



<http://www.phantasmmechanics.com/Hitcher/>

The Hitcher



As with our FCG, you have to see this effect in action to believe it. The mechanism is simple and direct - and reliable, using the well-tested construction methods found in the Flying Crank motor platform. It uses two motors and two lever-and-rack drives to produce a hitch-hiking effect, similar to one found in a very famous haunt. The three sisters move together in a synchronous routine, leaning from side to side and thumbing for a ride with their arms at the same time.

If you can assemble a barbecue grill, a bicycle or a set of shelves from Office Depot, you can build this mechanism. It's a true introduction to developing serious imagineering skills, and you will learn much from it.

The parts diagram shows what to cut and how to drill the raw aluminum stock

Here is the entire [assembly manual in .pdf form](#) - it's a bit large, but it 'holds you by the hand' as you go through the assembly process with color illustrations throughout. And, of course, it's free. :-)

The following is an excerpt from the introduction to the manual:

The UPM system is a true what-if kit for the experimental imagineer. The version you have purchased also includes a specific application kit, called the Hitcher (HK-1) which causes three auxiliary levers to produce an oscillating movement. These combined kits can be built as shown in these instructions to produce a frame to hold three hitch-hiking figures, or used in any number of other ways the builder's imagination can come up with. It is intended for moving light props, usually under a three-pound load - but if used in imaginative ways, it can equal the impact of costly animatronics.

The real aim of the UPM is to be a time-saver for Haunt prop builders who can use it for a new effect each season - and for Halloween and Christmas home decorators, who can share it with both seasons. It opens up new opportunities for variety in kinetic decoration and is very easy and quick to set up. Instead of measuring, cutting, and drilling anew each season, you just move parts around. Some of you may remember the Gilbert Erector Set (with the motor). If you ever had one, you know the kind of fun that's possible with the UPM.

Numerous standard mover configurations are possible. The shifting parallelogram, the scissor jack, and reciprocating levers (both synchronous and opposing - think of windshield wiper oscillation) are three of the main ones you can create. Most basic display mover systems use some variant of one of these three.

With the addition of add-ons like the HK-1 (referred to as secondary movers in Phanmech lingo) you can have complimentary action that adds complexity - and show value - to the moving display. Most of today's truly interesting display animatronics have more than one reciprocal movement, and you're about to find out how this can make a simple prop much more effective as you build this kit.

The hitch-hiking figures shown in these instructions are just one example of how you can use the combined kits to tell a one panel story - in other words, like a single-panel comic. The story: three female spirits are hitching a ride to Florida to spend Halloween at a well-known Orlando haunt. It's a reference to figures in that haunt, and thus the humor (the spooks in that haunt want to hitch a ride home with guests.) Since so many people have been there ? or have seen the film based on it - recognition should be immediate. It is obviously a conscious tribute to that haunt, without the stealing of its copyrighted images. Obviously, anyone could build figures suggesting the originals, but we won't. Besides, some of the humor is lost if you merely copy the proprietary ones - and the copyright police are everywhere. Be an originator - it's far more fun! In the future, there will be instructions on the Phanmech website for suggested uses, both

from us and other builders. This is where more fun comes in - you can participate and let everyone benefit from your experiences.

Yes - you can use the pieces of the Hitcher subassembly in any way you can imagine to construct such props as a guitar-playing or arm-waving Santa Claus, for instance. The possibilities are nearly limitless, and that's what all those extra holes in the levers are there for. All you have to do is take care to make sure your mechanism won't bind up or overload the motor - and we'll help you with that later in these instructions. Want an extra arm or lever to complete your design? Call us and we'll build it for you, or simply visit the hardware store and add it all on your own! Get your hands dirty and experiment. If completing this project doesn't addict you to imagineering, we'll be very surprised!

Also, the finished prop handles like a suitcase, by grasping the top structural member, so it's easy to carry it indoors to prevent theft.



Above, here's how you can get three different characters out of a 'Mystic Mask' from Michael's Crafts. I used stiff insulated wire with soldered exposures wrapped around tiny holes in the plastic. The wires pull the mask edges together and significantly distort the face. Below are the characters this technique produced:

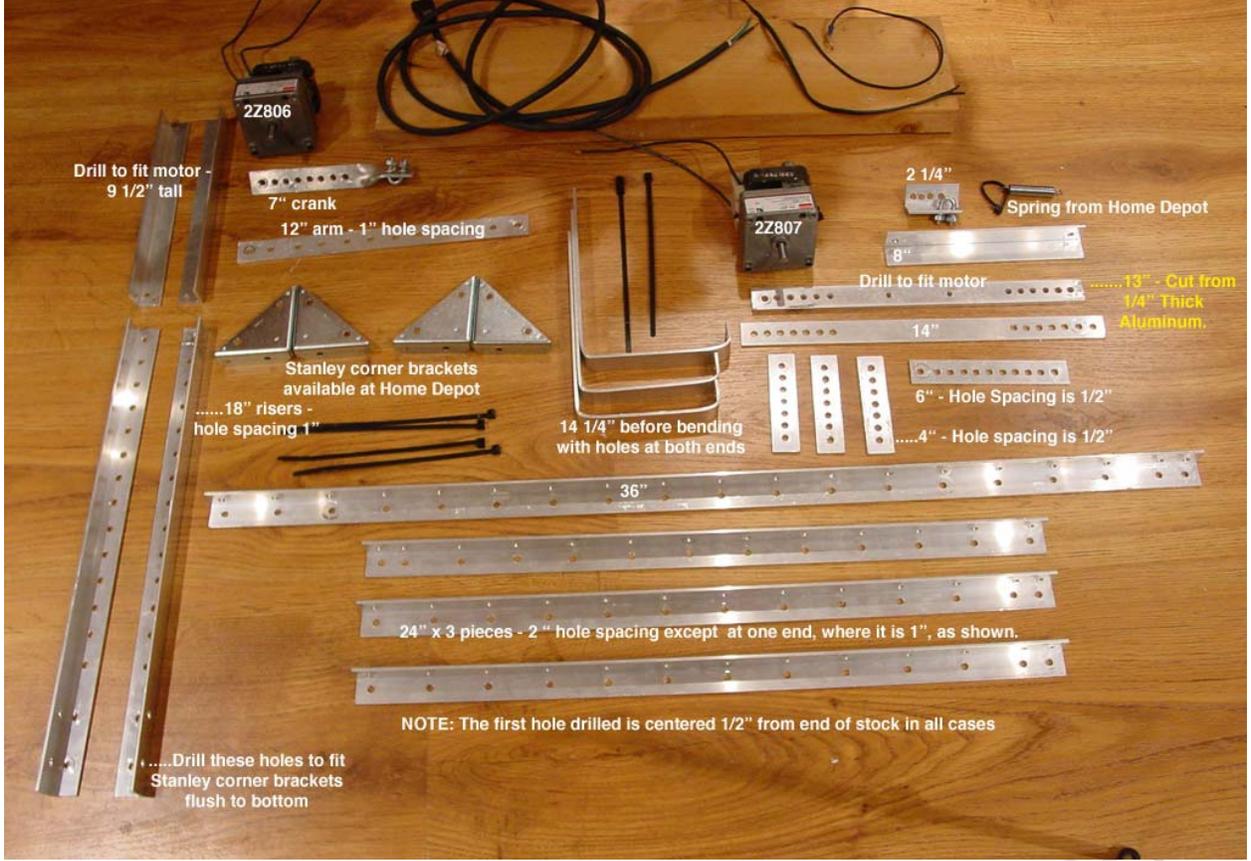


Below, reality impinges on fantasy as the hitchers hang out in the daylight.



Hmm... Pepper's Reality?

Hitcher Parts Guide (See Manual for Assembly Instructions)
All parts cut from 1/8" thick by 1" wide stock except as noted.



