



Repair modular power supplies

by [Prometheus](#) on May 28, 2006

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Author: Prometheus [author's website](#)

jack-of-all-trades hobbyist/inventor/fabricator

Specialties in automotive, cycling, power-transmission (electrical and mechanical), old-school fabrication/tooling.

Intro: Repair modular power supplies

Instructions on how to break the seal on modular power supplies to fix the common problem of fatigue breaks in the cord, repair the internals, or salvage for other uses. This will violate warranties so do this only for equipment not covered by one. Pardon the pics, I don't have a camera for this.

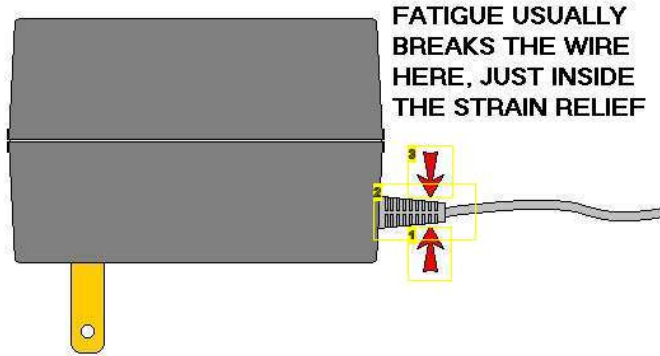


Image Notes

1. Another arrow
2. Strain relief
3. Arrow

Step 1: The modular power supply

These come in all shapes and sizes and capacities. The arrows point to the common point at which the cord tends to break internally. Before opening it, be sure that the power supply itself is at fault, and not what it's plugged into. If you are just salvaging, this can make good practice for when you are repairing one you intend to re-use.

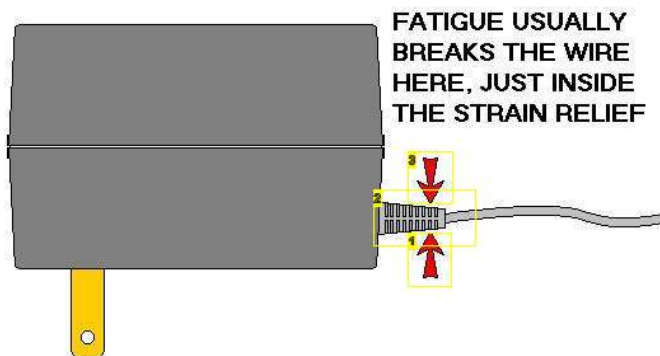


Image Notes

1. Another arrow
2. Strain relief
3. Arrow

Step 2: Breaking the seal

To open the case, you will need a (small but sturdy) sharp screwdriver or similar, preferably with a wide blade. Closely examine the groove going around it and look for what half the bottom of the groove belongs to. Typically the halves meet as shown in the pic (with the prongs facing downward).

Starting from the middle of each side, carefully pry at the angle shown while applying some inward pressure (DO NOT HAVE THE PRYING TOOL FACING ANY PART OF YOUR BODY). You may have to dig in a little, but it will eventually pop. Work left to right along the same side, then do the other, and then the narrower sides. Once you have compromised the seal on all four sides, carefully work into the corners until you can start to pry the halves apart. The idea is to try to work the pry tool through the seal, and then on top of the lip to start working the halves apart.

Be very careful not to allow the tool to penetrate too far, or you could ruin the transformer. Also be very careful not to allow the tool to slip and go into your hand or somewhere else.

