SUNDAY, APRIL 01, 2007

Finished Cutting Center Foot, Primer for Half Moons, Filed Shafts, Attached Foot Strips

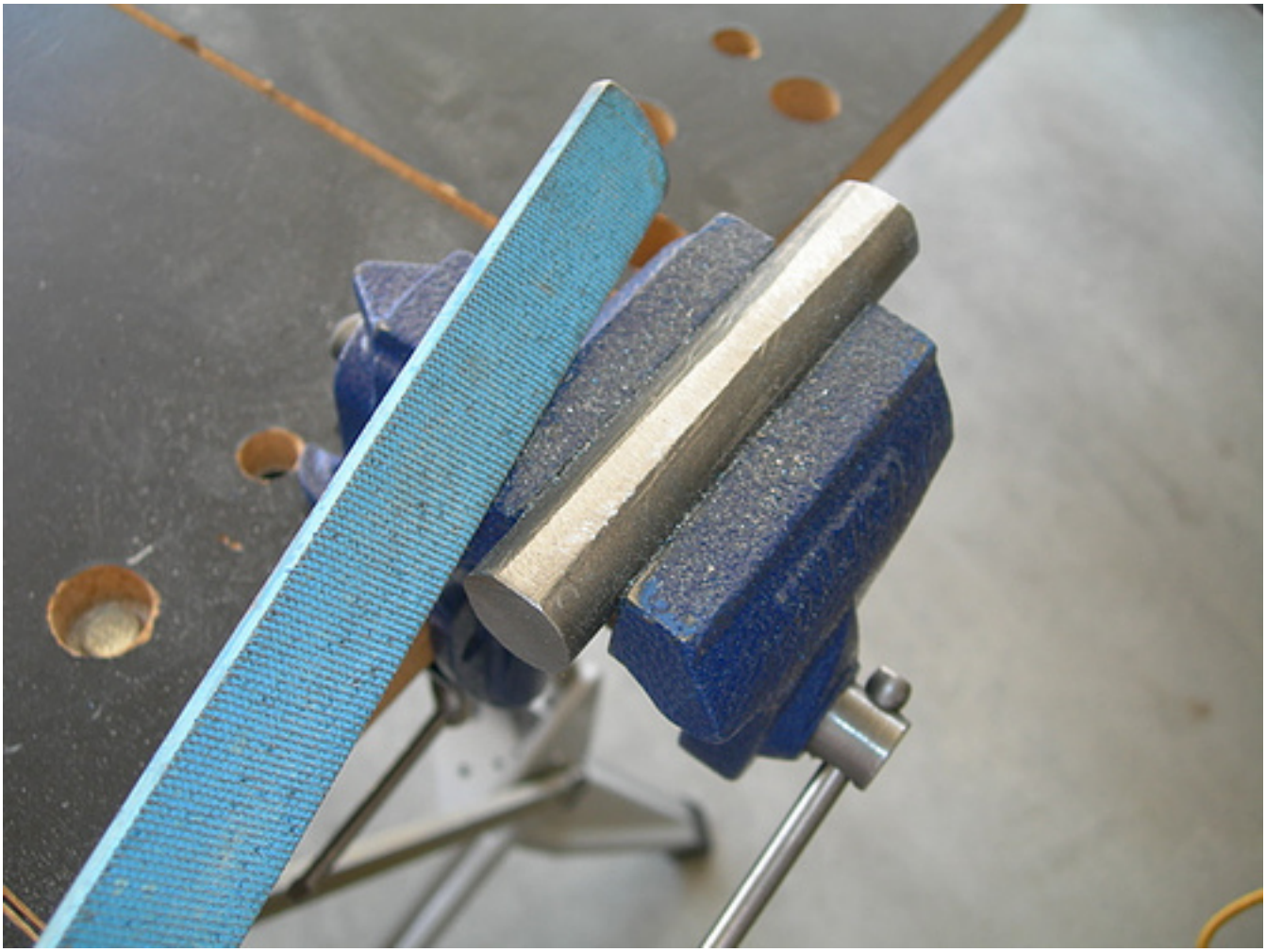
Unlike last year, I didn't have an April Fools joke for this year.

It was a busy day, but still not enough hours to do all that needs doing.

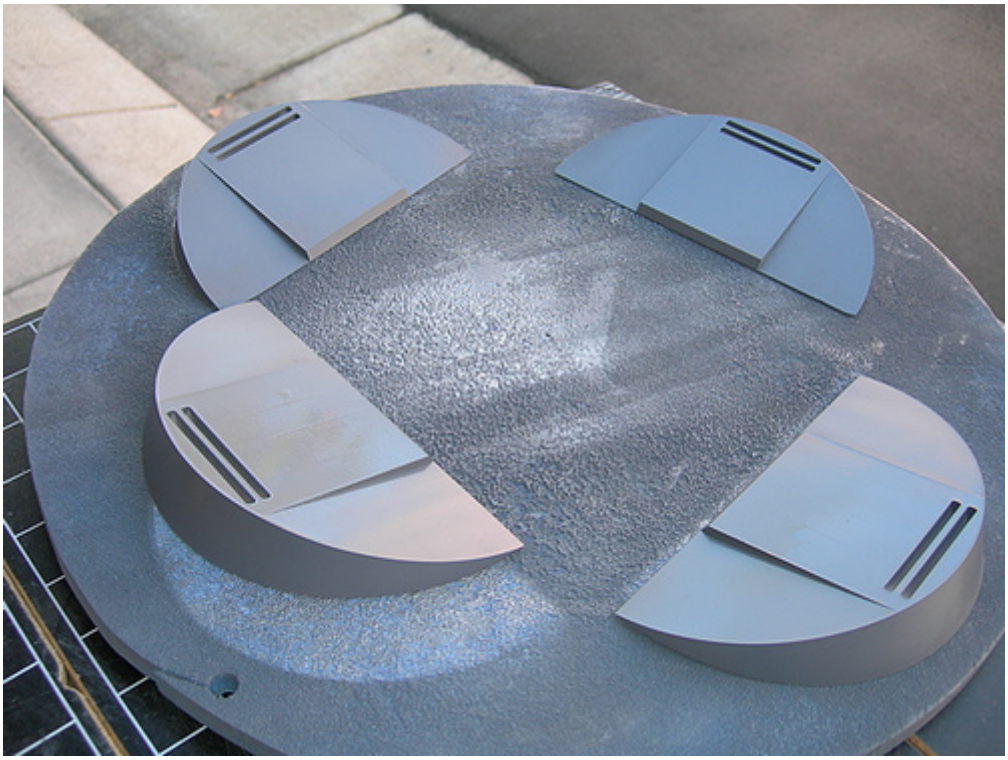
I started off by finishing the wood cuts on the center foot. I found that I needed another 1/2" of plywood to make everything work. I also have the casters sticking out further than half way from the bottom of the foot. I'm not sure if that may present any problems, but I don't think so.

I had to glue up that last 1/2" of plywood, so I hope to screw and bolt everything together once the glue dries.

Next, I turned to the enjoyable task of filing steel. Four axles and three shaft adapters need two flat spots each, to accommodate the set screws for the gears and wheels.

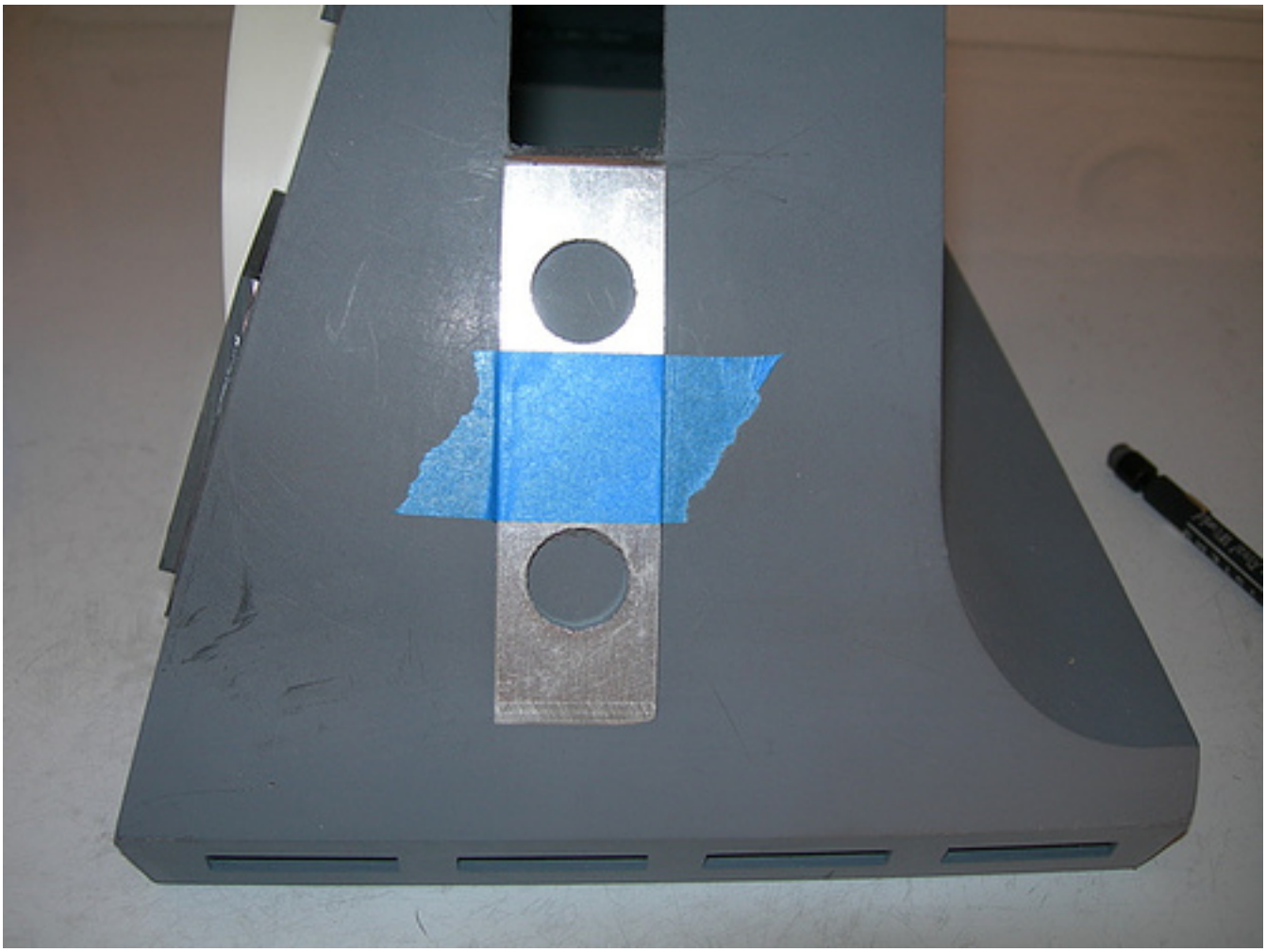


I applied primer to the half moons today. I was also going to prime the foot shell doors, but I didn't get around to it. All I did for those was rough them up with sand paper.



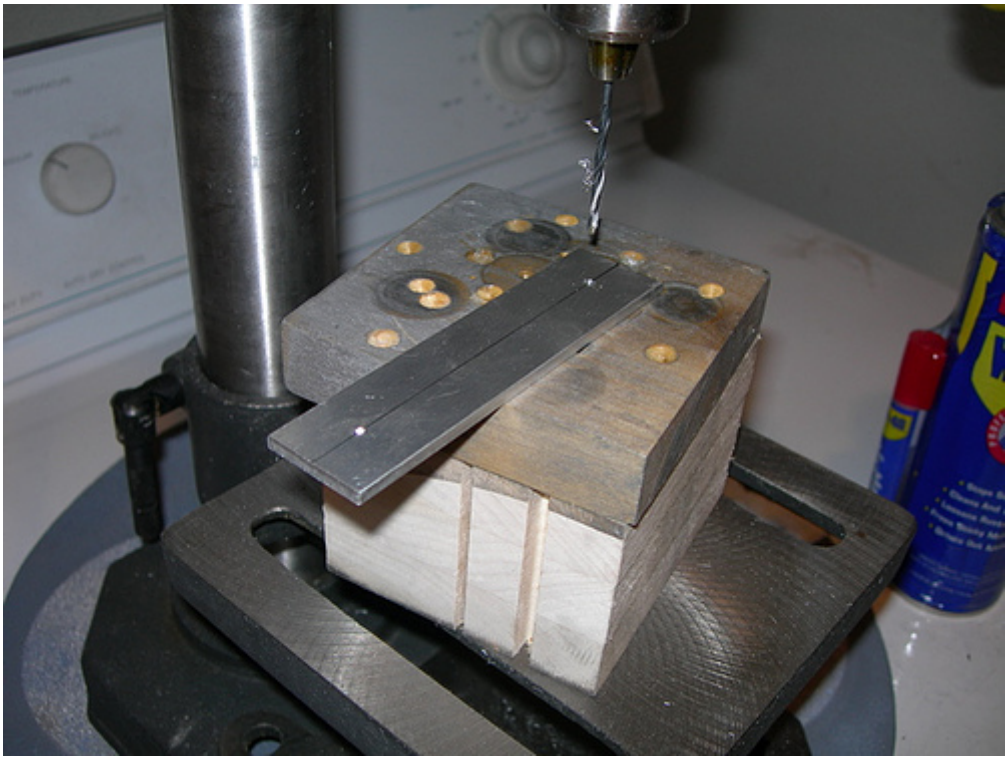
I wrapped up by installing the foot strips on all the feet.

For the front strips on the outer feet, I taped each foot strip in place and traced the circles for the knurled cable fittings with a pencil, to indicate where to drill.



I used a 5/8" Forstner bit to cut out the circles.

For the foot strips on the backs of the outer feet, and for both foot strips on the center foot, I drilled and tapped holes for #4-40, 3/8" machine screws. Those foot strips are screwed in from the inside.



I likewise drilled the foot shells, but I let the screw itself do the tapping into the PVC.

One step closer.

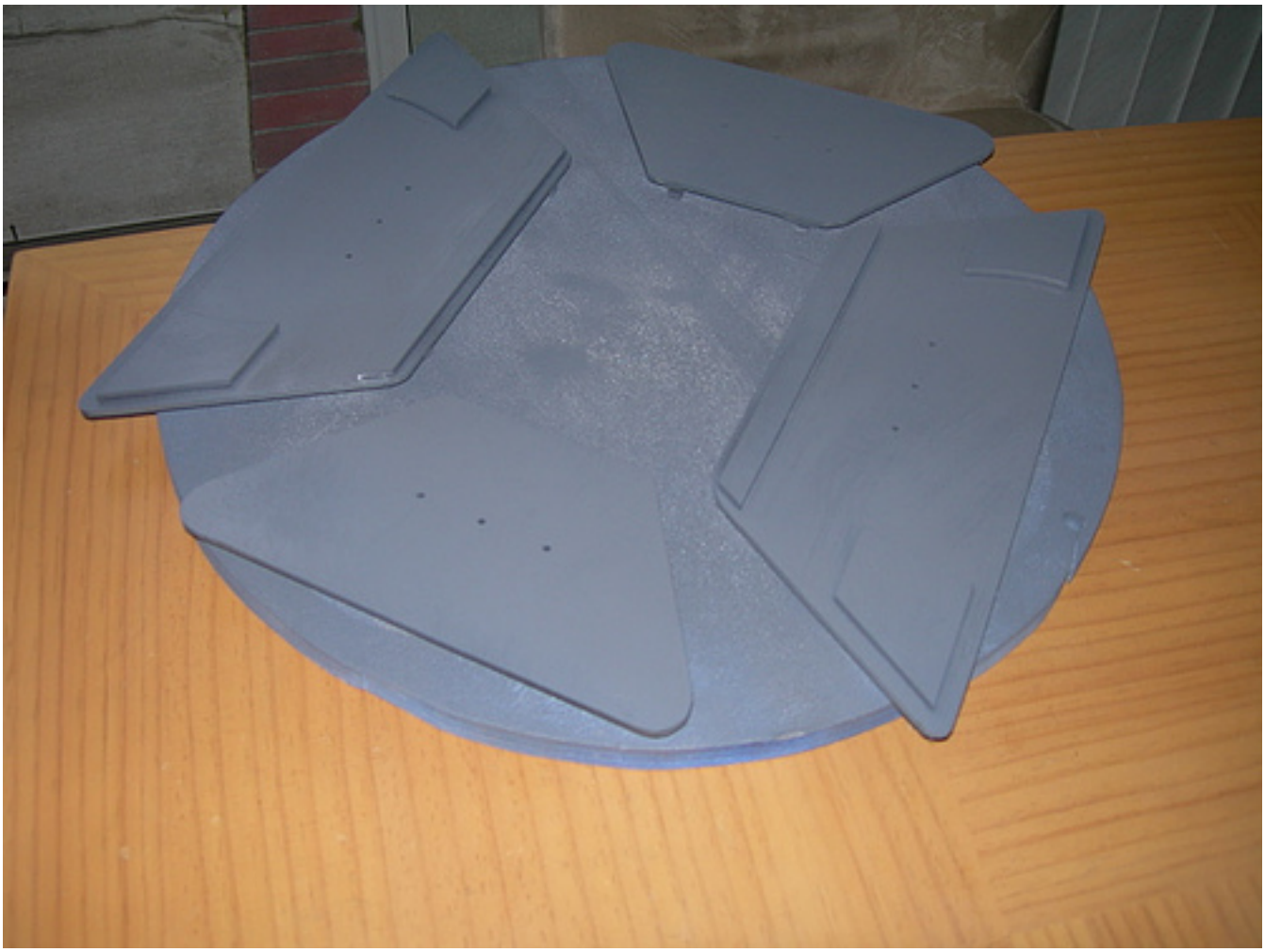
posted by Victor Franco at 11:50 PM 0 COMMENTS

MONDAY, APRIL 02, 2007

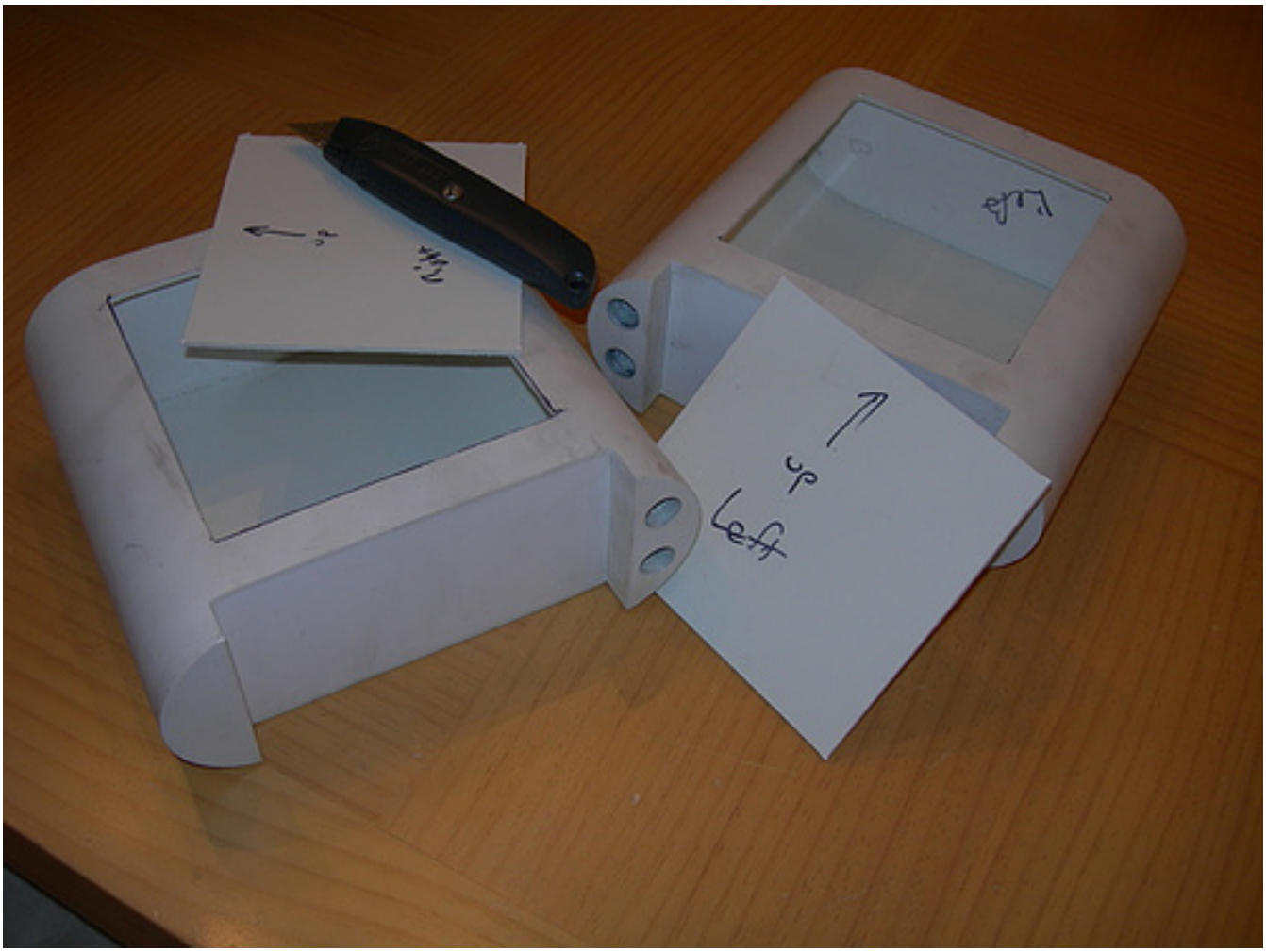
Primer for Foot Shell Doors, Finished Cutting Battery Box Doors, Continued Center Foot Assembly

The march forward continues.

This morning I applied primer to the foot shell doors, and glued together the wooden channel for the center foot.

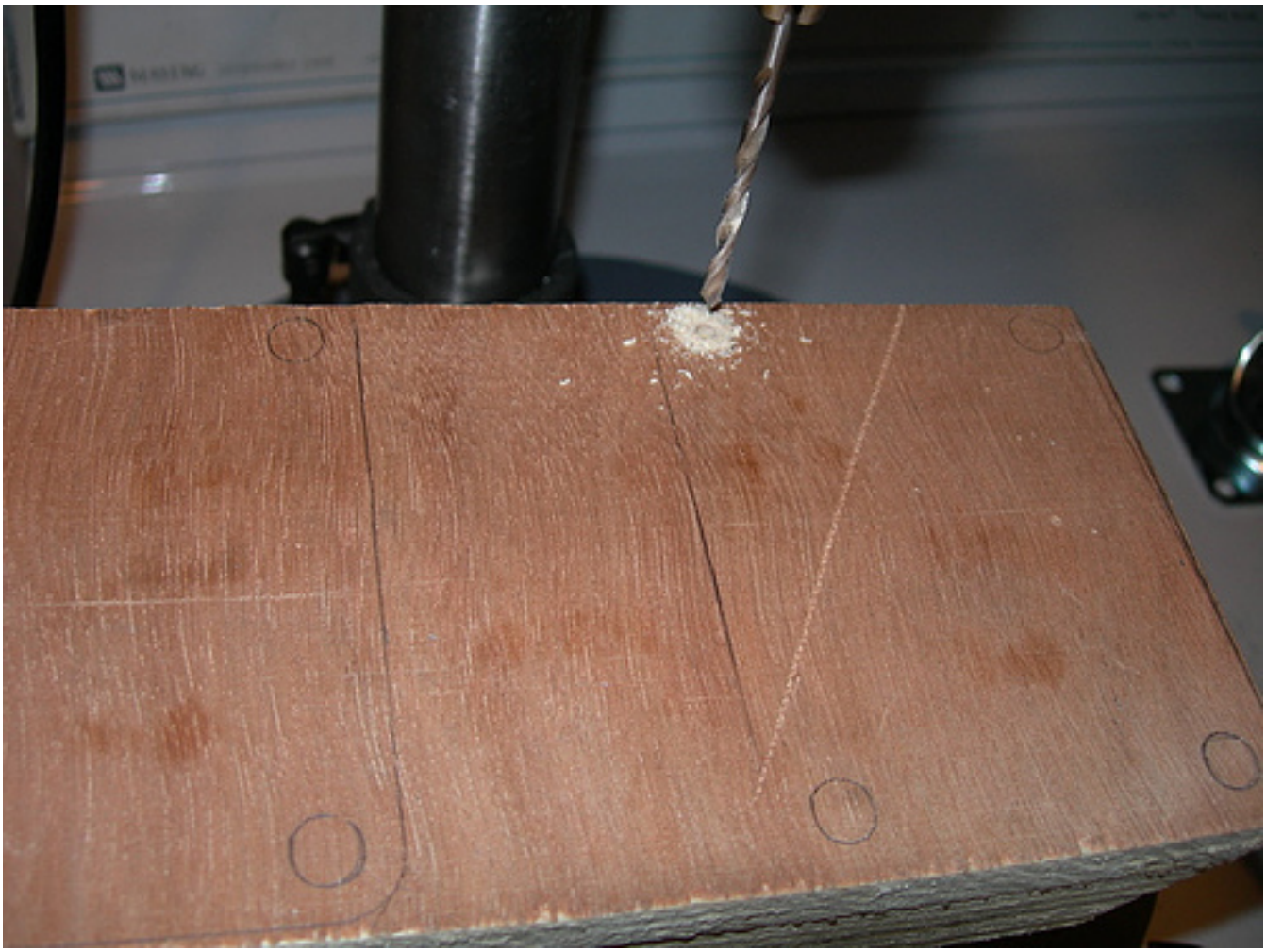


In the evening I finished cutting the access doors on the battery boxes that Mike started a couple of weeks ago. I will place small pieces of PVC on the inside behind each corner, and then screw the doors back on.



Once the glue had dried sufficiently, in the evening I drilled eight holes along the sides of the center foot channel and sunk 2" screws into the foot assembly to hold it all together.

Then I flipped the assembly over and drilled the straight holes for the casters. The outside holes will need to be drilled at an angle.



I bolted down the inside corners of the casters. Again, I hope those wheels aren't sticking too far out. I *think* they are okay.

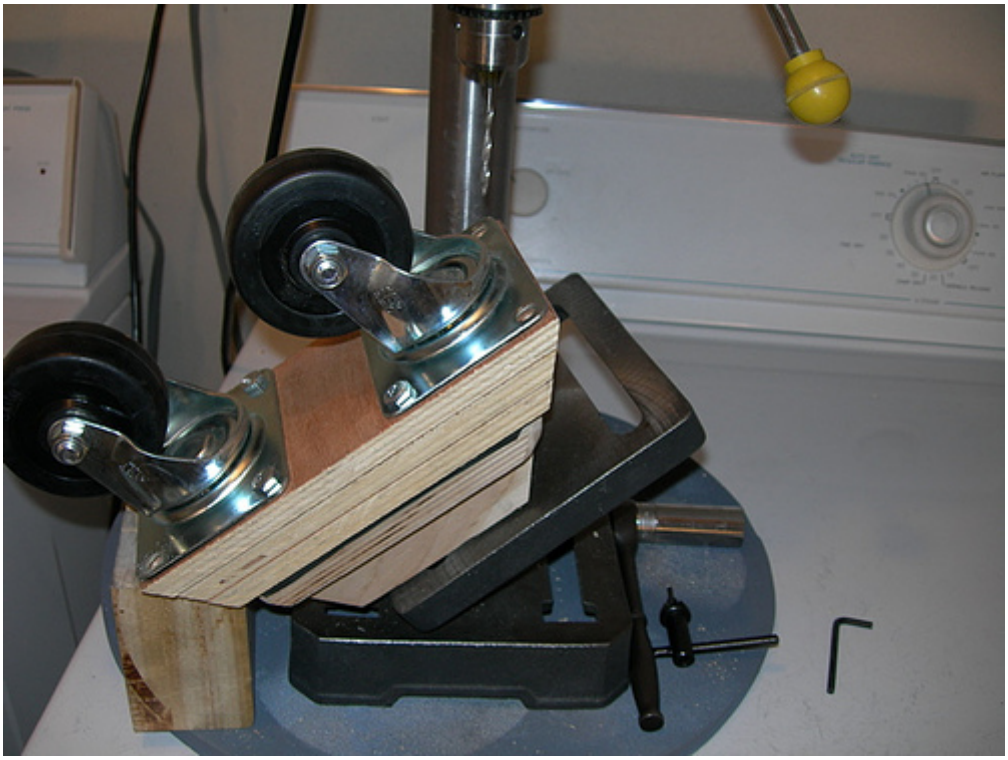
posted by Victor Franco at 11:54 PM 0 COMMENTS

TUESDAY, APRIL 03, 2007

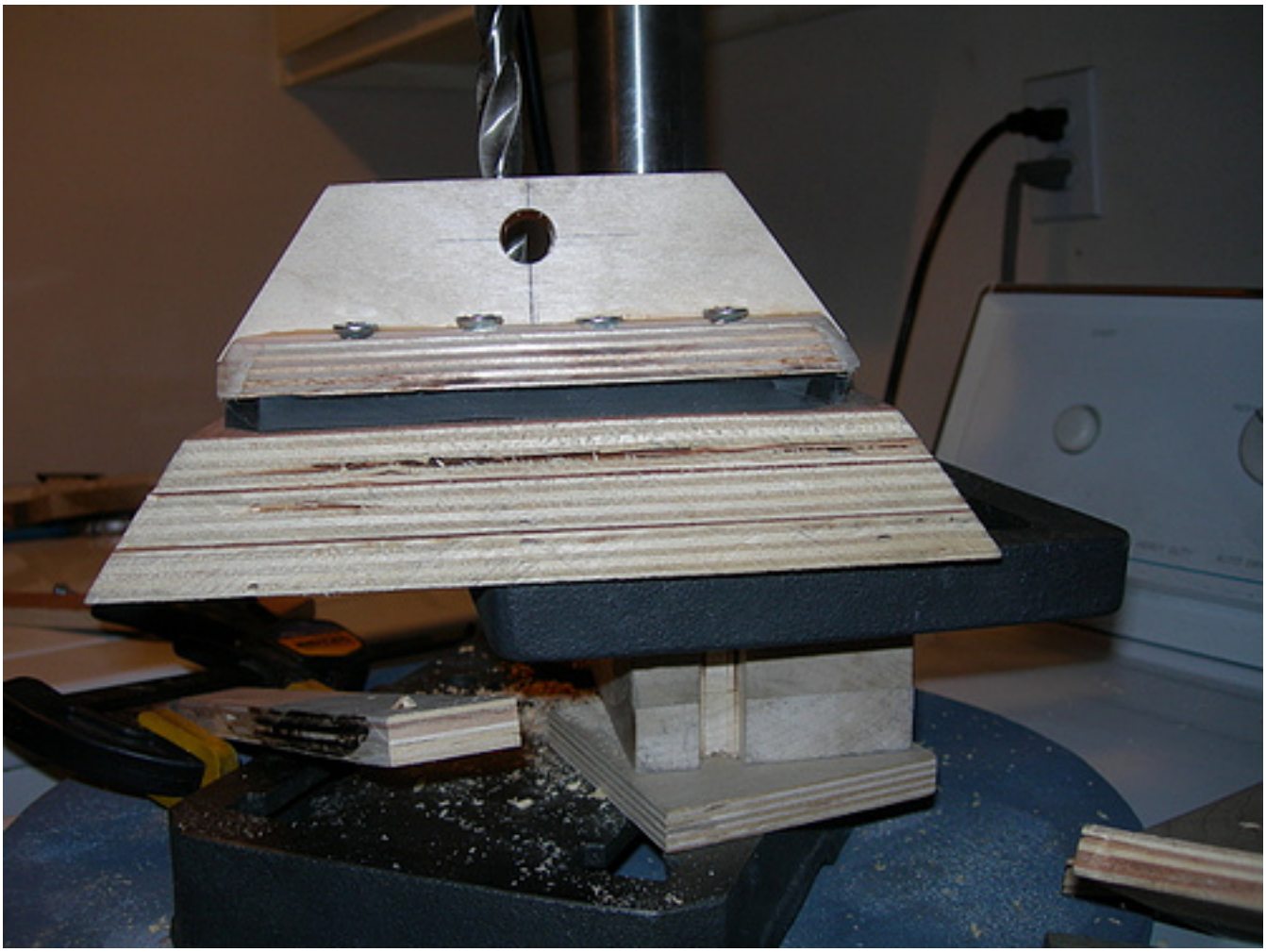
Center Foot Setback, Installed Battery Box Door Holders

I had been waiting for today for quite a while, but it ended in sadness.

Today was the day I planned to install my center foot. I drilled the remaining holes for the outer caster bolts.



Then I drilled the ankle bolt hole.



And then I tried fitting the center foot on the leg.

There are at least two problems with the center foot. First, it is too tall, as I feared it might be. Second, apparently I drilled my ankle hole too low, because the front wheel is barely touching the ground. The rounded part of the bottom of the center leg is forcing the foot to do a wheelie.

I will probably have to rebuild the whole thing from scratch, for the third time. That is why I am sad.

I did manage to get something right, I installed the door holders on the battery boxes. Once the PVC glue dries, I'll place the doors back on and drill holes through the door corners and the holders, and then install the screws that will hold the doors on.

posted by Victor Franco at 11:16 PM 5 COMMENTS

Two Years Ago Today...

