTS AND SETTING THEM ON THE CHART.

1. Prepare your puppet drawing or proportion chart, something like in the photo below. I usually use the chart of “average guy” by Andrew Loomis (the guy with mustache). As you prepare the parts, set them on the chart in their places. For this post I am photographing the parts against blank paper so that you could see the small parts better.

Andrew Loomis’ proportions chart (I will be using first choice – normal proportions)

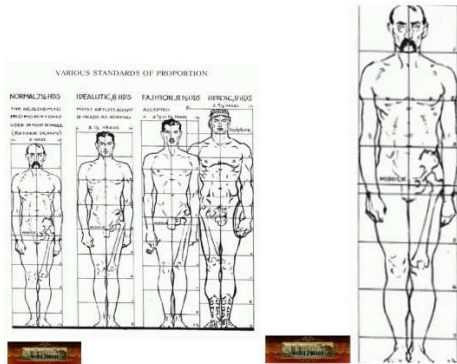


Image cropped, resized and printed (it took 2 sheets of regular paper).

How to print: Some printing software allows to print the image in the particular size. I usually print my chart on 2 sheets of paper, first – top part, than – bottom part. This is because I have regular 8.5 x 11 paper and my proportions images are larger: 11.5” to 12”. Regular paper meaning US Letter Size Paper 8.5 by 11.0 inches (215.9 by 279.4 mm). Then I tape the 2 parts together with a transparent packing tape. Then I cover the whole image with that tape to “laminare” it home-style with clear packing tape, so that I can put things and clay on it, without the chart getting oily and dirty and without the risk of printer ink transferring to the clay. Also, laminating makes the paper sturdy, it will last for a few puppets. The proportions chart can be also set upright with a board and binder clips. Sometimes it is very useful.



I am going to describe here how to make a humanoid armature, without any alternations of the existing kit parts.

The armature will be 10 1/4" or 26 cm tall, roughly a short realistic human figure in 1:6 scale.

It is possible to make it taller or shorter (from 4.5" or 11.5 cm to about 14" or 35 cm).

You just need to use [shorter or longer threaded rods](#) for spine, arm and leg barbells.

This way of assembly is not set in stone, treat these parts as an a human Erector set and experiment.

Chest Assembly:

– Find

1 [threaded chest/hip cube connector](#)

4 [M2x5 brass connectors](#)

4 [hex nuts](#)

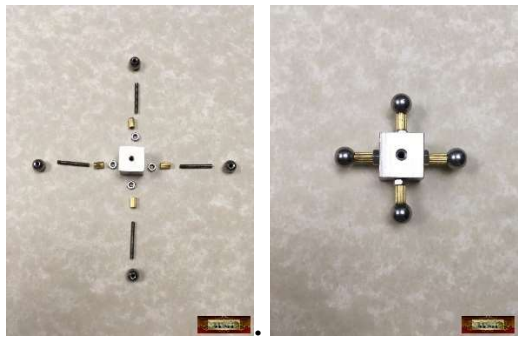
4 [16mm threaded rods](#)

4 [threaded balls](#)

– Put them together like this:

The small M2x5 brass connectors work as stoppers for threaded balls.

Hex nuts fill the gaps between the cube and the brass connector.



Hip Assembly:

– Find

1 [threaded chest/hip cube connector](#)

4 [M2x5 brass connectors](#)

4 [hex nuts](#)

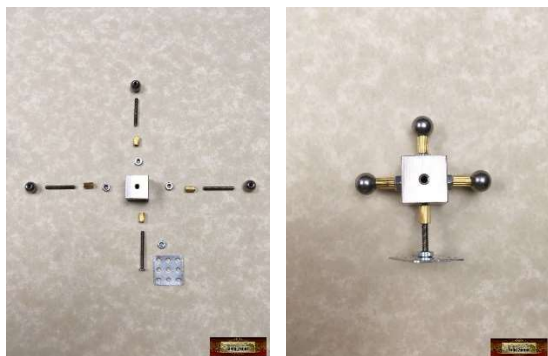
3 [16mm threaded rods](#)

1 [M2x20 screw](#)

3 [threaded balls](#)

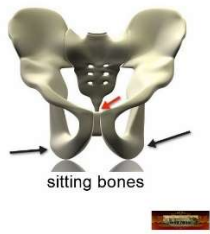
1 [perforated steel slice](#)

– Put them together like this:



– The sitting bone. My first puppets kept toppling and tumbling when seated, so I added parts to make this optional “sitting bone”.

This construction will provide a sturdy bottom for the puppet/doll so that he/she could sit without toppling.