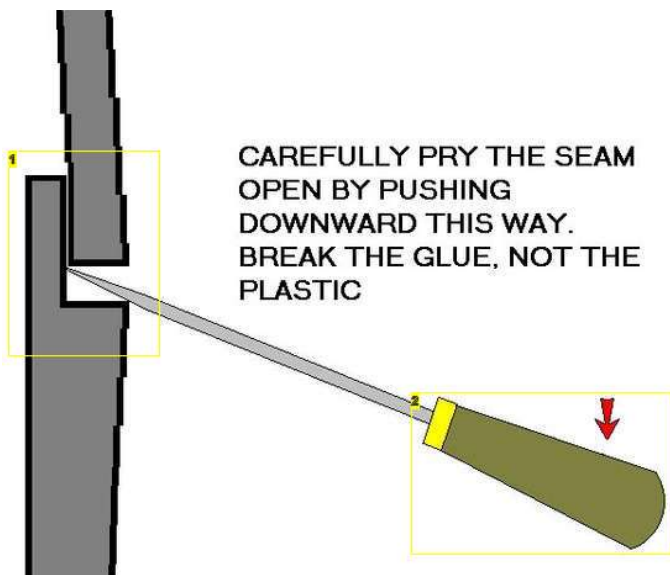


Image Notes

1. Typical lip seal used for modular power supply cases
2. Curiously-small screwdriver, or refigderator-sized power-supply? You decide!

Step 3: The guts

This is an overly simplified look at what's inside. DC power supplies can be simply a diode and a capacitor, or could have a full regulation circuit. AC power supplies will at best have a small disc capacitor, if anything, making the DC variety more suitable for projects/modification. Double-check the transformer to see that you didn't accidentally chisel the windings.

Look at the transformer spool (in yellow) to look for overheating/burning, distortion, or other deterioration. This will likely indicate the transformer had overheated. You can test for transformer output by plugging it in on a switched outlet, with only the top half removed. Leave the assembly in the wall-side half so that you can pull it out again without damaging the unit.

WARNING:

No matter what you use any part of the power supply for, never plug the bare transformer into the wall or any fault in the transformer can result in severe shock.

INSIDE THE TYPICAL DC MODULAR POWER SUPPLY

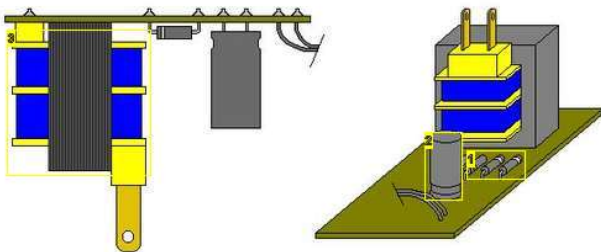


Image Notes

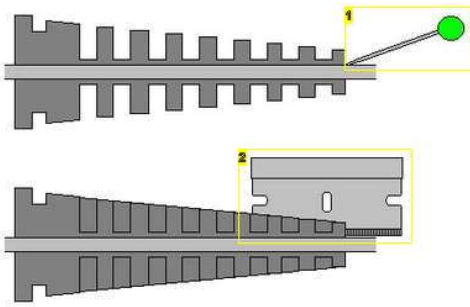
1. Diodes in "bridge" configuration (4)
2. Filter capacitor
3. Mains transformer; step-down

Step 4: Salvaging the strain relief

Using a pin, seal-pick, or other similar tool, try to unstuck the wire insulation from the strain relief, starting from the small end. It's not a big deal if you damage the insulation here as you will be cutting this section off later anyway. This may seem overly tedious, but it is worth it to make an old power supply new again. Don't give up too easily and you should be able to get it out. I use a small jeweler's screwdriver for this process with dramatic success.

The strain relief is cast onto the cord at the factory, but it not normally glued. The two vinyl-rubbers partially vulcanize during this process, causing the adhesion. You will be breaking this bond, but it's not terribly necessary as you will see in later steps.

If despite your best efforts you cannot separate the cord from the strain relief, you can cut into it with a razor as shown. Try to cut along a spine where you may have the chance to glue it back together again. If at all possible, start from the large end first and you might be able to avoid some extra work.



THE BEST WAY TO REUSE THE STRAIN RELIEF IS TO CAREFULLY UNSTICK THE WIRE INSULATION'S BOND WITH THE STRAIN RELIEF ITSELF BY WORKING A VERY SMALL JEWELER'S SCREWDRIVER OR A PIN BETWEEN THE TWO, STARTING FROM THE SMALLER END OF THE RELIEF AND WORKING TOWARDS THE LARGER END.