Today is the two-year anniversary of my meeting Mike's R2 for the first time ever at Walmart in Anaheim. I was hoping to have my R2 done by this date, but it's not quite there yet.

Just seeing that grungy Quicksilver shirt on the hanger brings back good memories. :)

posted by Victor Franco at 12:26 AM 0 COMMENTS

WEDNESDAY, APRIL 04, 2007

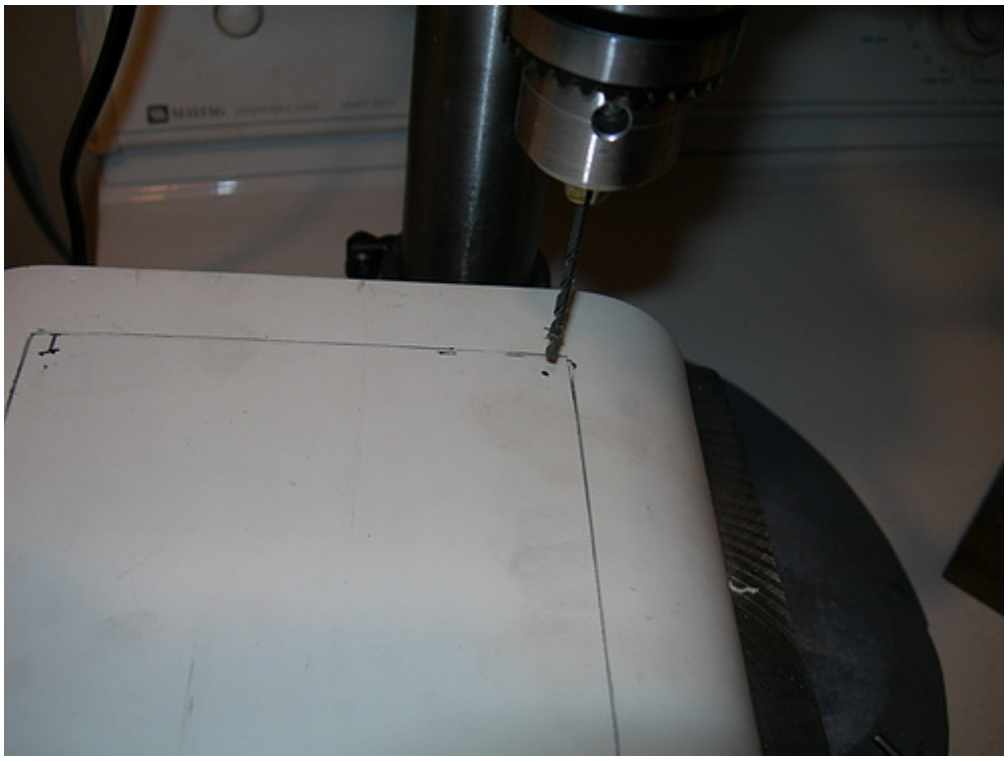
Finished Battery Box Door Holders, Hacked on Chain

Ah, sweet pity, where would I be without you?

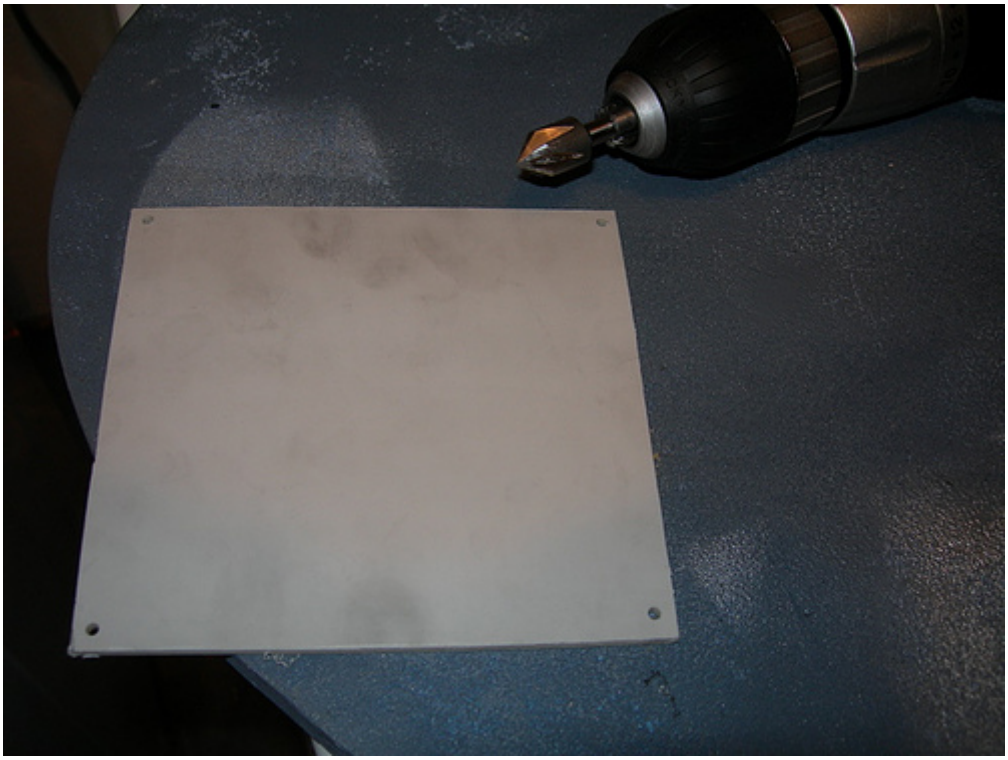
Matthew Henricks and Mike Senna have kindly offered to help with the center

foot; Matthew can help with the plywood, and Mike will help make sure that attempt #3 is correct.

In the meantime, I finished the battery box door holders. First, I reattached the battery box doors, and drilled four holes in the corners of each, using a drill bit just slightly smaller than a #4 screw. The hole goes through both the door and the holder underneath the door.



Then I re-drilled the door only, with a 0.113" drill bit, just slightly larger than a #4 screw. After that, I countersunk the four holes in each door.



Then I inserted the #4 screw. The screw self-taps into the PVC holder. Things are looking good, the doors hold right in place.

I tried working on the chain again with my chain unlinking tool, but all I managed to do was pop the pin half way out, and otherwise mangle the link. I'll tell you one thing, I have no fear of the chain breaking when R2 is driving around. I guess I'll try the Dremel next.

posted by Victor Franco at 10:20 PM 0 COMMENTS

THURSDAY, APRIL 05, 2007

Started Marking Foot Shells for Drivetrain Cuts

I barely got anything done today. All I did was start the process of marking the inboard side of the foot shells for the cuts that need to be made to accommodate the drivetrain, and I didn't even get very far with that. :/

posted by Victor Franco at 10:54 PM 2 COMMENTS

FRIDAY, APRIL 06, 2007

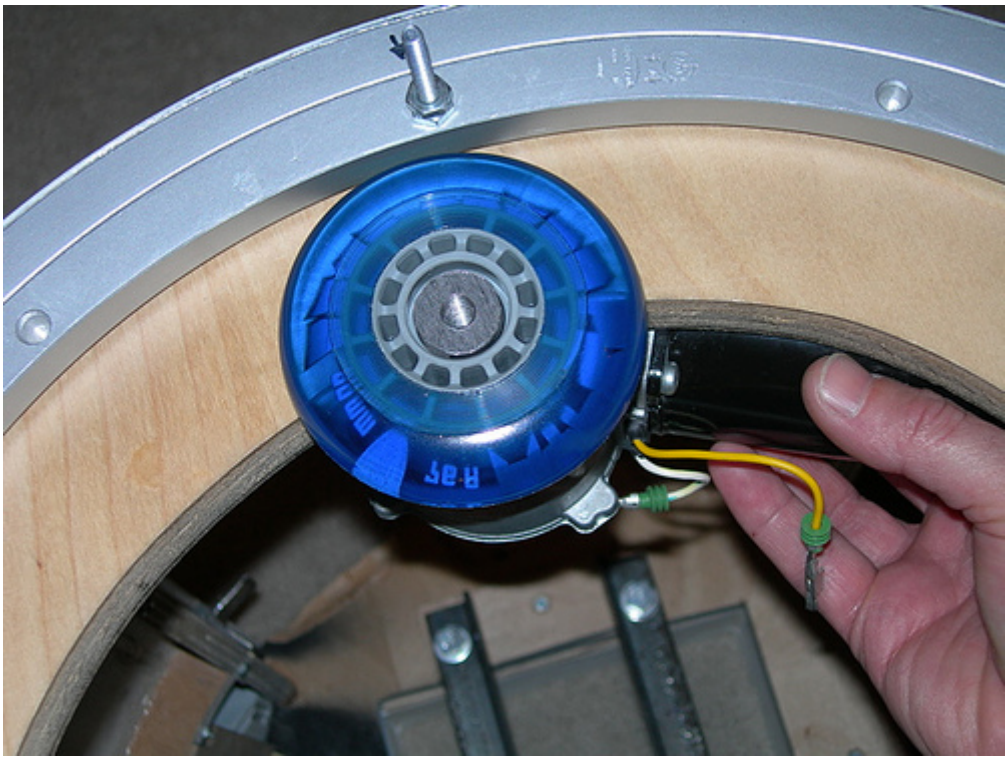
Cut Frame for Dome Drive

One last cut on the frame (or so I think).

This time it was for the axle to the wheel that will spin the Rockler bearing, on top of which the dome sits. The frame does not quite allow the axle to get close enough to the Rockler bearing for the scooter wheel to touch it, so I placed the wheel on top of the frame where it touches the Rockler bearing, and traced the hole.

I used the jigsaw to rough-cut the hole, followed by the Dremel drum sander to smooth it out. Roy Powers dropped by and gave me a hand with this, while afterward we discussed center foot issues.

Now, when the Saturn windshield wiper motor hangs from underneath the frame, the axle will be able to pass through the hole, and allow the wheel to spin the dome.



posted by Victor Franco at 11:35 PM 0 COMMENTS

SATURDAY, APRIL 07, 2007

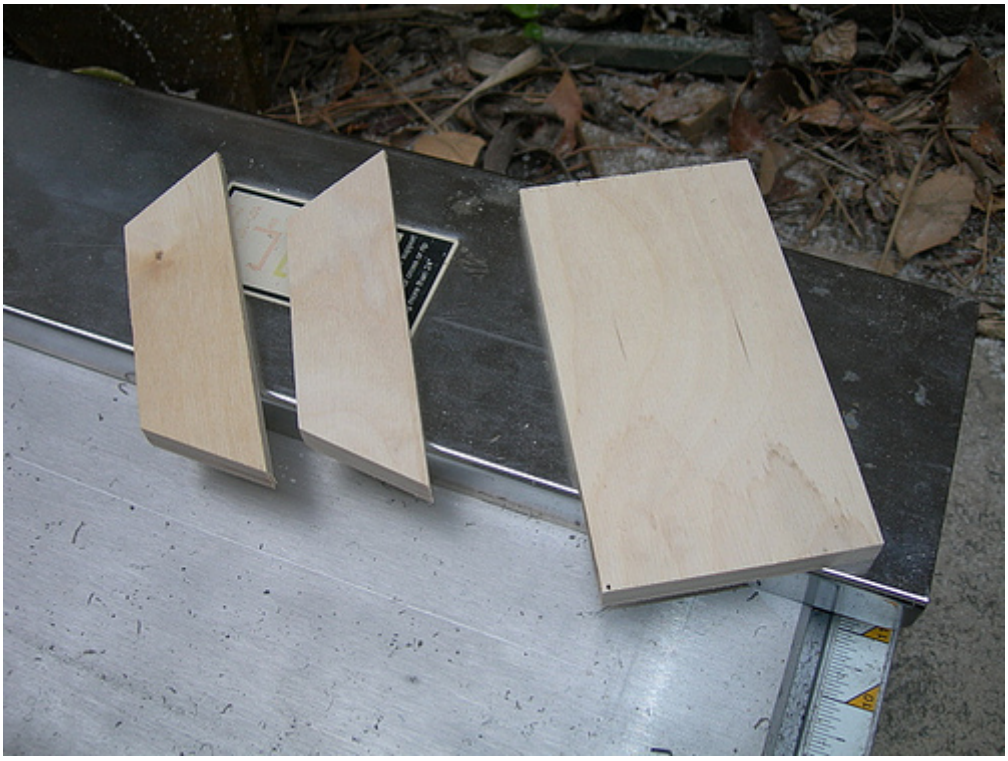
Recut Center Foot Again, Started Cutting Foot Shells for Drive Train

More help from my friends today.

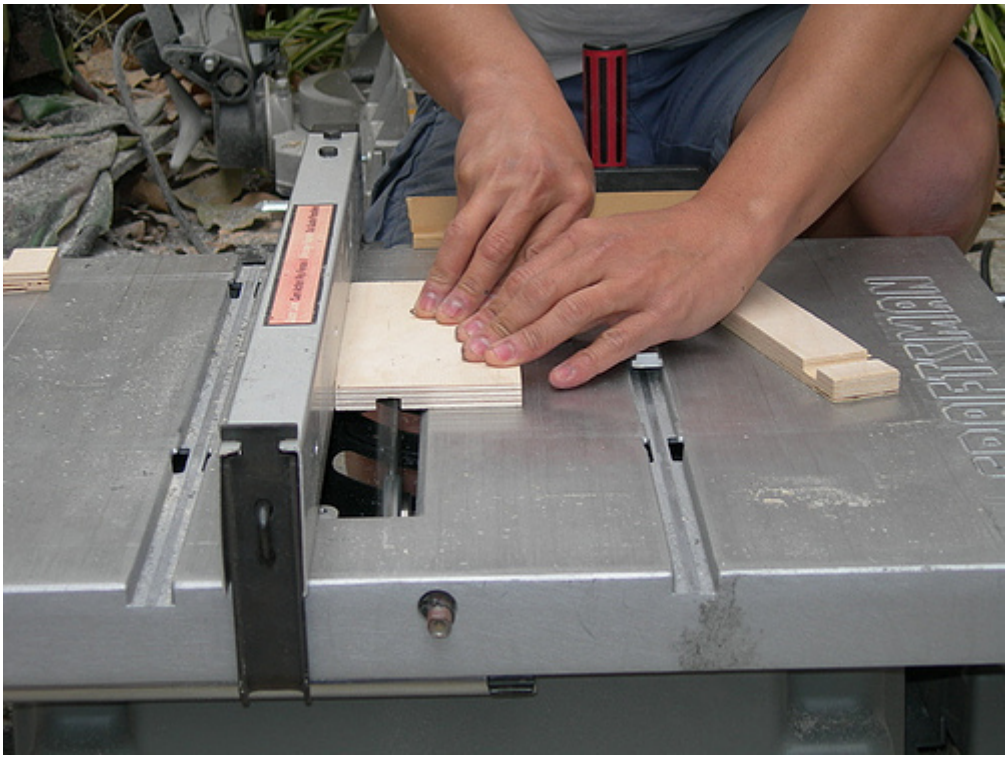
First, Matthew Henricks came through again for me with some more high-quality plywood for the rebuild of the center foot. Thank you again Matthew!

Mike helped for the three millionth time, this time with the rebuild of the center foot, and the start of the cuts on the foot shell for the drivetrain. Fortunately, my unintentional buffoonery usually makes Mike laugh, so he's somewhat entertained.

Stop me if you've heard this story before... I cut the basic pieces for the center foot on the table saw and miter saw.



Then Mike did the dado cuts that hold the channel pieces.



Meanwhile, Mike had all of about five minutes to work on his own building activities. He ordered some incomplete battery boxes from Craig, and is finishing

them himself.

While we were waiting for the glue to dry on my center foot, we started cutting into one of the outer foot shells, since the drivetrain will not fit within them. The drivetrain will continue into the battery box. Mike and I both worked on cutting the foot shell.

If I look like I'm going to puke, it's because the thought of accidentally destroying months of work with a bad cut on the Dremel makes me nauseous.

Next, Mike attached the casters. It is a *really* tight fit inside the foot shell, so the casters have to be mounted very precisely.

It's so snug in the foot shell, Mike had to grind off some of the overhang of the caster mount plate. More cool sparks!

As we wrapped up, we started checking to see if we could drill the ankle bolt hole.

Unfortunately, we ran into some trouble. The blueprints call for the ankle bolt hole to be 0.625" from the tip of the ankle, but it really needs to be closer to the tip (say, 0.500") for my 1/8" thick foot shells. So I'm going to have to figure out how to get a bolt into the foot shell without hacking too much of the shell, and verify that the foot will tilt at the 18 degree angle. If it doesn't, then some minor hacking is in store for the center leg. I really hope it doesn't come to that, though.

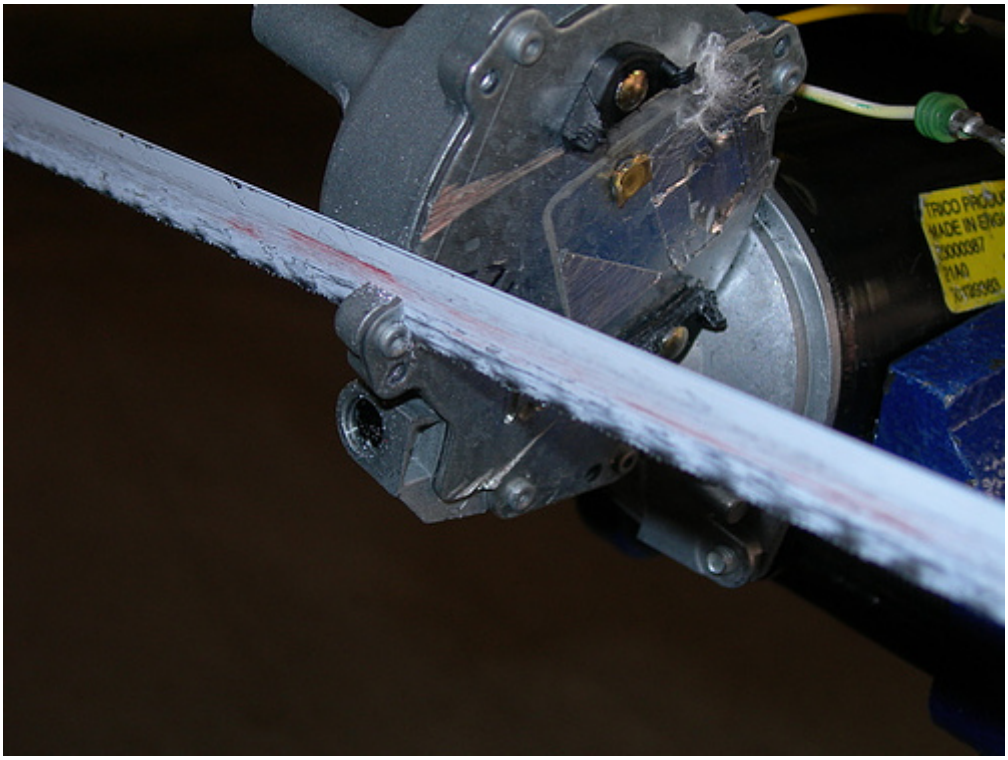
posted by Victor Franco at 10:20 PM 0 COMMENTS

SUNDAY, APRIL 08, 2007

Lots of Work on Left Foot

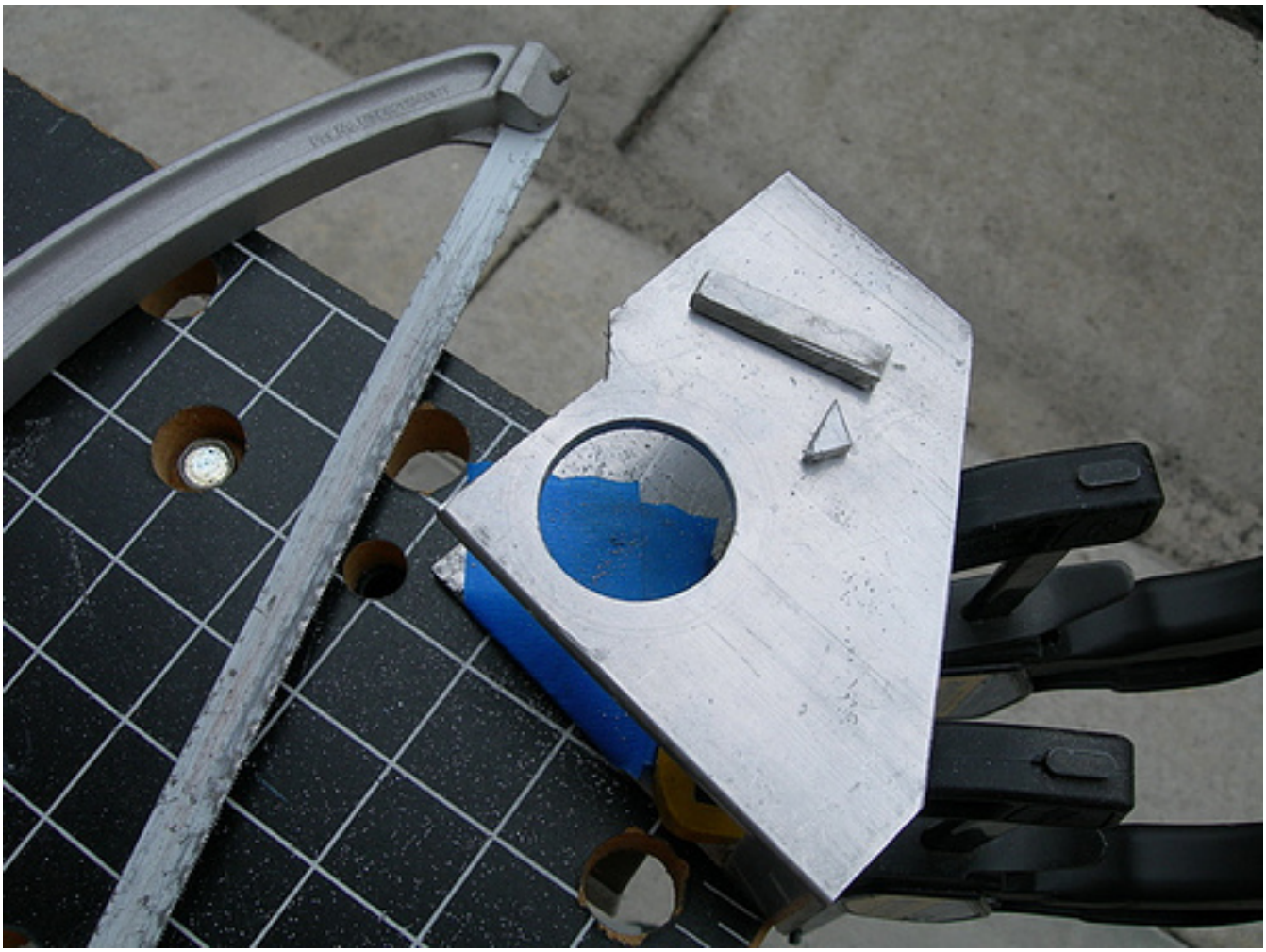
Today was a long but fairly productive day. I mainly concentrated on the remaining things to be done for the left foot.

First, I had to hack off one of the fasteners on each motor, so that they will fit inside the foot shells and battery boxes.

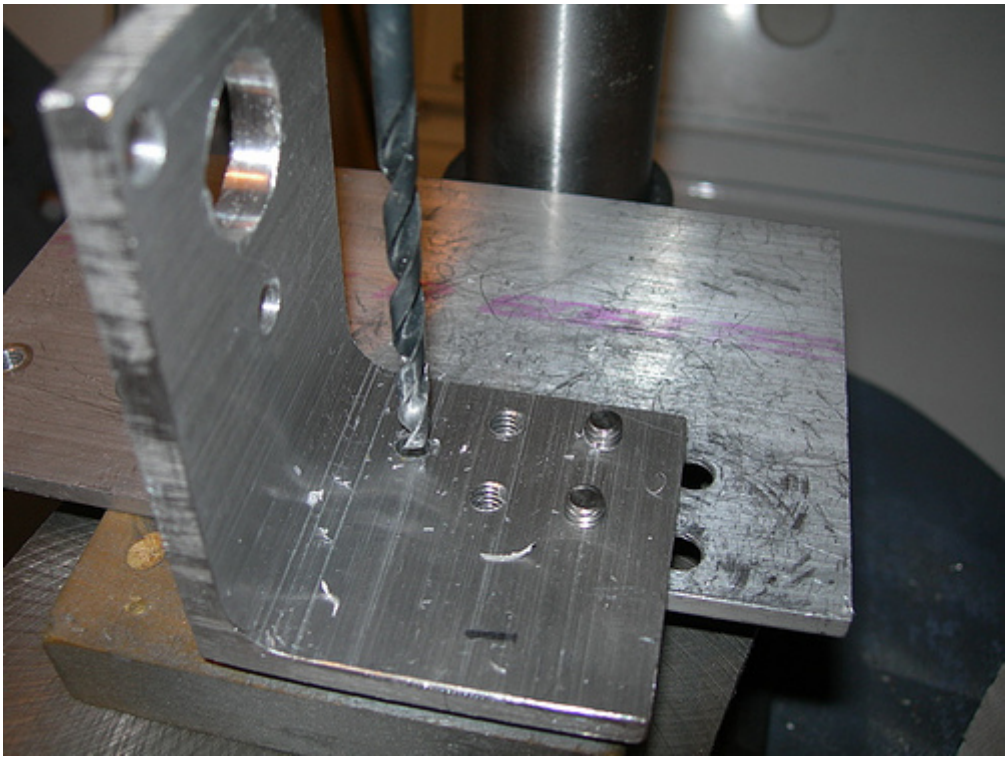


I found that if I followed the H&A drivetrain blueprints exactly, then the motor would collide with the inner part of the edge of the foot shell. I needed to move the motor inside the foot shell, by sliding the motor mount toward the wheels by 5/16", recycling previous motor mount scew holes. That necessitated a couple of changes.

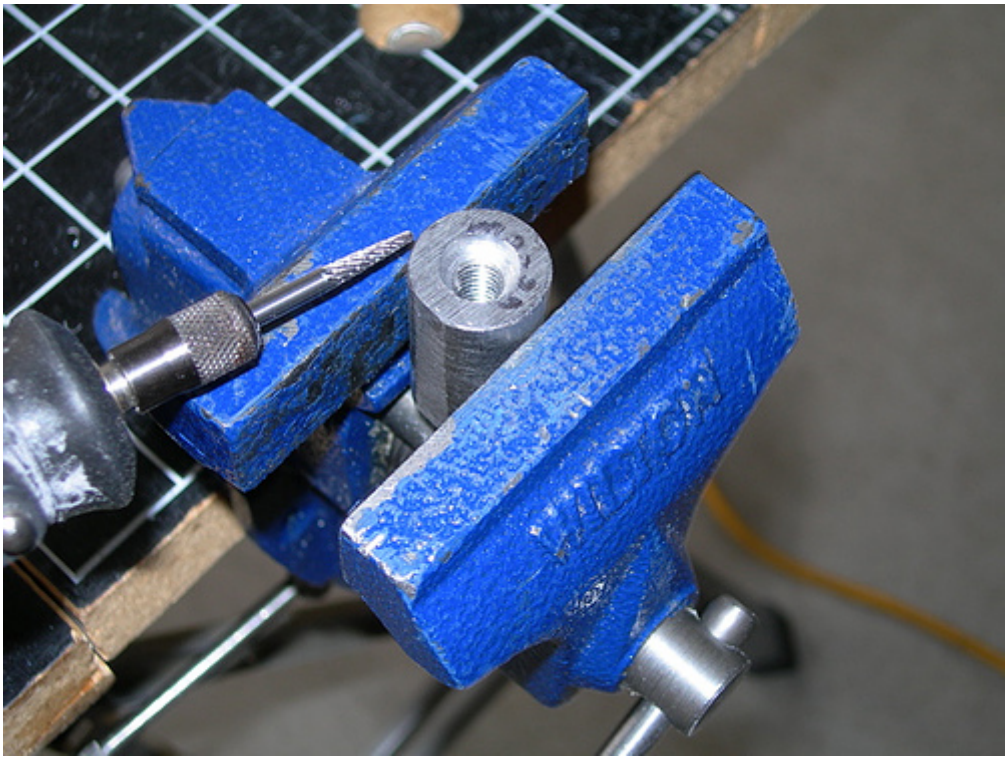
First, I had to hack into the front wheel housing, to allow the large, 22 tooth gear some room.



Second, I needed to drill a new hole in the main bar and the motor mount.

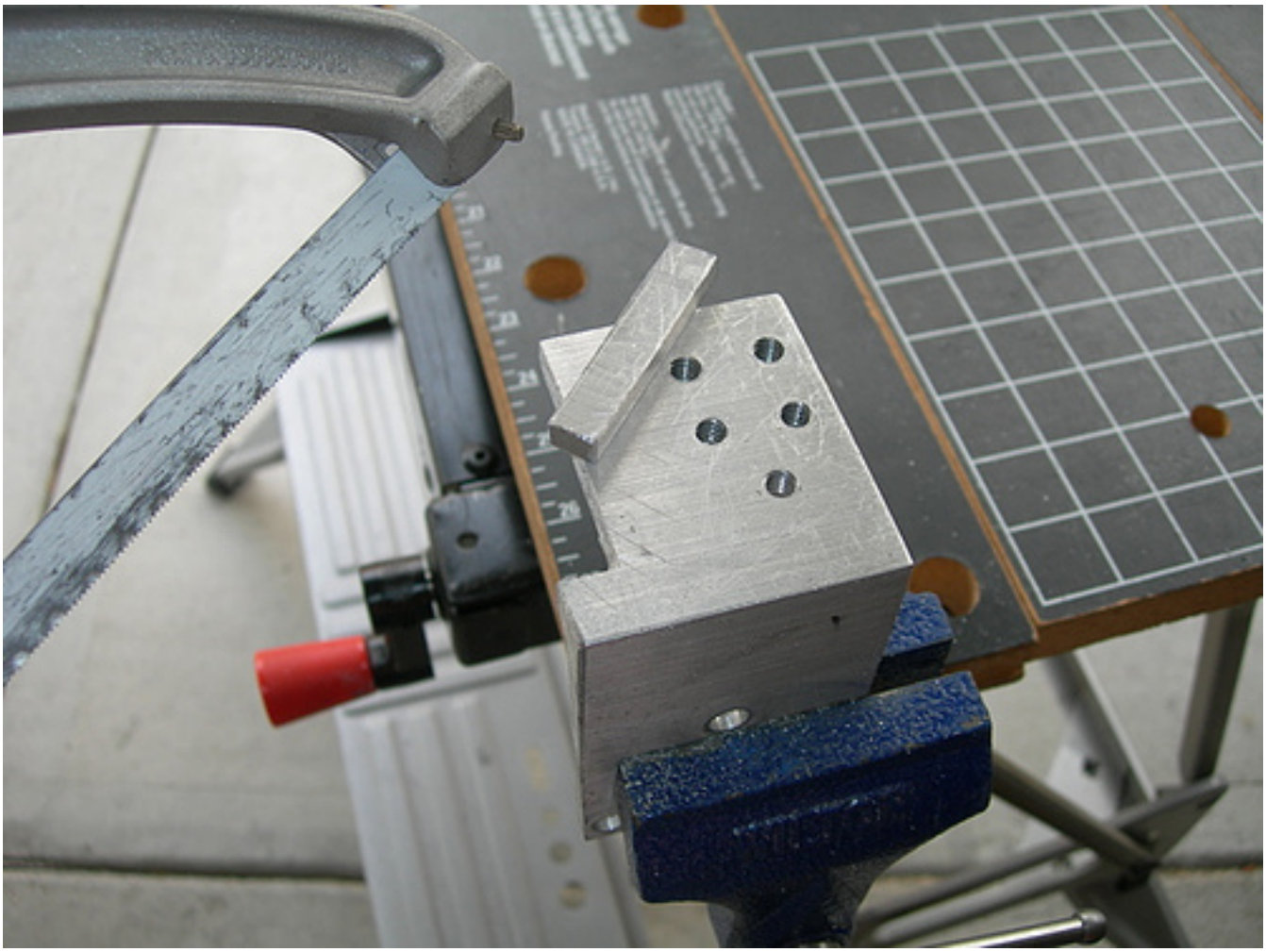


While I was working with the motors, I decided to modify one of the shaft adapters, to get it to fit snugly near the base of the motor shaft. With this modification, the shaft adapter screws on very close to the motor, and later I can drill a 1/8" hole through the middle of the shaft, and pin the whole thing with a 1/8" steel pin.

