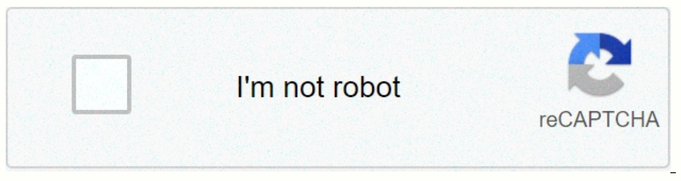

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Diy guitar amp attenuator schematics

Air brake attenuator Throughout my musical journey I've always looked for different ways to get a good sound on apartment-friendly levels. In recent years I started implementing vvr (Variable Voltage Regulator) in my amplifiers that can be used to reduce the voltage of the output pipes and reduce the volume in this way, but I wanted to build a standalone attenuator to use in conjunction with vvr or on my own. There are many attenuators on the market. Some of them use high-power resistors to convert part of the amplifier's power output into heat, while also let the rest of the power pass to the speaker. Some use combination of reactive load resistors, such as weber's Mass Engine, which is basically a guitar speaker without the cone, so it can't produce sound. Dr. Z Air Brake is one of the attenuators that people really like and it's not too complicated to build, having only resistive load. I started with the Air Brake Lite scheme and scaled it to work with small amplifiers that I usually build for myself. Dr. Z uses two 100W resistors that are played in few places and is good for amplifiers up to 45W of power. The circuit itself is very simple. In each position, the rotary switch selects different combinations of resistors, one in series and one in parallel with the speaker, effectively forming a different L-pad in each position. In the last position there is no resistance in the circuit and this does not affect the signal. Mods The first mod came from the Amp Garage Forum and involves replacing the 5-position rotary switch in the original with a 6-position switch that has one more level of attenuation. In addition to touching the two resistors in one more place, they suggest adding an 8 ohm 20W resistor to the parallel resistance network, making the total impedance closer to 8ohm all attenuation positions. Dr. Z uses a fixed resistor of 25ohm in parallel with the speaker making total resistance less optimal in some positions. It's not easy to find those big 100W resistors where I live and have no need for such a high power rating, so I used 7 smaller resistors instead of rated 9-10W each. This should be good enough for all my amplifiers that are 6W at most, but should probably work fine up to 10W. I also added a simple touch line-out that I can use to record the signal directly from the amplifier and add boosts in the DAW. It's easy and simple to do, so why not. Below is the scheme that includes all the mods mentioned above. Construction To simplify construction I used one of the plastic cabinets I had in my trash can and used point-to-point terminals to suspend all resistors in the air. This should provide airflow to keep them cold and prevent them from touching the plastic box. As we are dealing with a very low impedance signal, noise is not a major concern, so I didn't even care about protecting the cabinet with the copper sheet. He He out very good. I sound good at all attenuation levels and don't kill much tone even in the lowest setting (-11db). No guitarist should be without one. For those of you who are not familiar with the concept, an attenuator converts the output of your tube amplifier into heat, thus allowing you to crank your amplifier without the crushing volume of the ear. My design uses a 100-watt L-Pad to attenuate the power of the amplifier. Because heavy attenuation can cause tone loss, I include a bright switch to help compensate for treble loss. Also, I've included a bypass switch for obvious reasons. This design is a combination of two DIY pages-This site is the basis for my attenuator: also included the bright preview/bypass switch of this page: these parts can be purchased at your local Radio Shack with the exception of L-Pad. I bought mine from Parts Express for $12 plus shipping. The total cost of this attenuator was less than $40. Author topic: DIY Reactive Variable Attenuator (Demo and Internal Schema) (Read 9826 times) 0 Members and 1 Guest are viewing this topic. The 'All About... The characteristic of the attenuators we did didn't make me think. I had never seriously thought about buying an attenuator because I play mainly through low input power valve amplifiers and I've always been quite happy using an overdrive pedal or an amplifier modeler for low volume interference and practice at home. However, I like high-powered amplifiers too, and to do them justice they need to be increased. Courtesy to family and neighbors restricts the time I can spend throwing them at or near the total volume. There is also the issue of long-term hearing damage to consider. The result is that while researching the attenuator's article, I found that many guitarists are building their own. So I spent some time investigating various projects and features, providing parts and experimenting with components. The result is a design for a resistive attenuator that can work at 4 or 8 ohms and features treble compensation. This is one of the easiest DIY projects we have covered so far. All parts are easy to find, and for a few hours of work and relatively little spent you can build a attenuator that would cost £100 or more to buy. All you really need is pliers, a soldering iron, an electric drill and a step cutter. The complete circuit diagram for our attenuating The L-Pad There are numerous ways to attenuate an amplifier signal, but the vast majority of DIY attenuators are based on a simple circuit called L-Pad. This method employs extra resistors to dissipate electric as heat. In simple terms, amplifiers and speakers should be combined, so if the output of your amplifier is labeled 8 ohms, it should be connected to a speaker rated at 8 ohms. The smart thing about the Design is the way it adds resistors to the circuit, but keeps the same 'load' at all times. Let's look at a basic example; if you connect two 8-ohm resistors in parallel, the combined resistance will total 4 ohms. If you solder an 8-ohm resistor through the terminals of an 8-ohm speaker, the result is the same – a 4-ohm charge. If you then connect a 4-ohm