IF THIS IS UNSUCCESSFUL YOU CAN SPLIT THE STRAIN RELIEF DOWN THE MIDDLE. SPLITTING DOWN THE SPINE MAKES IT EASIER TO SUPERGLUE BACK TOGETHER. IT IS POSSIBLE TO PUSH THE WIRE BACK THROUGH AGAIN LATER.

Image Notes

1. Pin
2. Portable weapon of mass destruction

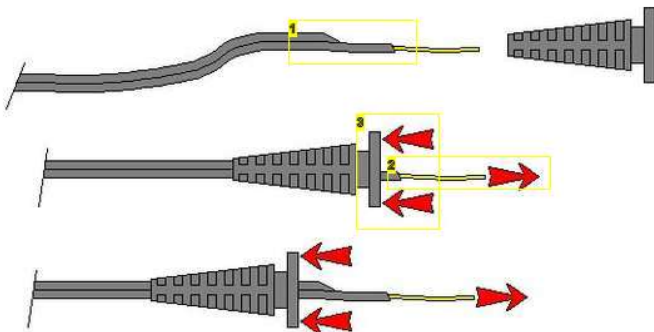
Step 5: Rethreading the strain relief

If you were patient and careful, you might have been successful in separating the relief from the cord. If so, find which conductor broke first by pulling on the wire alone. The broken side will pull out or at least stretch the insulation. cut the remnant of the cord end as shown and use the longer unbroken conductor as a "fish" to thread it through, after twisting the braid and perhaps tinning the end. Be sure to cut with the angle shown to make this process easier.

Do not lube the cable in any way if you can avoid it, as the friction between the relief and cord is somewhat desirable. The structure of the relief makes it act like chinese finger-cuffs, so apply the force as shown to ease moving it down the wire. Again, this will seem tedious, but will be worth the results. Once you get both sides of the wire through, this becomes much easier.

Pull through enough to be able to meet the soldering locations on the board, and then some. You will want to tie a simple but tight knot on the inside and leave a little slack in the case for any slight migration that may occur later. Tie the knot as close as possible to the relief, or slide the relief up to it afterwards, but before reassembly.

If you had cut the relief open and didn't repair it again, or didn't plan to, threading it through is a lot easier, just be sure that the wire is snugly nestled in the form, and not twisted inside it. Once you have properly set the slack you need, use zipties to close the relief, pulled tight with needle-nose to assure a tight fit. You will still need the knot on the inside to keep the wire from slipping and eventually pulling out.



AFTER SEPARATING THE WIRE FROM THE STRAIN RELIEF SUCCESSFULLY AND ASSURING THAT THE WAY THROUGH IS CLEAR, CUT THE WIRE AS SHOWN AND USE THE FREE END AS A "FISH" TO GUIDE THE WIRE THROUGH. TRY TO DO THIS WITHOUT LUBRICATING THE CABLE, AND PULL ON THE INSULATION AS SOON AS YOU CAN GET A HOLD OF IT. PULL THROUGH ENOUGH SLACK TO BE RESOLDERED IN PLACE ONCE THE WIRE IS CUT OFF EVEN. THEN ADD ABOUT 3/4-INCH MORE SO THAT YOU CAN TIE A KNOT ON THE OTHER SIDE OF THE STRAIN RELIEF.

WHEN THREADING THE WIRE THROUGH, PUSH THE STRAIN RELIEF DOWN THE WIRE INSTEAD OF TRYING TO PULL IT. BY PULLING THE WIRE AS YOU PUSH AGAINST THE LARGE END OF THE RELIEF.

Image Notes

1. Both sides of insulation cut at an angle to act like a wedge, to ease threading
2. Pull carefully on the conductor until you get some insulation, then pull on both
3. Apply force so that you are pushing the relief down the cord, instead of pulling it.

Step 6: Close it up!