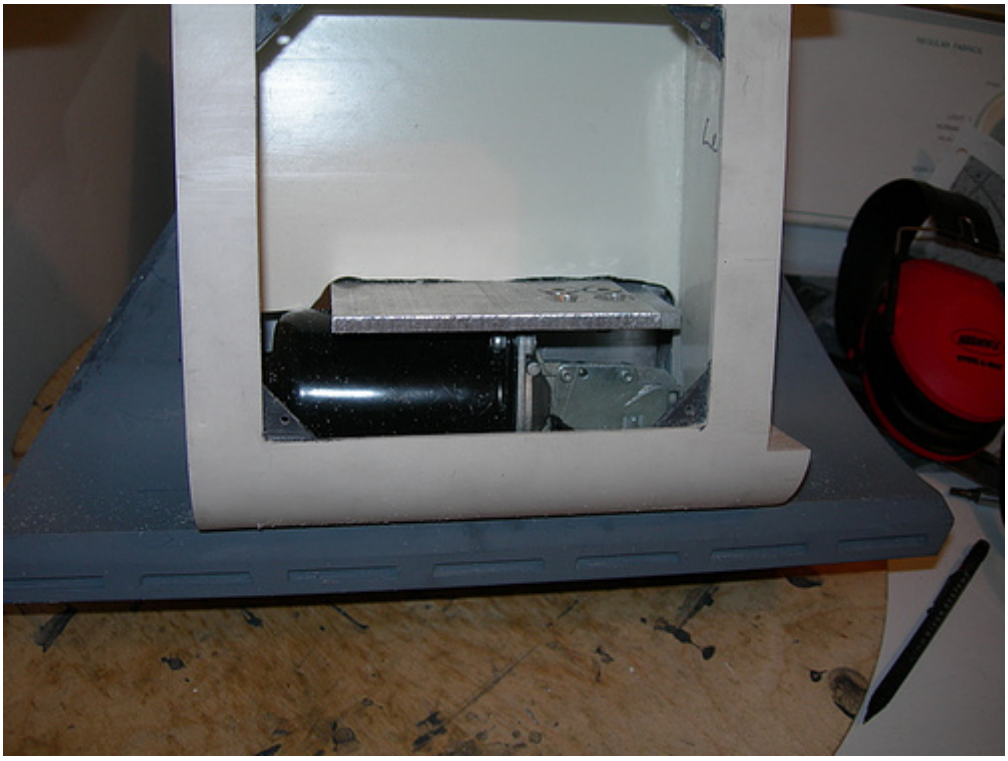


Next, I cut the side of Craig's battery box that faces the foot shell, to allow the motor to enter into it from the foot shell. It feels like I'm vandalizing a piece of art here, but it has to be done.

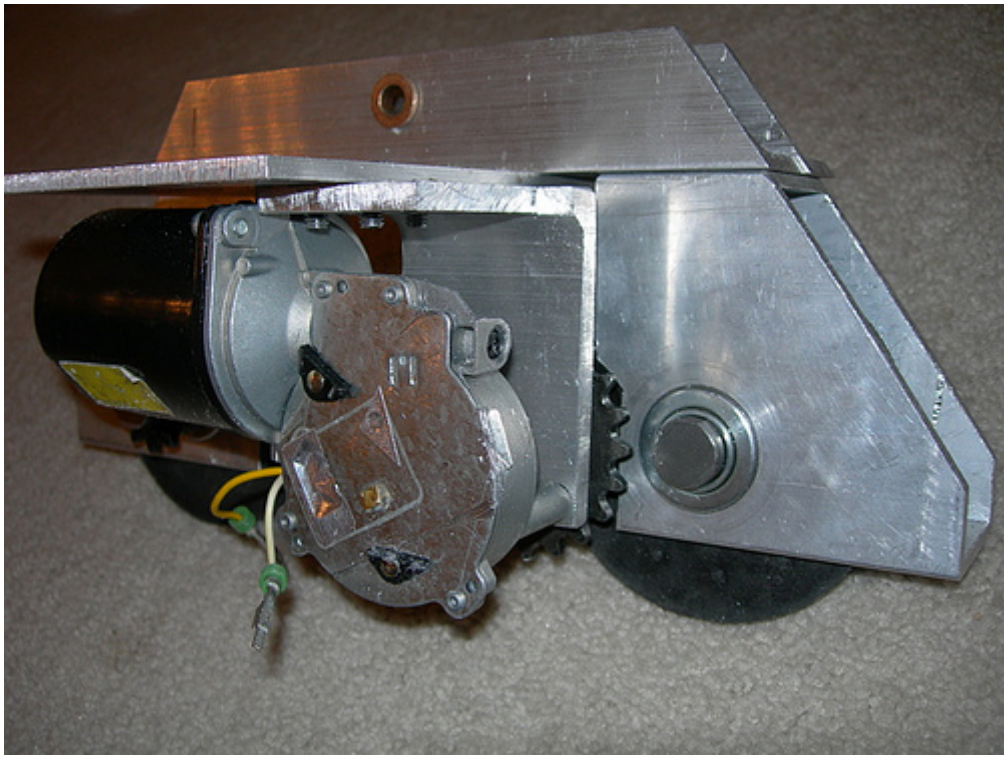
I needed to trim some material off of the motor mount to get it to fit into the battery box.



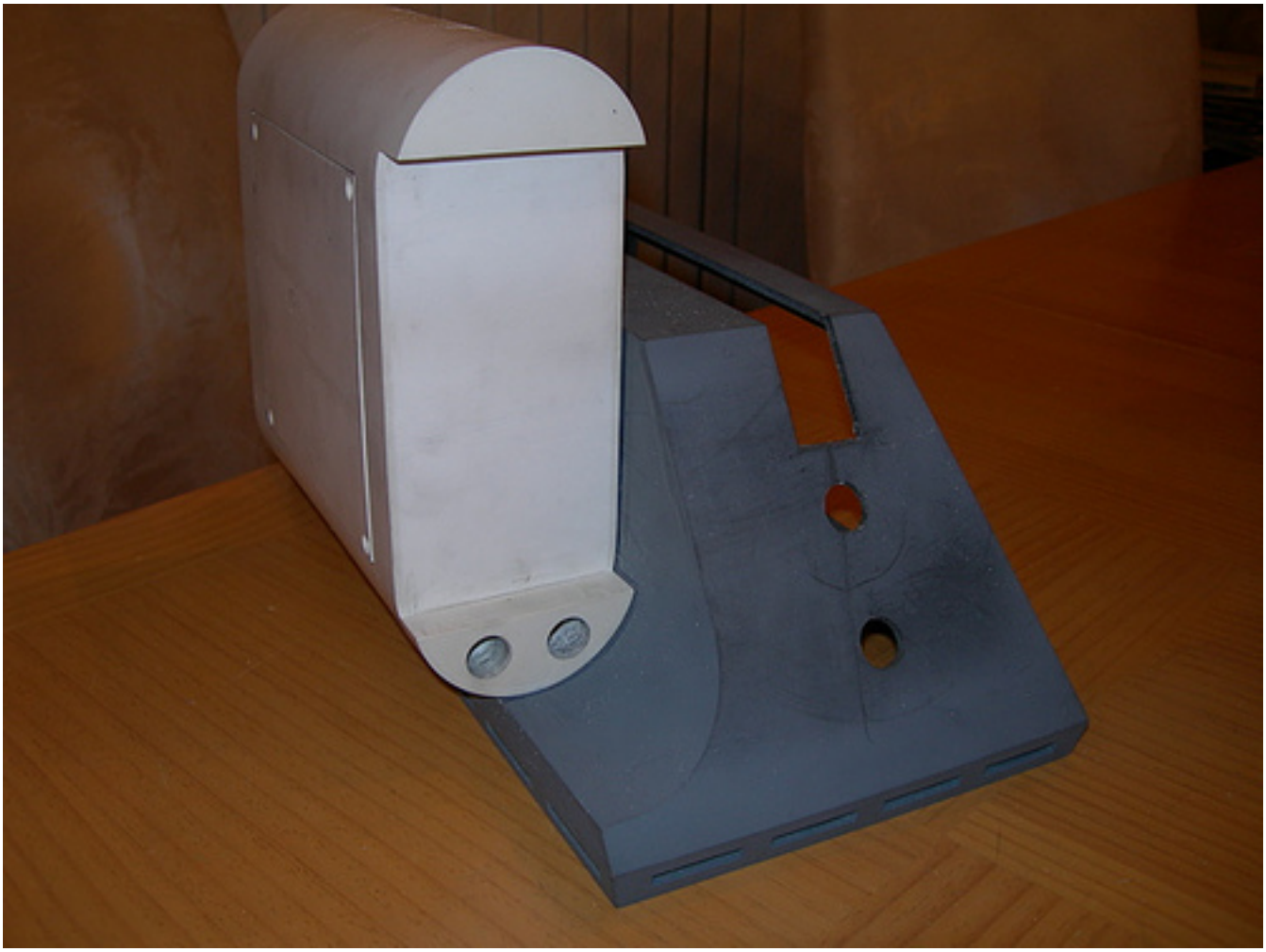
With some iterative fitting and sanding, I was able to get the battery box to mount perfectly on the foot shell, and get the overhang of the drivetrain to fit perfectly within the whole thing (foot shell and battery box).



The modifications to the drive train mean that I will have very little room to tension the chain, but hopefully what I have will be enough. Of course, I still need to build up the chain first...



Despite all the cutting I did on the foot shells and the battery box, none of that is visible to the outside world, which is a relief!



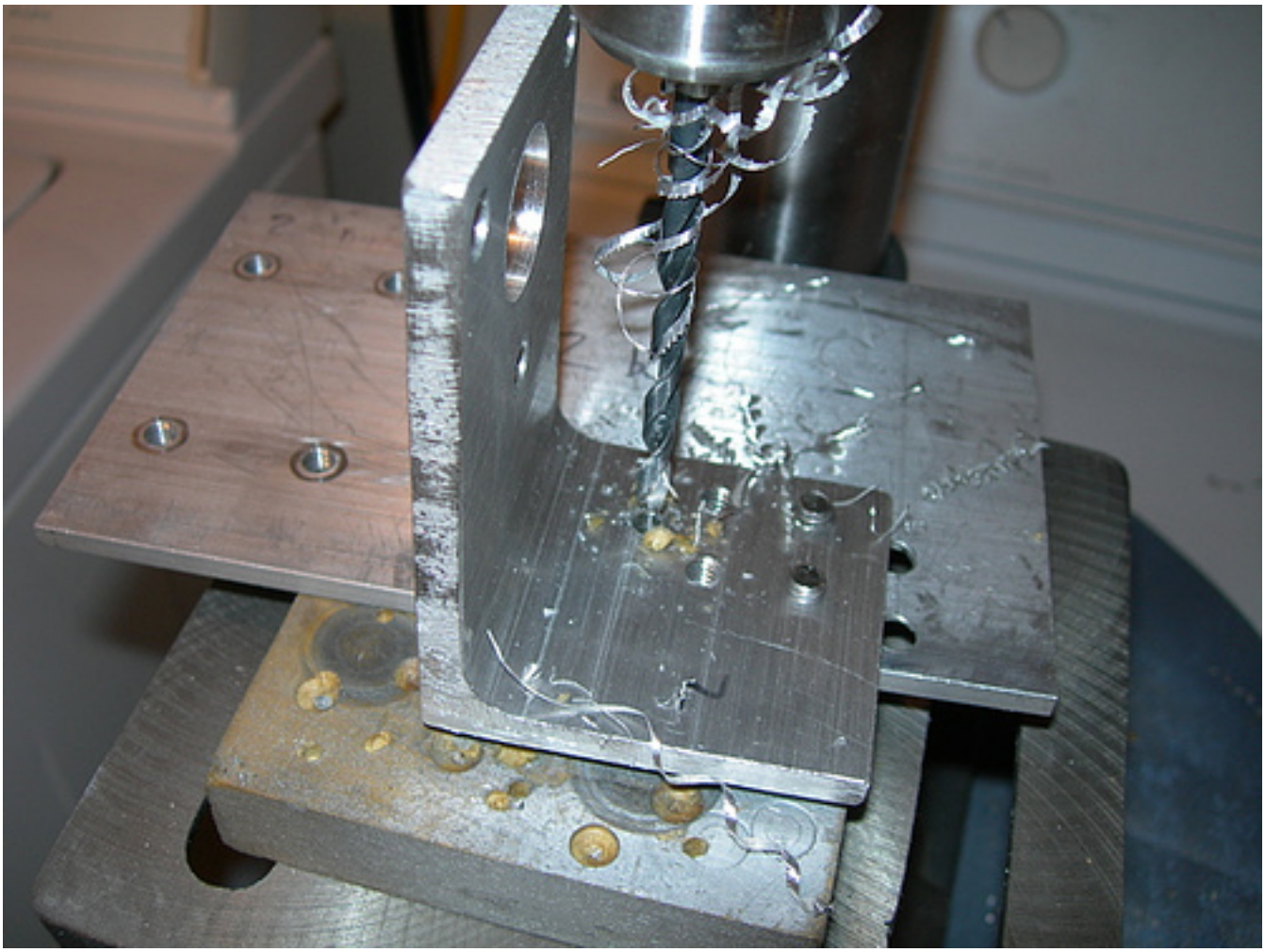
posted by Victor Franco at 10:53 PM 0 COMMENTS

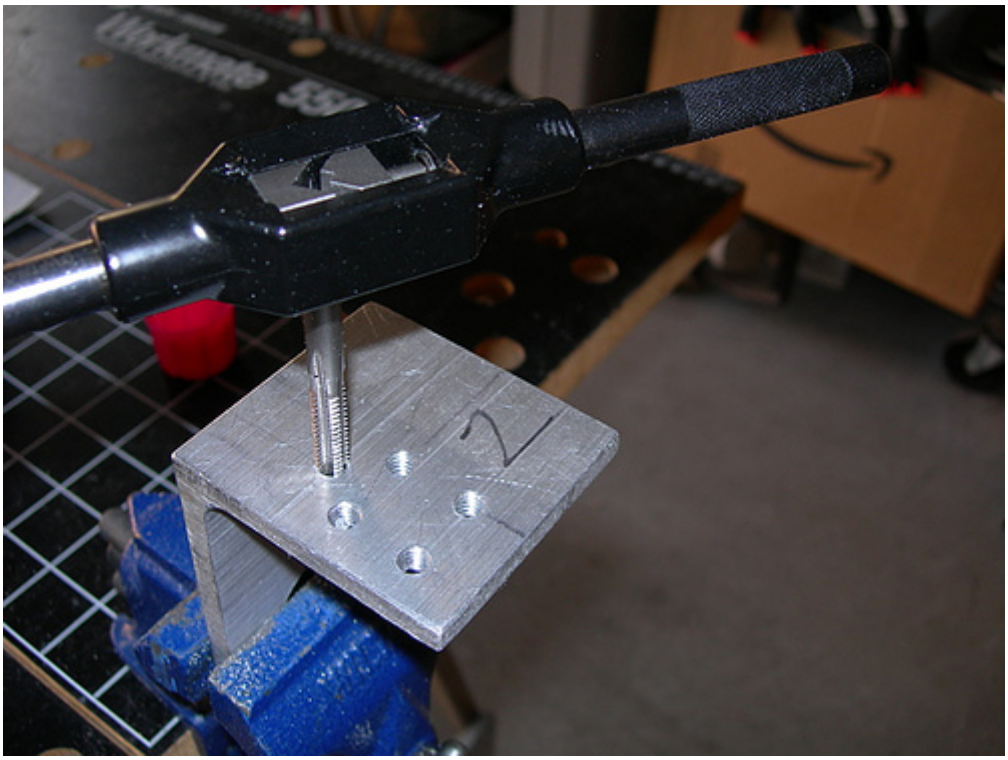
MONDAY, APRIL 09, 2007

Worked on Right Foot

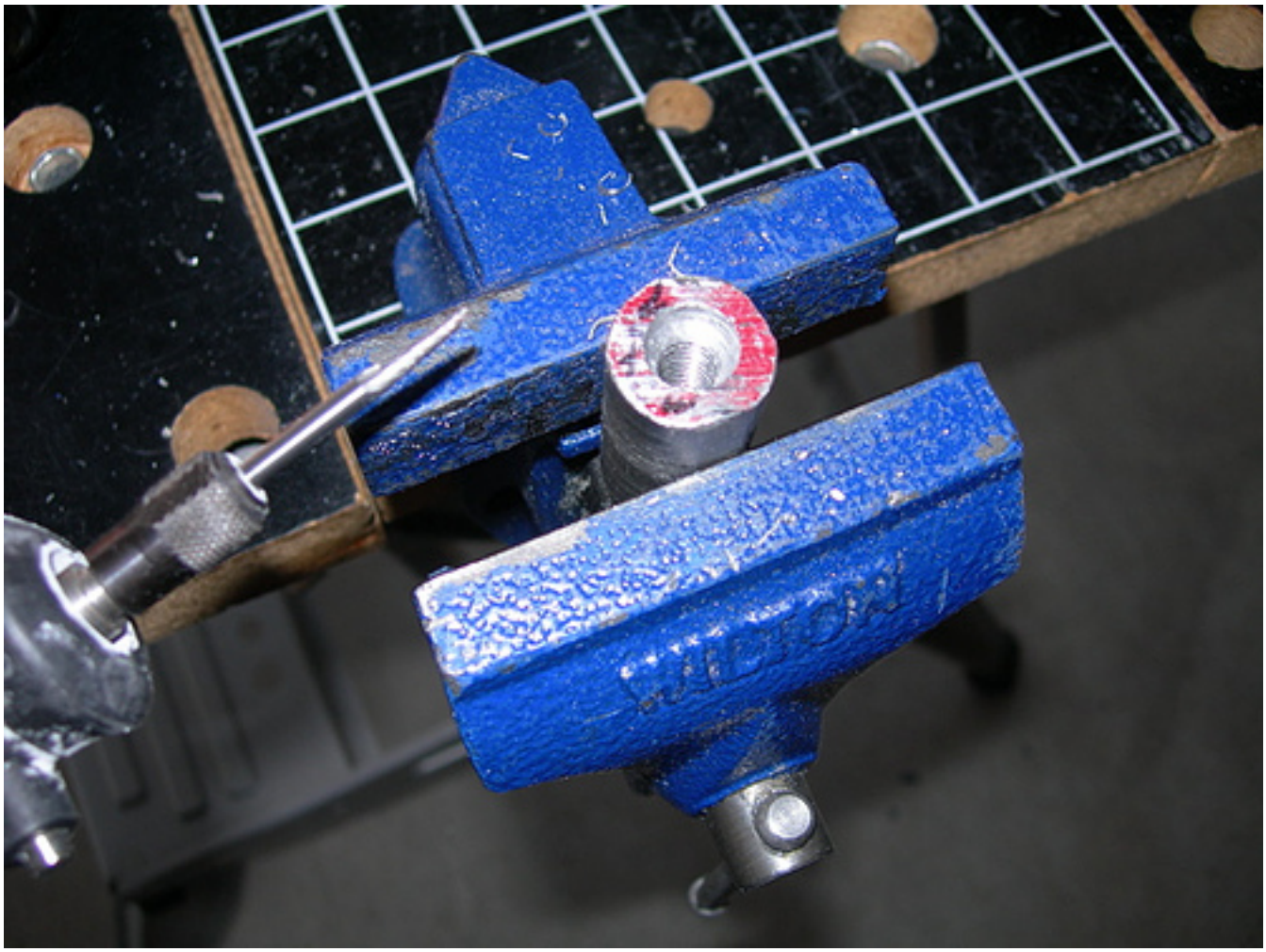
Today I repeated several steps from yesterday, this time on the right foot.

I had another opportunity to drill and tap, this time on the right foot's motor mount bracket. I drilled a 0.201" hole, followed by a 1/4"-20 tap. Like yesterday, this was done to move the motor mount that hangs from the main bar closer to the wheels, so that the motor will reside mostly within the foot shell.

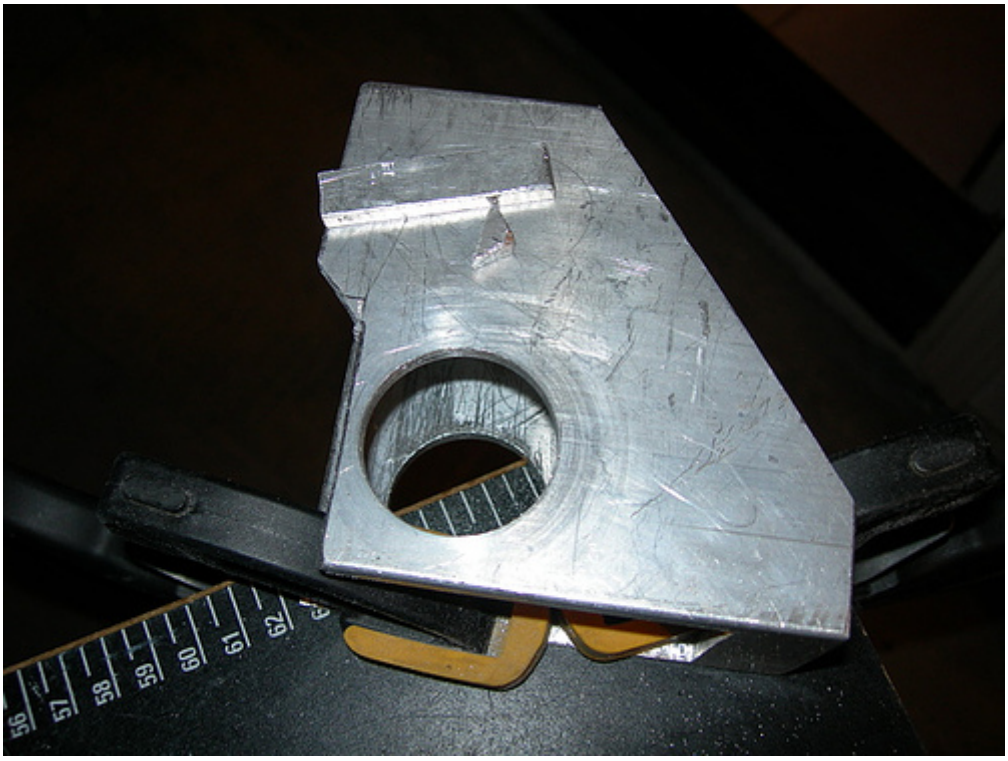




Next, I opened up the base of another shaft adapter so that it could fit closer to the base of the motor shaft when it screws on. I used a 13/32" drill bit and the Dremel with a grinding attachment for this modification.



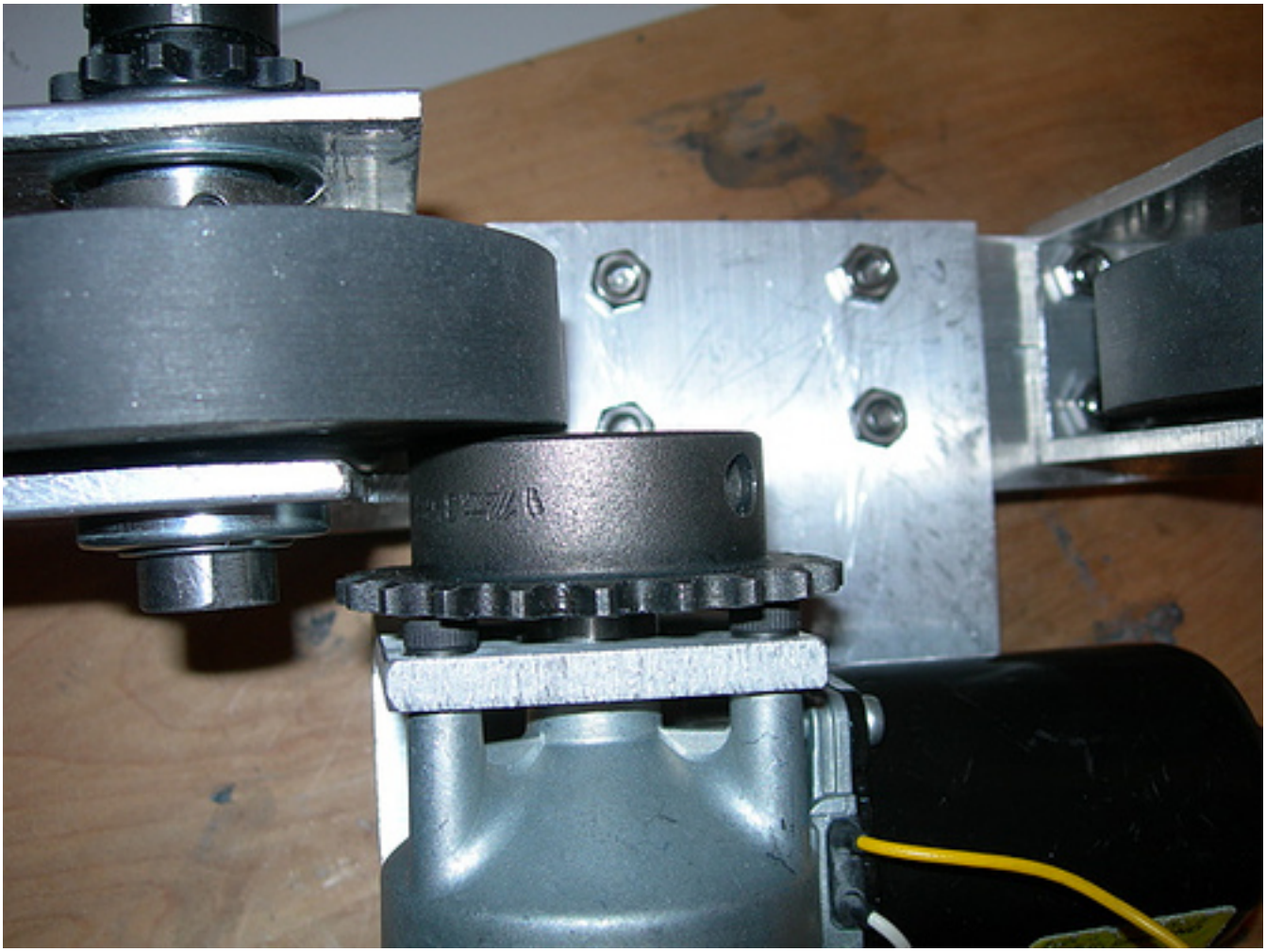
I had to trim some of the wheel housing out to allow the 22-tooth gear some room, just like yesterday.



Things are so tight in the right foot drivetrain that I even had to file down some hex cap screws.

I wasn't kidding. You can barely see daylight between the gear and the hex cap

screws on one side, and the gear and the wheel on the other. Making matters worse, I think my shaft adapter has problems, the gear has a slight wobble as the motor turns. It still clears everything, but just barely. That likely portends of problems to come, I'll probably have to make a new shaft adapter.



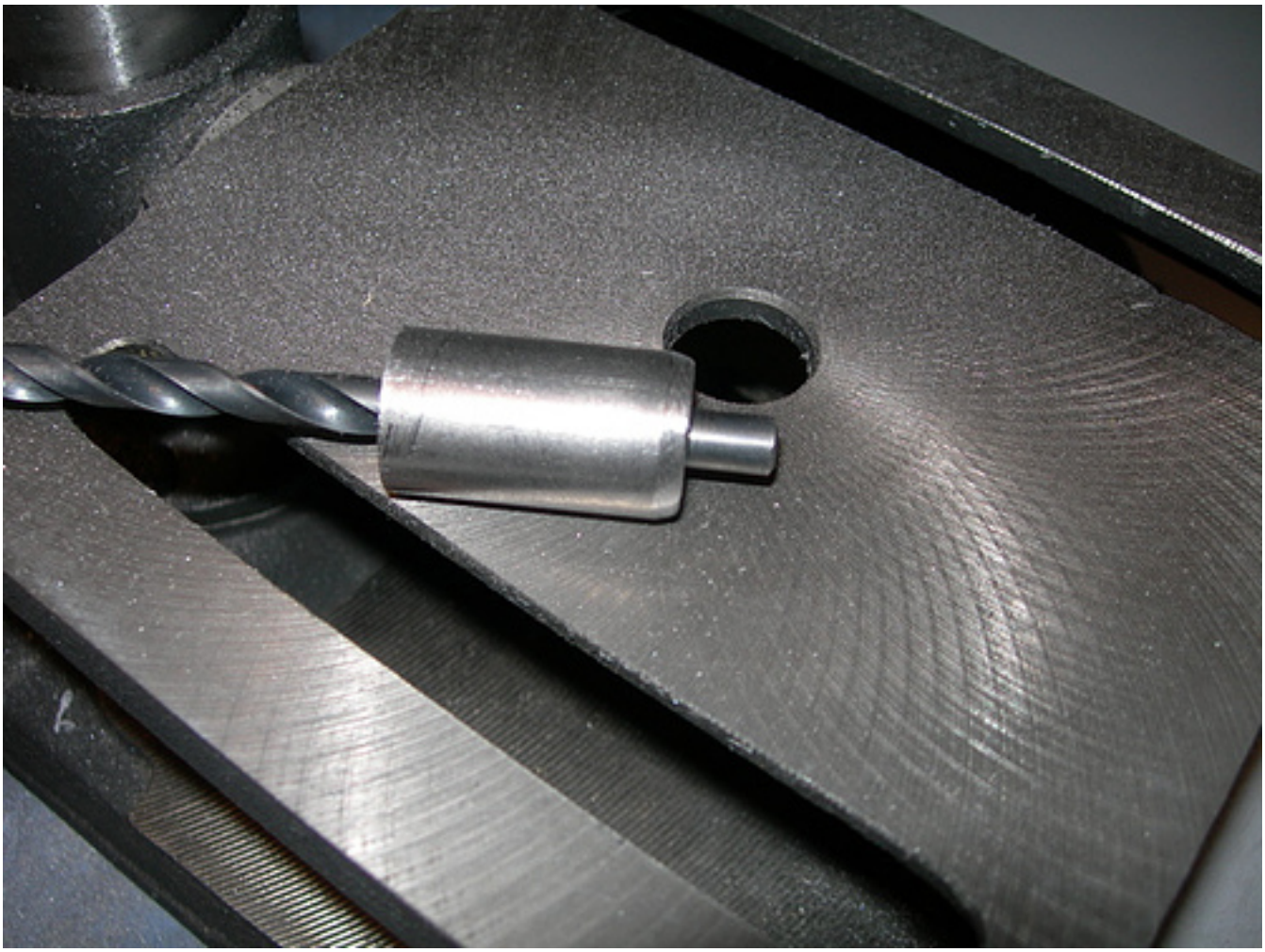
posted by Victor Franco at 11:00 PM 3 COMMENTS

TUESDAY, APRIL 10, 2007

Started Working on Shaft Adapter Tool

It's an inevitability that I will have to make more shaft adapters in the (near) future, so I started working on a shaft adapter tool. The idea is to take a 3/4" outer diameter, 1.25" long steel rod with a hole drilled perfectly in the middle and squeeze it half way deep into a tube that has a 3/4" inner diameter. Then a blank steel rod with no hole can be drilled. Here is an example.

I started with a pre-drilled shaft adapter, and sanded the corner off.



