

Electric Bear Fence for the Sierra Foothills

©Randy Oliver 2014, updated June 2023

ScientificBeekeeping.com

Black bears are common where we keep bees in the Sierra Foothills. They can smell bee hives from a great distance, and will readily demolish them to consume the brood combs and honey. We are happy to coexist with bears, and train the local bears to avoid the white wires surrounding our apiaries. Once trained, we have virtually no problem with bears — so long as we maintain our fences. **You want to train the biggest, baddest bear in the neighborhood, since it will then become a guardian for your hives, driving other bears out of its territory.**

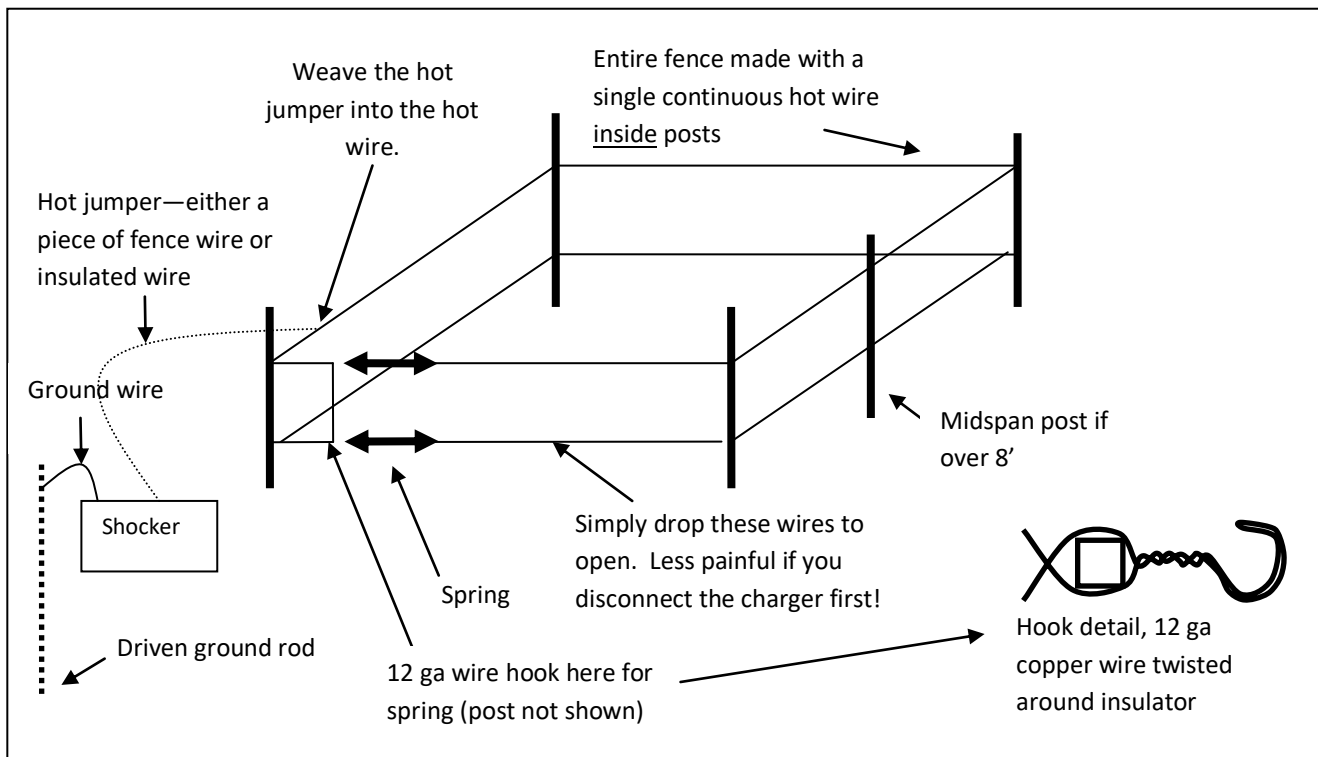
We've run bear fences around a few dozen apiaries for many years. Over the years, I've developed a quick, inexpensive, and reliable design. We are especially fond of the Parmak solar chargers, as they are reliable and effective, and only require a few hours of sun exposure each day to maintain their charge. **You can add additional generic 6V solar panels in parallel to the charger battery in shady yards.**