After making all necessary repairs, clean up the edges of both halves where the seam was. No need to be pretty, just free of debris from the shattered glue. At this point you are pretty much done. Ziptie the halves lengthwise (between the prongs) to keep it from slipping off, or ziptie the short way so that you can slip it off later. Lengthwise is preferable, since zipties aren't all that expensive, and you won't need to cut it until it fails again. Be sure to pull the ziptie extra-tight so it won't slide all over the place. Cut all zipties flush with their heads with a razor

DO NOT USE TAPE, as no matter how good you think your magic tape is, it will eventually fail, especially as the transformer warms up during normal operation. Not even duct-tape, as it is conductive and still won't last. Ghetto-fix is fine, but not THAT ghetto.

To permanently seal it (not recommended), use superglue around the seam, and firmly clamp for at least 6 hours. Once set, fill the groove with a bead of superglue, and allow to dry at least another 6 hours. At this point now the only way to open the case is to break it open, which is why I don't recommend it.

Now instead of tossing that power supply for nothing more than a broken wire, you have saved yourself the cost of finding and buying another one, and have done a small part to not be one of the "throwaway masses".

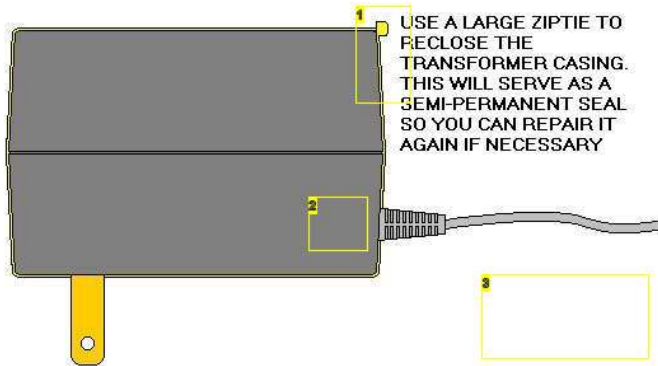


Image Notes

1. Ziptie pulled tight with pliers and cut flush to the head with a razor blade
2. You did tie that knot, didn't you?
3. This space for rent

Related Instructables



Using a Telephone as a handset for a Handheld Radio
by LargeMouthBass



Remote Home Automation
by dathomar



AreoGarden Repair
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Power supplies tutorial
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How to Repair a Hughes HDVR2 Tivo Power Supply
by Alan Nishioka



A USB Power Controlled Plug Strip. With Isolation.
by toymotorhead

Comments

20 comments

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skyd123 says:

Thanks a lot for this article.. Going to try this as soon as i reach home.. Its three weeks w/o my laptop... Thanks again ..

Aug 29, 2010. 3:06 AM [REPLY](#)



advancedage says:

Thank you! After my sister swung the cord around I've been without a laptop but today I got bored and found this article. Now I just need to do a little soldering and I use it again. Hurry!

Nov 15, 2009. 1:40 PM [REPLY](#)



Prometheus says:

To be honest, I never thought this article would be so useful to so many when I submitted it...I had been doing this for years, had been bored one day, and posted this project (oddly enough). I am glad to see that this project alone has saved many a headache for you and others, and I thank you all for your input. I hope this project continues to serve everyone as my knowledge of doing it has served me. To hear your thanks is worth more than any contest winnings to me...

Nov 15, 2009. 10:17 PM [REPLY](#)



manumanu says:

This guide is very very useful... I experienced the very same fault of the power cord, just near the relief and I after reading this I'm surely going to try to fix it. Thank you all. Bye from Italy

May 23, 2009. 10:28 AM [REPLY](#)



Derin says:

I would like to rent that space,for \$0

Aug 27, 2008. 12:09 PM [REPLY](#)



Prometheus says:

Sorry, the running rate is \$89.95 if you want it, \$149.95 if you don't. Rate can be negotiated with inclusion of cheerleaders or asian schoolgirls. :lol:

Aug 28, 2008. 1:22 AM [REPLY](#)



Valche says:

I doubt I'll be taking power supplies apart any time soon, but wow, what a detailed instructable! Very good work, and I never knew that that's how some cases are sealed, good to know! Great stuff. +1

May 11, 2008. 4:36 PM [REPLY](#)



pwilliam56 says:

Most of these can be saved this way. Great information. I have found that most of these cases can be opened fairly easy by placing them on a smooth, hard surface (concrete or tile,) with the seam perpendicular to the floor and the case on one edge. Take a hammer and carefully tap on the top edge of the seam. With a little practice the shock of a well placed tap will pop the glue loose. Sometimes it is necessary to turn the case over and tap on the opposing corners to break the seal all the way around. This generally doesn't scar up the case as badly as just prying it apart.