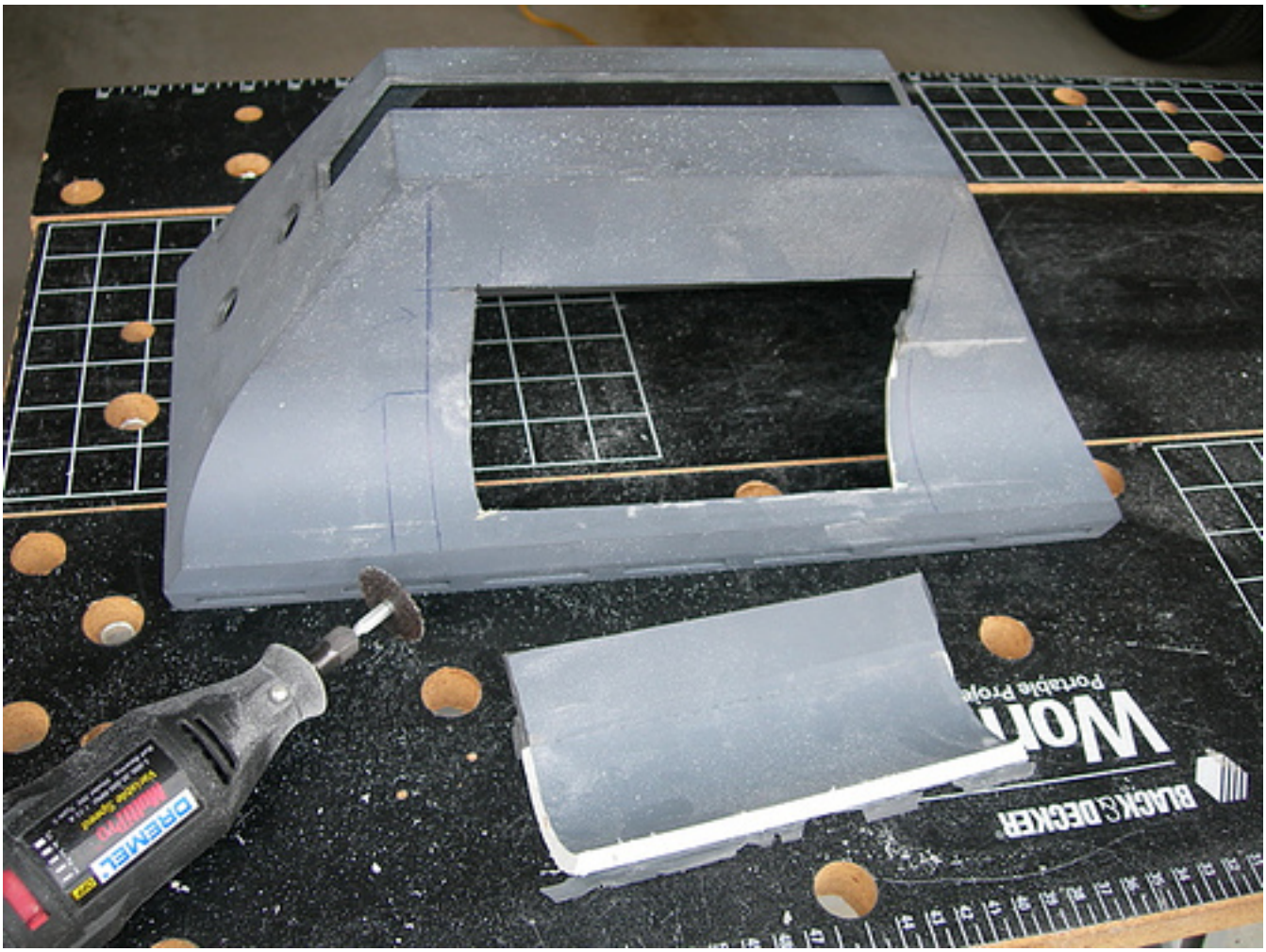
Then I started whaling on it with a hammer to force it into the tube. I'm finding it difficult to force perfect alignment in the tube. I should probably use a vise, or something other than hammer. It started getting late, so I put down the hammer and I'll get back to this another day.

posted by Victor Franco at 10:32 PM 0 COMMENTS

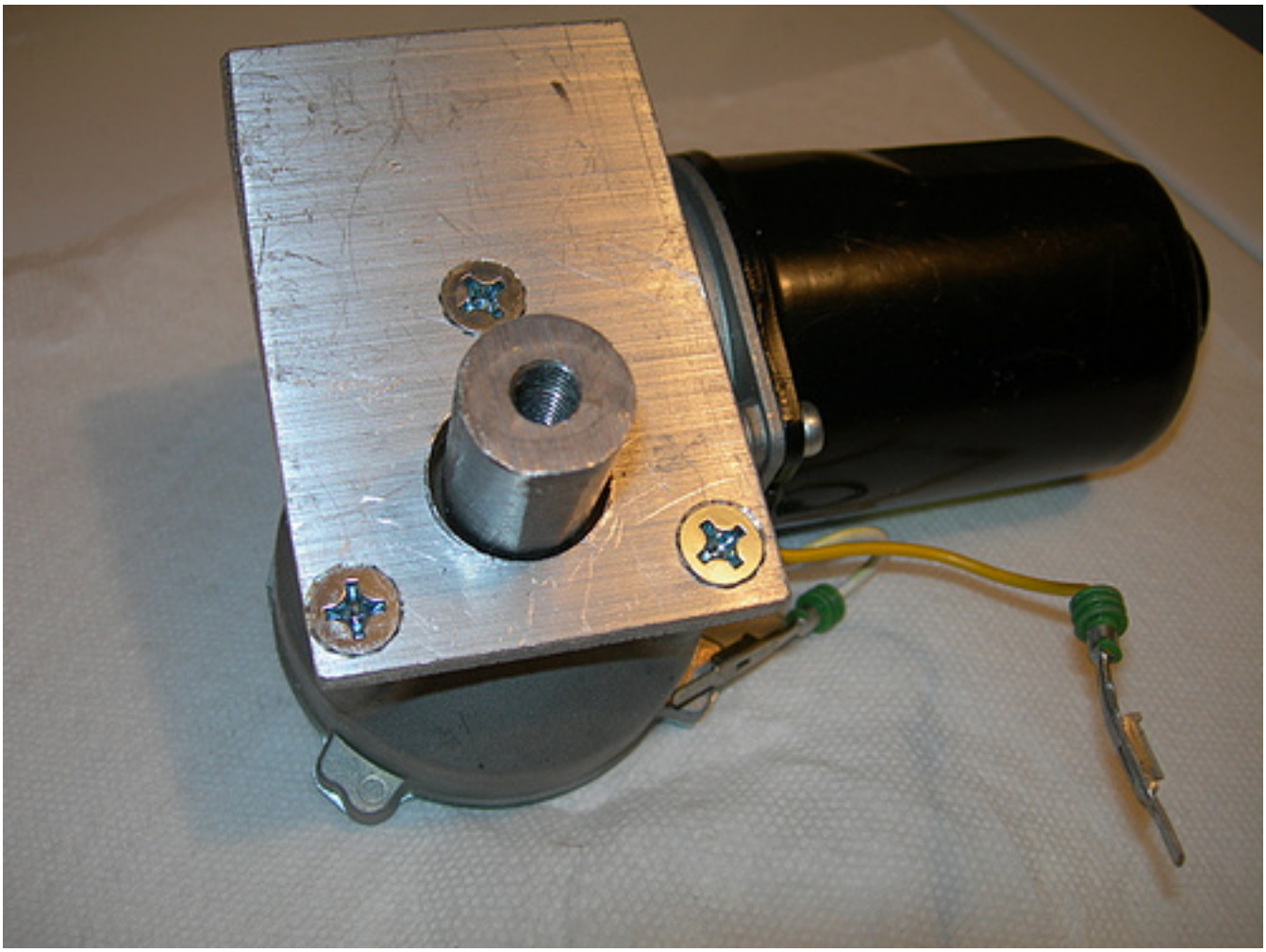
WEDNESDAY, APRIL 11, 2007

Cut Right Foot Shell for Drivetrain, Countersunk Screws in Motor Mounts, Battery Box Setback

Today I cut the right foot shell to accommodate the drivetrain.



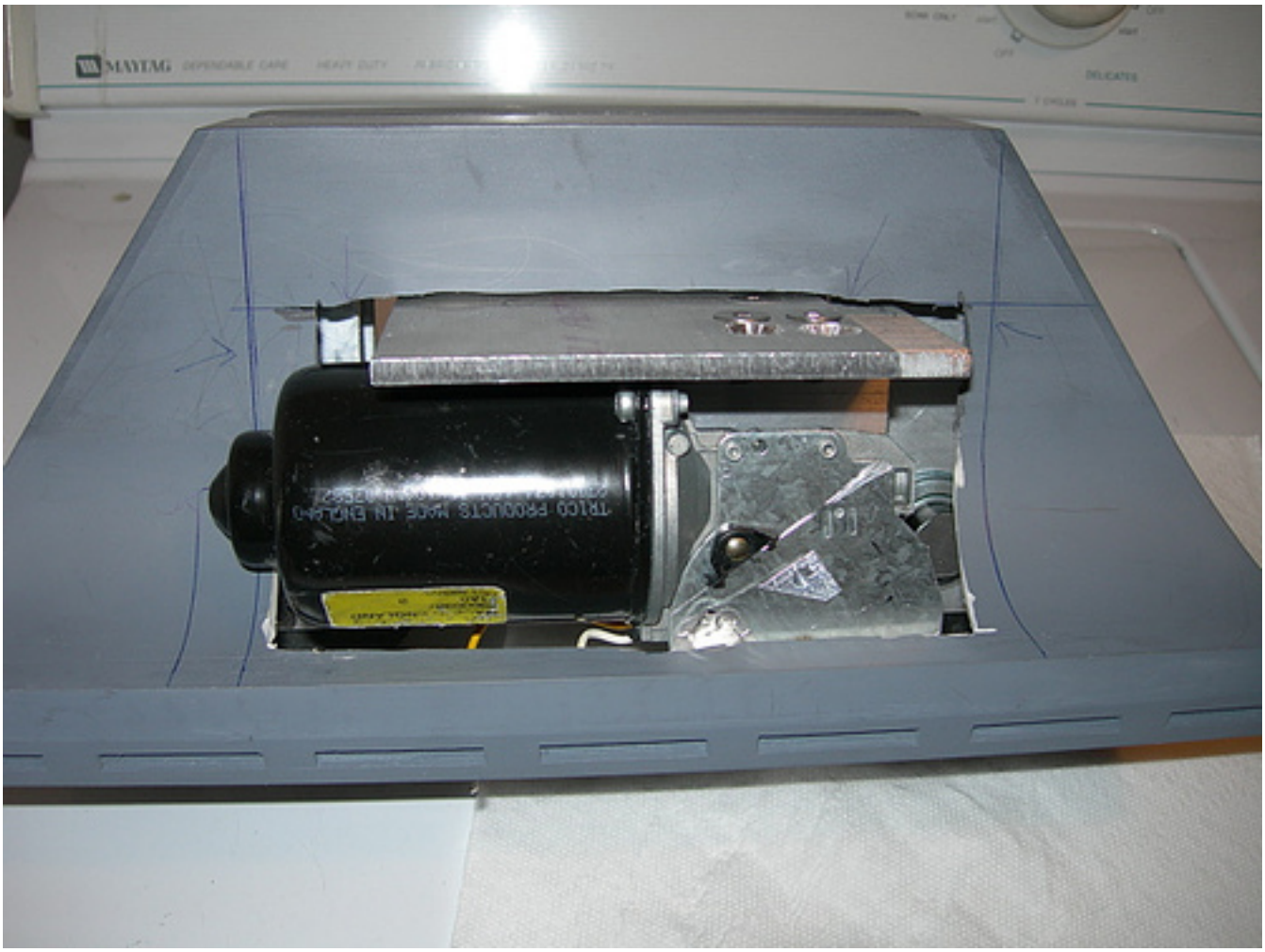
On Mike's advice, I countersunk some new screws into the motor mounts, to allow more breathing room for the gear to spin.



The good news: The right foot shell surgery was a success. The bad news: The right battery box will not conceal the entire motor. On the left foot, this was not a problem, the end of the motor points toward the back. On this right foot, the end of the motor points to the front, exactly where the battery harnesses go. There really isn't enough room to slide the battery box forward, and even if I did, it would look funny compared to the left foot.

I have already set Plan A into motion, I have sent an e-mail to Craig Smith begging to get on a list for a set of longer battery boxes. I am formulating Plans B and C in my head now, but they are not attractive (cut & extend, or scratch-build).

Dang, I was so close.



posted by Victor Franco at 11:08 PM 6 COMMENTS

THURSDAY, APRIL 12, 2007

Started Drilling Dome Drive Bar

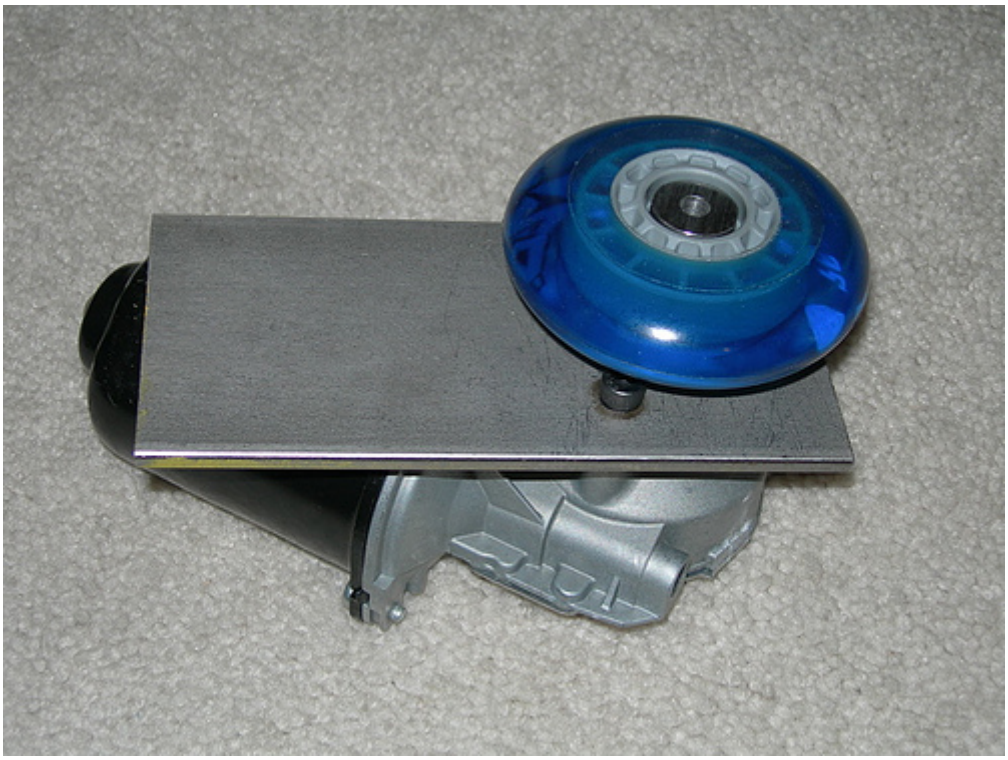
This morning I went to Industrial Metal Supply and picked up a 12"x3"x3/16" steel bar. I had them cut it in half, into 6" long segments. I plan to use this for the bar that the Saturn wiper motor will hang from for my dome drive.

Using one of my drivetrain motor mounts as a template, I drilled four holes into the bar. I was unable to use the 7/8" Forstner bit that I used on the drivetrain for the middle hole, that bit won't go through steel. Instead I used a regular 1/2" drill bit.

The holes seem to line up okay. I will probably try using the Dremel to widen the center hole to 7/8", so that the 3/4" shaft adapter can fit through it. Right now it is completely above the bar.

I will drill one more hole toward the opposite end of the bar, and that will be the pivot point through which a bolt will go. The bolt will then pass on through the top of the frame, and allow a spring underneath the top of the frame to pull the dome drive wheel into the Rockler bearing.

I'm using the hex cap screws to hold the motor on at the moment, but I will likely have to replace at least two of the three hex cap screws with counersunk machine screws so that nothing rubs against the bottom side of the top of the frame.



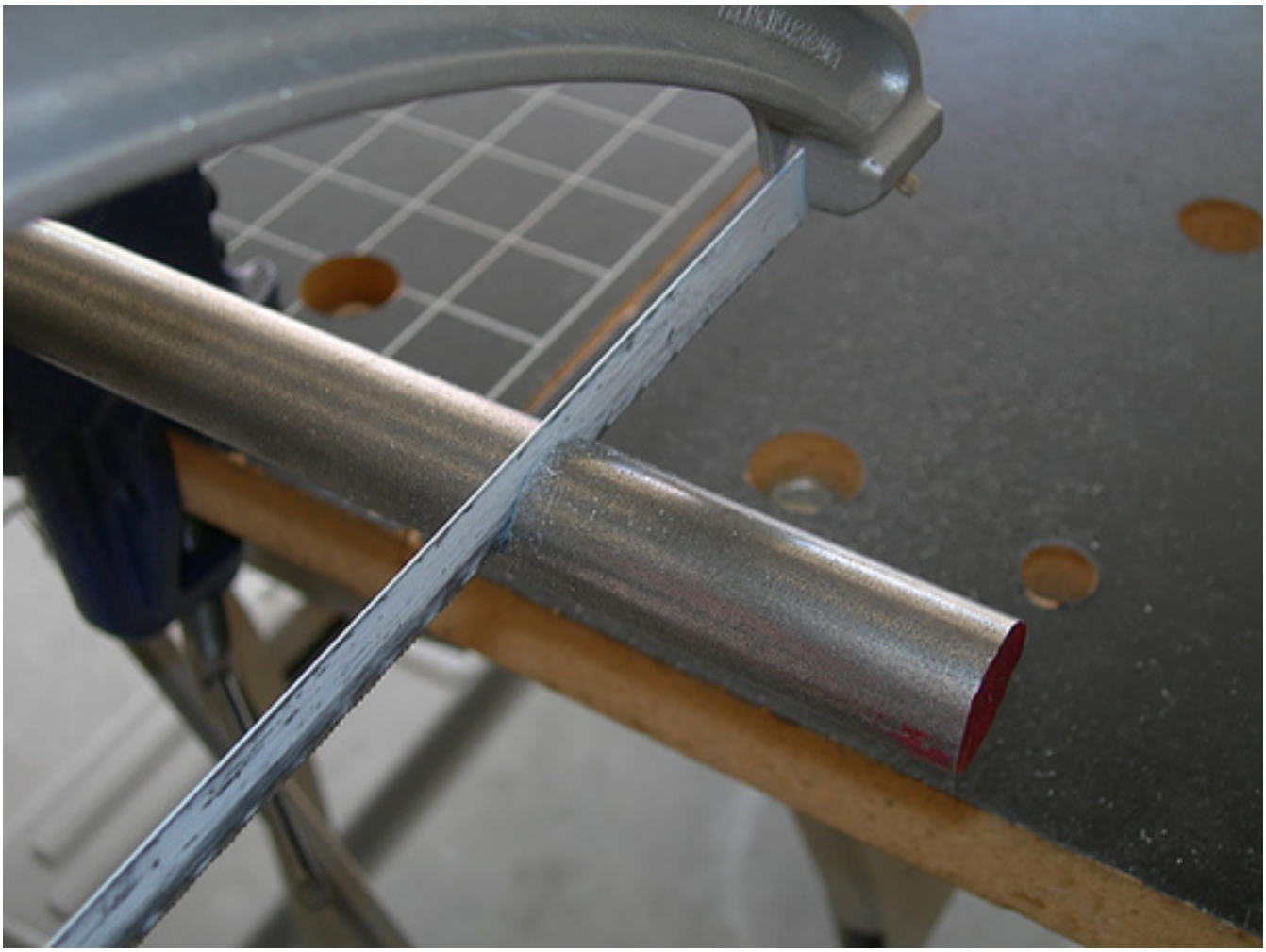
posted by Victor Franco at 10:07 PM 0 COMMENTS

SATURDAY, APRIL 14, 2007

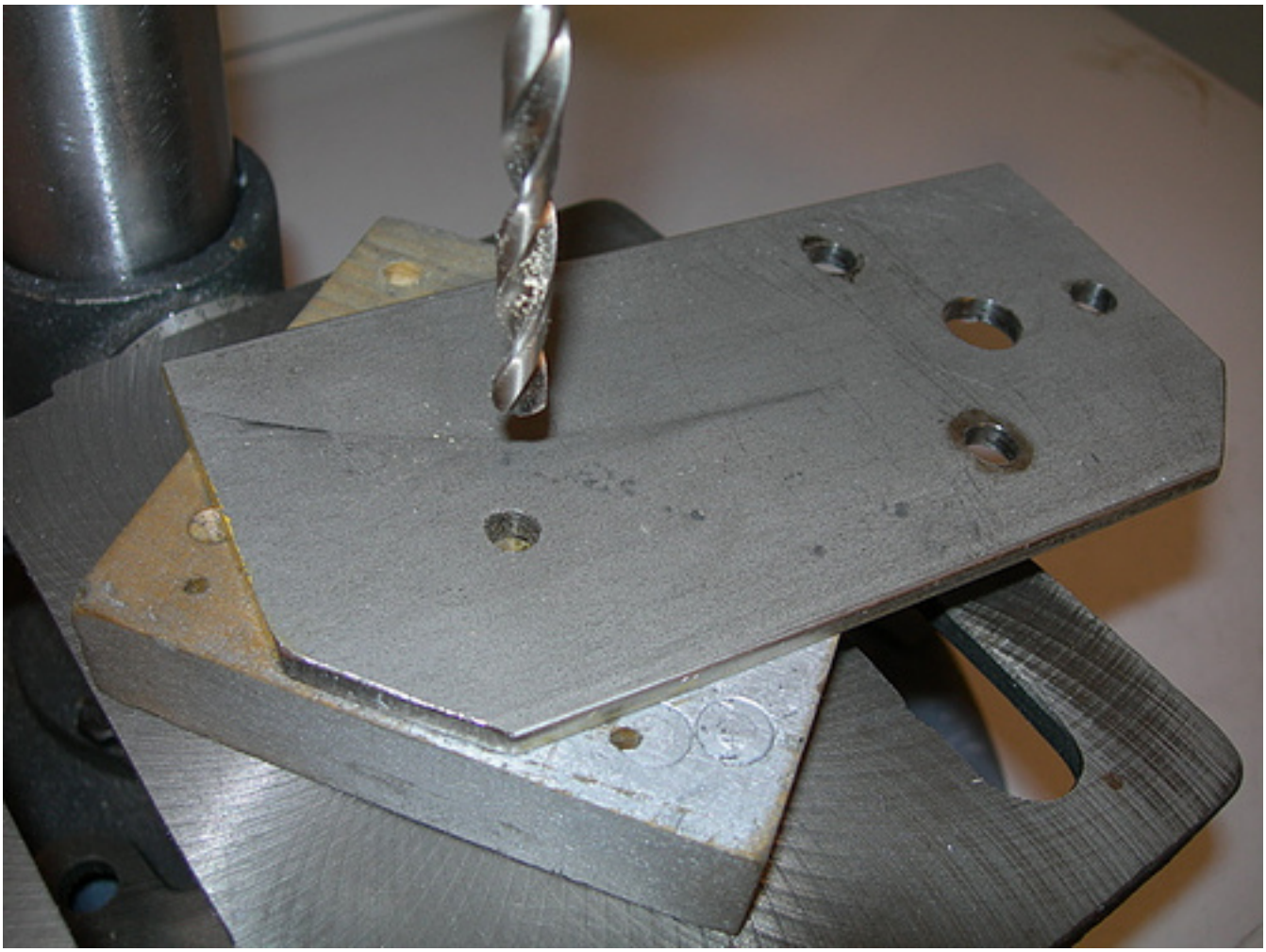
Continued Working on Dome Drive

After a rare day off from building yesterday, I resumed work on the dome drive.

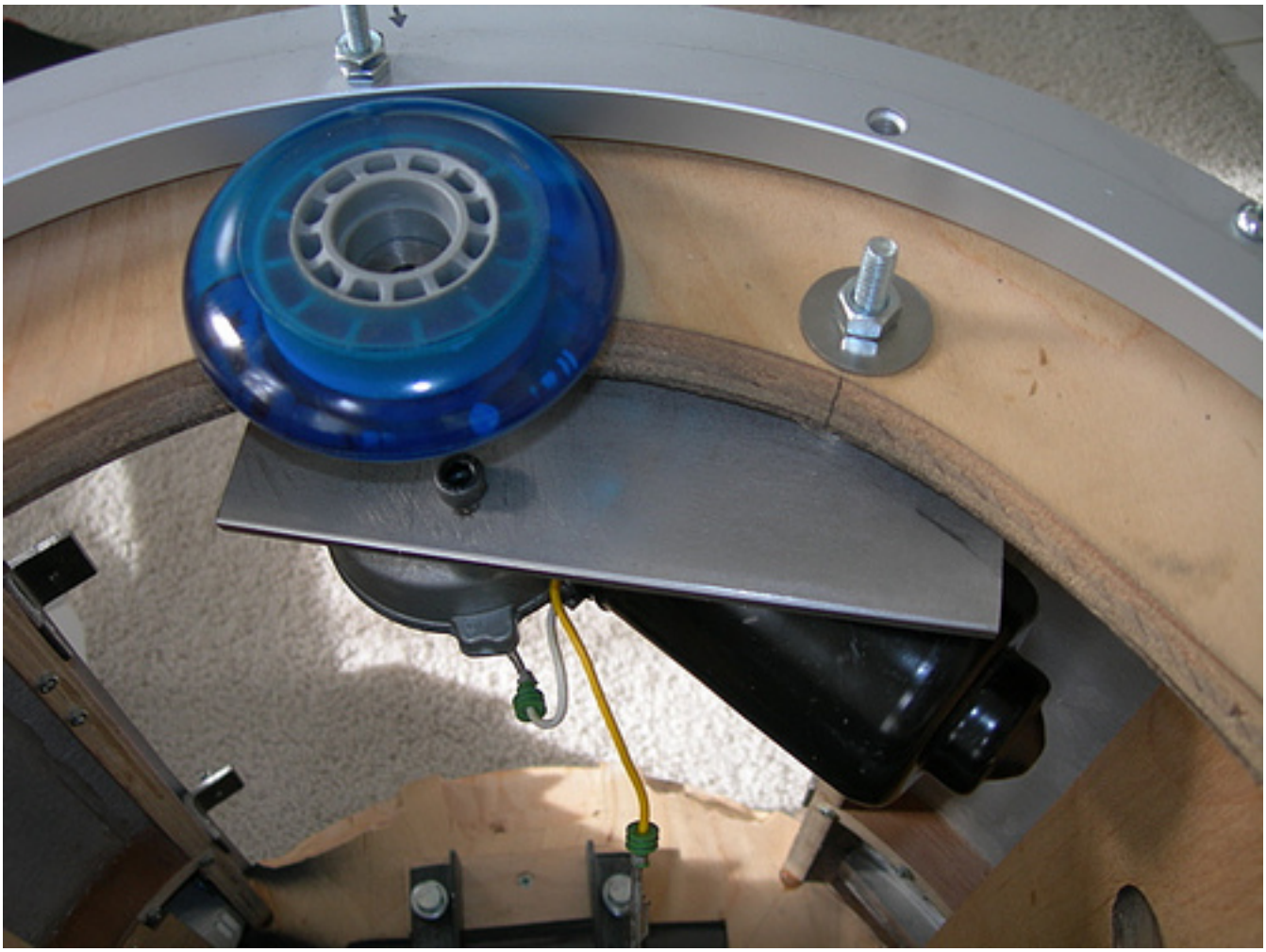
First, I needed to cut a shaft adapter that is longer that the ones used on the feet, since this one has to pass through the frame and wheel. More hacksawing through solid steel.



Next, I trimmed a couple of corners off of my dome drive bar (again hacksawing through steel), and then drilled the pivot hole.



I drilled a hole in the frame and attached the dome drive with a 1/4" bolt, using some washers to help with the spacing and to distribute the stress. The fit seems pretty much perfect. I'm using a foot shaft adapter as a temporary stand-in, until I can drill the longer piece that I cut today.



Oh yeah, and I also visited the R2 mailbox closest to my house (about 11 miles away). This mailbox is in Newport Beach, CA.

posted by Victor Franco at 11:49 PM 2 COMMENTS

SUNDAY, APRIL 15, 2007

Lunch with Daniel, Mike Rescues Battery Box

Several of us got together for lunch today at Red Robin with Daniel Deutsch. From left: Daniel Deutsch, Guy Vardaman, Matt Munson, Victor Franco, Vince Sanchez, Mike Senna, Chris Romines.

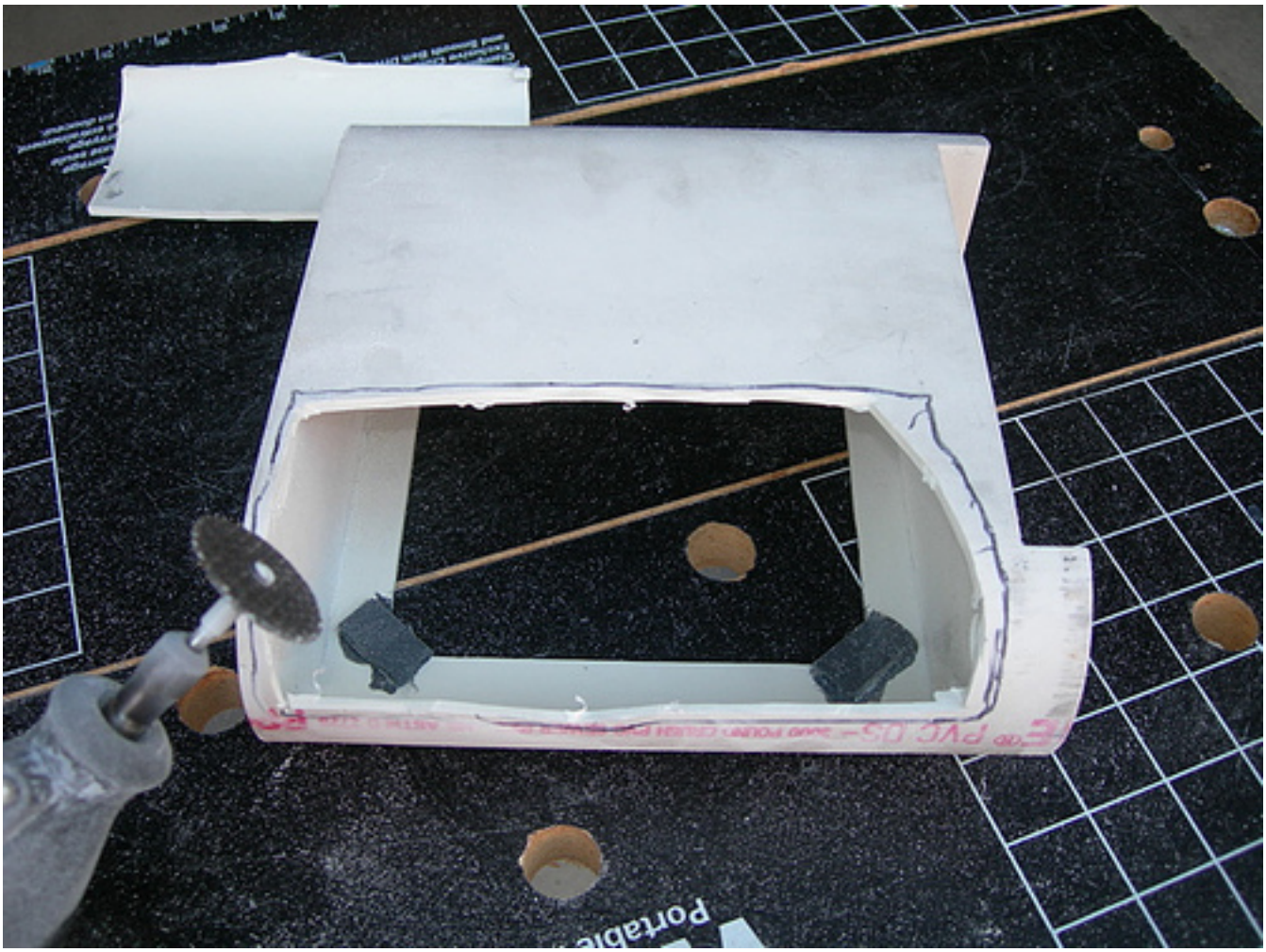
Just when Mike thought lunch was over and he could go home, I dragged him over to my house and put him to work. I was at a loss on what could be done to salvage the right battery box to make it fit the drivetrain. Mike analyzed the problem and quickly came up with a plan.

First, he lengthened the slots at the top of the wheel housing with the Dremel, to allow the wheel housing to slide further back. This allows the motor to scoot back without running into the wheel housing.

Next, he drilled four new holes in the main bar, with the bar positioned about 3/8" further back than it had been. Since the motor mount hangs from the main bar, this moved the motor back, allowing the motor tip to barely fit inside the battery box.

Finally, to allow more room for the 22-tooth gear, Mike Dremeled some material off of the wheel housing near the bearing.

After Mike left, I got busy chopping on the right battery box, which I had given up for dead a few days ago.



I had to remove some material from the inside of the battery box, near the tip of the motor, to get everything to fit.

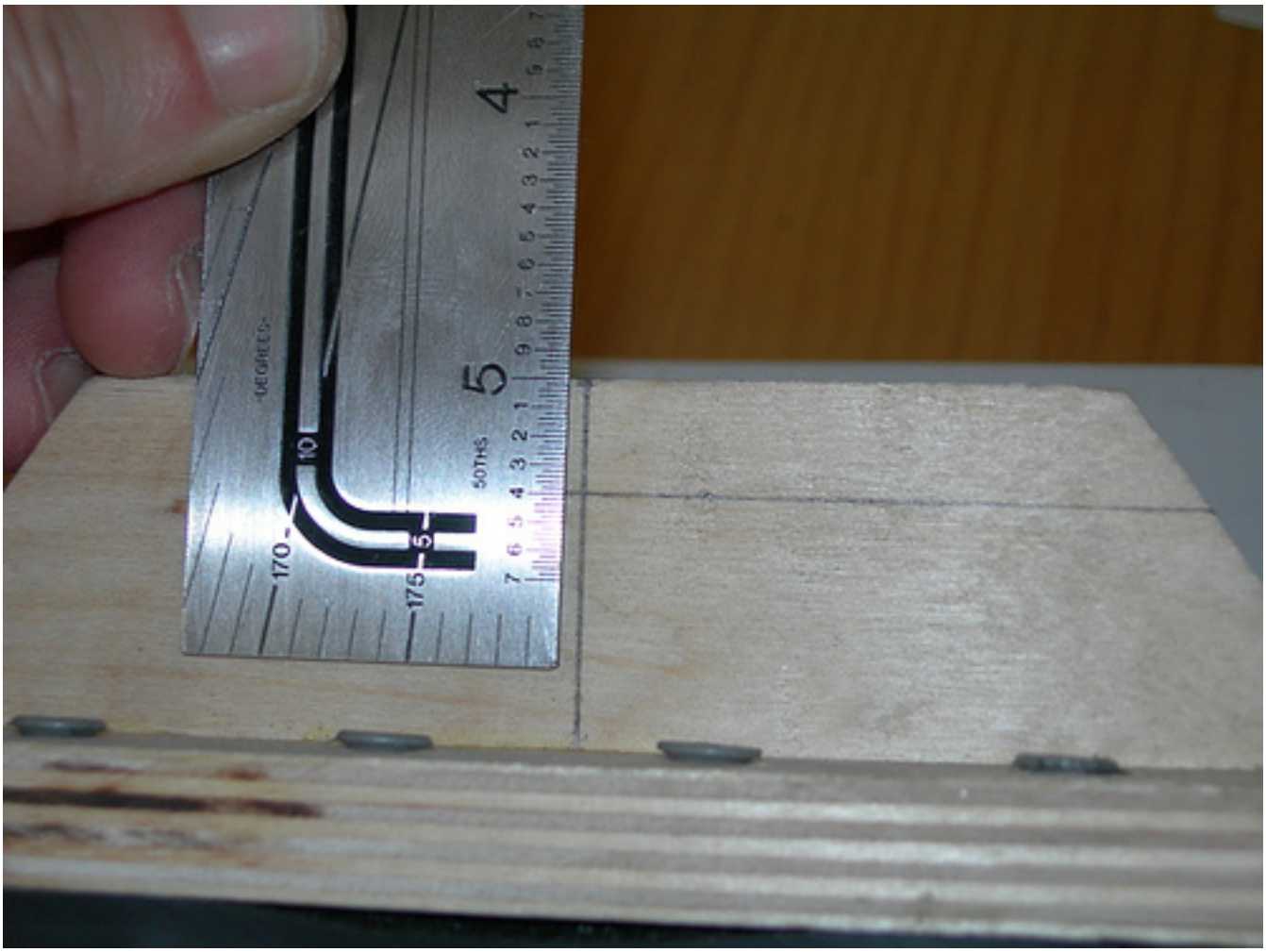
Success!! This was the last potential show-stopper (that I know of, at least). I just need to keep moving forward now, and not mess anything up.

posted by Victor Franco at 10:23 PM 0 COMMENTS

MONDAY, APRIL 16, 2007

Drilled Center Foot Ankle Bolt Hole

Tonight I finally drilled the ankle bolt hole for the newest incarnation of my center foot. The hole is 0.40" from the top of the foot channel.