Spine Barbell

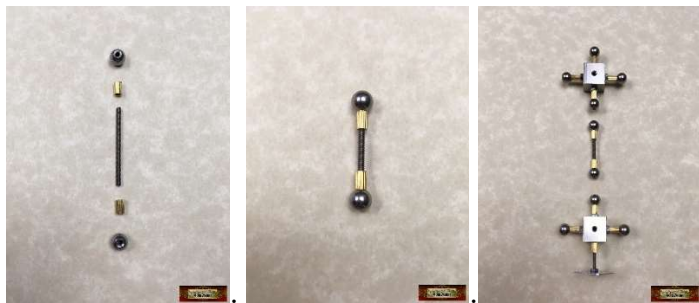
– Find

1 [30mm threaded rod](#)

2 [M2x5 brass connectors](#)

2 [threaded balls](#)

– Put them together like this:



Thighs (Femur) and Arms (Humerus) Barbells

– Find

2 [60mm threaded rods](#)

2 [40mm threaded rods](#)

8 [M2x5 brass connectors](#)

8 [threaded balls](#)

– Put them together like this:



Mini Barbells for Extra Shoulder and Hip Joints

– Find

4 [M2x10 brass connectors](#)

4 [16mm threaded rods](#)

8 [threaded balls](#)

– Put them together like this:



Neck, Arm and Leg Drumsticks

– Find

7 [M2x10 brass connectors](#)

7 [16mm threaded rods](#)

7 [threaded balls](#)

– Put them together like this:



Feet Assembly

– Find

1 [perforated steel slice](#)

2 [M2x10 screws](#)

2 [M2x5 brass connectors](#)

2 [threaded balls](#)

– Cut the perforated slice to make 2 strips for the feet.

– Straighten them with pliers because they curl when you cut them.



– Put them together like this and bend, forming the feet:

– At the end they will look like this:



Magnetic Wrists Assembly

- Find
 - 2 [M2x10 brass connectors](#)
 - 2 [countersunk ring magnets](#)
 - 2 [ball screws](#)
- Just locate these parts for now and put them on their places on your chart

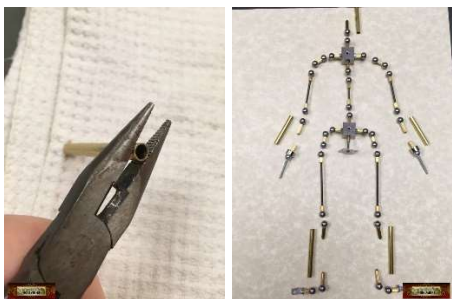


Removable Tube Modules

The purpose of making removable head, leg and arm modules is to help you to build your puppet.

You will be able remove the modules from the armature and make the head, hair, hands, feet and shoes in peace, without dragging the whole puppet around while you are working on the particular part.

- Find
 - 1 [30 mm cut tube](#) for the head
 - 2 [30 mm cut tubes](#) for forearms (radius bones)
 - 2 [40 mm cut tubes](#) for legs below the knee (tibia bones)
- Slightly pinch the end of each brass tubes with pliers (to make it stay on the connector better).
- The fit should be somewhat tight, but not too tight, so you can remove it when you need it.
- Put the tubes on their places on your chart



Shoulder and Hip Joints

- Find
 - 16 [compression plates](#)

8 [M2x10 screws](#)

8 [M2x10 brass connectors](#)

The “flesh” (padding) at these places is about 10mm thick, this is the reason for the size chosen.
You can use other sizes of brass connectors, if you need to.

– Put them together like this:



Elbow, Knee and Neck Joints

– Find

10 [compression plates](#)

5 [M2x10 screws](#)

5 [M2x5 brass connectors](#)

The “flesh” (padding) at these places is about 5mm thick, this is the reason for the size chosen.
You can use other sizes of brass connectors, if you need to.

– Put them together like this:



Chest and Ankle Joints

– Find

8 [compression plates](#)

4 [M2x10 screws](#)

2 [M2x20 brass connectors](#)

2 [hex nuts](#)

– Put them together like this:

All assemblies are in their places



Magnetic Wrists and Hands Assembly

It is useful to have a hand reference image. You can use the one below.

For example, my own hand is 18 cm long, so 1:6 scale would be 3 cm long.

Some printing software has an option to print to size.

While we are at it, there is the feet image too (resize to about 4 cm for 1:6 scale)



– Find the magnetic wrist assemblies that you already set out on your chart.

2 [M2x10 brass connectors](#)

2 [countersunk ring magnets](#)

2 [ball screws](#)

1 piece of [cotton-covered finger wire](#)

– Slide the magnet ring over the M2x10 brass connector (it will not stay put until you epoxy it).

– Epoxy brass connectors inside the ring magnets like this (postpone this step until you are ready to threadlock all parts with epoxy).

Note: Make sure that the connectors do not stick too far into the magnet cup – you will need the round cup for the balls.