Obtained from
Omarshauntedtrail.com

PHANTASMECHANICS

THE UNIVERSAL PRIME MOVER KIT (UPM-1)

WITH *HITCHER* ATTACHMENT (HK-1)

Introduction

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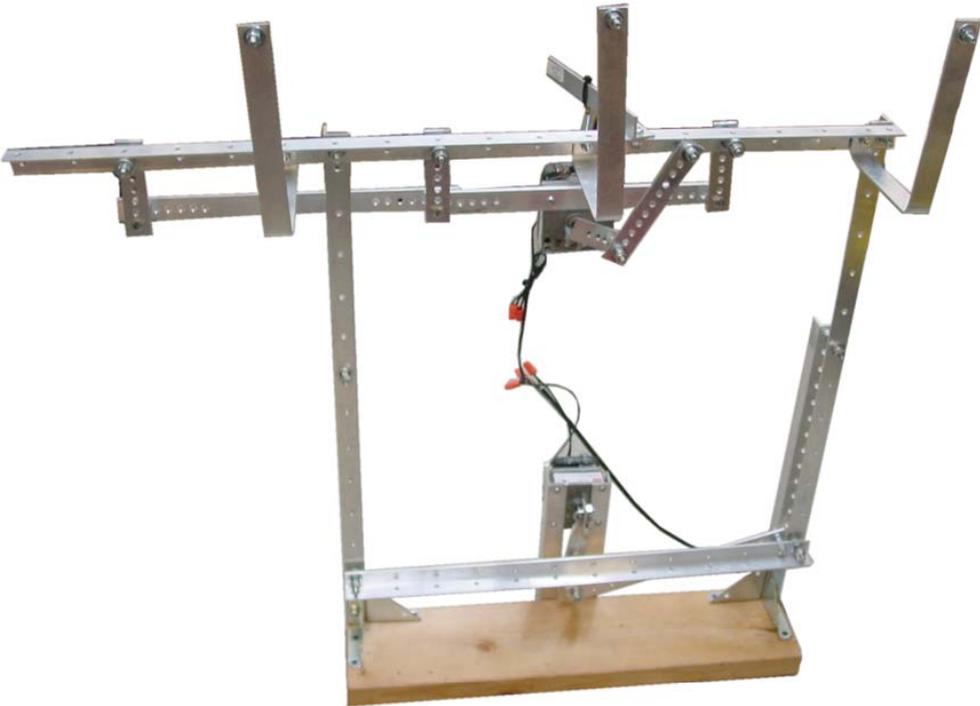
CAUTIONS

We all know the drill here (no pun intended), or should. However, these are some basic ways to avoid hurting yourself – or others – so please take the time to read this section. The reputation of Halloween is always damaged each time someone gets hurt by a haunted prop.

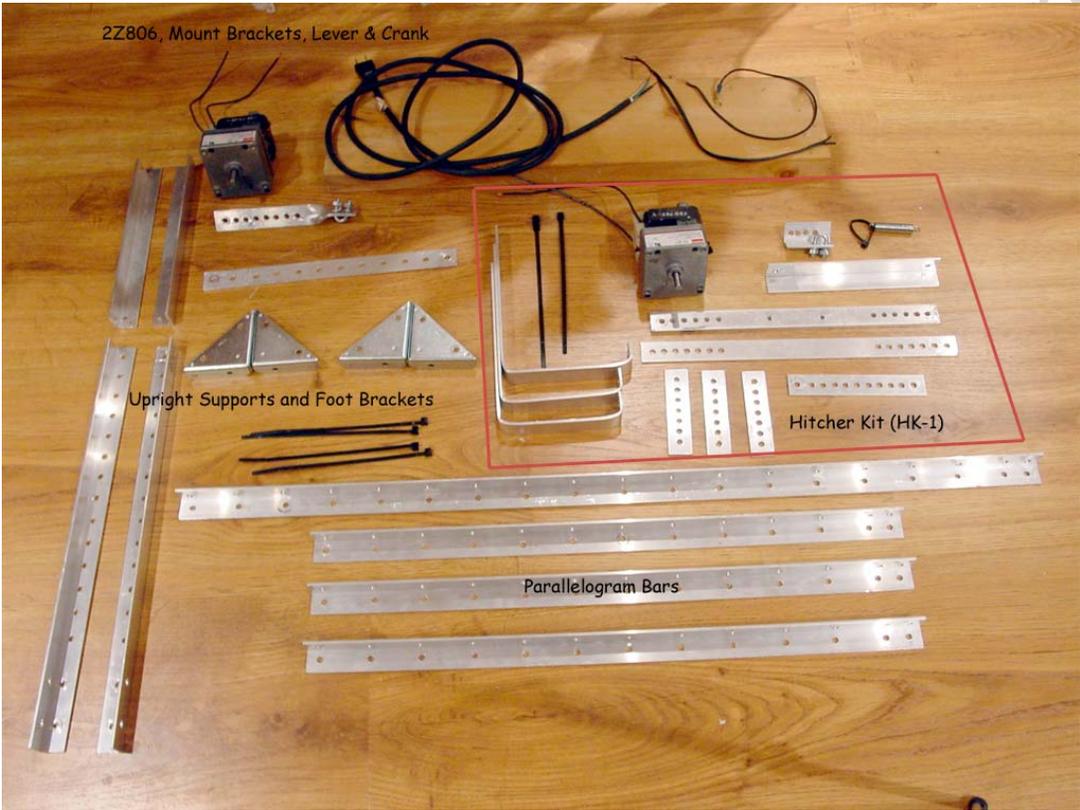
- **Never work on an animated prop device while it is running!** You could get part of your body or clothing caught in the mechanism, and could be seriously hurt! (I've done it. Don't you do it.)
- **Do not allow guests or your children near the running prop. It is not designed to be handled by the public, and it could accidentally hurt them.** Never mind the fact that some patrons can - and *will* - destroy a prop in a few seconds! Do you care about what you create? Then keep it isolated from walk-through traffic, and if you use it outside, *bring it inside after closing!*
- **The UPM system is *not* an all-weather device. If you use it outside, store it indoors when not in use.** It's light as a suitcase, and almost as easy to carry, so protect your investment. You can put *ventilated* covers on the motors if you would like to leave it out; but remember that prop theft is *very* common, especially at Halloween time, and especially with something that can be quickly swiped.
- **Do not run the UPM/Hitcher kit unsupervised.** It's reliable, and the motors are thermally protected, but since I didn't build it, I can't promise fire safety. Forewarned is forearmed.
- **The UPM/Hitcher unit is not a toy!** If children are involved in creating the finished product, be sure they are supervised at all times. As above, make sure they don't touch the running device.
- **If you are uncomfortable about some aspect of kit construction, please call us at (504) 888-2834** before proceeding. I have tried to be thorough in this manual, but some misunderstandings could still occur.

Obtained from
Omarshantedtrail.com

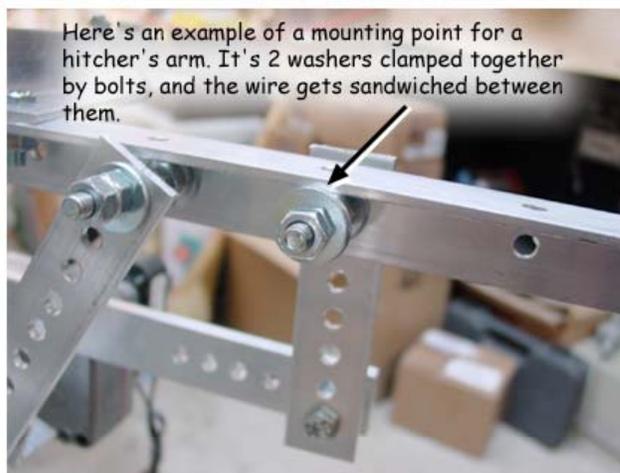
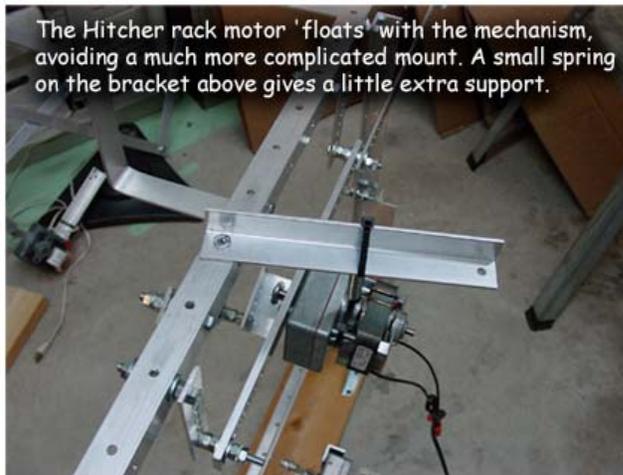
Finished Kit