I lined up everything on the drill press and clamped it down, and then did the drilling.

Did it work??

I don't know! I thought I had some more bronze bushings so that I could try it out in the foot shell with the ankle bolt, but I don't have any, so I can't do a true test just yet. Hopefully I'll get my hands on the bushings shortly.

Normally the suspense would be killing me, but I'm just about numb now with all the ups and downs I've had with this droid lately.
posted by Victor Franco at 10:05 PM 0 COMMENTS

TUESDAY, APRIL 17, 2007

Fixed Dome Motor

I would have gotten nothing done today if it weren't for the fact that a solder joint on my 24-volt conversion of the dome motor had worked itself loose. I re-soldered it and all is well now.

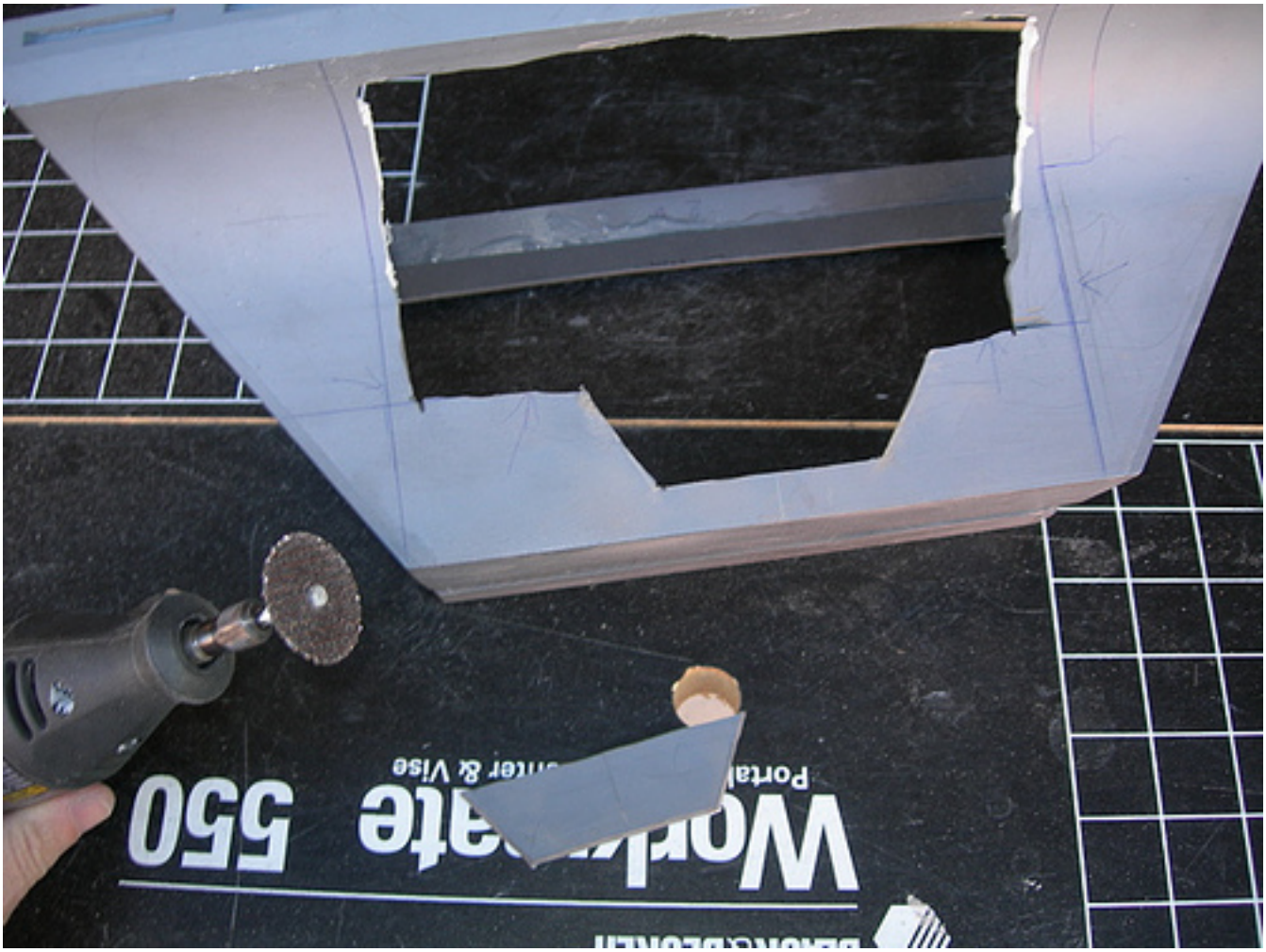
Tomorrow I should be able to finished cutting a little more material from the foot shells and battery boxes to allow access to the ankle bolt hole on each foot. Then the feet and battery boxes can go onto the droid.
posted by Victor Franco at 11:21 PM 0 COMMENTS

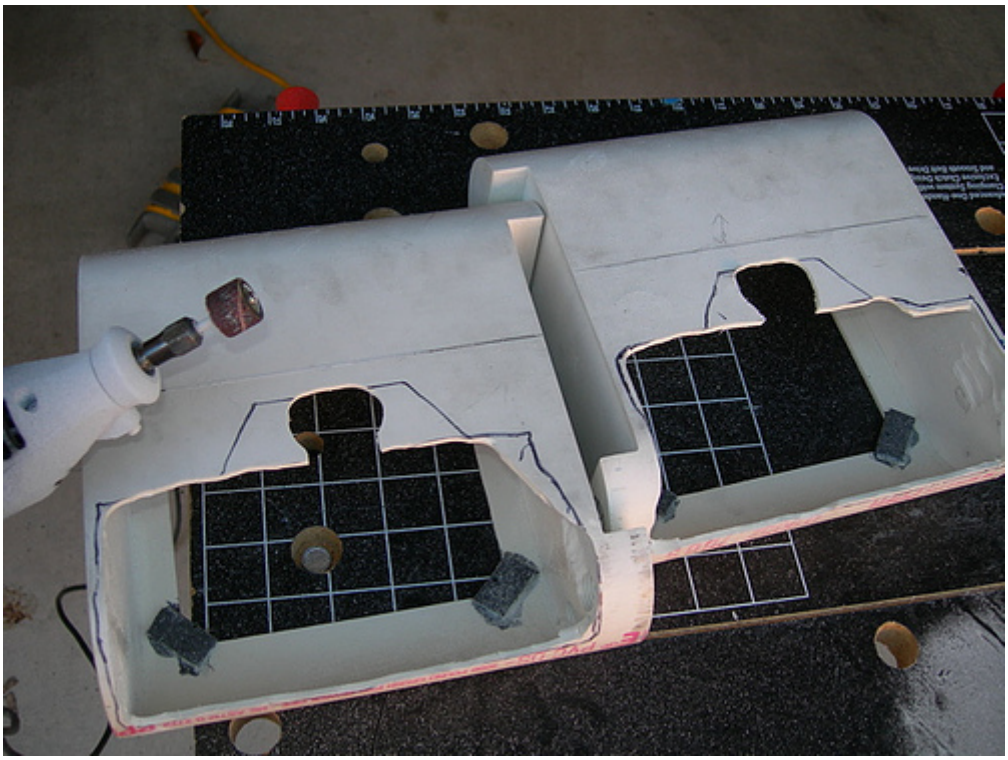
WEDNESDAY, APRIL 18, 2007

Finished Cutting Battery Boxes & Foot Shells, Trimmed Axle, Test Fitted Feet

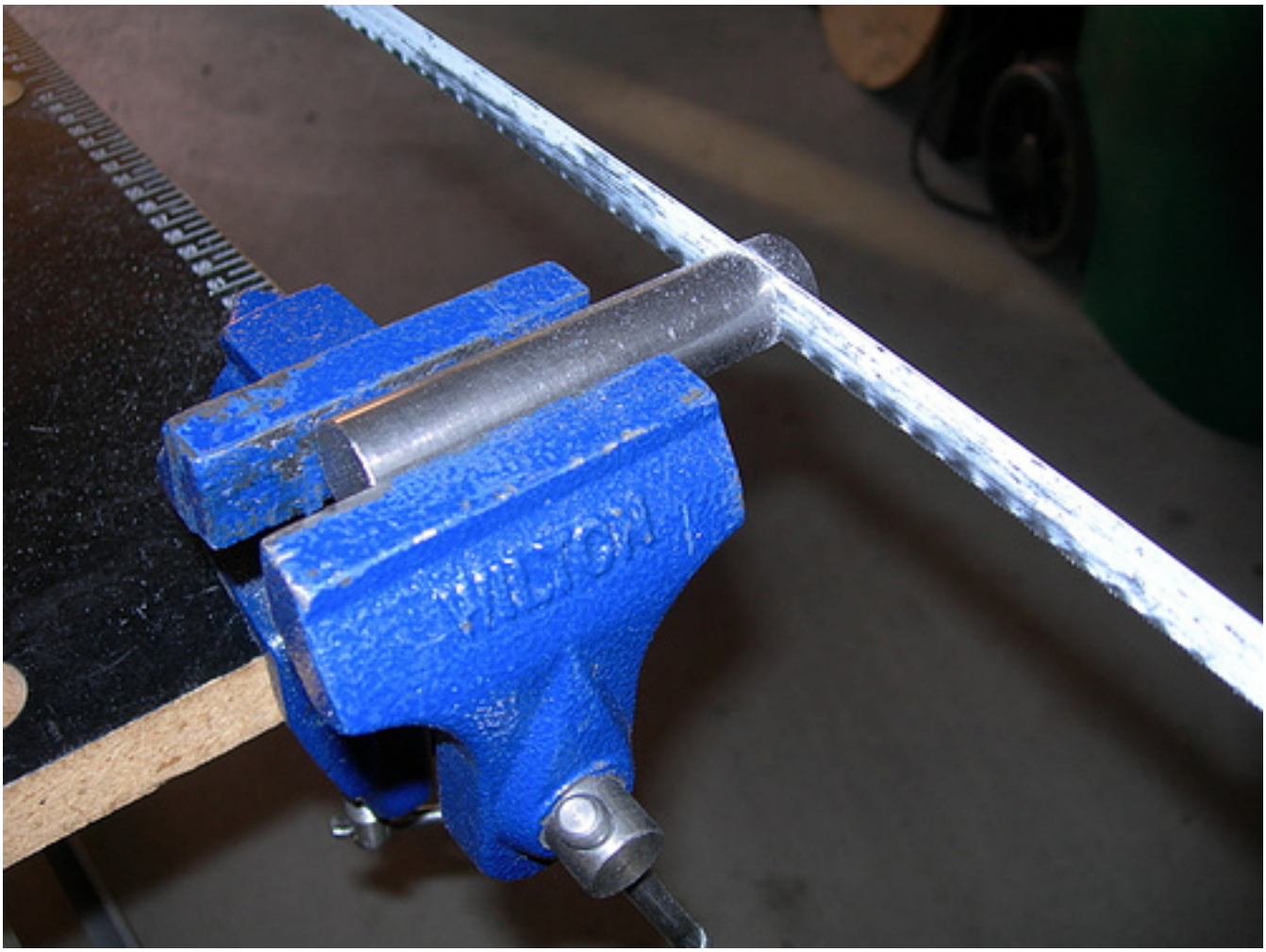
Today I cut the battery boxes and foot shells to allow access to the bolt that will hold the feet onto the ankles. This pretty much wraps up the cutting on these parts, except I'll need to open a small hole at the top of each outer foot shell for the motor wires to pass through.

It isn't necessarily pretty, but it doesn't need to be.





I also had to trim one of the axles, Sunday's drivetrain modification brought the 22-tooth gear closer to the axle overhang, so this got rid of the overhang.



And then, it was time to do a test fit of the drivetrain, foot shells and battery boxes on the droid.

The biggest problem is that the round areas at the bottom of the center and right ankles are running into the foot shells as R2 leans back. I think I'm going to have to sand or file down (and repaint) these curved areas on the center ankle, and do something to the right ankle cylinder holder to get it a little higher. Without these modifications, R2 won't be able to tilt the standard 36 degrees.

Still, it was nice to see him on three feet for the first time in a long while.

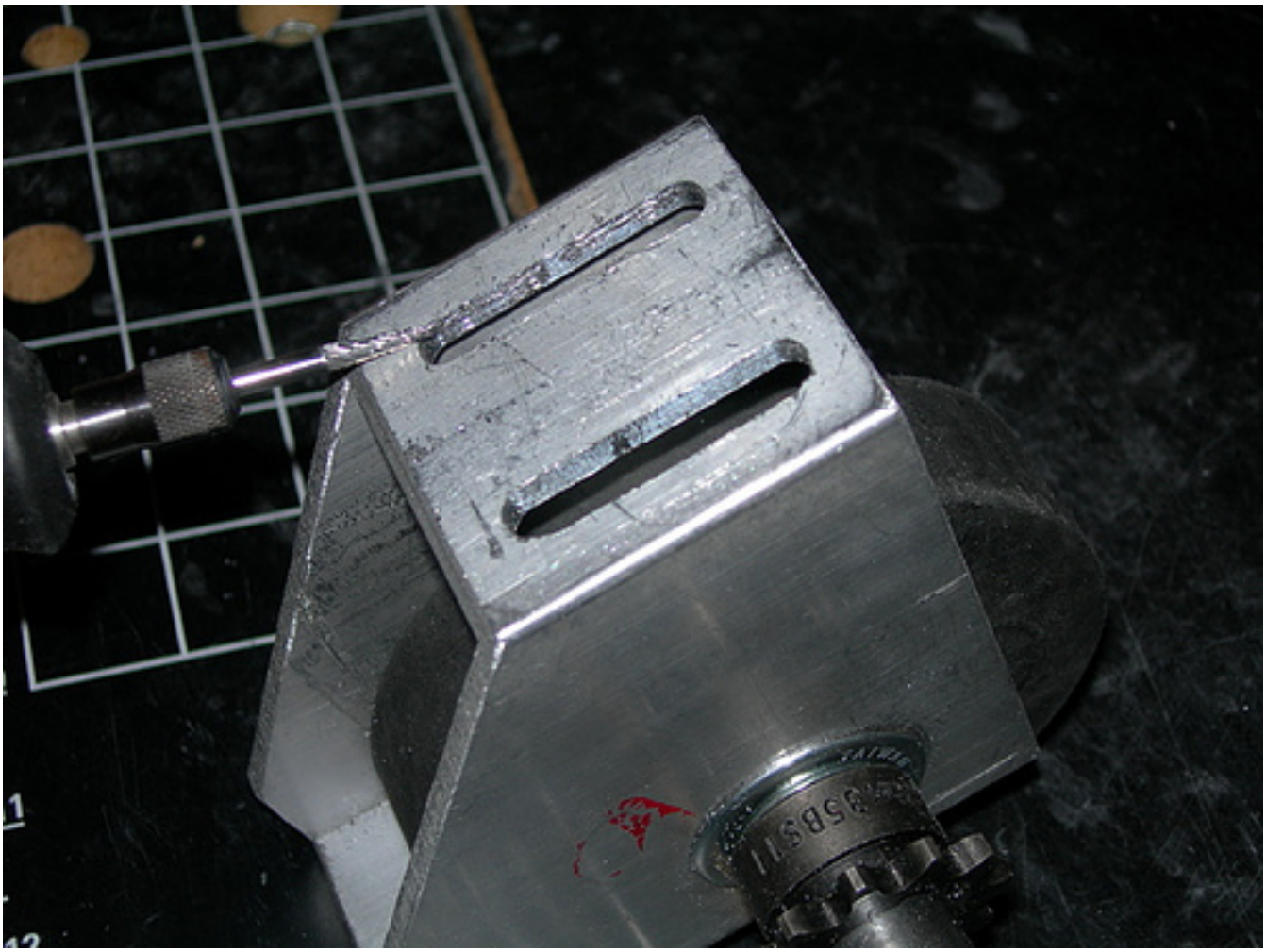
posted by Victor Franco at 11:04 PM 0 COMMENTS

THURSDAY, APRIL 19, 2007

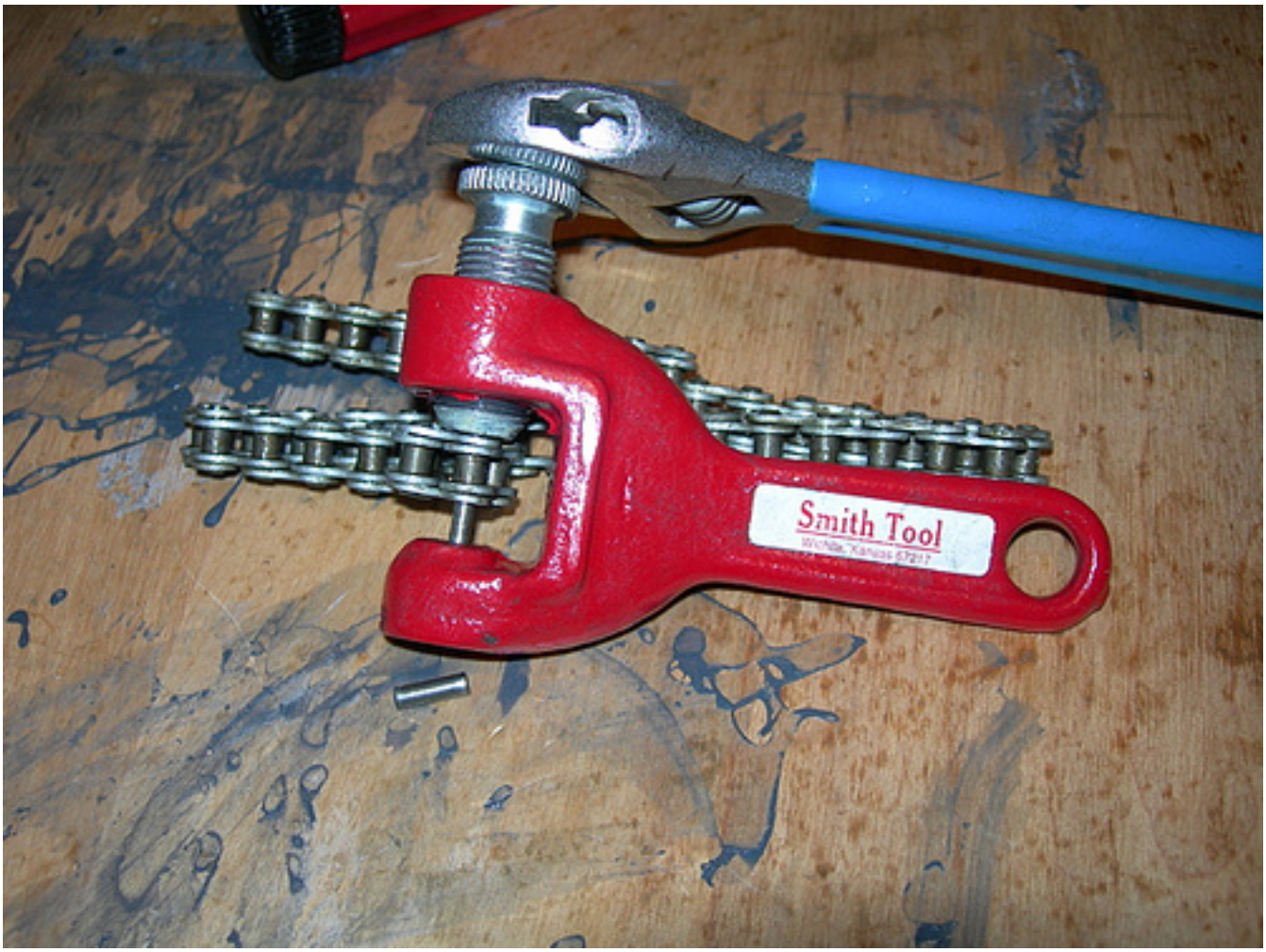
Built & Installed Drivetrain Chain

Another learning opportunity, this time in working with chain. I had purchased 10 feet of ANSI 35, 3/8" pitch chain. I didn't even know there were ANSI standards for chain until this project. Tonight I worked on getting the chain installed on the drivetrain.

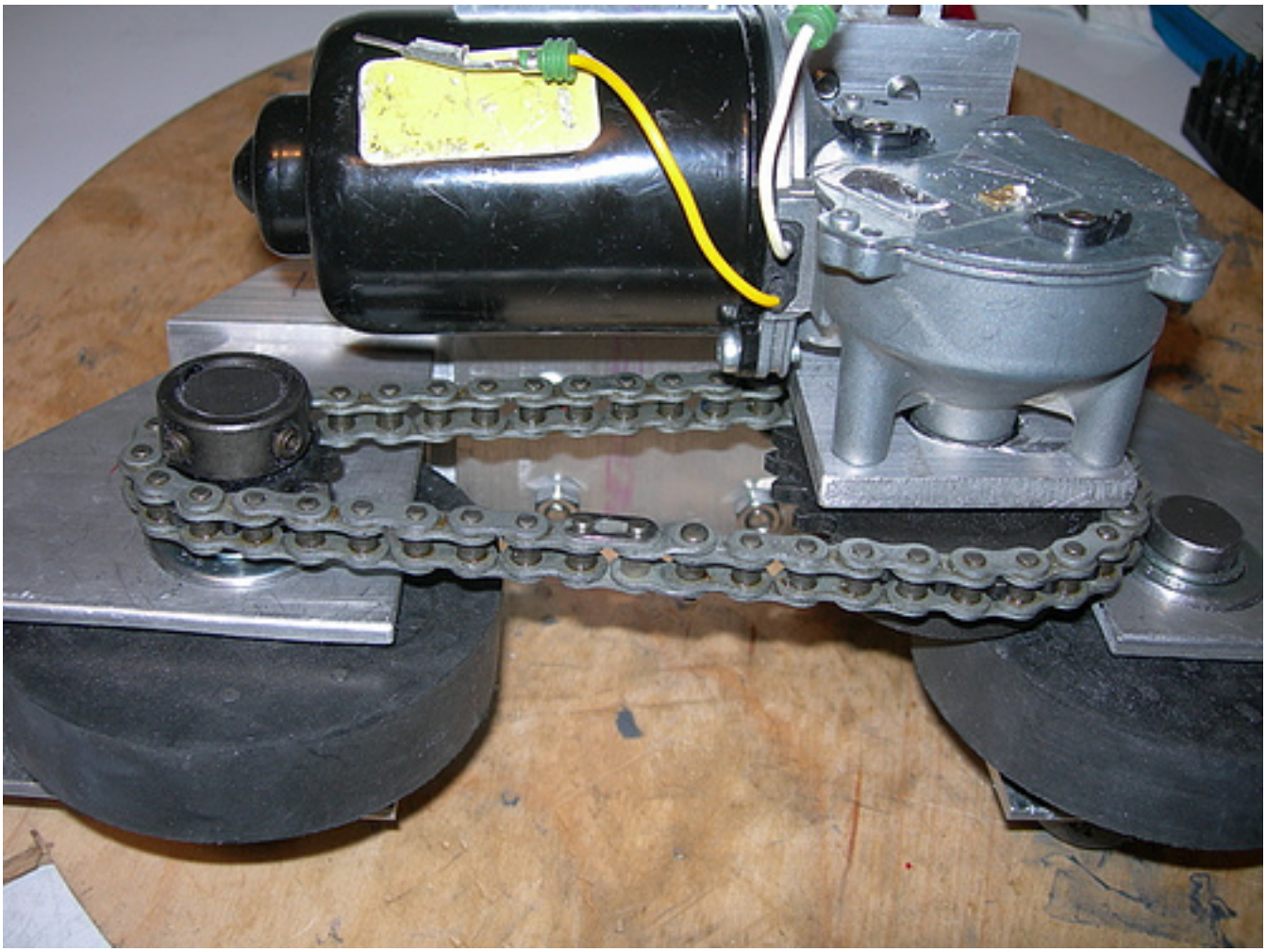
First, I lengthened the slots on one of the wheel housings with the Dremel, to allow more room for chain-tensioning.



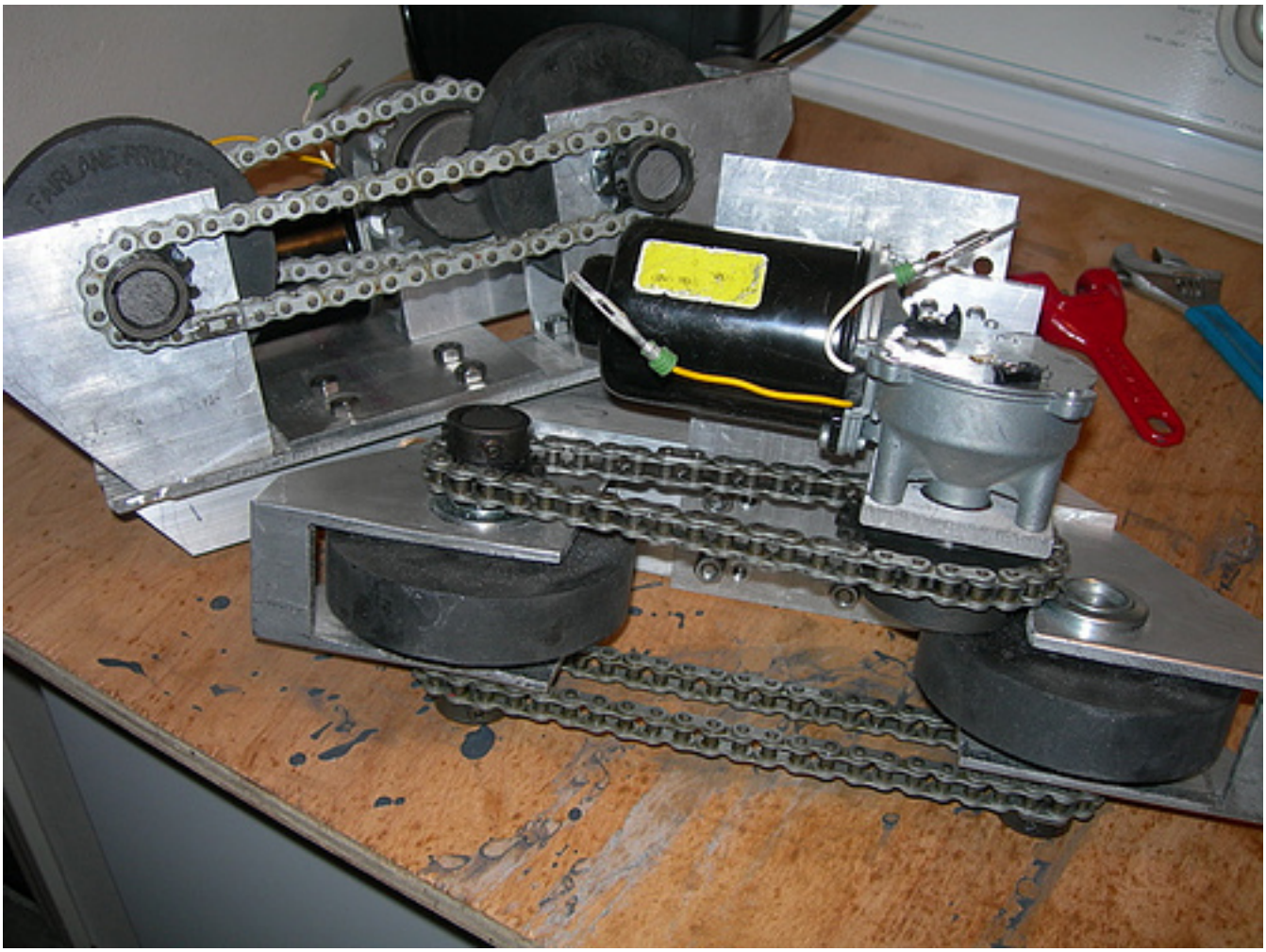
I used an awesome chain breaking tool that I purchased from McMaster-Carr. It's a bit pricey, but to me it was worth every penny. It made unlinking the chain effortless, and it came in handy several times tonight.



Once the chain was of the the approximate needed length, I had to install connecting links and sublinks to get the chain just about right. I adjusted the wheel housings away from each other to tension the chain.



Four lengths of chain (two for each drivetrain) were installed. The motor drives one wheel, and then the other wheel is driven on the other side of the drivetrain with gears and chain. I tested the setup with the battery, and all the wheels are spinning like they should. A four-wheel drive droid.



My only concern is that due to the overhang of the axle bearings on the outside of the wheel housings, I had to slide the small gears out a bit to clear them. I'm worried that the gears will have trouble fitting into the foot shells now, but I haven't test-fitted them yet.

posted by Victor Franco at 11:32 PM 0 COMMENTS

SATURDAY, APRIL 21, 2007

Electronics Shopping, Dome Drive Shaft Adapter Fixed

In preparation for R2's first steps, Mike and I went shopping for things like wire, switches, fuse holders, and other related items. We ended up going to Radio Shack (spare battery holders, switches, 12 gauge wire), a local electronics store named Orvac Electronics (CAT5E cable with multiple strands for wiring up sound, fuse holders, main circuit breaker, wire connectors), and Home Depot (power blocks).

I still need to buy some 30-amp fuses and some tie-downs for the wires.

The other day I tried drilling the shaft adapter for the dome drive, but either the drilling or the tapping (or both) turned out crooked, so the shaft adapter wobbled as the motor turned. Mike helped redrill and retap, and the result was a much cleaner rotation.

Rather than tapping by hand, Mike had the idea of putting the tap onto the drill press and manually turning the chuck to tap the hole. That way, the tap would go in at exactly the same angle as the hole that was drilled on the drill press. It worked out well.

I still have a ton of work to do before the droid is wired up for movement. I have to build a small assembly for the dome drive electronics. I also need to set up a mount for the sound board. And I still need to pin the shaft adapters to the motor shafts. Looks to be a busy upcoming week.

posted by Victor Franco at 10:46 PM 0 COMMENTS

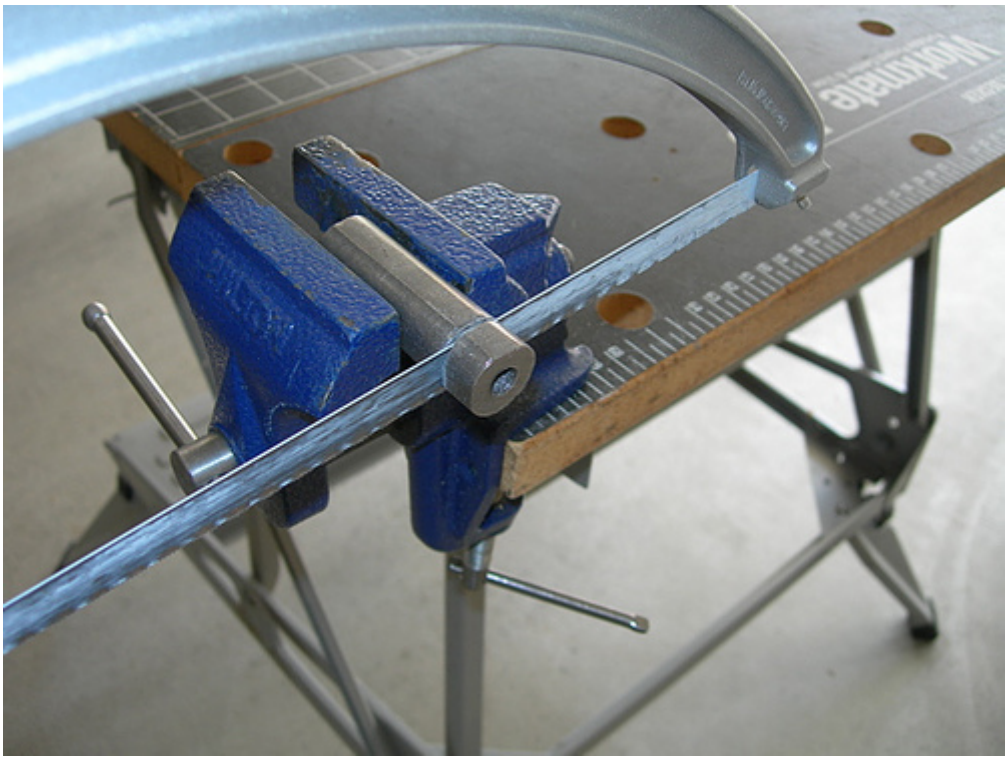
SUNDAY, APRIL 22, 2007

More Parts Shopping, Worked on Shaft Adapters, Vantec Mounts, Rockler Bearing Screws

Today I picked up a bunch of 30-amp fuses from Kragen, and some tie-downs for the wire from Home Depot, so the remaining items on the shopping list is getting shorter.