Materials

- If AC current available: 120V 5-mile charger, or
- Solar (recommended if no AC power) Parmak DF-SP-LI charger (very good),
- Or* (for shady remote areas): Zareba 4612-A *plus* a 12V deep cycle marine battery and battery clamps (the battery must be swapped each month, so we no longer use these)
- 5' heavy-duty (1.25 weight) tee posts (1 for every 8' of fence perimeter plus gate ends)
- 2 pinlock (Zareba YPL25TP) plastic insulators per post
- Alum high voltage wire (optional)
- 8' Ground rod and ground rod clamp
- Ground wire 12 ga copper
- Poly fence wire 1/8" white (for night visibility), e.g. Parmak #859
- 2 Hillman #194 extension springs
- pc of 12g copper wire to twist for spring hooks
- Electric fence warning sign

Tools

- Post driver for ground rod and posts
- Hand sledge for ground rod
- Electrician's pliers for twisting copper wires
- Big screwdriver and/or wrench for ground clamp
- For battery –powered only: Wire strippers, wire crimpers, wire antioxidant, electrical tape, wire nuts
- Weed shears or weed whacker
- Pruning shears and saw for clearing brush?
- Pick or hoe to bury ground wire
- Fence tester (or green blade of grass)



You cannot stop a hungry bear with normal (un-electrified) fencing—they are simply too strong. But two electrified shocker wires will keep even the strongest bear away from your hives. This fence is not about strength—it is solely about the electrified wires.

The number of strands of wires to use depends upon the intensity of the bears. Two strands has worked well for the outyards which we must fence in the foothills. But we have had more problems at higher elevations, where the bears are more persistent, so we use 3 wires there (see Grounding and Training the Bear below, where I describe using alternating hot and ground wires).

CHARGERS

We've been happy with the 6V Parmak chargers, but haven't tried the 12V ones (they might be better for really troublesome bears). Please let me know if you've tried other brands. If AC is available, I've been very happy with my Zareba EAC50M-Z 50-mile charger).

The 6V solar units may not get enough sun in some yards. In that case I wire in an additional off-the-shelf 6V battery charger solar panel (wired in parallel, not in series). The additional panel can be facing a different direction to catch sun coming between another hole in the trees.

THE FENCE POSTS

Use heavy-duty tee posts placed at 8-10 ft apart. Put corner posts at 45° with bumps facing inward toward center of pen (to avoid the wires touching the metal posts and shorting out the charge). Put midway posts (if necessary) in line between the corner posts (put in after you string wire on corner posts, with bumps facing inward). Each post gets two pinlock clips, facing inward (cavities in the pinlock clips facing down, so as not to collect rainwater). Put the top wire insulator just high enough to step over without shocking your testicles (bears won't jump over the fence at that level), bottom one about halfway up. Adjust the insulators after you've run the wires to follow the ground contours so as not to leave holes that a bear might try to squeeze through.