Parts included in the Kit (hardware not shown)



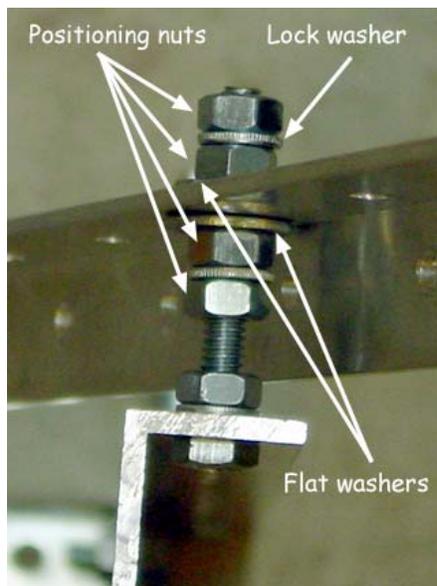
Various Views of the Completed Device And Some Related Remarks



Pre-Construction Basics

This kit requires the following additional tools and materials to construct:

- 2 similar 7/16" box-open end wrenches (10mm will work)
- Pointed nose wire pliers (or regular pliers)
- Wire cutter (side cutter) pliers
- Electrical tape
- Flat blade screwdriver
- 1 2x6 board about 2.5 to 3 feet long. (These are actually 1.5 inch thick)
- Molybdenum Di-Sulfide enriched grease (available at auto parts dealers)
- 3 Mystic Masques or equivalent (4" wide approx.) from Michael's or another craft store
- 12 yards of 1-yard-wide cheesecloth fabric (don't get the small craft packs)
- 4" diameter Styrofoam balls
- Tacky brand white craft glue



About constructing pivots

The pivots in the UPM system all use a similar construction. A bolt is tightened onto one piece of stock to form an axel. Then, if necessary, a pair of positioning bolts is added and locked together by tightening. Moly grease (included) is placed on each side of the pivot, then flat washers – using the smoothest side against the stock – are placed to sandwich the grease and bar. Finally, another pair of positioning nuts are added (see below). The positioning nuts are then adjusted back and forth – if necessary - and finally locked together. The ideal is to tighten the positioning nuts such that the pivot moves smoothly and doesn't wobble, but also doesn't bind. This is the most important and critical part of construction, and thus we'll keep reminding you of it throughout this manual.

Moly enriched grease has 'molecular ball bearings' that make it super slick, and it adheres very well to metal. **DO NOT ASSEMBLE AND RUN THE DEVICE WITHOUT THIS GREASE.** To do so will void the warranty.

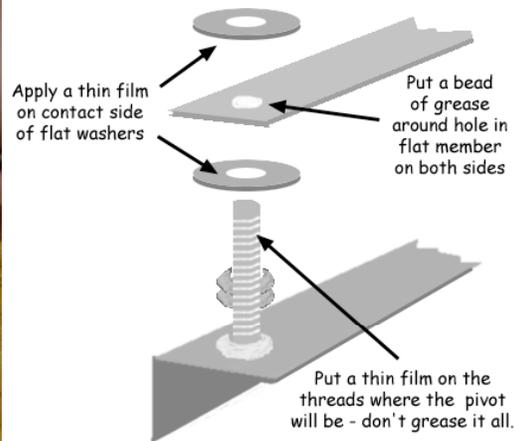
How tight is tight?

Without a torque wrench, it's really impossible to know – but there's a really simple method I use every day. Take the wrench you're tightening with and wrap *only two* fingers around it. Tighten until your fingers begin feeling pain, then stop there. If you have a small hand, then try three fingers. If you have very large hands, use one finger. With this hardware, the old-time shop tip works just fine.

Tuning the pivots

You must make sure that the pivots are truly locked in place, and are not over-tightened. The structure must not wobble or flop from side to side against the washers. The 'sweet spot' takes a minute or two to find. When the pivoting seems relatively loose, and nothing clanks around, you're there.

How to Apply Grease to Pivots



Above: Tightening a pivot. The left hand holds the lower positioning nut still, taught against the flat washer, while the right hand tightens the other nut above it. Make sure not to let the wrench holding the stationary nut move – your sweet spot will be lost!

You can adjust tightness a second time if necessary by simply unlocking one positioner pair and nudging a bit. Then lock them back together again, as before.

The technique of positioning the pivots will be covered for each separate instance, step by step. Clearance warnings will be presented as they apply.

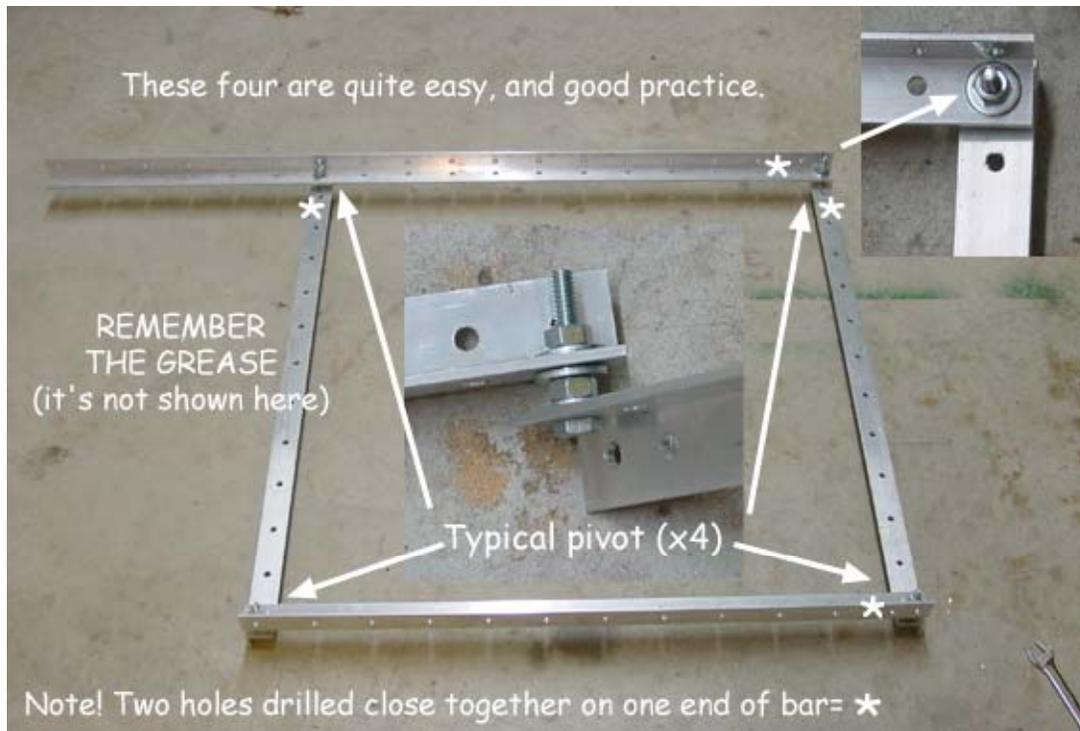
Keeping things parallel

In assembling the kit, it is important to keep lever linkages and frame members parallel. This keeps the crank systems from wearing unevenly and/or straining too hard. We've included extra flat washers that can be used as shims, in case something doesn't line up exactly. You can't make things perfect, but you can come closer. In test-assembling the kit, we checked and re-checked the clearances, and thus you shouldn't have difficult problems with it.

Assembly

Step 1: The parallelogram rack

Below are pictures showing what you are about to build.