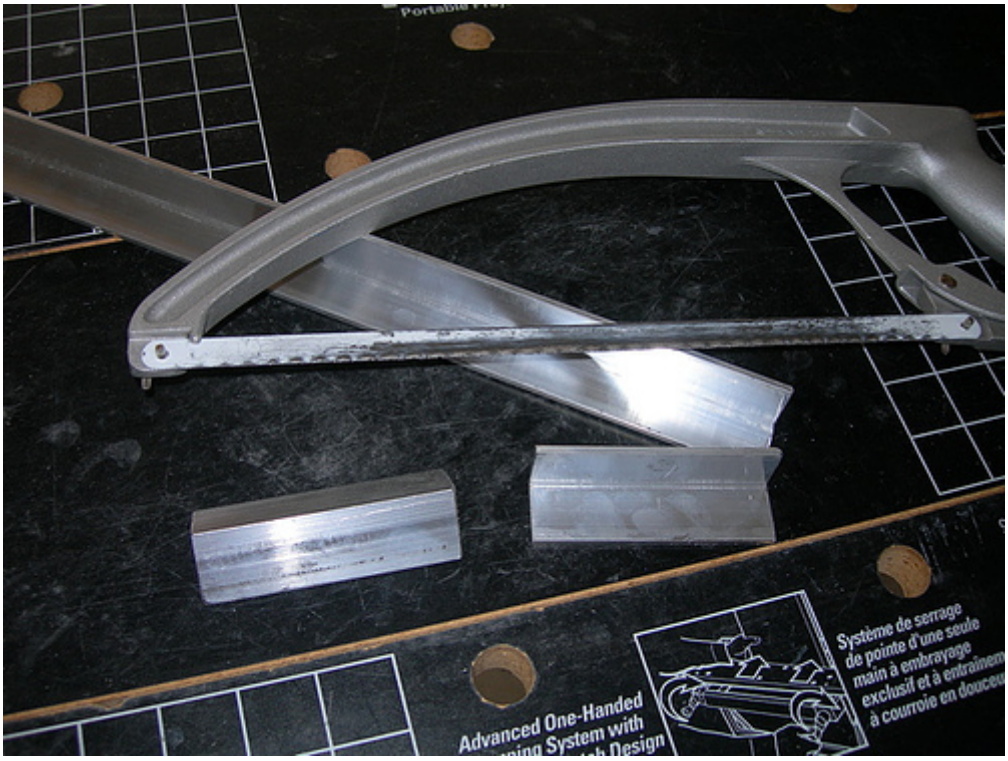
Just when I thought I was done sawing steel, I found that the dome drive shaft adapter was just a little too long, it was hitting the D-cell battery holder in the

dome as the dome spun. So I sawed that down, and now the dome spins freely.

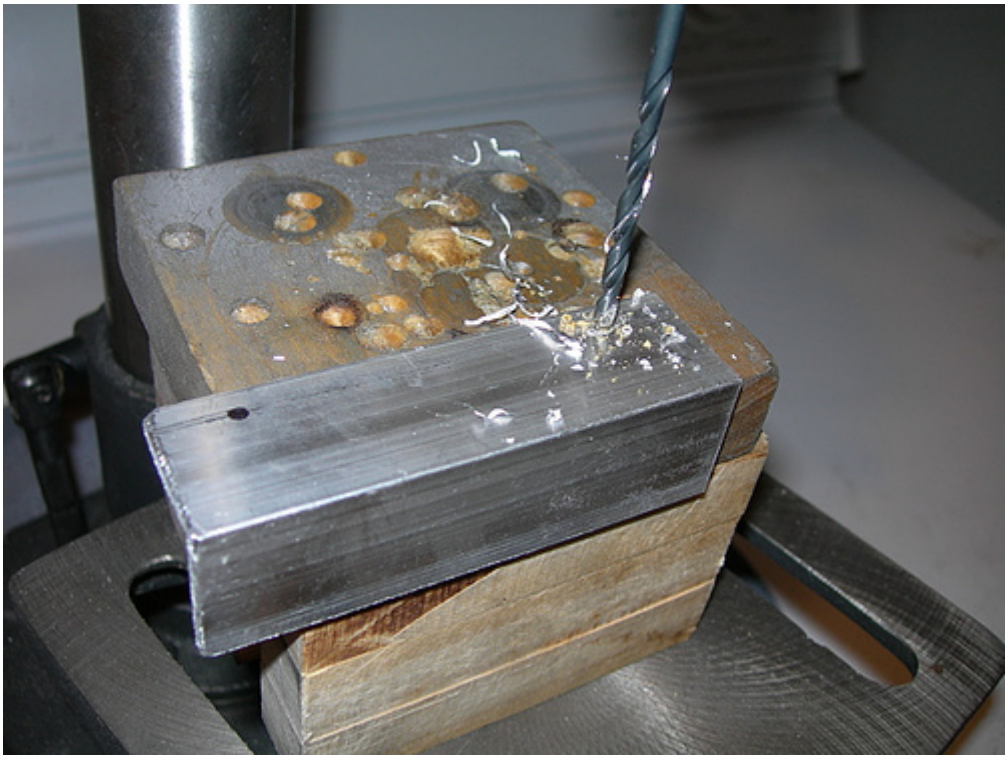


I also sawed open the dome drive plate, so that I can get the motor in and out of the assembly. With the shaft adapter permanently installed (see below), I did not want to lock this in place for eternity. Hopefully *now* I'm done sawing steel, for a while at least.

Of course, there's always aluminum to saw. I'm using 1" angled aluminum to mount the Vantec speed controller and Keycoder.



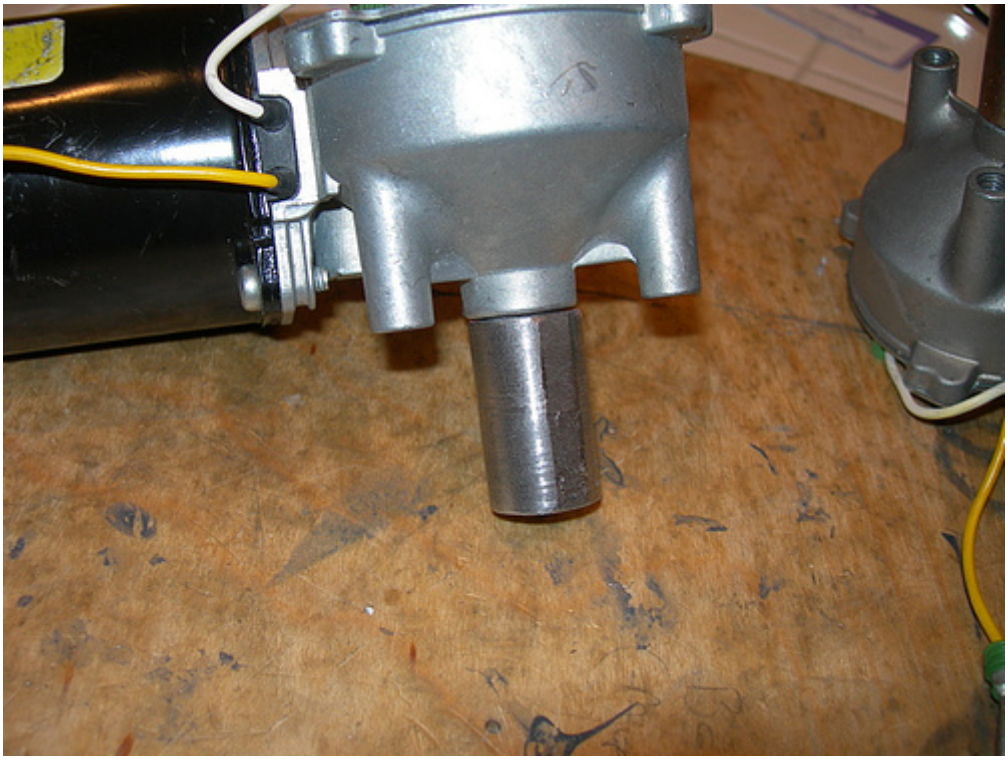
After cutting the aluminum to size, I drilled and installed it with #6 screws.



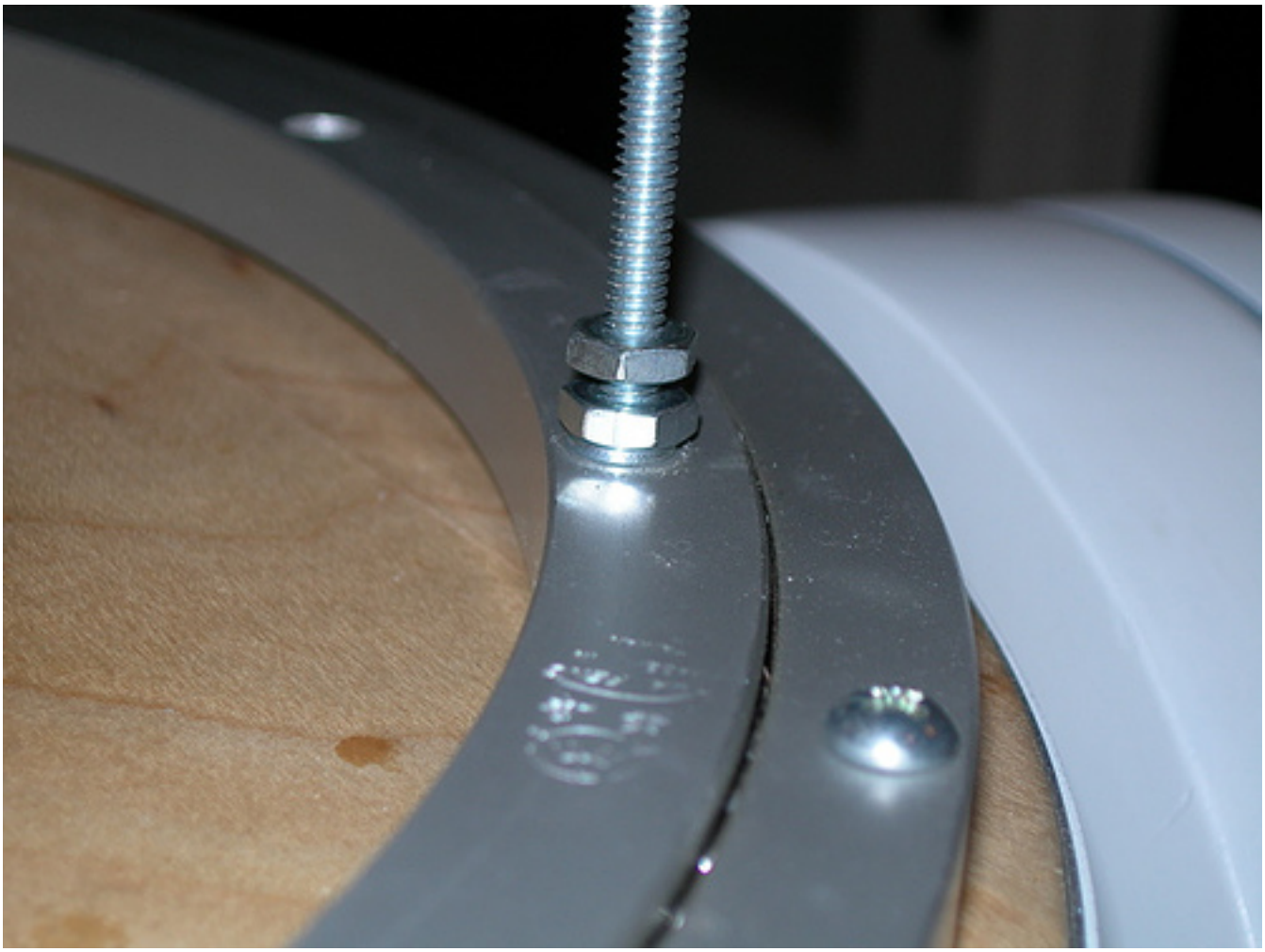
The bare side of the aluminum will be screwed onto the inside of my wooden frame.

I JB Welded the two motor shaft adapters and the dome drive shaft adapter to their respective Saturn wiper motors.

I will also drill a 1/8" diameter hole near the base of the shaft adapter, and insert and JB Weld a 1/8" steel pin, to help secure the shaft adapters to their shafts.



Finally, I picked up some #10 lock washers and installed them on all six screws that secure the dome to the Rockler bearing. With the lock washers installed underneath the bottom nut on each screw, the screws are now on the bearing nice and tight.



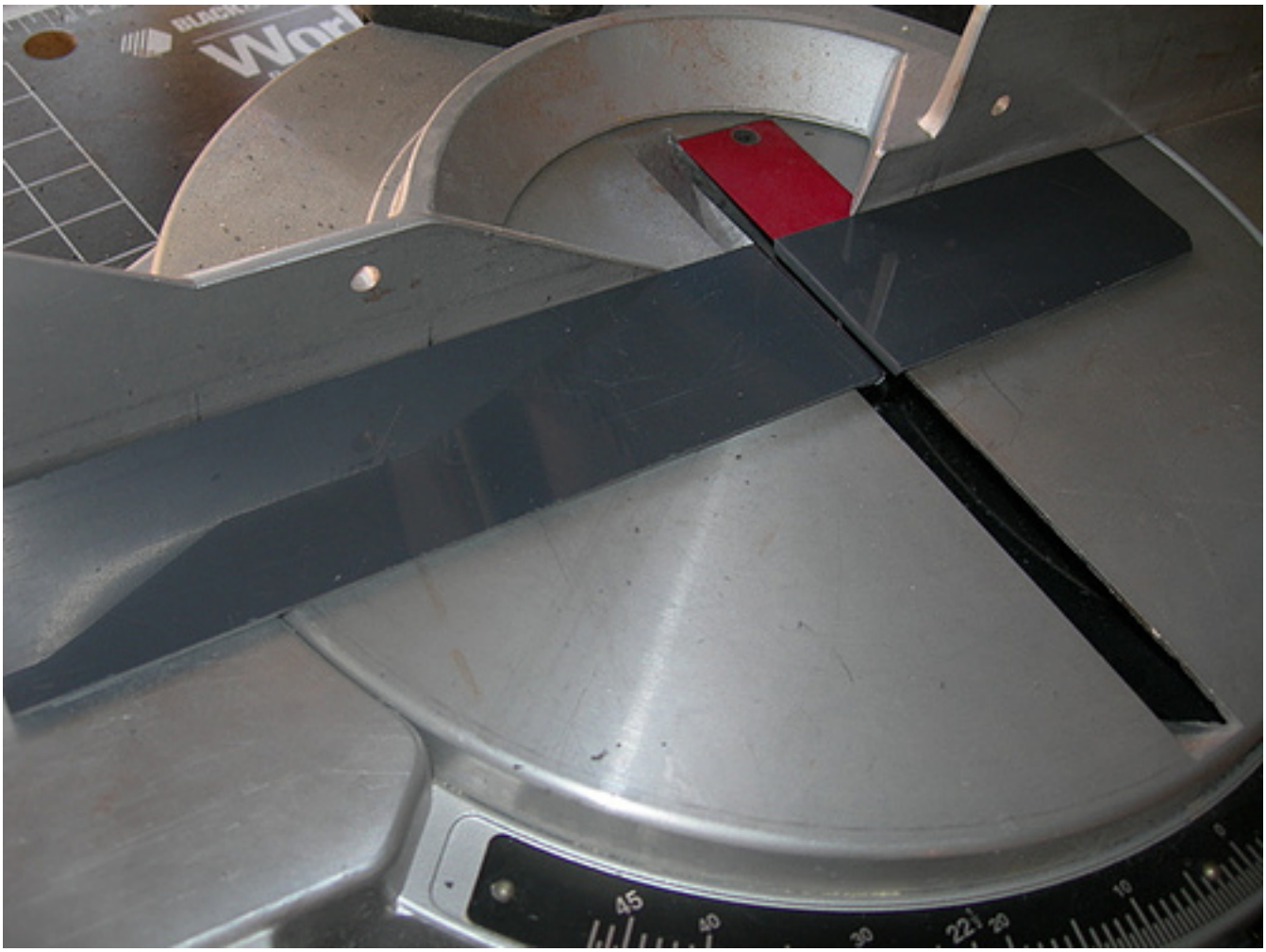
posted by Victor Franco at 11:37 PM 0 COMMENTS

MONDAY, APRIL 23, 2007

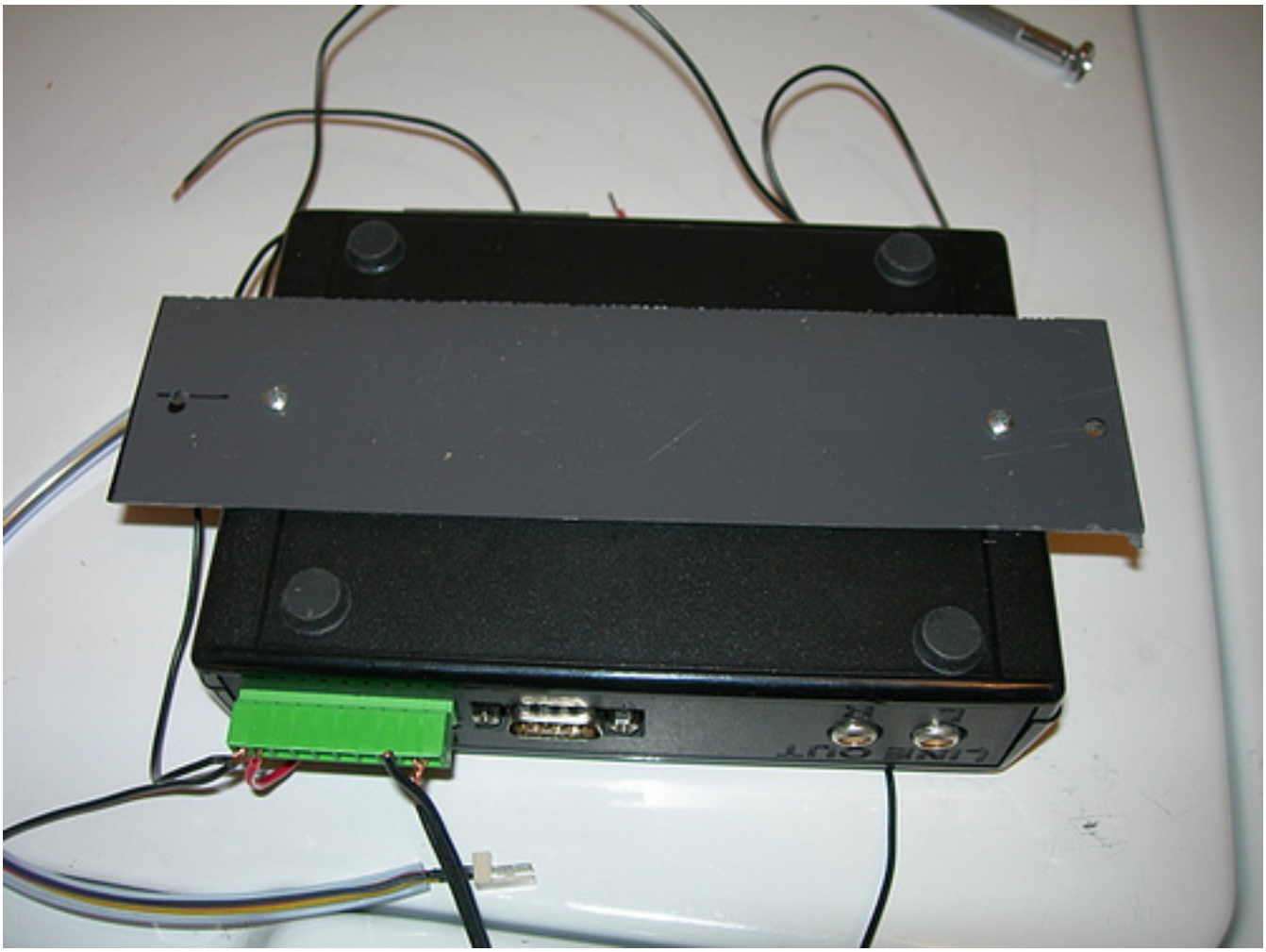
Mounting Board for Sound Card, Drilled & Pinned Shaft Adapters, Drivetrain Finished

Tonight I made a little mounting board for the CFSound III board, so that the enclosure can attach to the inside of my frame.

First, I cut a spare strip of PVC to size.

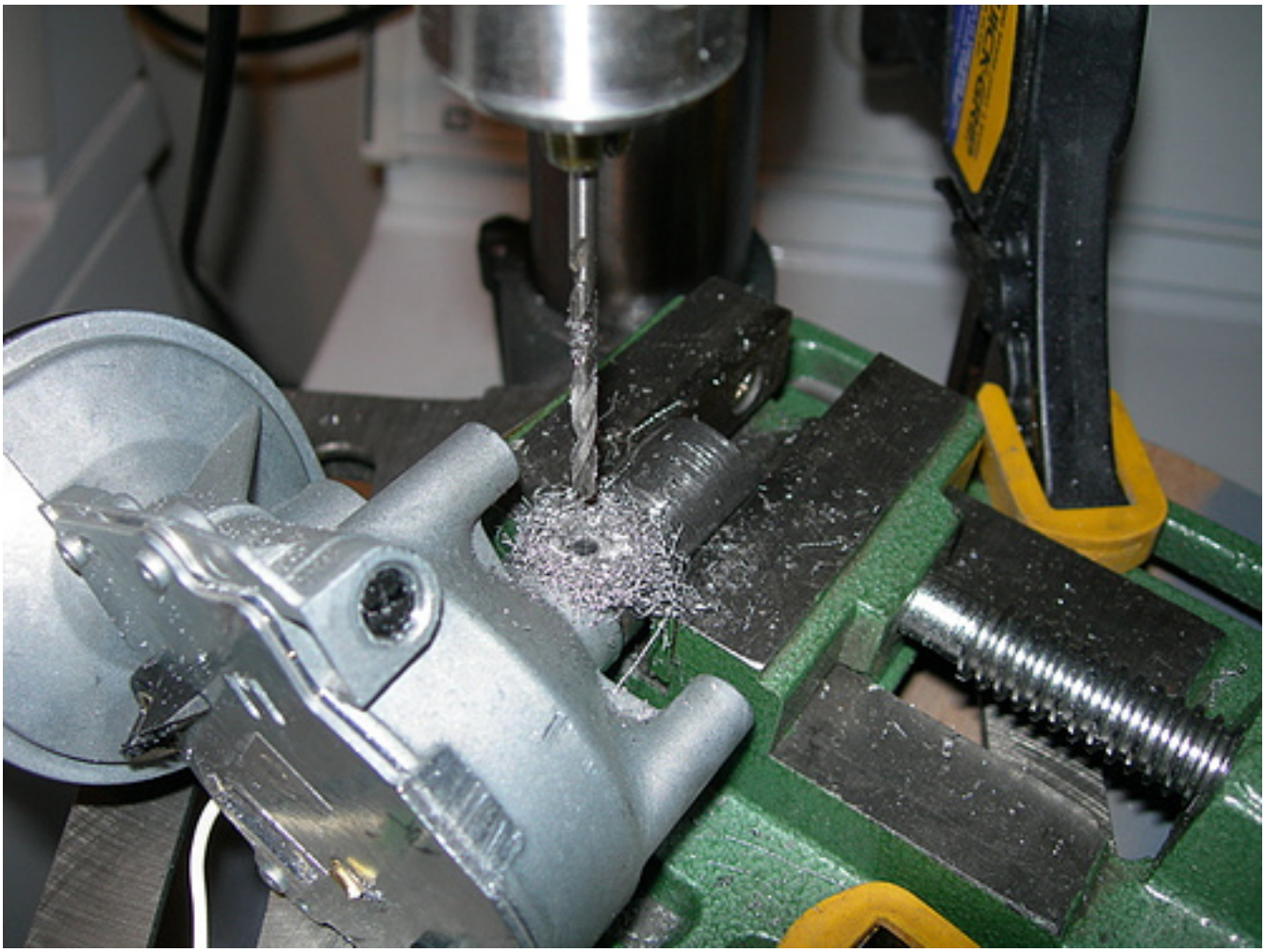


Then I attached the PVC strip to the enclosure by drilling holes in the strip that match where the pre-existing screws on the bottom of the enclosure go. Now the PVC strip gets screwed onto the back of the enclosure. I also drilled a couple of mounting holes on the ends of the strip, so that I can mount the enclosure onto one of the wooden vertical planks of my frame.

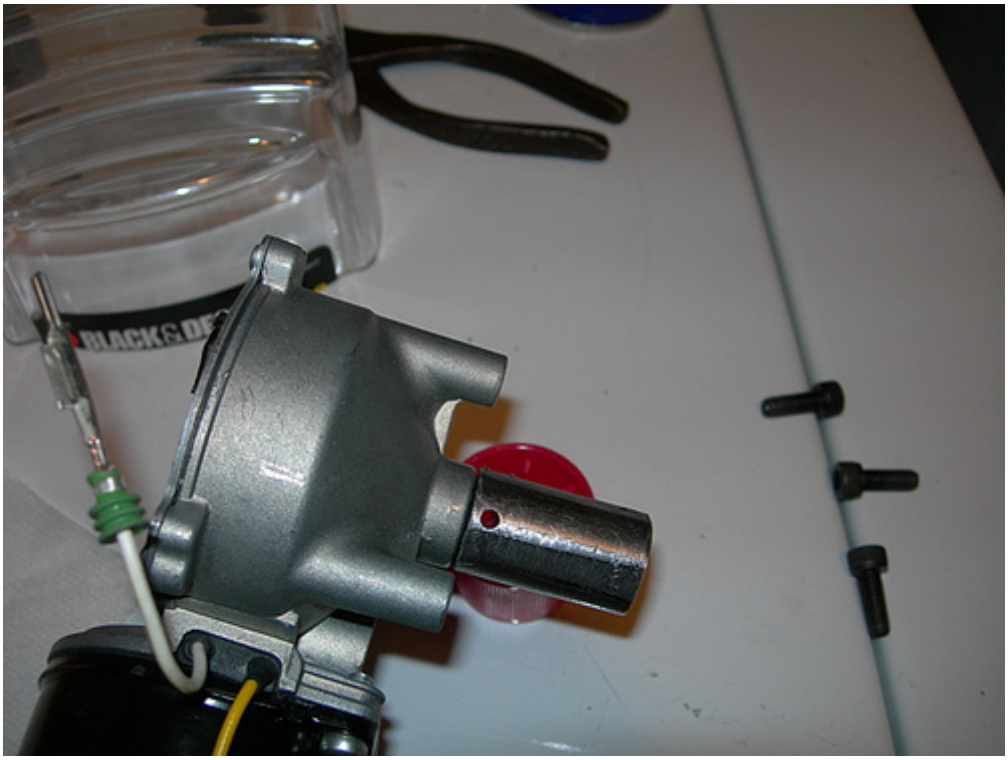


Next came a part of the drivetrain build that I had been fretting over for quite a while, the drilling and pinning of the shaft adapters to the Saturn motor shafts. It turned out that I had nothing to worry about, it was not as hard as I thought it would be.

I clamped down the shaft adapter in my drill press vise, and then secured the vise to the table. When I was sure that the drill bit was ready to go dead-center through the shaft adapter and shaft, I fired up the drill press and slowly drilled a 1/8" diameter hole through it all.



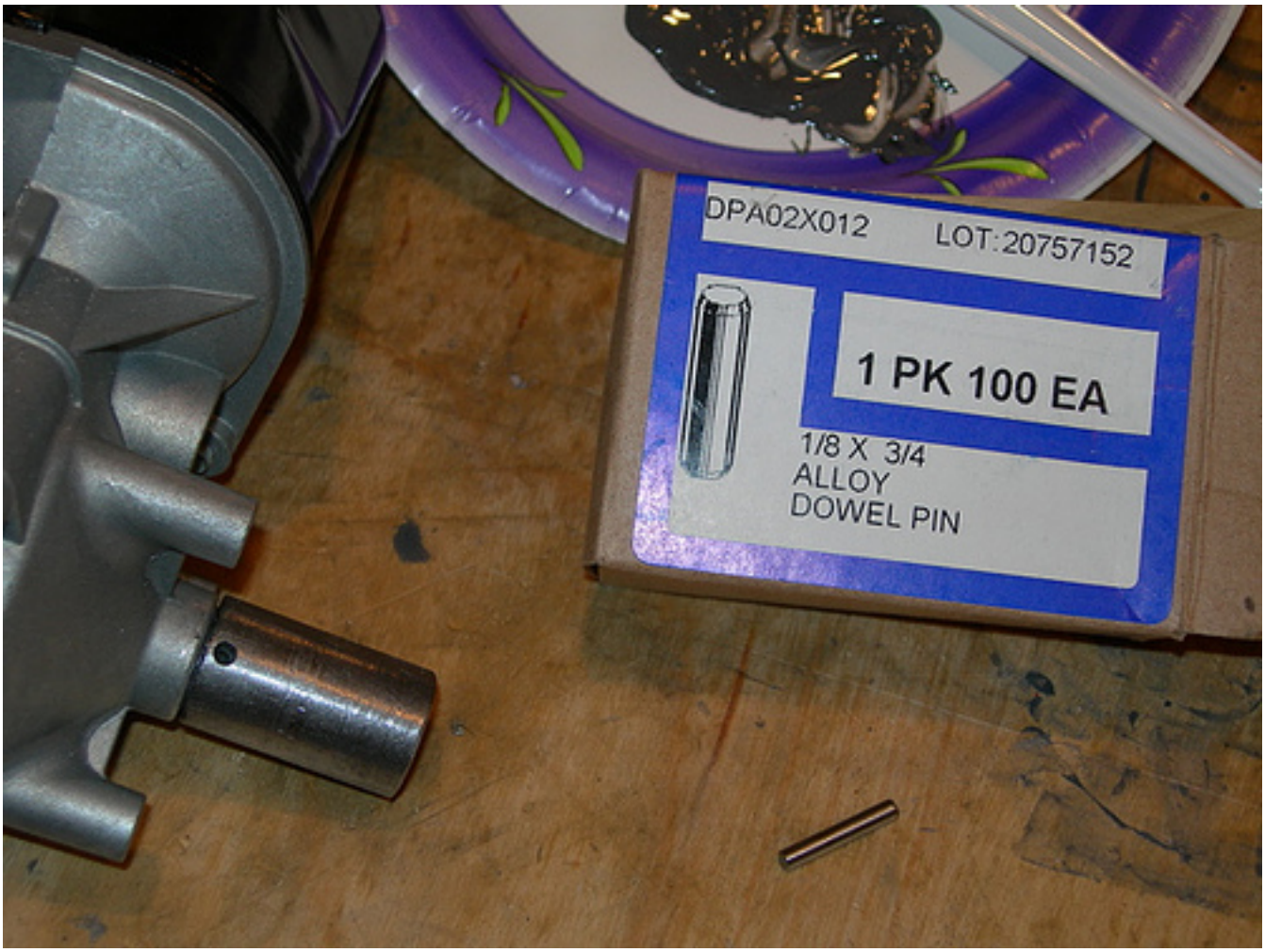
I got the hole just where I wanted it, toward the very bottom of the shaft adapter, near the thickest part of the motor shaft, and right through the middle.