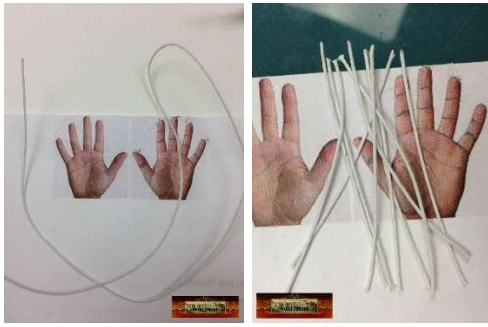


– Snip ball screws to size with wire cutters.



– There are 2 pieces of [cotton-covered finger wire](#) in the kit, each 18" (45 cm) long.

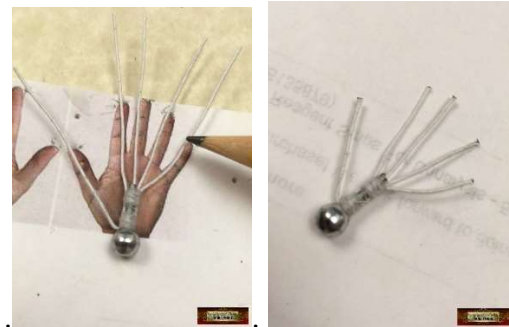
If you cut ten 4.5 cm pieces, 1 piece of wire is enough for 10 fingers (and one extra is included for the case if you mess up).



– Tie the wire fingers onto the ball screw with household cotton thread (one piece for opposable thumb from the opposing end).



– Measure off and trim the finger wires with scissors.



– Paint with epoxy (postpone this step until you are ready to threadlock all parts with epoxy).

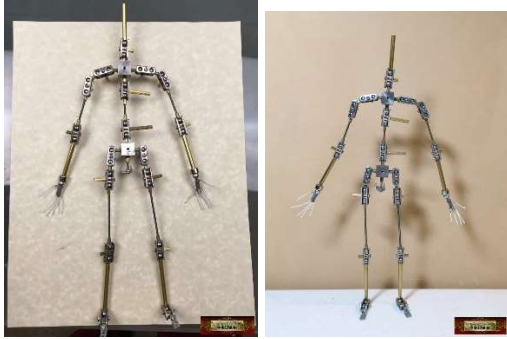


All the parts are ready for assembling.

NOTE: Go easy with tightening the joints. Different joints need different degrees of tension. DO NOT OVERTIGHTEN. The limbs work as levers and generate a surprisingly strong torque in the joint – enough to break the metal.

This puppet has narrow hips, so I bent the sitting bone to allow for thigh adduction (movement of legs towards the center of the body).

Don't expect your armature to stand and do things just yet. We will need to thread lock it with [JB Cold Weld Steel Reinforced Epoxy](#), because everything you screwed together tends to get unscrewed. At this point everything is wobbly, moving and rotating. It is very confusing why something moves – because of a loose joint or a loose thread. So don't exercise your puppet/doll just yet.



Part 2 – THREAD LOCKING (with [JB Cold Weld Steel Reinforced Epoxy](#))

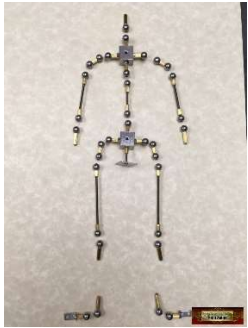
- Find a tray or a shallow box with a towel. This is to prevent the parts from rolling around and dropping to the floor.
- Find [JB Cold Weld Steel Reinforced Epoxy](#) in your kit. Squeeze out equal amounts of both ingredients (about pea size each). The epoxy hardens within about 40 minutes and completely cures overnight. Mix well (very well).



- Remove all tube modules from the armature. Set them aside on the towel, keeping the outline of the figure so that you do not get lost. Things can get confusing, so work methodically.
- Loosen and remove all joints. Set them aside on the towel, keeping the outline of the figure so that you do not get lost. Things can get confusing, so work methodically.
- Unscrew each assembly, one at a time (chest assembly, hip assembly, all barbells and drumsticks). **One assembly at a time.**
- Keep putting epoxy on all threads and putting the assembly back together. **One thread at a time.**
- Screw them in place as tight as you can without breaking. Tighten the thread with 2 sets of [long nose pliers](#). like on the photo below. Your fingers are not strong enough.