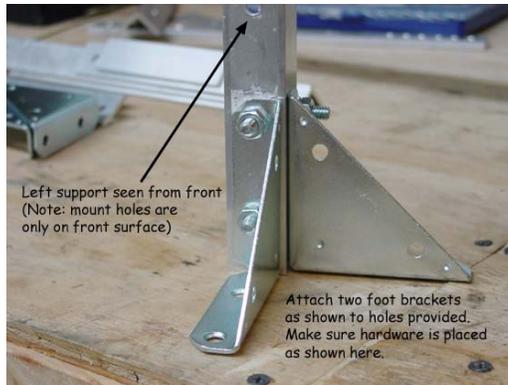


This is the main structure that moves from side to side, and carries the figures, attached at their necks and 'feet.' You are looking at it from the audience side. The pivot bolts start on the hindmost (vertical) pieces and protrude through the horizontal ones, as seen above. Be sure the sides are all parallel, or it won't work at all (count holes if necessary.) The three smaller pieces are identical, by the way. Be sure to position them as shown, with the ends having two close holes at the starred locations. **Use the 1 1/2" bolts to make these pivots.**

After you have tightened up the pivots, pick the completed rack up and move it around. See if it rattles or if there is any excessive play in any of the pivots, and re-tighten if so. Take your time and be sure – this is the main part that makes it work, and it's carrying all the hitcher apparatus with it.

Step 2: Main Supports

Now we will assemble the two arms that hinge the rack left and right. **Use the 2" bolts for these pivots.** These will be a little more involved, so take it slowly. Below the attachment of the foot brackets is shown. Do this first, and attach them with the small 3/4 inch bolts, nuts, and lock washers.



Make sure the hardware is secure. **Do NOT grease static connections like these on the footers.**



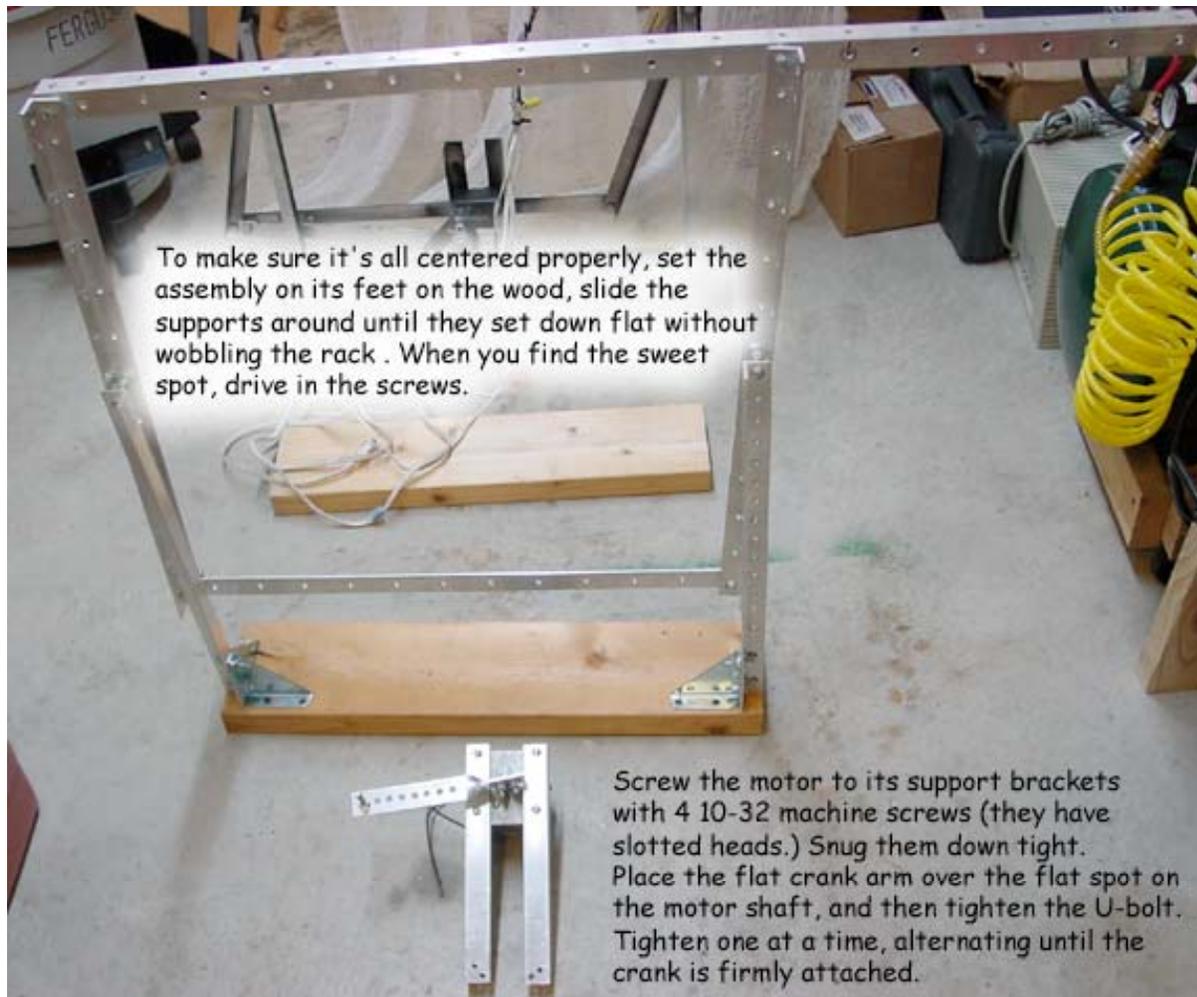
Assemble the parallelogram to the supports by constructing the pivot assembly as shown on the previous page. **Note that the pivot goes in the 7th hole from the bottom of the rack (count the one holding the pivot!)** Remember, use a bolt and lock washer on each pivot when mounting it to the support. Now pick up the assembly and test for play and rattle. Adjust if necessary. This should all be moving smoothly and not binding. The **grease** really helps, and allows you to tighten more firmly against the flat washers.

Step 3: Mounting the rack and adding the motor.

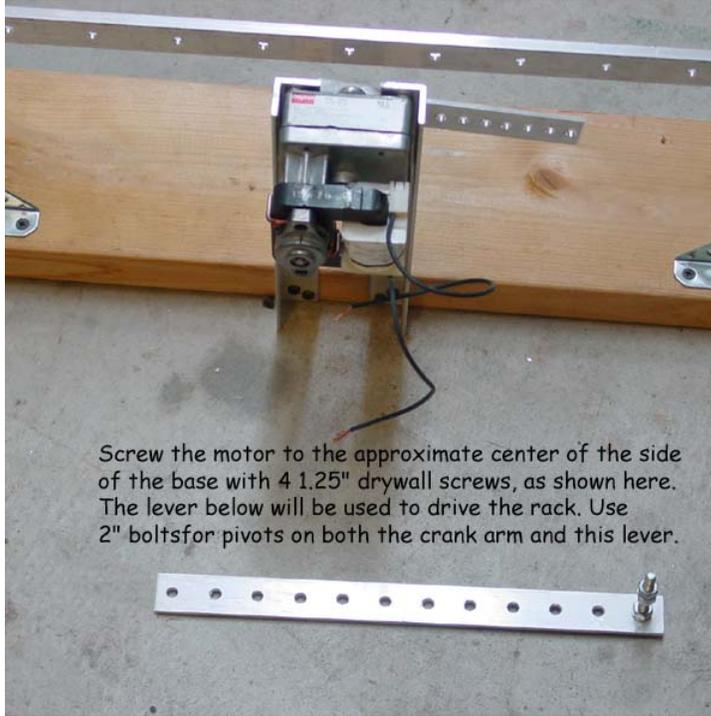
Select a 2.5 to 3 foot long piece of 2x6 that is relatively free of knots and cracks, especially on the side. Mount the feet of the supports to the base with 1.25" drywall screws as shown. To begin with, the assembled UPM/Hitcher unit will be a bit back heavy. When the figures are mounted, it will just about be perfectly balanced.

Larger bases are perfectly acceptable, so long as they are 1 1/2" thick. If you plan to have other static props in the scene and make it permanent, a larger base is probably right for you.

Having a base that is easy to attach things to allows you to construct other devices from the UPM parts set easily. Just build your gadget, then find the best mount positions and screw it down there.



Omar



Screw the motor to the approximate center of the side of the base with 4 1.25" drywall screws, as shown here. The lever below will be used to drive the rack. Use 2" bolts for pivots on both the crank arm and this lever.