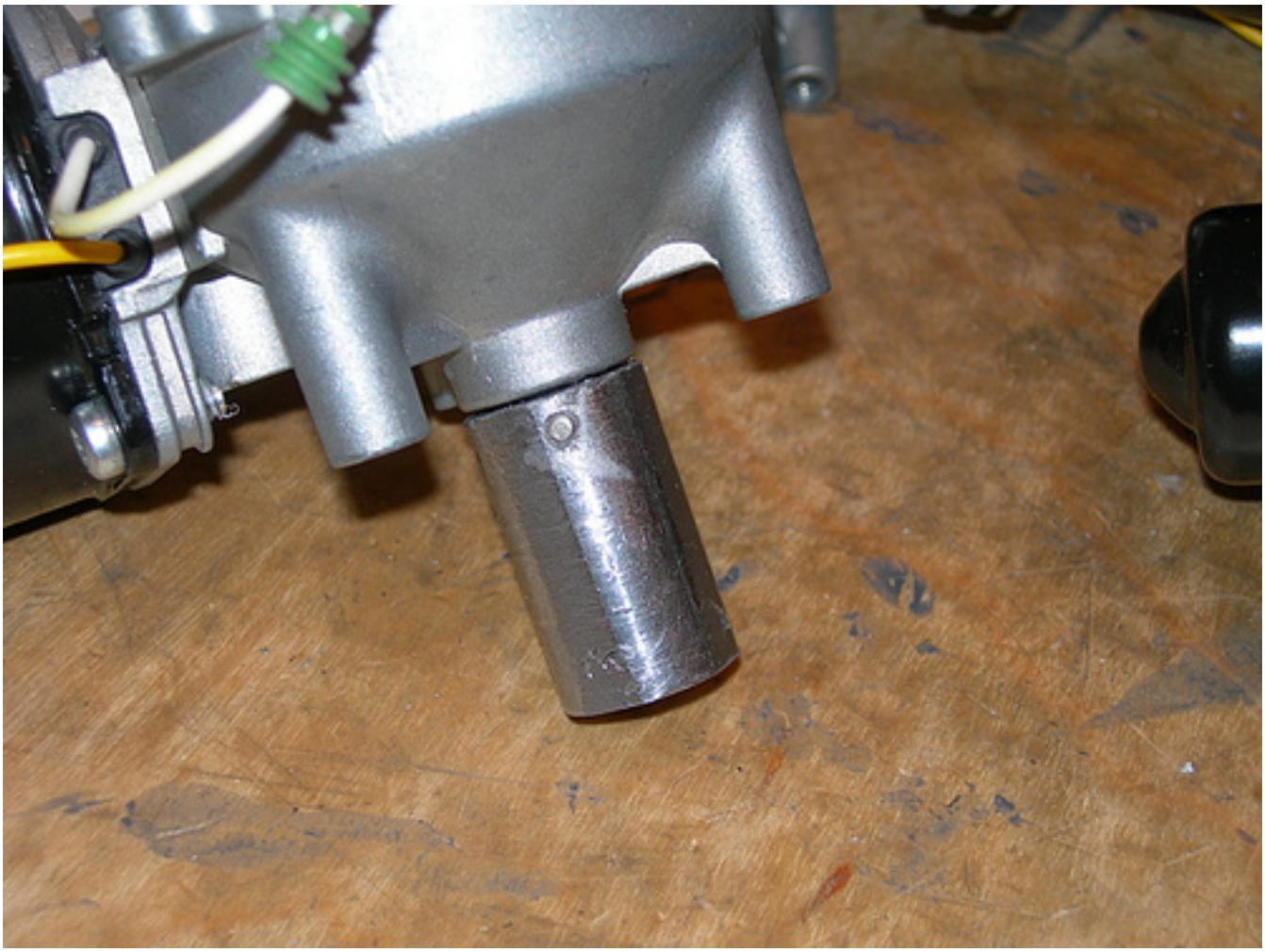


In all, I drilled the two foot motor shafts, and the dome drive motor shaft. I still need to drill another hole in the dome drive shaft adapter to secure the dome drive scooter wheel to it. I'll deal with that soon.

Next, I JB Welded a 3/4" long, 1/8" diameter steel pin into each hole. The steel pins are from McMaster-Carr, and only come in quantities of 100. The pin will secure the shaft and shaft adapter together, so that the two won't shear when the motor torque kicks in.

It's important to secure the pin to the thickest part of the motor shaft, as the threaded area of the shaft has been shown to be too thin and/or weak to handle the stress when running the motors at 24 volts.


DPA02X012
LOT:20757152
1 PK 100 EA
1/8 X 3/4
ALLOY
DOWEL PIN



And with that, my scratch-built Heath & Alex drivetrain is *done*! I'll put it all back together again once the JB Weld has dried.
posted by Victor Franco at 11:18 PM 3 COMMENTS

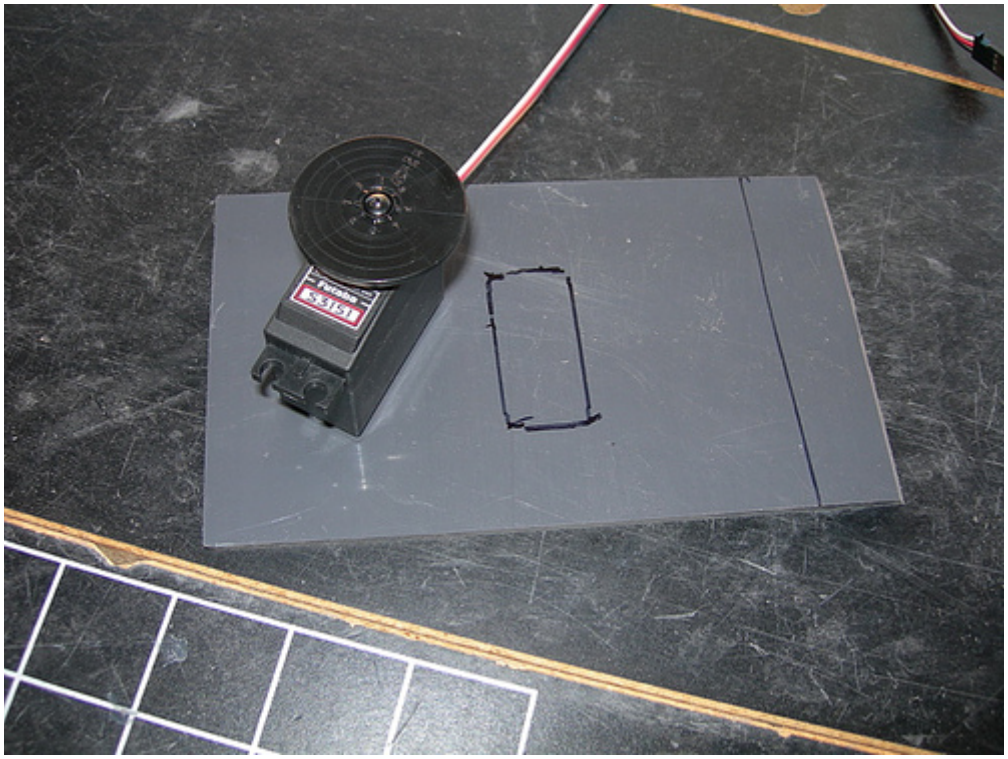
TUESDAY, APRIL 24, 2007

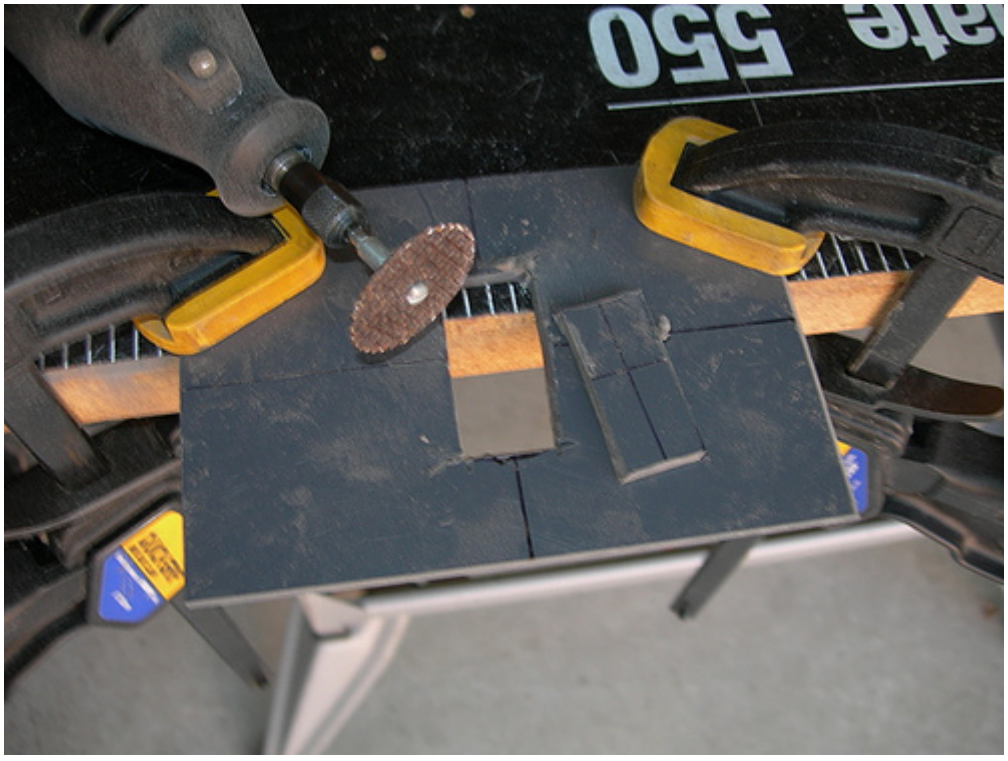
Started Dome Servo Mounting Plate, Trimmed Foot Shells for Drivetrain Gears, Removed Some Door Holders, Drilled and Pinned Dome Drive Wheel

Today I worked on an eclectic set of droid building tasks.

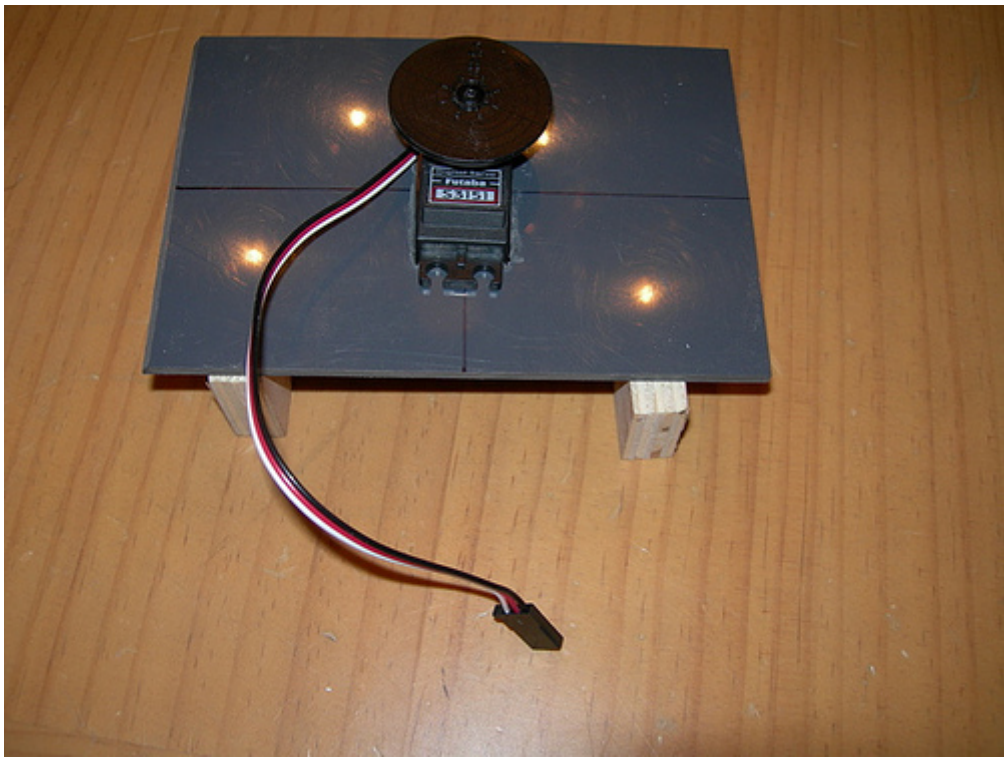
First, I started working on a mounting plate for the servo mechanism that will trigger the spinning of the dome. The mechanism's workings will become clearer over the next day or two, but this particular piece will house a servo.

First I traced the servo outline on the PVC mounting plate, and then I used the Dremel with the cutoff wheel attachment to cut out the rectangle.

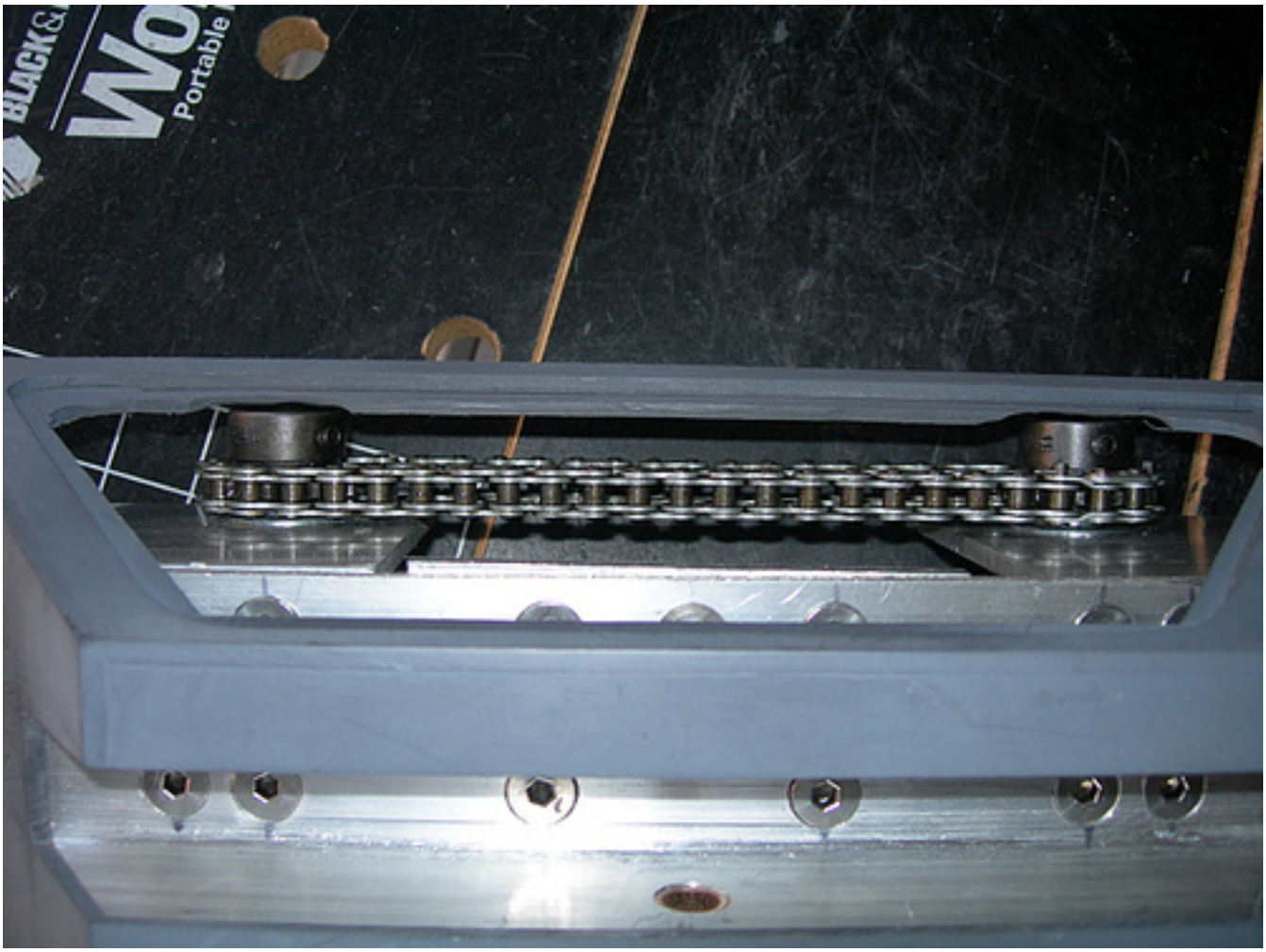




The servo fits in just right. This will be mounted to one of the vertical wooden planks in my frame.



Next, I returned to the foot shells. When I installed the drivetrain chain the other day, I had to move a couple of the gears on each foot outward, causing them to interfere with the foot shells. I was able to trim a small amount of material from the inside of the foot shells with the Dremel drum sander, and now the gears fit inside the foot shells with a small amount of clearance.

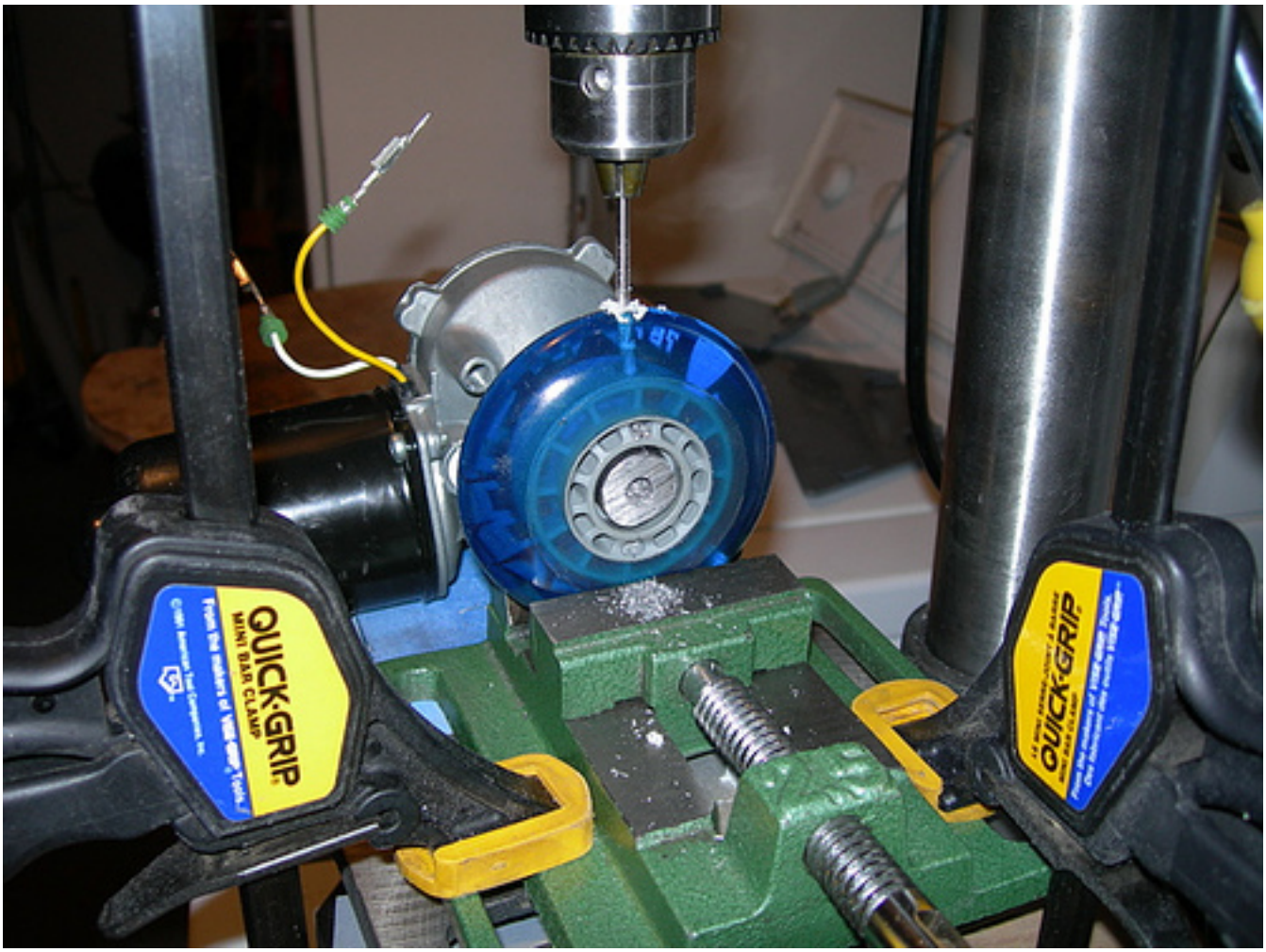


I needed to remove the two bottom door holders on the back of each outer foot shell door, as these also interfere with the gears. I didn't consider the positioning of these very carefully when I first installed them. So I trimmed the holders off with the Dremel drum sander. Once I got down to the last sub-millimeter, I could just peel the rest off. I'll recut and reglue some new ones in better locations on each outer door shortly.

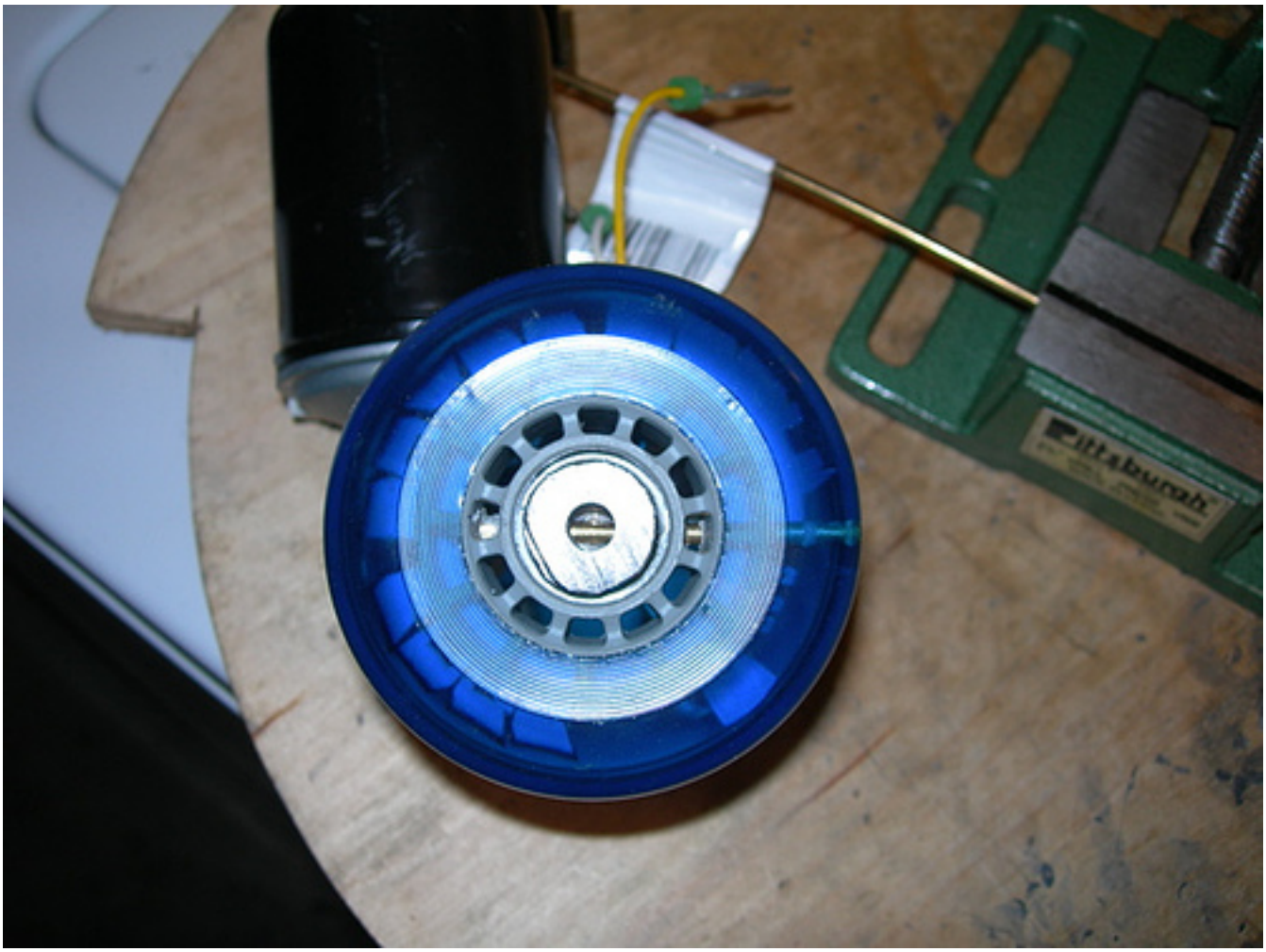
Finally, I wrapped up by pinning the dome drive scooter wheel to its shaft adapter.

A while ago I had drilled a hole into the wheel, and pushed some 1/8" diameter rod through to act as a set screw. I was able to pull that out and recycle the hole.

This time I drilled through the wheel and shaft adapter, much like yesterday's exercise.



Then I cut a new section of 1/8" diameter rod, and pushed it through the hole, pinning the wheel to the shaft adapter.



I need to do a little drum sanding on the wheel to ensure that there is zero wobble as it spins, and I need to install the spring that pulls the dome drive wheel into the Rockler bearing. Then the dome drive itself will be done.

posted by Victor Franco at 11:07 PM 0 COMMENTS

WEDNESDAY, APRIL 25, 2007

Goofed Up Dome Drive Wheel, Sanded Down Foot Shell Door Backs, Built Receiver Battery Housing, Attached Battery Boxes

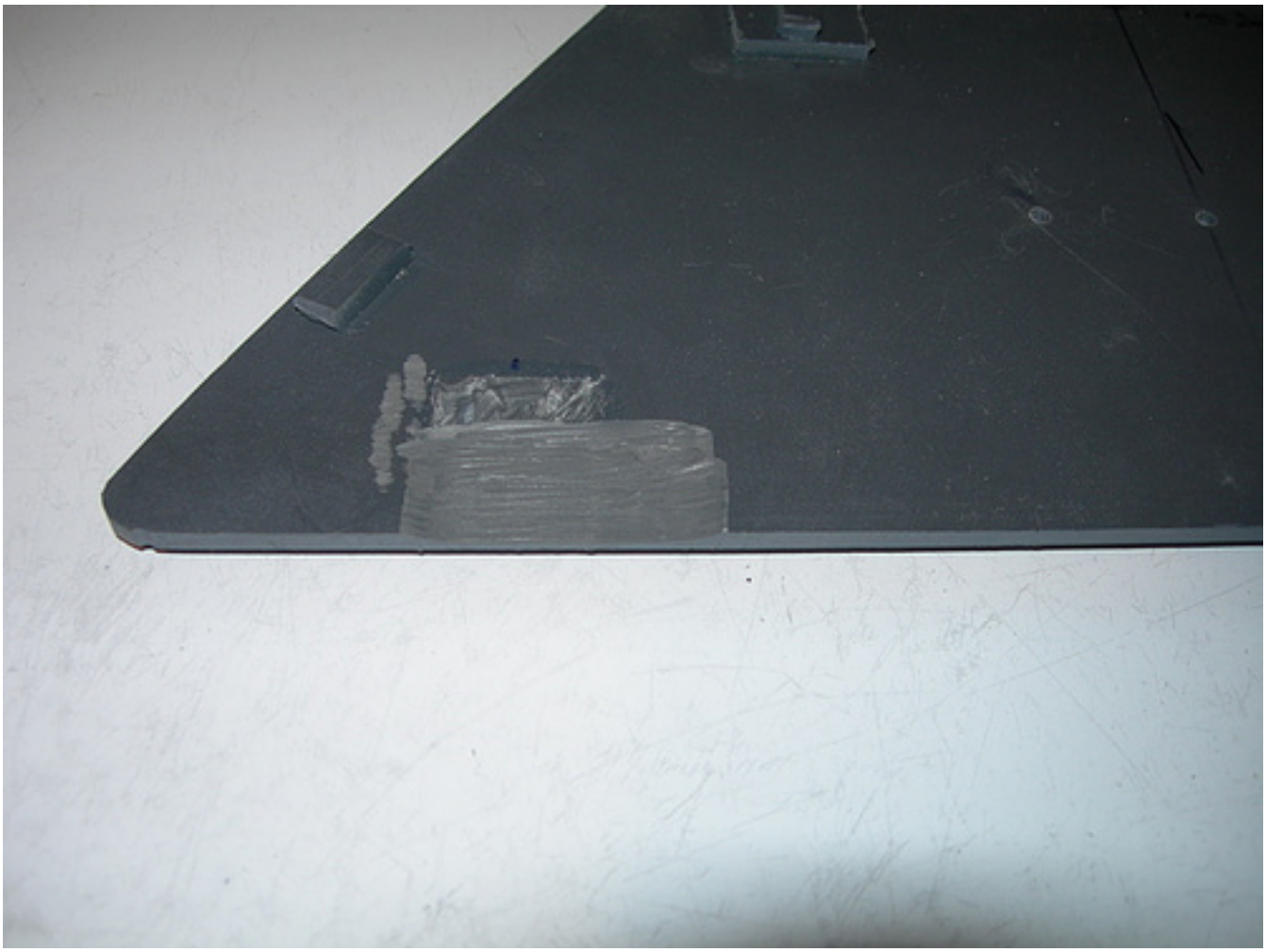
Another day of variety.

First, I attempted to smooth out the wobble of my dome drive wheel ("attempted" should clue you in on where this is going). I clamped the motor in a vise, and held the Dremel with the drum sander next to the wheel, and fired up the Saturn wiper

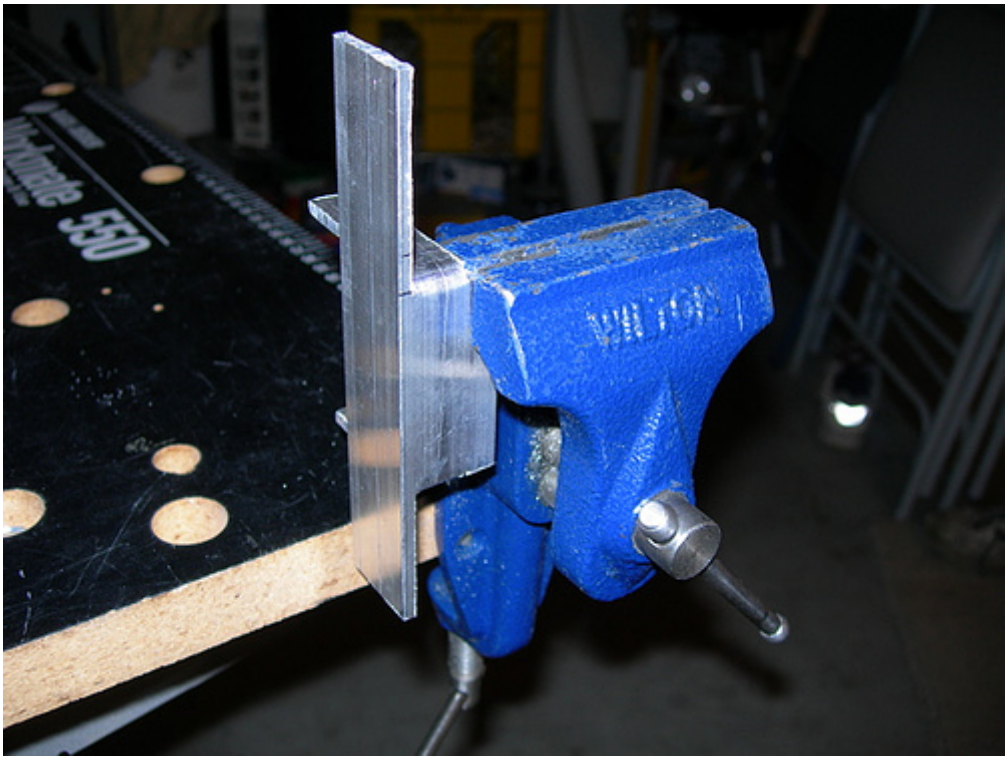
motor. The idea is that as the wheel turns and wobbles, the Dremel shaves some material off of the wheel, making for a smooth edge.

Unfortunately, my results were not so great. The wheel still has a slight wobble, and even worse, when I tried the wheel out with the dome drive on my R2, the wheel did not grab and spin the Rockler bearing consistently. I'm not sure if I can salvage this wheel. If not, I do have another identical, untouched wheel I can use, and I have already verified that I can remove the current wheel.

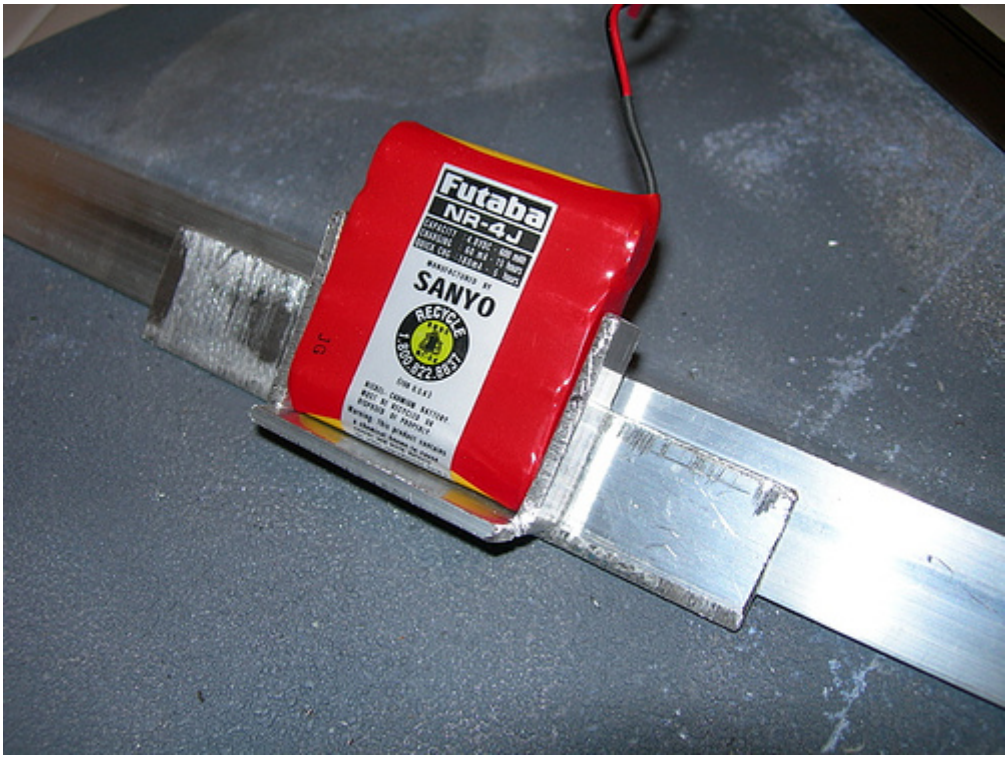
Mike had commented that the gears might bump into the inside of the foot shell doors, so while I had the Dremel out, I trimmed a little material off of the back of the doors, near where the gears are. I'm pretty sure the gears won't hit the doors now.