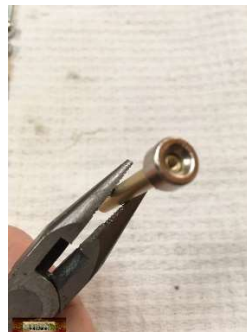
- Set each thread-locked assembly on the towel to cure. Keep the general armature outline, so that you don't get lost.
- After everything is thread-locked, you should get this:



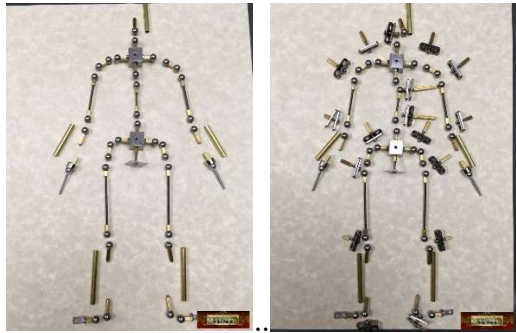
- Decide on the point where the leg modules will be removable – at the knee or at the ankle. This is “at the knee” variant.
- Put epoxy on the ankle connector, slide the tube, pinch a few times with wire cutters so it will get stuck there forever. The leg modules will be removable from the knee in this case. Another option – leg module removable from the ankle.



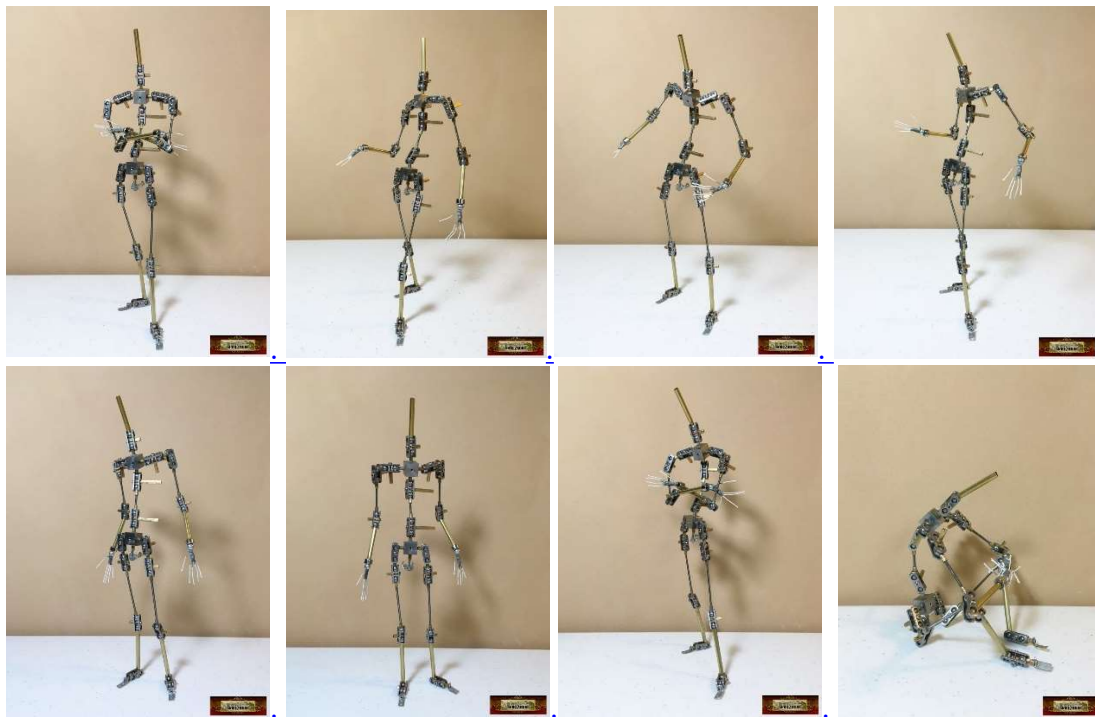
- Assemble and epoxy the magnet wrists. The arm modules will be removable from the elbow.



- Methodically bring onto the towel the rest of the parts (tubes, then joints), set them in their places.
- WAIT UNTIL NEXT DAY TO ASSEMBLE. Seriously, walk away and do not touch for at least 12 hours, better 24 hours.



Next morning – FINAL ASSEMBLE AND TESTING.



Other Variations

Variations: [HPA-M2 BASIC](#)



Variations: Shorty

This one is shorter – 7" or 18 cm. Shorty can be a little taller or shorter, his height depends on the length of the [shorter or longer threaded rods](#) for spine, arm and leg barbells. Also, there are detailed descriptions on additional customizing of armatures in [HPA-2](#) and [HPA-1](#).



Variations: Tiny

Tiny is the shortest possible fully articulated armature – 4.5" or 11.5 cm. The only way to make him smaller is to forgo the spine, knees and elbows joints.



Variations: FlexSpine

FlexSpine (on the right in the photo below) has a piece of [flexible plastic ball and socket armature](#) (1/8" size) for his spine.

Rather simple – all you need to do is drill 2 mm hole through the plastic, pass the threaded rod through the hole, secure with a couple of hex nuts and epoxy.

This idea can be useful for making creatures with long necks, tails, or tentacles.

[Flexible plastic ball and socket armature](#) comes in 3/32", 1/8", 3/16" and 1/4" sizes. Think dragons, dinosaurs and krakens.



. Thank you!