May 31, 2006. 2:42 PM [REPLY](#)



Prometheus says:

Just remember that sometimes the glue might actually be stronger than the plastic itself. The common practice is to use a glue that produces something similar to the "vulcanization effect" with rubber patches; meaning it reacts with the plastic and partially melts it to create a bond. I prefer to mar the case a little to make the repair then to introduce new problems as a result of physical shock force to the unit. I do not recommend this method for any power supply that may possibly be transistorized, as it may do more harm than good....

May 19, 2007. 3:53 AM [REPLY](#)



pellepeloton says:

Sometimes you may have a faulty transformer and often is is the primary/ Just check with multimeter between the pins on the AC plug. If you have an open circuit, you may still be able to salvage it as there might be a thermal fuse or normal fuse inside?

Jun 6, 2006. 5:38 AM [REPLY](#)



Prometheus says:

Few modular power supplies have a thermal fuse on the primary winding. If it does though, it is safe to simply jump the fuse, and let the winding itself act as a fuse...if the transformer burns out again, just toss the whole thing, as the transformer has failed, causing the initial burnout, and is not reasonably salvageable. If for any reason jumping the thermal fuse causes any breaker to blow, or anything other than typical operation, toss it...not even worth fixing. Transformer is like the engine in an old car....if it goes, the whole unit is a total loss, so just forget it and try to find a replacement.

May 19, 2007. 3:47 AM [REPLY](#)



spinach_dip says:

How dangerous is this?

May 30, 2006. 4:08 PM [REPLY](#)



Prometheus says:

Only danger is in how careless you are with handling electronics. If you cannot handle a simple power-supply repair, don't attempt this as it will get you nowhere. If you try this while it is still plugged in, you win the Darwin award... Simply put, if you don't get this, don't try it...

May 19, 2007. 3:39 AM [REPLY](#)



xcursedx says:

to many outer cases won't come unglued, so i just glue then tape them up, i also find it's better to shave down to the wire then to cut into it, i just replace the jacket with a piece of wire housing, usually the thickest i have around, i also usually lead the wire up [__], from the housing to reduce future stress...

Dec 17, 2006. 4:05 PM [REPLY](#)



jtobako says:

a strip of electrical or duc tape will extend the strain relief and reduce the number of times you have to re-do the repair.

May 30, 2006. 9:53 PM [REPLY](#)



Prometheus says:

Me personally, I would use rubber hose, like that for vacuum tubing, but in cases where it is 20AWG 2-conductorzip-wire coming out, extending the strain relief has little effect. When I can, I use heavier cord from previously cannibalised units where it was a faulty transformer.

Jun 9, 2006. 1:14 AM [REPLY](#)



rjones3 says:

Nice work on the drawings!

May 29, 2006. 9:15 AM [REPLY](#)



Prometheus says:

Thanks...Not bad for just MS Paint huh? lol

Jun 9, 2006. 1:10 AM [REPLY](#)



Prometheus says:

Jun 9, 2006. 1:08 AM [REPLY](#)

Well thanks for the comment guys. As far as scarring the case, I am fairly careful about this when I do it anyway. The idea of squeezing the case may work about as well, but the corners usually become a problem. If this is done with care and respect, it is perfectly safe so long as you reassemble it again later...



Vermin says:

Jun 1, 2006. 1:43 AM [REPLY](#)

Another method for opening the case is to squeeze the seams gently in a vice. I've used this to pop many a case open without fail.