THE WIRE AND SPRINGS

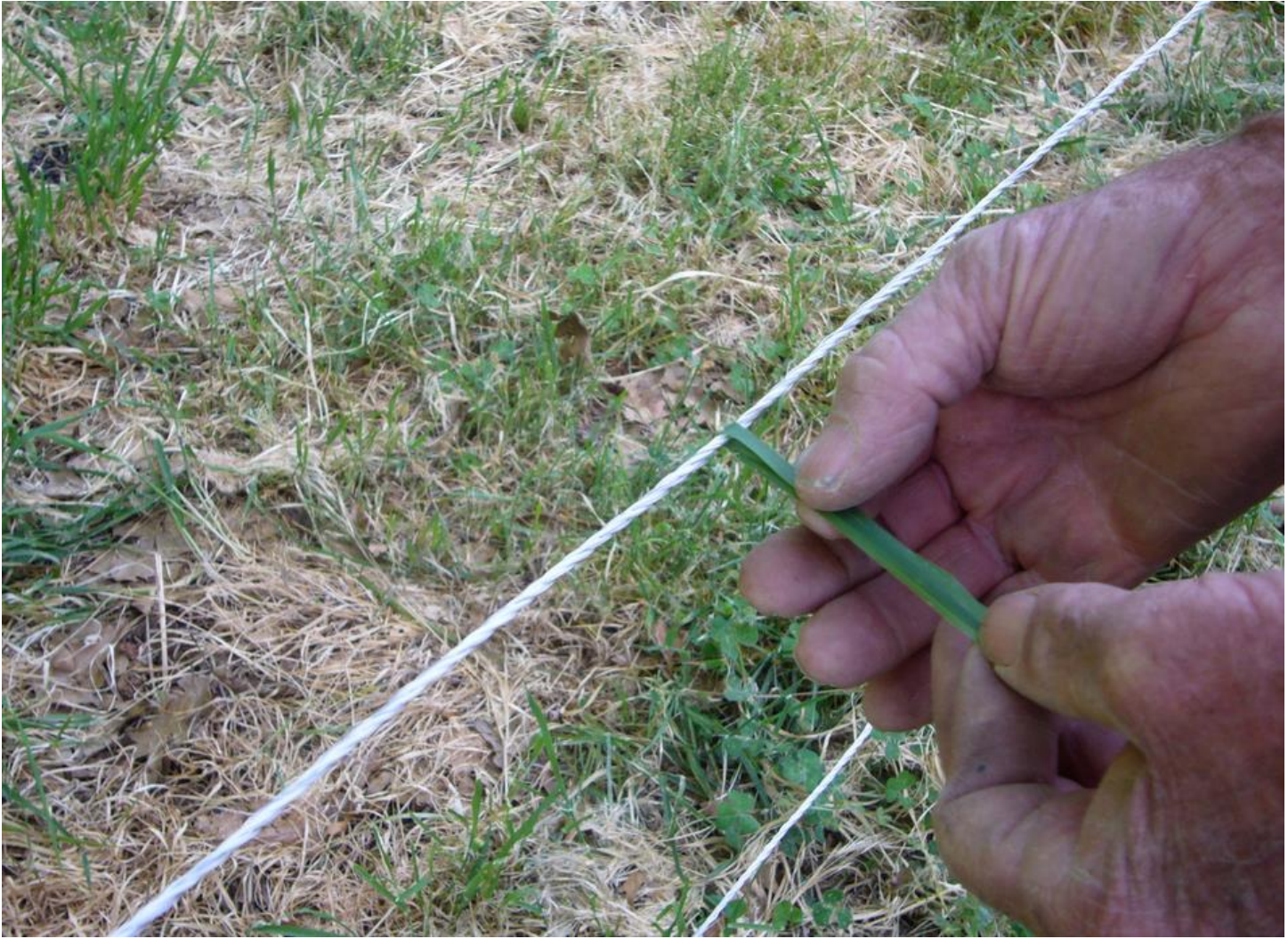
Use white poly hot “wire.” White wire is visible at night, so that animals (deer and you) can see it. The “wire” is run in one continuous loop, with springs at each end. The loop in the drawing above (at left) is shown without the post, but actually goes straight down through the top and bottom pinlock insulators on a post. The hot wire must not contact any fence post! Allow the hot wire to slide freely through pinlocks (don’t loop or tie) so that it can slide if a deer hits it. The purpose of the springs is to create “give” in the hot wires, so that they don’t break if a deer run into them.

Make two wire hooks out of 12 ga copper wire to hook the tension springs to (don’t use the fancy electric fence springs—the spring is too strong). **After testing different strengths of springs, we find the Hillman #194 to provide the right balance of tension and strength.**

Snug the wires so that the springs are under slight tension—you want them to be able to absorb the shock of a deer hitting the fence wire.

TESTING THE CHARGE

Test the charge: The fence should read about 7000-9000 volts to ground. If you don’t have a tester, you can test with a blade of green grass, while wearing normal shoes with rubber soles. Hold the blade of grass in your fingers, and carefully loop it around the hot wire, holding only the ends of the blade until they are touching. Then slide your fingers toward the wire. You should feel a very slight shock at about 1½ inches, stronger at 1”, very noticeable (but not painful) at ¾”.



Testing the fence voltage with a blade of grass. Be sure to have shoes on with rubber soles (do not be kneeling on the ground when you try this). At this point, you should feel the pulses without them being too uncomfortable.

GROUNDING

If you feel no shock, the wire is grounding out, battery is dead, or the soil is too dry to make a good ground. In the latter case, either water the soil, or lay chicken wire on the soil, with a ground wire jumper attached to it—Caution: the shock will then be intense! You can also run intermediate grounded wires in some situations, but this is not usually necessary—a shock through the entire body is the best deterrent (don't just believe me—get on your knees and see how it feels when you touch it with *your* nose)!

You want to train your bears while the soil is moist enough to provide a good ground. Once trained to the fence, they will leave it alone even later in the season when the soil is too dry to provide a shock.

In dry ground areas, we use inexpensive 2-foot-wide rolls of 2" mesh chicken wire around the perimeter, held down with the "U" staples sold for use with drip irrigation piping. Electrically connect this chicken wire to the same ground rod that the charger is connected to.

MAINTENANCE

Fence maintenance. There is little maintenance with the solar chargers—we love ‘em! Check the charge needle each time you visit, and replace the battery when it starts to drop. We buy aftermarket SLA (sealed lead acid) batteries of the same voltage, such as https://www.batteryssharks.com/Parmak-DF-SP-LI-6v-Solar-Pak-Fence-Charger-p/p-dfspli6vsolarpakfch_b6-14_x1.htm

Battery-powered (non solar) units will last over a month if the hot wire is not grounded out.