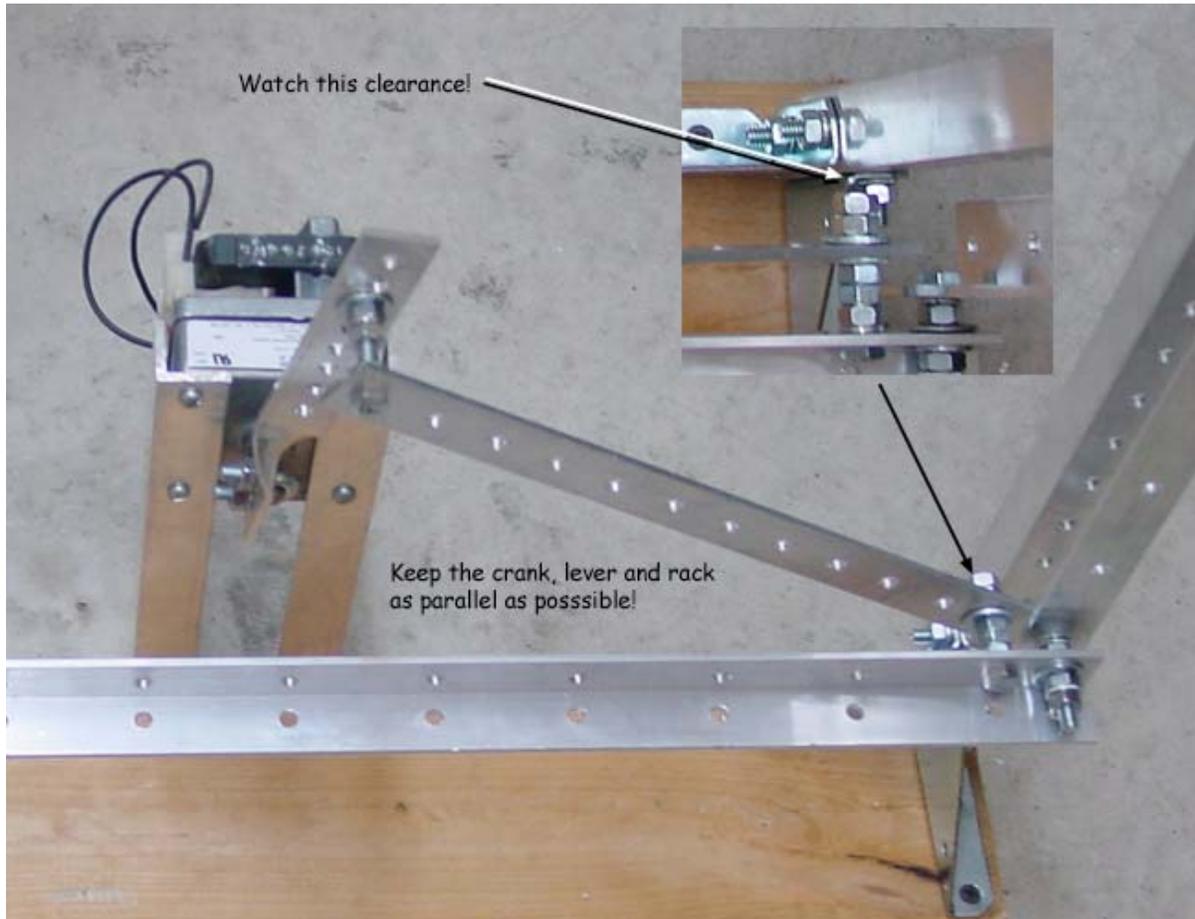
By now, you know the drill - here's the configuration of the crank arm pivot.

You can play with the mounting holes to change the range of motion, but for now, copy this!

Use hole #5 out from motor shaft to begin with.

GREASE, PLEASE

At this point, we become concerned with clearances. There's a fairly tight dimension where the lever – where it attaches to the rack – makes a close pass to the right support stand. If this isn't clearing, you may have accidentally bent one or both of the 2" bolts that are the main pivot. Otherwise, you may need to move the support pivots out further on their bolts. If you can no longer fit the lock washer on the assembly, just snug two nuts directly together. It works! You'll be doing it right here...

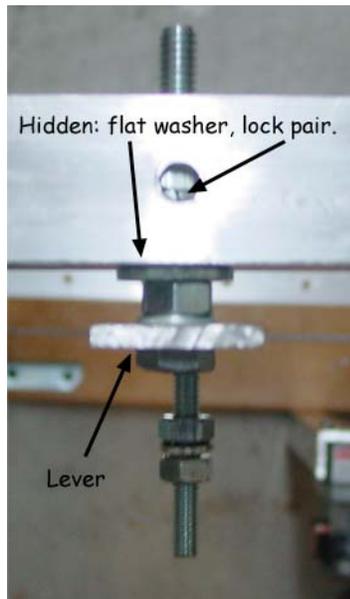
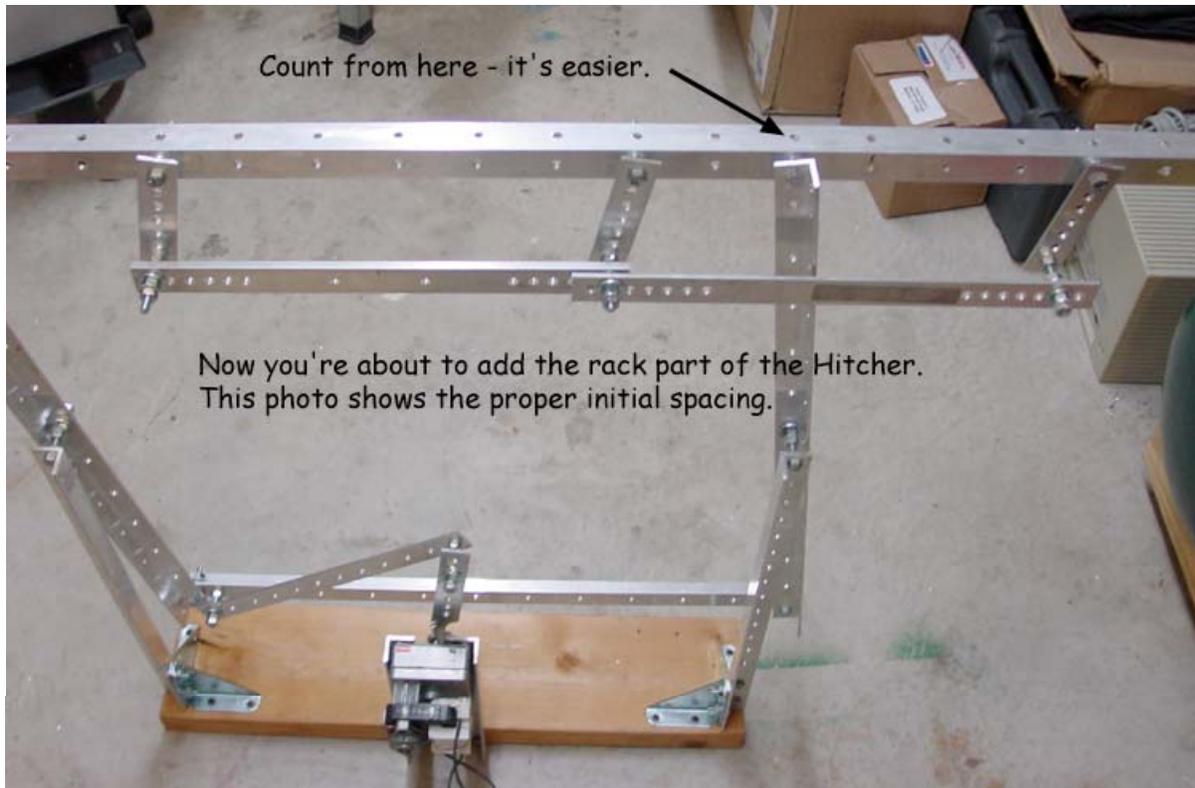


Note that the pivot is different here. It's bolted to the rack, like normal - there's *one* lock washer at the initial join. But instead of an extra nut and lock washer, it's a stack of 3 nuts for spacing – the initial join bolt, plus two more. Two touching nuts cap it off. **Add grease, remember!** Take your time, and get the bearings tight – and smooth.