Next, I sawed and bent some aluminum angle bar to form the remote control receiver battery holder.

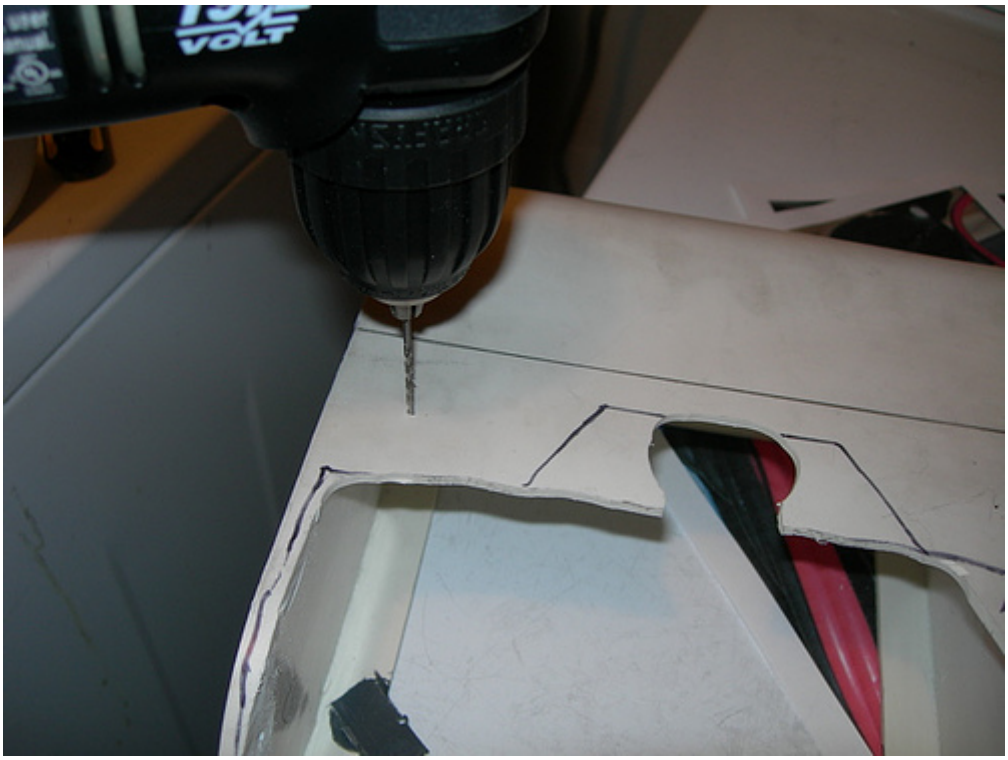


There will be an additional bar that goes across the front of the battery to keep it in place. This will be attached to the inside of my wooden frame.



Finally, I wrapped up by attaching the battery boxes to the foot shells. I drilled

small pilot holes in the battery boxes.



Then I used wood screws with a long thread on them (not sure how else to describe them), to attach the battery boxes to the foot shells. The drivetrain still fits just fine in both shells, although I took the right foot's drivetrain out of the shell.

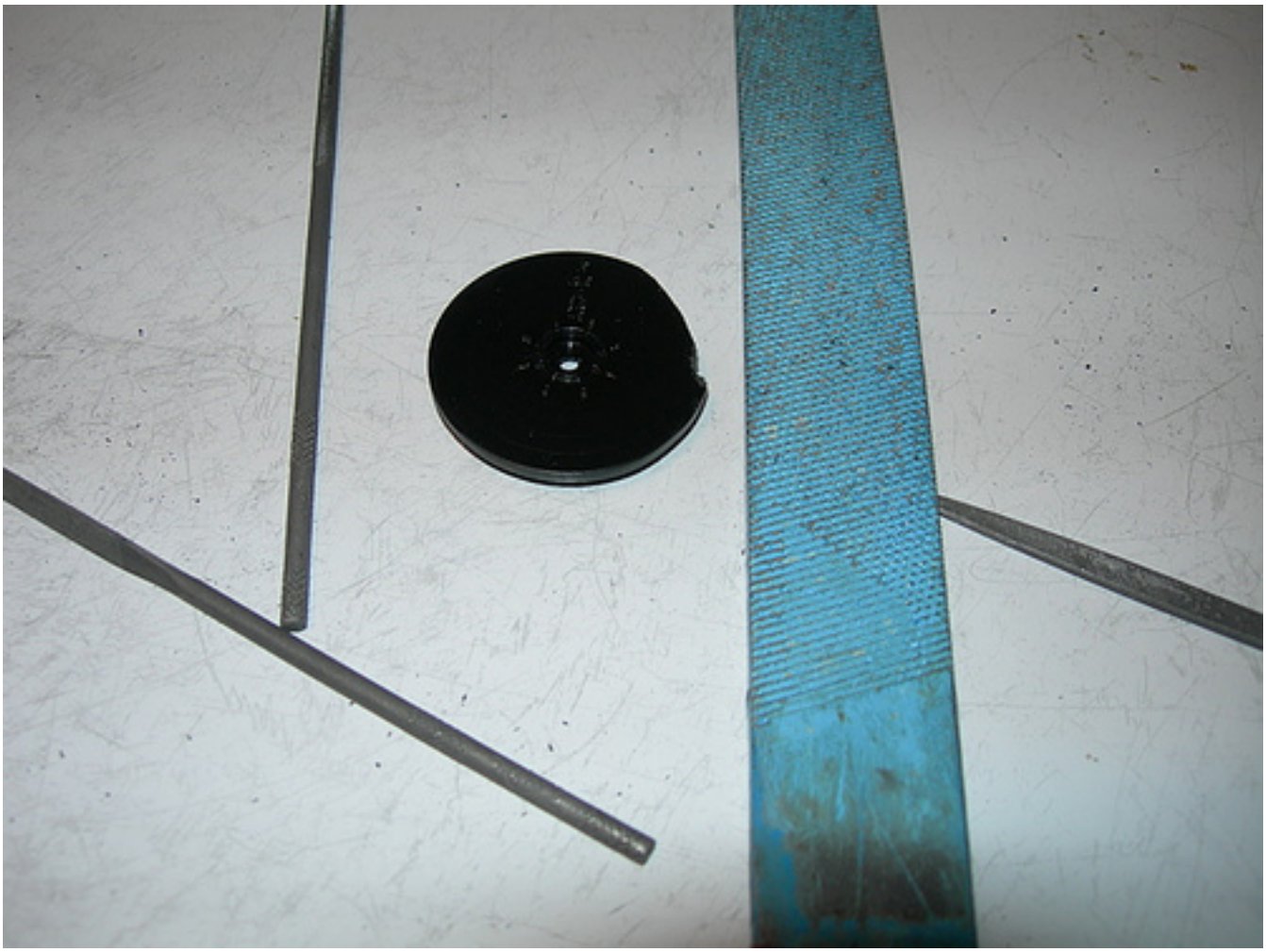
posted by Victor Franco at 11:43 PM 0 COMMENTS

THURSDAY, APRIL 26, 2007

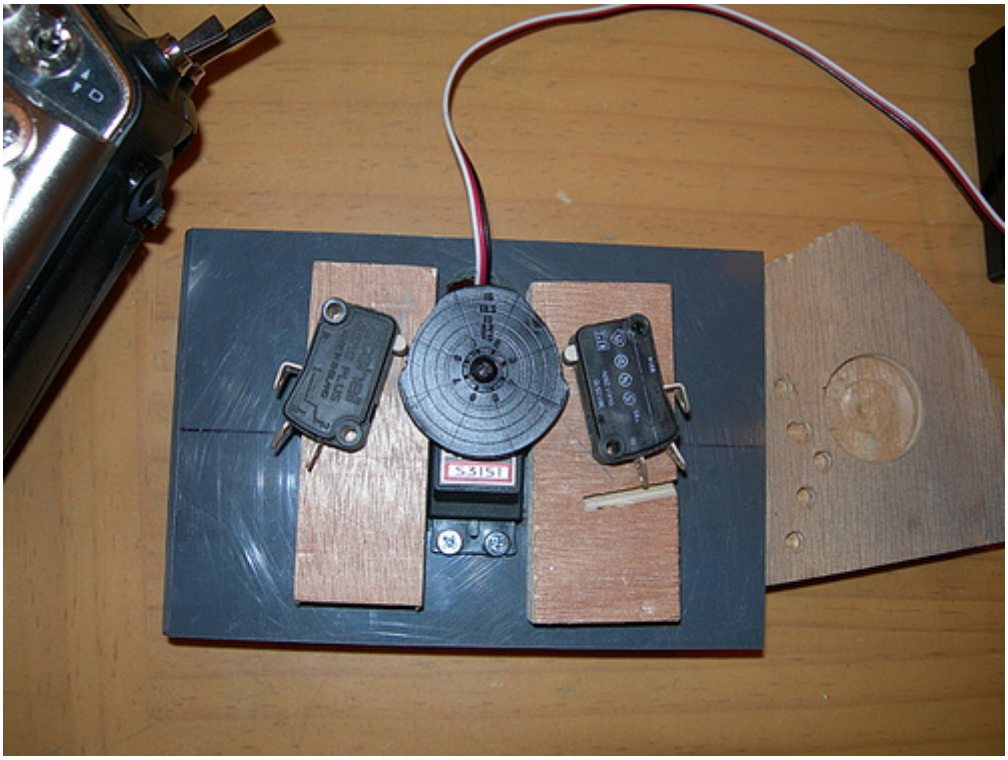
Roy's Leg Pipe, Started Working on Dome Drive Servo Mechanism

Roy Powers dropped by for a while, and he got to experience the joy of drilling through steel pipe. He needed to use my drill to get started drilling the holes in the steel pipe for the bolts that hold his R2's legs together. There's an inner and outer pipe that were drilled.

Meanwhile, I finally got to work on the servo mechanism for my dome drive. I started by filing some material off of the servo horn disc.



I iteratively filed the disc and fitted it on the servo, and used the remote control to turn the servo clockwise and counterclockwise. As the disc turns, it bumps into switches that will cause the dome motor to turn one way or the other, depending on which way the servo rotates and which switch (left or right) the disc hits as it rotates.



I removed a greater amount of material from the top of the disc, so that both switches are never pressed at the same time when the disc pivots. I plan to mount the servo, wooden switch holders and switches permanently to the PVC base tomorrow.

By the way, the dome drive wheel problem from yesterday may be due to the shaft adapter bumping into the frame. I'll Dremel a little more material from the frame and see if that solves the problem.

posted by Victor Franco at 10:44 PM 0 COMMENTS

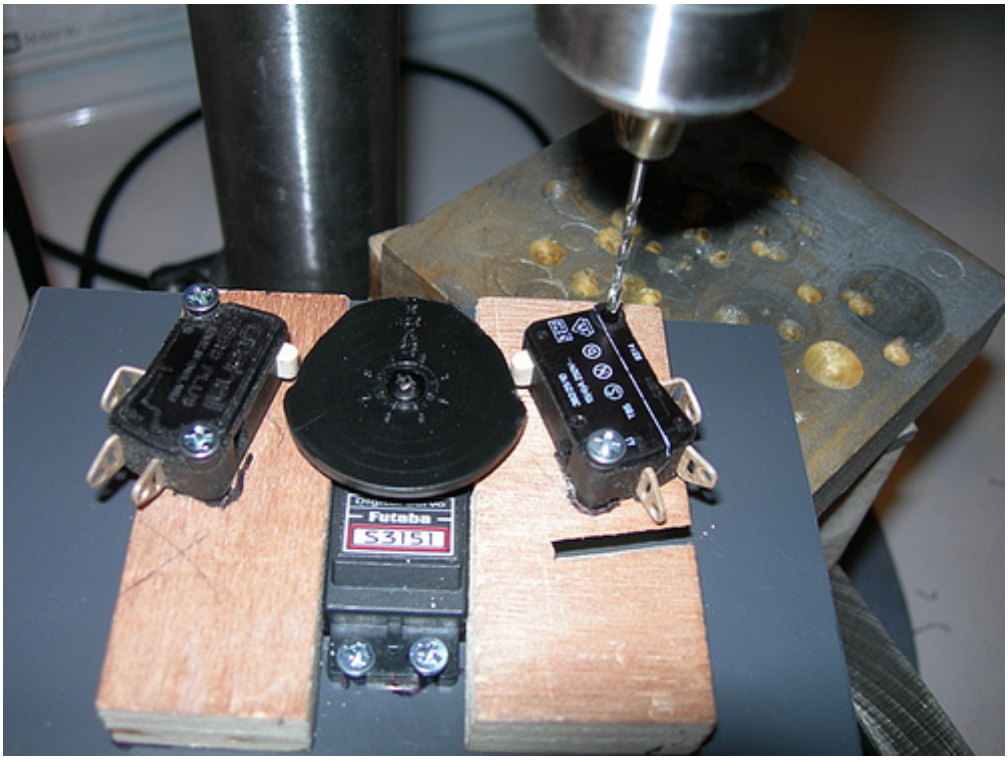
FRIDAY, APRIL 27, 2007

Widened Dome Drive Groove in Frame, Finished Dome Drive Servo Mechanism

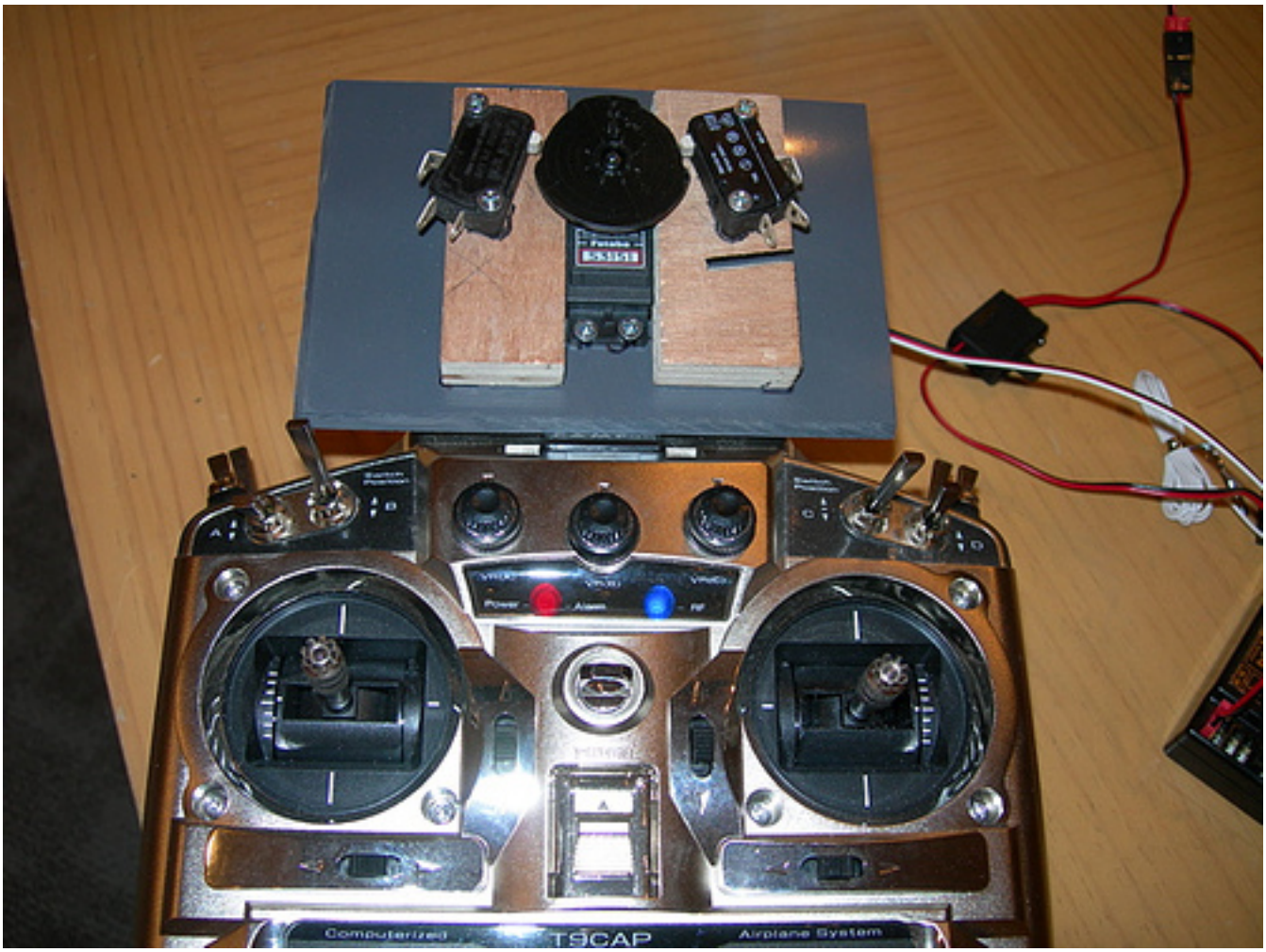
Tonight I fixed the problem with the dome drive wheel not grabbing the Rockler bearing as it spun. Sure enough, because I trimmed some of the edge off of the wheel to keep it from wobbling, I needed to bring the whole assembly closer to the bearing. The problem was that the shaft adapter was running into the groove in the frame that was meant to allow access to the bearing. So I widened the groove and now the dome drive works as it should.

Next, I finished up the servo mechanism that will trigger dome rotation.

I attached a couple of wooden blocks from behind with screws onto the PVC servo holder. Then I drilled pilot holes and screwed down the switches that will be bumped by the servo horn disc. The switches will be wired up to the dome drive motor.



Now, when the left stick on the remote is centered, neither switch is pressed.



When the stick is pulled to the left, the servo rotates and bumps the left switch.

When the stick is pulled to the right, the servo rotates in the opposite direction, and bumps the right switch.

Tune in again tomorrow, there may be some interesting developments.

posted by Victor Franco at 11:54 AM 0 COMMENTS

SATURDAY, APRIL 28, 2007

First Steps

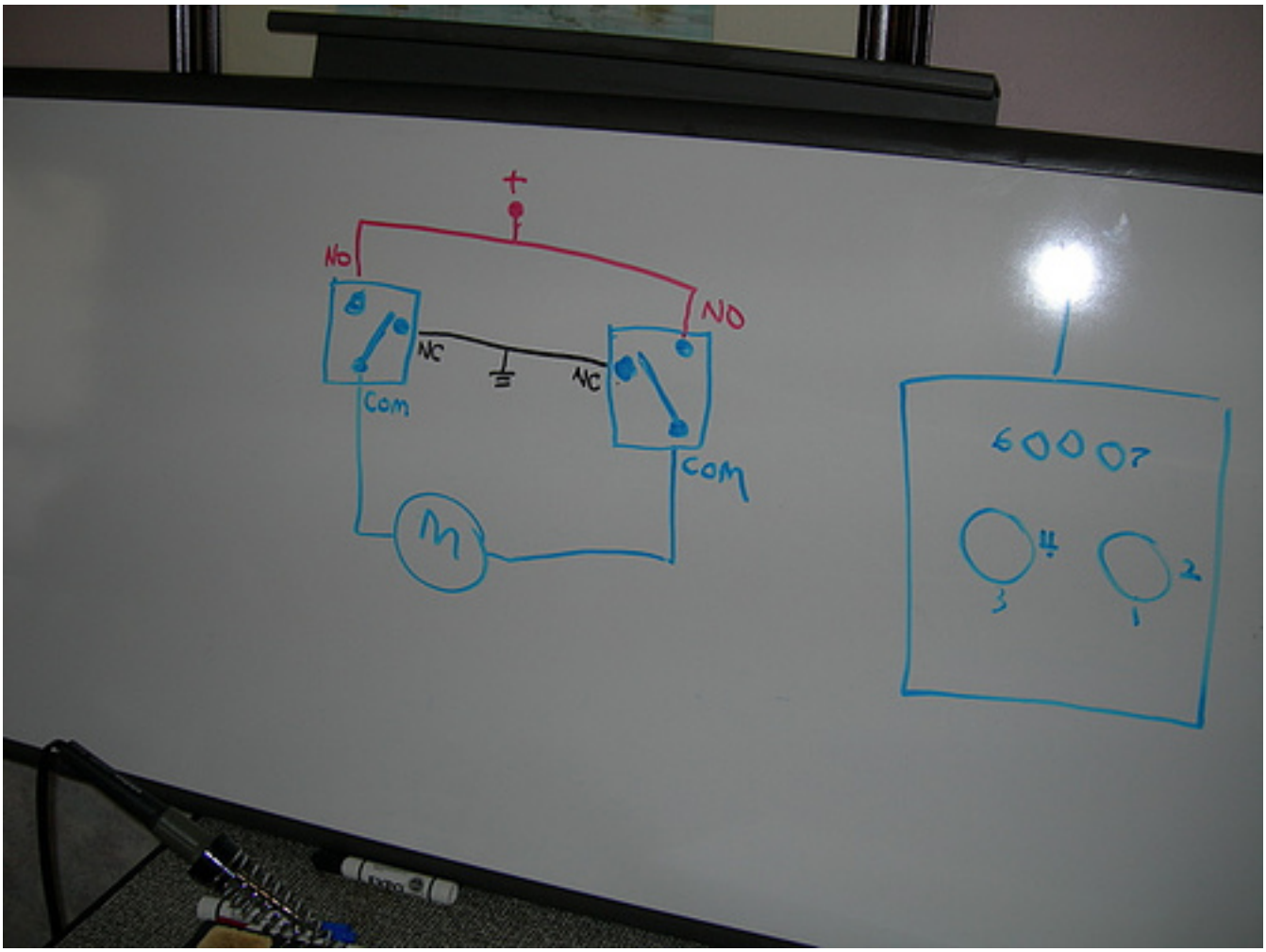
R2 took his first steps today. Here's the tale of how the day went.

I got to Mike's around 10:00am, William Miyamoto joined us a short time later, and Roy Powers also dropped by for a while and lent a hand. My main function was to stay out of the way as much as possible and operate the video camera, as we were shooting the wire-up for a DVD tutorial.

Mike and William worked on wiring up the Saturn motors.

Meanwhile, Roy tinned up some of the data lines for the sound card.

Part of the DVD tutorial included some whiteboard explanation. Mike explained radio control basics, and later diagrammed how the dome motor controller worked.



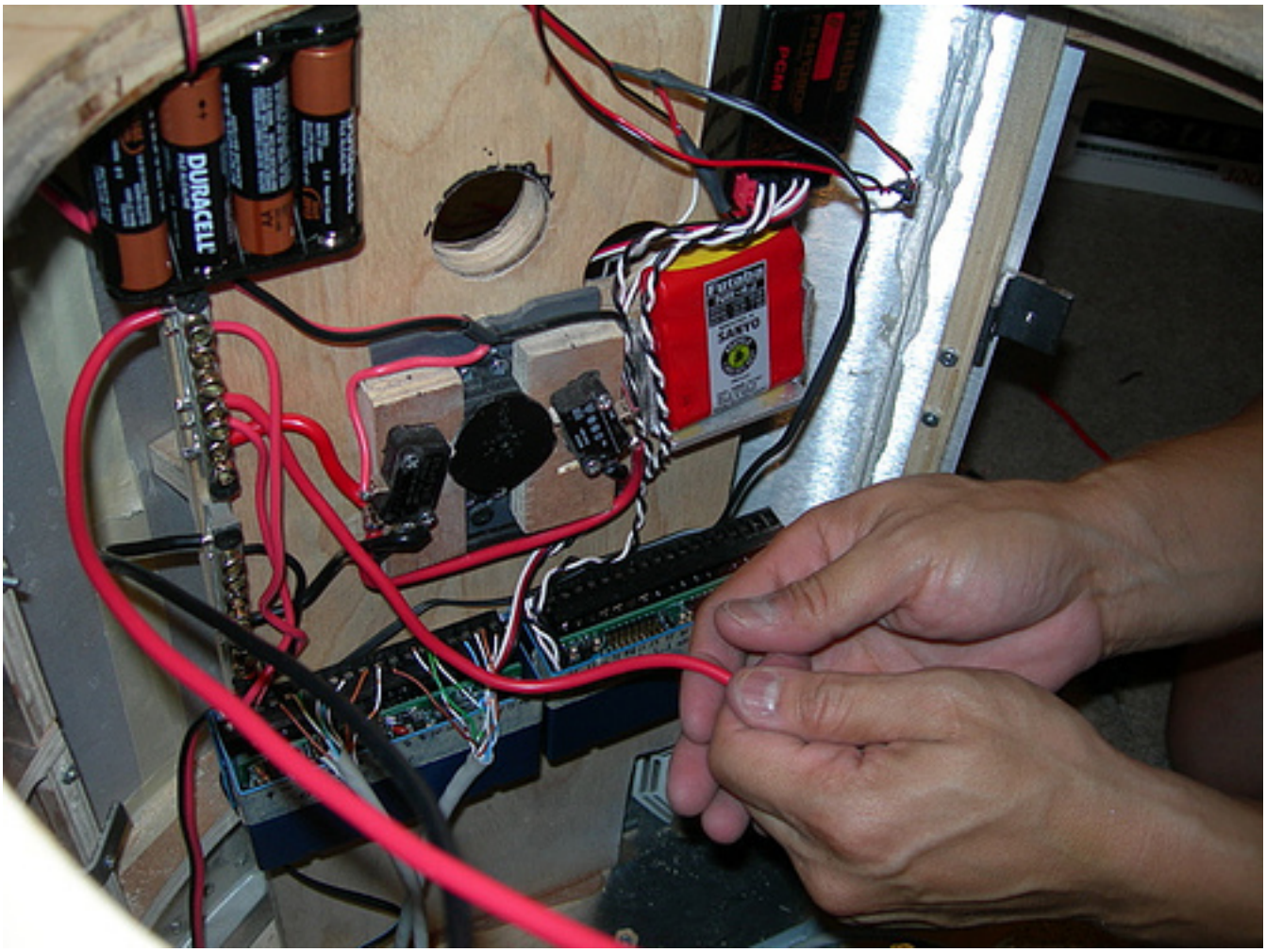
We had a late lunch break (around 2:30pm) and wolfed down pizza before returning to work.

I got into the act every once in a while, mostly hacking aluminum and drilling pieces here and there. I also wired up the data lines for the sound card, and there are a lot of connections to make (32 total, 16 on the Vantec Keycoder, and 16 on the sound card).

Mike added parts to the frame as we went along. The receiver, main receiver battery, and the backup receiver battery were installed, along with the dome motor controller.

Mike and William soldered up battery connectors and other wiring.

The Vantec Keycoder and speed controller were installed and wired up.



After a lot more work, it was finally time to try out R2. We powered up the receiver, main power and transmitter. The first thing I tried was the dome motor. It worked! Well, it worked backward, but it worked. William made some adjustments on the transmitter that reversed the behavior, and fixed things so that the dome motor turned properly. We could have swapped how the wires were connected on the dome motor, but this was easier.

Next, I moved R2 forward. As with the dome motor, we had a connection that wasn't quite right on the speed controller. A quick swap of a connection, and R2 was moving like he should! I was all smiles.

No video to share yet, but I should have some in the next day or two.

The bad news: We blew up the CF Sound III card. We accidentally hooked it up to 24 volts, which is more than it can handle. I'm pretty sure the card is dead. I'll get a replacement some way or another. Oh well. If that's the worst thing that happens, I'll be a happy man.

R2 will spend the night at Mike's house, it was too late to tear him apart and pack him in the car by night's end. I'll pick him up Sunday and bring him home.

Thank you Mike, William, and Roy, for getting R2 that much closer to a dream come true!

posted by Victor Franco at 10:55 PM 5 COMMENTS

SUNDAY, APRIL 29, 2007

Second Steps

A little more of the same from yesterday, but that's a good thing.

I went back to Mike's to pick up R2 and bring him home. While I was there, Mike kindly wired up my batteries so they can be easily connected to the inside of R2's power bus, and he also wired up my battery chargers to hook up to the batteries. In addition, Mike installed the main circuit breaker, which should trip before the fuses on each battery pack ever get hit.

A short video of R2's second day of locomotion is available at:

http://pw2.netcom.com/~artoodetoo/R2sFirstSteps.html

Mike piloted the controls for that small shot, he knows what he's doing. In the few minutes that I've had the stick, I've proceeded very cautiously.

(If you can't hear what was said toward end of the video and are wondering what we discussed, Mike asked if I had tightened down the bolts on the drivetrain. I replied, "Not really... not with a wrench. The feet may fall off in the middle of this.")

I brought R2 home, and later in the evening I put him back together. I'm charging up the batteries for about 20 hours before running R2 again.

I also spent all of five minutes recutting bottom door holders, I'll glue them on soon.

posted by Victor Franco at 11:37 PM 0 COMMENTS

MONDAY, APRIL 30, 2007

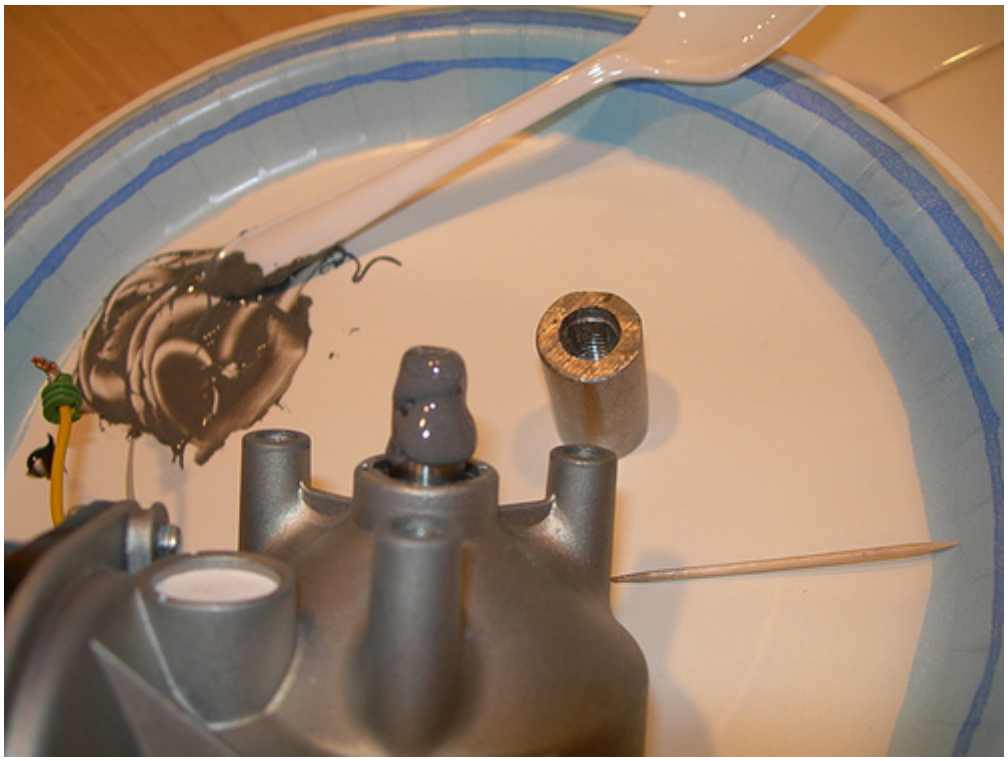
Right Motor Troubles, Glued Down Door Holders

When I powered R2 back up tonight, his right motor was not moving. After some troubleshooting, I determined the problem was with the motor itself. I removed the motor and applied 12 volts to it. As I rotated the motor case around in my hand, the motor would occasionally engage. That made my 24 volt conversion inside the motor my primary suspect.

I opened up the motor, and it seemed as though the solder joint was somewhat loose, so I resoldered it. A few minutes later when I reapplied power, I saw a tiny spark from under the motor's circuit board, and the motor was history. I don't know why that happened. I'm slowly frying my droid, one part at a time.

The big bummer of all this is not so much that the motor is trashed, but that it meant all the work I did on the shaft adapter was wasted, since the shaft adapter is JB Welded to the motor shaft. So I had to grab another shaft adapter, open up the base to fit the profile of the motor shaft, and JB Weld it onto a new motor. I'll

pin it tomorrow, after the JB Weld has dried. (Hmm... maybe I should have tried 24 volts before JB Welding the shaft adapter onto the shaft, eh?)



I also finally got around to gluing down the new bottom door holders on the outer foot shell doors. I'll nail in the pivot pieces tomorrow, and then the foot shells should be ready for a reprime and paint, although I still need to drill some small holes through the top of the outer foot shells, to allow the wires to pass from the legs on into the feet.

posted by Victor Franco at 11:21 PM 2 COMMENTS