If you hear pops, then the hot wire is arcing to a ground. Check the insulators and charger. Weed whack regularly to keep weeds from touching the hot wires!

It helps to bury the ground wire so that you don't hit it with the weed whacker.

Leave low weeds in summer to make a better ground than dry dirt.

GROUNDING AND TRAINING THE BEAR

We have the most issues with our fences in large, isolated yards, where no one is around, and the bear can spend all night trying to get in. Bears get through when the soil is too dry to get a good ground. A bear will not get a good shock, and try to dig under the wire.

To prevent this, you need to either lay a 2-foot perimeter of grounded chicken wire on the ground (connected to the shocker ground connection), or **run alternating strands of hot and ground wires**.

To get a shock, the bear must touch both a hot wire and a ground (either damp soil, chicken wire laid on ground and connected to the ground of the shocker, or between a hot and a ground wire (if you run both on the fence).

Keep in mind that using electric fences to protect your hives is all about **training the bear**. And you only have one good opportunity to do that -- on the bear's first experience in touching a fence wire.

The problem with alternating and ground wires is that a bear won't get a shock by touching only a single wire -- it has to touch two. So if it sticks its head between the wires, it's fur may at first insulate it from a shock. As it squeezes further through, it will eventually get a shock running through its body **only between the two contact points**. That shock may cause it to jump either backwards, or forwards through the fence (thus penning it into an enclosure full of hives).

The advantage (in addition to simplicity) of having all hot wires on the fence and the ground being the soil (or a wire mat on top of dry soil), is that -- for training purposes -- a bear's **critical first shock** will not only be to its sensitive nose, but also run through its body and heart all the way through its feet. And it will associate that extremely painful and memorable **first shock** with touching a wire. That **critical first shock** experience will train that bear to never touch a hot wire again (that's why we use highly-visible white hot wires). Don't take my word for it -- try it yourself! Press your leg against a hot and a ground wire a few inches apart, and then compare the experience with a shock between your nose and the bottom of your feet. I'm collecting data, so please report your evaluation of which shock was more memorable.

TRAINING THE BEAR(S)

When you first set up the fence, or if you hear of a bear in the neighborhood, bait the top wire with a strip of bacon in each corner, so the bear will get the first shock on the nose! (Turn off charger first!)

If you live in an area in which the soil gets too dry to provide a good ground during the summer, a bear may manage to get through the fence and destroy a hive or two the first night. Once it's gotten a taste of the brood, pollen sub, or honey (the order of their apparent preference), it will return for more!

You need to "train" that bear:

1. Repair the fence, and make sure that it has full charge. Adjust wire heights if necessary.
2. Look for the path that the bear took (they often drag away combs). Then lay a trail of uncooked bacon pieces (1/3 strip) every 4 feet or so from the woods to the place that the bear entered the fence.
3. If the ground is not damp enough to deliver enough grounding for a full shock, place chicken wire down just outside the bear's entry point, and ground it with a wire to a good ground.
4. Insert the last piece of bacon into the upper wire (it helps to turn off the shocker when you do this), directly above the chicken wire, so that the bear will have its front feet on the grounded chicken wire when it sniffs or bites the bacon on the top hot wire.
5. That night — when the bear receives a full-body shock from its mouth through its front feet — it will be trained to never touch that fence again!

Photos below to help:



Bear scat outside a fence. Yes, that's a normal sized hive tool! This simple fence design will stop even the largest bear if properly constructed and maintained. Proper grounding is critical, and bare soil or green grass around the perimeter for good electrical contact. A mat of grounded chicken wire around the perimeter makes the fence completely bear proof, but we rarely find it necessary.



Typical bear fence, Eric whacking weeds. Face the solar charger to the south (or to the best sun exposure). If possible, locate the charger on the same post as the spring hooks, as this helps to remind you to turn it back on.



Typical fence during dry season. When soil is this dry, you may need to water or lay down a chicken wire ground.