Step 4: The Hitcher attachment

Now it's time to add the secondary mover – the Hitcher attachment. The first step is to construct the three small levers as shown here, with 2" bolts. Just lock them up good and tight. One bolt goes one direction, and the other the opposite way (see above). Now, place the three levers in the holes in the top of the parallelogram, as seen below.



Connect the central pair of these little crank-like levers with the thick motor mount rack. Install it as close to the inside as possible. You want, in other words, for the motor mount bracket (rack) to be as close to the big parallelogram rack member as possible, to help with an upcoming clearance issue.

Screw on a single position nut against the nut locking the bolt to the little arm, and then add a flat washer, the motor mount bracket, and another flat washer. Check for parallelism here. If spacing is wrong, you can use flat washers to shim (space) the pivots.

Now, **on the left bolt only**, finish with a pair of position nuts with a lock washer between. On the right, over the flat washer, install the second Hitcher rack piece between the central lever and the lonely one on the right. (See photo above.) Now they are all connected. Top these remaining pivots with the usual nuts and lock washer trio. **I needn't remind you to tighten, test, and GREASE,** right? I thought not.

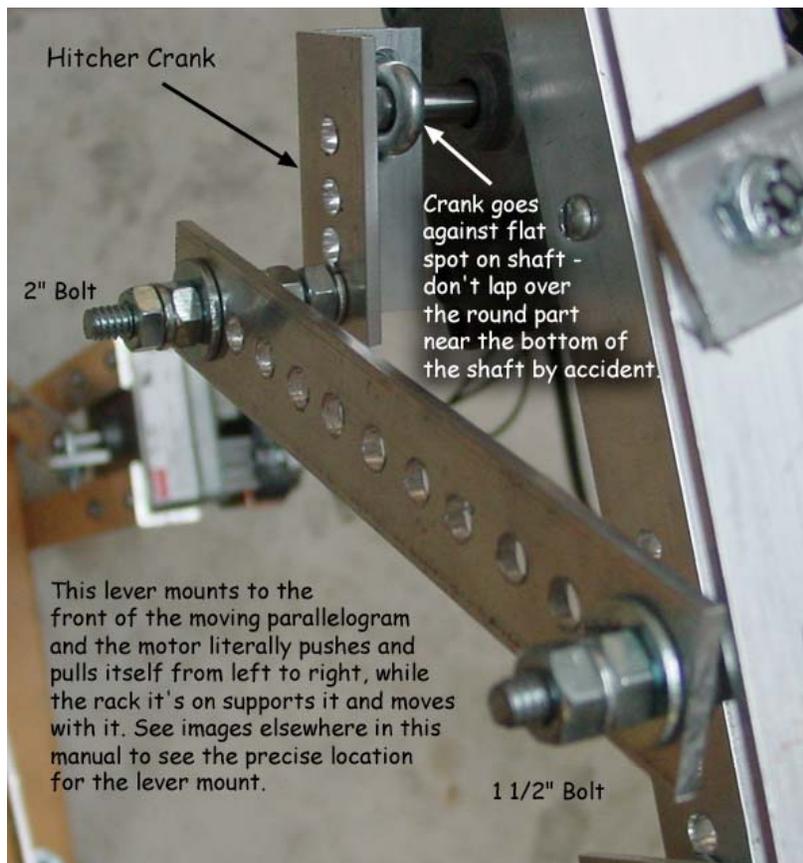
The second hitcher rack piece has a clearance issue to face. It rides very close to the upright on the flexing parallelogram frame (see below.) This should be fairly easy for you to resolve – the test



kit had enough clearance when assembled as shown.

It's little things like this that teach the finer points of mechanical Engineering, and if you are a novice builder, it's the time to learn how to problem-solve. If you fail at first, back off and start over. Remember, I'm always available by phone, but make a good stab at solving problems before calling.

Assemble the Hitcher crank, and attach it to the motor shaft. You use the same method with the U-bolt as you did on the UPM crank system. The image below shows how everything should look. Now, using four 10-32 screws provided, attach the motor to the thick rack bar as shown, with the shaft facing into the parallelogram rack. Attach the lever to the crank pivot, then to the parallelogram rack. On the rack, the 1 1/2" bolt is hard attached, and the lever has the pivot. **Remember to use grease! This is the most demanding situation on the device, so make sure everything moves smoothly and there is no appreciable wobble.**



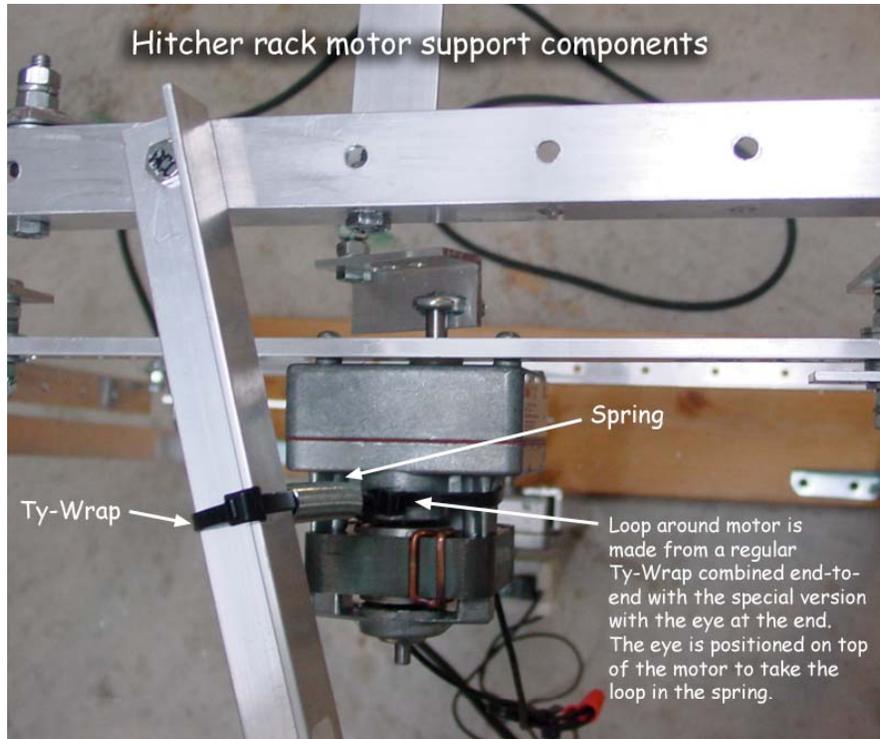
Now, all that remains to be done for the Hitcher mechanism is to mount the clamps for the coat hanger wire arm movers. These consist of a nut, 2 flat washers and a nut, and go on the long bolts of the three small hitcher levers that protrude from the front (see image near front of manual.) You'll discover that a lock washer is unnecessary, and having them 'free' makes working with the arms later a snap.

The Motor Support

The Hitcher attachment's motor can run as-is, but we've added a little extra support for the overhung load. Look at the illustrations of the finished kit to see the location for it. It attaches with a single short bolt to the top of the parallelogram rack, in

the hole that's nearest to the center of the motor's travel from left to right. Take the spring provided, and secure it to the support piece with a Ty-Wrap. Just put the tie through the spring, and zip it around the bracket as seen in the pictures.

Now attach the spring to the motor. As shown below, take the eyehole-version Ty-Wrap (a spare is provided) and combine it with an ordinary one end to end to make a single long piece that will fit around the motor. Put it on and pull it snug, leaving the eye on the top of the motor. Again, make sure the support bracket is positioned near the center of travel. You can turn it as shown in order to do this.



Step 5: The ghost mounts

The three gooseneck pieces go on as shown, with short bolts and lock washers. To make location simple, stand in front of the device

(audience side). Mount each gooseneck on the third hole to the left of the little hitcher levers. See the completed kit images at the beginning of the manual if you need clarification.

The top holes on the necks take a short bolt, and a flat washer – on the audience side. The hanger wire ghost armatures will clamp to these.