resistor in series with the 8-ohm parallel resistor and 8-ohm speaker, the load resistance turns up to 8 ohms. The power of the amplifier is divided between the speaker and the resistors. Resistors convert energy into heat while the speaker converts energy into sound energy. Since the speaker receives less power from the amplifier than without the resistors added, the acoustic power is lower and the amplifier is quieter. Combining the 8-ohm speaker and resistor in parallel creates a 4-ohm load. Adding the 4-ohm resistor brings the load back to 8 ohms, but the signal is attenuated by about 6dB In the example given above, there would be an attenuation of about 6dB. Working attenuation involves some complex maths, but there are several sites with L-Pad tables and calculators that can make things simple. Checking one of these tables, we see that, roughly speaking, a 20k parallel resistor along with a 2k series resistor attenuates the signal by 3dB. With 4k and 5k in the same configuration, the attenuation is closer to 9dB, but the amplifier always 'sees' 8 ohms. It is perfectly possible to combine a rotary switch with an array of resistors to build a attenuator that works in 3dB increments. In fact, many commercially manufactured attenuators work just like this. The common complaint is that the raw settings are usually a little quiet or a little too high and never too certain. The easy solution is to use a rotary L-Pad controller. Everyone at G&B was very impressed with the master control on the newly revised elektra 185 amp – and that turned out to be an L-Pad. These devices are like oversized volume pots with two-wire resistors inside. The L-Pad we bought came with fixings and a nice big control button. Be sure to buy the right L-Pad for your needs; this has been evaluated at 8 ohms and can supposedly handle up to 100 watts Internal variable resistors are connected in series and parallel and, regardless of the position of the control button, the total resistance of the L-Pad device remains constant. When choosing an L-Pad, there are certain stipulations that you should consider. First, you should buy one that matches the load you need. So if you're using an 8-ohm speaker, you'll need an 8-ohm L-Pad. Secondly, they have power ratings, so don't buy a 15 watt L-Pad to use with a 50 watt amplifier. In fact, there's not much point in buying a 15-watt L-Pad. You'll save a couple of pounds, but the attenuator always always hot and you may end up blowing it up. For this project, I just bit the bullet and originated a 100 watt, 8-ohm L-Pad. That said, I'd still be cautious about using it with more powerful amplifiers than 50 watts. Bypass Deviation The merits of true bypass are worth a debate whether we're referring to pedals, but when you're considering 50cm or more of cable length to connect an amplifier to a speaker, it's easy. Then our attenuator will have a real bypass switch. This allows the attenuating to be completely out of the loop, so you can install one permanently inside a combo enclosure and turn it on only when needed. You can also compare attenuated and non-attenuated tones. Treble switching Are those Fletcher Munson curves again! Our perceptions of brightness and lowability change depending on the volume level. Thus, changes in tone that we can perceive when the amplification signal is attenuated may not be a characteristic of the attenuator, but rather a volume function and the way human hearing works. Either way, one of the level complaints in L-Pad attenuators is the way they reduce treble content, with a knock-on effect on clarity as attenuation is increased. Therefore, this design incorporates a three-way switch. Using an on/off switch means that the center position can be neutral and the other two positions can provide two preset degrees of treble elevation. The basic principle is more or less identical to the acute bleeding capacitors used in guitar spinning. The switch connects bipolar electrolytic capacitors on two L-Pad terminals, so that the higher frequency content of the amp signal goes straight to the speaker and the attenuator acts only at frequencies below a selected point. Since the L-Pad and speaker feature the amplifier with a consistent load of 8-ohm, regardless of the amount of attenuation, it is quite easy to change this to 4 ohms. All that is needed is an 8-ohm resistor in parallel with the L-Pad. However, you can't use any old 8-ohm resistor. The type you need has to be able to handle the energy produced by the amplifier. The wire wound is the kind that settles, and they come installed inside an aluminum box. These resistors will ideally be fixed in a heatsink and, in this case, the cast aluminum cabinet will serve appropriately in this regard. For the impedance switch, we recycle an on/off of an old speaker. The enclosure, non-polarized electrolytic capacitors and high-power resistor came from several different suppliers, providing the parts One of the perennial problems with electronic designs is to find the parts you need – or rather, all parts you need from a single supplier. When you are required to buy from multiple vendors, you may end up paying postage fees for each order, and costs may increase. With the exception of energy resistors and bipolar capacitors, I able to get everything I needed from CPC UK. See the parts list for more details. We bought heavy switches – partly because they look good, but also because we wanted something robust that could handle the power preparing the cabinet This turned out to be the most complicated and time-consuming part of the project, but if you buy a cabinet of the same size and use the supplied measurements, the work should progress quite quickly. I used a Hammond 10758PSLA cabinet measuring 49x145x95mm, so it's much bigger than a conventional stompbox. If you use the same enclosure as us, these dimensions should work. Drill pilot holes in the specified locations and increase the diameter using a step cutter to make the components fit Although relatively few holes are needed for the components, I drilled ventilation holes in the sides of the cabinet around the l-pad position. Remember