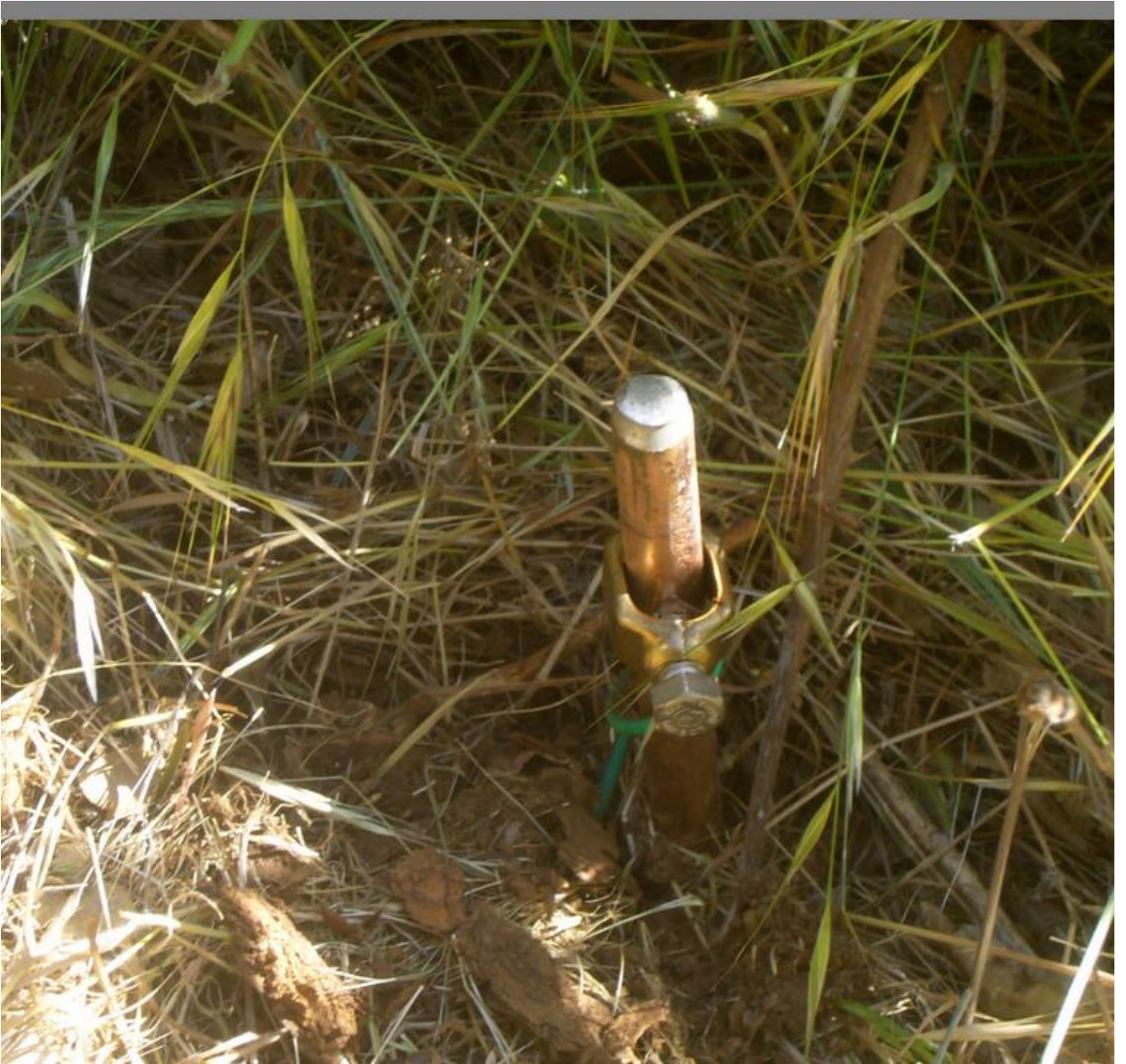
A particularly diligent bear dug under this fence (see the digging in the foreground). We laid chicken wire on the ground outside the fence and hooked a jumper from the ground rod to it. When the bear came back, he left a tee-post bent over at right angles at ground level during his exit. He's never returned.



Typical fence after weed whacking the blackberry vines around the perimeter.



Solar charger, ground wire protected from weed whacker and then run shallowly underground to the ground rod (not shown). Note detail of how I attach the hot jumper—I unwind a bit of the hot wire and weave the jumper into it.



Ground rod detail. Yes, drive the rod the full 8 feet into the ground!



Corner detail. The orange 12-ga hook is twisted to the insulator, and must not contact the fencepost.



Corner details—be sure to use heavy duty posts so that the pinlock clips snap on securely (they are loose on light-duty posts).



We tie off the wire to the spring with a half hitch for later adjustment. Do not allow the free end to flop around.



Corner detail.



Typical fence—blackberry bloom about to begin! I maintain a 3-ft path between the fence and the blackberries.



Fence wire down. Any time that you turn off the charger, drop the fence wire to remind you that the charger is off.



The person hooking the wire back up when you leave is responsible for turning the charger back on. We find that this is the most difficult thing to remember to do! We've assigned the job here to our local police chief/hobby beekeeper—always nice to have friends in the right places :)

© Randy Oliver 2014