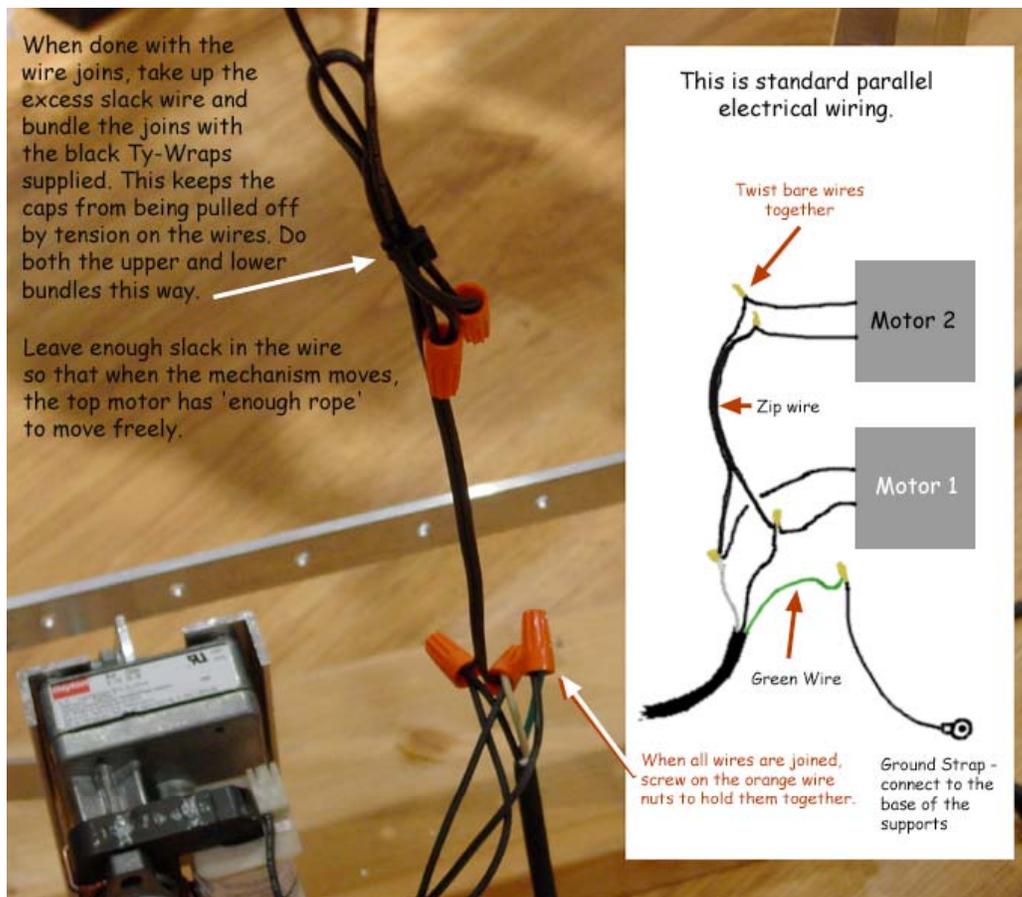
Step 6: Wiring

Now it's time to run-test the device, so you need power to the motors. The wiring on this prop is simple. See the illustration on next page for wiring diagram and other details.

When done, with all body parts away from the prop, plug it in. Leave your hand on the plug, so you can pull it if a bind-up occurs. If you have been careful, and have checked your work, the Hitcher device should work as designed. If it does hang, the cause will be readily apparent, and you should be able to adjust and correct for it.

Allow your Hitcher to run for a while, and watch it. It is possible that you may have missed a loose pivot lock, and if so, parts could work loose. This is what you're looking for (and yes, it happened to me while testing the prototype.)

Again, **BE SURE NOT TO ADJUST THE MACHINE WHILE IT IS RUNNING!** I know it's a temptation, but you could get HURT. Let's all be safe, shall we? You're making hitchhiking ghosts, but you don't *really* want to *become* one.



Once everything is secure, run the machine for a few hours, if you can afford to. This will break it in and let the pivots settle. Afterward, check again for any excessive pivot play. Adjust if necessary.

Step 7: The ghosts

If you've built our FCG, you will have absolutely no trouble with these little ladies. It's a craft project in which the whole family can get involved. I suggest you have a meeting of all those involved, and decide what the ghosts are going to look like. Below, we show you a technique to distort the mask face, and this can be carried to extremes.

Michael's craft stores carry the "Mystic Mask" line, and that's the mask I used. If no masks are available, you can make stiff paper ones and make them work. Alternately, you can use Styrofoam eggs as heads, and sculpt them to suit you. Don't worry about anatomical correctness – in the dark, under black light, everything seems different! I encourage you to create and drape your ghosts with black light available. That way, you can see what you're doing and make changes on the spot.

How to make the ghosts

First, you will need to 'blue' your cheesecloth. It's really brain-dead simple to do this. You'll need about 4 yards of cheesecloth per figure (about 12 total yards) depending on how you choose to drape.

Put the cheesecloth – all of it in a bunch – in a clean sink. Add a handful of laundry detergent. Almost all of these have blueing in them. Just shine your blacklight on the powder or liquid to be sure. Let the cheesecloth soak for 5 minutes or so, then rinse - but not thoroughly. Leave a little residue behind. Now throw it in the dryer for about a half-hour and you'll be ready to begin.

You will also need about 5-6 wire coathangers – the kind that doesn't have a paper tube as the lower bar. You'll open these by untwisting the hook, and then carefully bend them out straight. You'll be re-bending them in different locations to make your armatures (the 'skeletons' of the figures.)

As with the FCG armature, we used coat hanger wire for these. In the images below, all will become clear.



Once you have your faces distorted, and the styro half-ball glued in as the cranium, it's time to cover the faces with two layers of blueed cheesecloth. With a brush, spread a medium - thick coat of Tacky glue over the face. Press the cheesecloth onto it, making sure to wet both layers. Allow to dry for 2 hours or so before doing anything more with the heads.

If you plan on lighting the eyes using C-7 bulbs (as we will show later), coat the insides of your masks with aluminum foil - except for the eyes, of course. Just glue it in with Tacky and then use an X-Acto knife (or other small, sharp hobby knife) and carefully slice out the eyeholes.

The Armatures

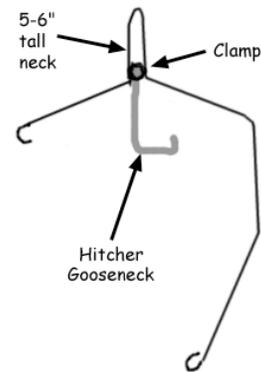
You will be creating three of these. The shoulders on my ghosts vary from 7 to 8 inches in width. If you want a wider or narrower figure, that's certainly possible, and up to you. Remember that female figures have 'triangular' shoulders, so make the slopes pronounced. Square just shoulders look wrong with these ghosts.

The best place to work them up is right on the goosenecks of the machine. Clamp the armature as shown, between the flat washer and the gooseneck surface. The neck sticking up should be about 6 inches tall.

If you wish to use the C-7 bulb eye option, now's the time to put in the sockets. We bought sockets from a lighting dealer and sandwiched them between the wires of the neck, facing forward. Check the position of your aluminum-lined mask, and set the bulb level with the nostrils. This will help keep direct light from guest's eyes. If you still have angle problems, paint the top of the bulb black. There will still be plenty of reflected light in the mask. Use a lamp dimmer (Radio Shack, Home Depot, Wal-Mart) to balance the illumination of the eyes with the fabric glow.

Now, we need some hands for our hitchers. Make 6 hands (3 left, 3 right) as described below.