how the L-Pad dissipates the power of the amplifier as heat? The ventilation holes should help prevent things from getting too hot. Apply adhesive tape throughout the cabinet, mark the positions of the holes and make them using a small bit – about 3mm in diameter should be fine. These pilot holes can then be enlarged using a step cutter. Once complete, you can remove the masking tape and use needle files to clean any aluminum burr. I got pregnant with a project in a graphic program and printed it on water-decal paper. The decal was applied to the box and, once it dried, I stomped it with light coats to seal and protect it. We've made a waterwater decal to mark the controls, and there are many online videos that can show you how. Alternatively, you could just write in the cabinet with permanent marker We made a smaller decal to the side of the cabinet. You wouldn't want to mix the Assembly, Stage 1 connections The attenuating Although I have added impedance and treble response switches to this design, you can choose which features will be useful to you. The only mandatory pieces are the soques and the L-Pad. With that in mind, I'll build this project in stages, starting with a basic 8-ohm attenuator. Here is a diagram of the basic attenuator circuit with a bypass switch The L-Pad used here has a metal cover. These covers can be removed to expose the interior to air and keep the L-Pad cool when dealing with high-power amplifiers. If you attach the four tags to the L-Pad cover, the cover can be removed and the L-Pad will run a little cooler Start repairing the sockets, L-Pad and bypass switch. Start by fixing the components in the enclosure. Note that the L-Pad cover has been removed, so be careful not to drop pieces of solder on the L-Pad when connecting the wires if you have a water water decal, be careful not to overtighten the nuts, as you can tear the surface. After connecting connect wires, it's time to test. If you don't want a treble exchange or a 4-ohm input, you can stop here because the project is complete With the first step of wiring now completed, you should test that the L-Pad is working properly. Make sure the unit is switched to bypass, connect the amplifier output to the attenuator input, and connect the speaker to the attenuator output. Turn on the amplifier and once established that everything is working normally, set the attenuator control in the middle of the path and turn on the attenuator. If everything was done correctly, you should hear the same sound – only quieter. If you can't hear any amplifier signal, go back to get around immediately, turn off the amplifier and check its wiring. Assuming everything is working, it's time to move on to the next phase. Assembly, stage 2 Impedance changing To tap everything in this cabinet, the 8-ohm high-power resistor had to be threaded into space under the sockets. Again, keeping the component cold is paramount, so that a series of thermal compound was run along the bottom of the resistor housing before being fixed to the cabinet with pop rivets. To prevent overheating of the 8.2-ohm resistor, it is fixed in the cabinet with pop rivets or nuts and bolts. To maximize heat transfer, the thermal compound is applied to the bottom of the resistor before being fixed in place Since the cabinet is being used as a heatsink, this compound ensures that heat is transferred from the resistor to the cabinet more efficiently. Two wires were welded to the resistor, with one attached to the L-Pad and the other to the

impedance switch. The second lug of the switch was welded to the ground on the sleeve label of the output jack. Turning on the impedance switch is very simple. You may want to consider welding resistor connection wires before it is installed in the enclosure The impedance switch is installed and turned on. Notice how the thermal compound has squeezed. Much is better than very little When the switch connects the resistor to the ground, it operates in parallel with the L-Pad and the impedance of the attenuator drops to 4 ohms. Mounting, threshold switch 3 For the treble switch, it is easier to weld the capacitors and connect wires on the labels before the switch is installed in the cabinet. Several sources suggested values of 4.7uF and 10uF, but Found the capacitor 10uF very bright. You may feel different, but the values I set were 2.2uF and 4.7uF. The effect is more subtle and according to frequency response correction rather than equalization. The capacitors and connecting wires can be welded on the treble switch before installation and then welded on the L-Pad The treble switch assembly has been installed and connected. with non-polarized electrolytic capacitors of 2.2uF and 4.7f. Feel free to try it out the values to achieve the tone you like Verdict Punching the ventilation holes was the hardest part of this project, but only because it was so tedious. Other than that, it was a quick, easy and inexpensive design that works exactly as expected. Even with the level control set for minimal attenuation, changing the attenuator results in a slight down in volume, but that's what you should do. From there, the level is gently down until it disappears completely. After an hour of continuous play with a 20-watt amplifier, the L-Pad was barely warm to the touch. Overdrive may sound a bit grainy without the smoothing effect of a compressed speaker, and you may notice a slight reduction in treble and bass, but over most of its range this design sounds surprisingly natural. The attenuated amplified tone is certainly preferable to that obtained with the use of an overdrive or a digital modeler. So you really should consider building one of these. You owe it to your roommates, family, pets, neighbors and your own sense of hearing. Parts list and suppliers CPC UK - cpc.farnell.com • L-Pad 8-ohm 100W - order code LS00547 • On/Off/On DPDT switch - order code SW04204 • Switch on/on DPDT - order code SW0 4202 • SPDT on/off switch - order code SW05066 • 2 x open frame mono sockets - order code AV09109 • Hammond Cabinet 10758PSLA - order code EN81988 EN81988

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