Coat-Hanger Wire Armature (x3)



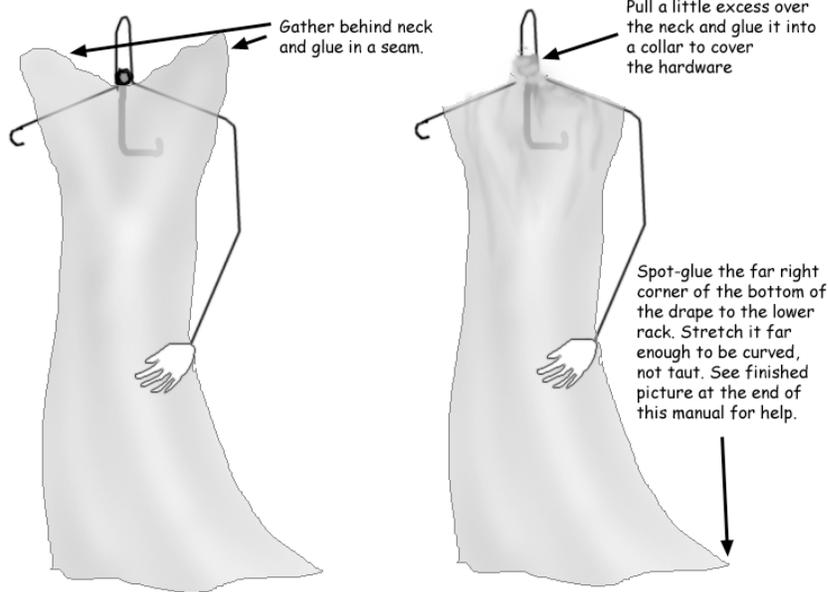
Take 3 straight pieces of coat hanger wire about 18" long each, and twist a flat loop in one end with pliers. Attach the finished 3 right hands to these loops with Tacky glue. Allow them to dry flat – and make sure they *can*. Drying time may be as long as 4-6 hours, so be cautious. *Don't put these in the microwave!!!*

The left hands attach to the loops on the armature in the same manner. Clothespins help to clamp the hands on while drying; just keep the pins away from the glue. Allow to dry.

Draping the ghosts

Before you begin draping, run the UPM/Hitcher until the parallelogram's top bar is all the way to the left, from the audience side. This must be done in order to locate the tack points for the 'feet' of the ghosts, as they will 'sidestep' while thumbing. Clean the top surface of the bottom parallelogram piece with alcohol (not rubbing alcohol – it has baby oil in it) or a household cleaner. This insures that the glue will hold.

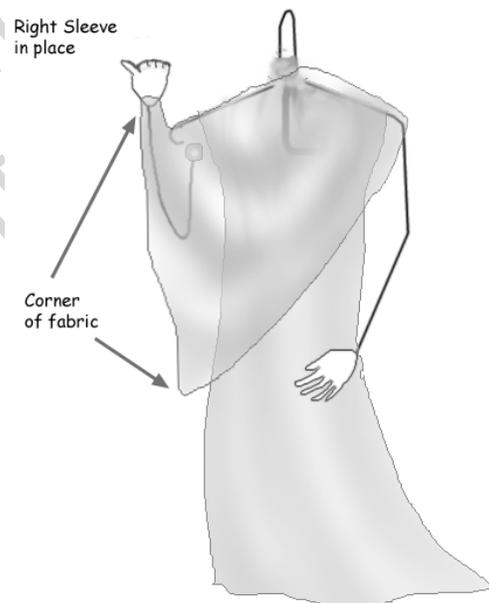
Cut a piece of cheesecloth about 40-42 inches long for each ghost. This will be the body. Now, drape it as shown below:

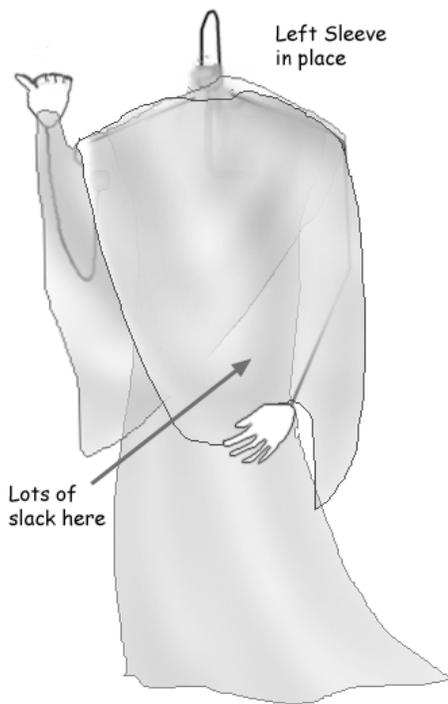


Now, it's time to add the right arms to the mix. Take the assembly, and add a loop to the other end of the arm, and clamp it onto one of the hitcher rack arm mount points. (If it isn't obvious, these are the ones that have 2 flat washers braced between a pair of nuts - the ones on the hitcher levers, in other words.) Take the arm and carefully bend it so that the thumb is just below what will be mouth level on the figure (get a head and check it.) Now, with the

hand in that position (you hold it there) distort the rest of the wire until it approximates the position the arm would naturally occupy. This takes a little play, and once the unit is running, you'll make some more adjustments to the arms' positioning on the Hitcher shafts. (In fact, you'll probably play with it a lot, if you're like me! I spent over an hour fiddling with the arms and drapery before I was happy with the ghosts.)

Draping the (eventually moving) right arm is not hard, but it is position critical for a good look. Put the drapery around the neck again as you did with the body, but let more hang in front than in back. (see pictures in back.) One corner of the square of fabric should be pointing at the ground, and the other corner should be at or about at the wrist. Make a collar of bunched fabric at the wrist to hide the wire behind it. It is not necessary to drape the wire supporting the hand. You can, if it looks right. Otherwise, let the wire live





outside of the sleeve. (Two of mine are outside, one inside the sleeve. I decided based upon appearance.)

Next comes the left arm (each arm needs a 1-yard-long piece of cheesecloth.) Start at the shoulder, and drape the fabric around the neck about half and half front to back. Stop and play here before gluing – there are any number of ways to drape this arm piece. If you want a more massive stole effect in front, wrap more of the fabric around the front of the neck, for instance. At the wrist, center that end of the sleeve over the arm. Let the drape hanging down on both side be about even. Note that having the left arm on top helps make up for all that weirdness in the right.

NOTE: You should play with every aspect of draping before committing fabric to glue. You may discover a new and superior method of doing this, and if so, we hope you'll photograph it and let us put it up on phantasmechanics.com

After you're satisfied with your body, take the finished head and press it onto the neckpiece slowly and carefully. Those doing the lighted eye option should place the mask far enough forward so that the bulb is not touching the foil lining (the bulb doesn't

even get hot enough to melt styrofoam, but be safe anyway.)

You can do fun things like tilting the head to the side in a jaunty angle, in the direction the thumbs are pointing, to give a bit of extra 'going my way?' to the image. You can also have them looking in different directions. This is also time to play with arm positions, and make final adjustments of the main drapery. What-if-ing is a good thing, and the heart of imagineering.

Now it's time for the final drapery – the hair. Divide up the remaining cheesecloth amongst the sisters. (The longest hair on any of my ghosts is 24" across, and the shortest is about 18".) Fold the cheesecloth in half across its width, and then double that over. Simply lay it across the top of the head as you wish. The hair will be 4-ply, and thick, so you can 'style' it with a combination of draping and glue-tacking. I tend to spot glue little peaks at the temples, but do what ever suits you: more playtime. In fact, in my experience of building dozens of finished FCG marionettes, the hair is the most critical thing for a good look with this prop. Once again, the pictures below (last page) are worth many words.

NOTES – please read

The **eye option** can be constructed any number of ways. The cheapest, of course, is cannibalizing a Christmas light string – the C-7, 110 Volt variety, not the miniature kind. You'll have to do some cutting and splicing, but if you can wire these motors, you can wire these lights. It's the same exact method. Be sure your joints are clean, and that there is no exposed wire anywhere. **To be safe, wrap the wire nuts with electrical tape. You might want to do that with the motor leads as well, for child safety, if that is a factor!**

The **candle** shown in the hand of the center ghost can be made of a socket and a PVC tube, or you can cannibalize an electric Christmas candle – or a battery powered one. We used a socket in a tube, and drove it (C-7 clear bulb) with a neat, inexpensive AC candle flicker device from

www.hauntmasterproducts.com (be sure to tell Jim Kadel what you're using it for – he's a friend). We also misted that bulb with flat black paint to keep it looking mysterious and more like a real flame. The back of the bulb is completely blackened, so as not to shine on the figures.

Images of the finished prop – enjoy your project, and make it beautiful!

