



# **D<sub>2</sub>O Amplifier**

## User Manual

**Dusky Electronics, LLC**  
**Durham, NC USA**

## Introduction

Congratulations on your purchase of the D<sub>2</sub>O Amplifier from Dusky Electronics. Your amplifier is designed to provide you a lifetime of dependable service and superior sound, while allowing you to achieve your artistic goals with a minimum of fuss.

We encourage you to register your amplifier at the Dusky Electronics website. You can do so at <https://duskyamp.com/pieces/register>

You do not have to be the original owner to register. Registration is required for any warranty work for the original owner and may also help to establish a record of ownership in the event it may be required for insurance purposes or tracking down the provenance of a stolen amp.

## Overview

The Dusky Electronics D<sub>2</sub>O Amplifier is a 32-watt vacuum tube instrument amplifier head designed for use with any electronic instrument, especially electric guitar or bass. The D<sub>2</sub>O Amplifier supports speaker loads of 4Ω, 8Ω, or 16Ω. The 32-watt output may be reduced to 8 watts by means of a rear-mounted toggle switch, allowing a greater amount of breakup distortion to be achieved at lower sound pressure levels. The D<sub>2</sub>O Amplifier's complement of tone controls is unique in the market and allows a wide range of control while remaining easy to use, making the D<sub>2</sub>O uniquely adaptable to just about any instrument, speaker cabinet, or musical situation.

The D<sub>2</sub>O Amplifier is a new, original design amplifier that employs a classic architecture—a minimal, clean two-stage preamplifier driving a cathode biased power amplifier section. As signal level increases the power amplifier section is driven into distortion just a little before the preamplifier section, much like many classic guitars amplifiers from the 1950s and 1960s.

## The Front and Rear Panels

Pictured here is the front control panel of the D<sub>2</sub>O Amplifier:



From left to right we have:

**IN** This is the input jack of the amplifier. It accepts a standard ¼" phone plug like that found on any standard instrument cable. The output of your instrument, or of the last effect in your effects chain if you are using effects, should be connected here using a standard instrument cable.

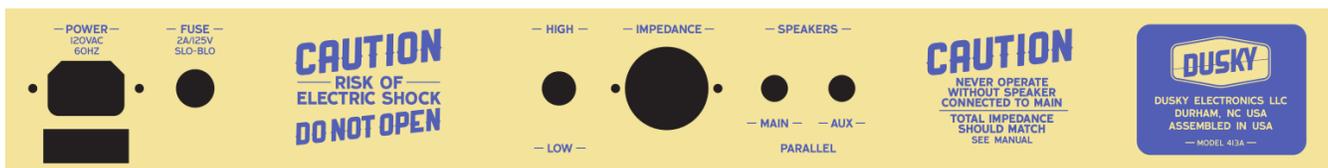
**VOL** This knob controls the output level of the amplifier. This knob not only affects the sound pressure level ultimately produced by your speaker cabinet, but the amount of distortion produced internally inside of the amplifier. Both sound pressure level and distortion increase as the control is rotated clockwise.

**BASS MID TREBLE CUT** These four knobs, collectively, are used to control the frequency response of the amplifier, allowing it to adapt to different instruments, speaker cabinets, and the user's musical intention. See the section on tone controls for more information.

**STDBY** This switch, when **down**, mutes the output of the power amplifier stage. If the unit is powered on, use of this switch can keep the output of the amplifier muted while allowing the tubes to remain warm and ready to amplify, thus keeping the amplifier in a hot standby mode. With the switch in the **up** position, the power amplifier stage is unmuted and the unit operates normally.

**POWER** This switch turns on the amplifier. There is a small time lag (15 to 20 seconds) between when the unit is turned on and when the tubes have warmed up enough to begin amplifying. Once the tubes have warmed up the amplifier is ready for use and will operate normally.

Pictured here is the rear control panel of the D<sub>2</sub>O Amplifier:



From left to right we have:

**POWER** The power inlet accepts a standard IEC power cable much like you may be accustomed to using with computers or other electronic equipment. Obviously, a cable must be attached here and plugged into a power source in order for the amplifier to function. Amplifiers sold in North America will come with a power cable included. Amplifiers sold outside of North America will be sold without a power cable. The user will need to provide a power cable that fits local electrical

outlets. The power inlet will be labeled with the voltage your amplifier is wired to accept, which will vary depending on the country where it is intended to be used.

**Serial Number** Your unit's serial number will be located just beneath the power inlet.

**FUSE** This is the fuse holder for the mains safety fuse. If the fuse blows replace only with a fuse of the labeled type, which will vary depending on the country of intended usage. If the amplifier blows more than one fuse in a short period of time, this indicates a problem with the amplifier. Please refer your amplifier to Dusky Electronics or to a qualified technician for repair.

**HIGH/LOW** When this switch is in the **up** position, the amplifier operates at full power and can deliver up to 32 watts of power to an attached speaker load. When the switch is in the down position, available output power is roughly  $\frac{1}{4}$  or 8 watts.

**IMPEDANCE** This switch can be turned with a flathead screwdriver, coin, or heavy guitar pick. It should be set to match the impedance of the speaker load attached to the amplifier. See the section on speaker load below.

**SPEAKERS** One or two speaker cabinets may be plugged into these speaker outputs, which accept standard  $\frac{1}{4}$ " plugs. If only one speaker cabinet is used, it should be plugged into the output labeled **MAIN**.

## Tone Controls

### Bass and Treble

The first preamp stage includes the **Bass** and **Treble** controls based on the classic "James" tone stack. This configuration allows independent control of bass or treble, allowing either range to be cut or boosted without affecting the other frequency range.

Flat EQ is achieved with both controls set at approximately 11 o'clock.

### Middle

The **Middle** control is located in the next preamp stage, completely isolated from the Bass and Treble controls. The Middle control is a passive mid-range filter tuned for the lower-middle frequencies that are often described as sounding "muddy."

With the Middle knob set fully clockwise, very little mid-range is being cut. As the control is rotated counterclockwise, progressively more lower mid-range is scooped out, allowing you to go from very warm sounding to very scooped.

Flat EQ is achieved with this control set fully clockwise.

## **Cut**

The **Cut** control is a passive treble cut located in the power amp section. This control can tame the upper registers beyond the frequency range emphasized by the Treble control. This is especially useful if you're overdriving the amplifier—allowing you to tame the harmonics added by distortion introduced in earlier stages and in the power amplifier itself.

For a cranked tone, turn up the Treble control—which will push the tubes a little harder—and also turn up the Cut control, in turn, to tame the resulting high end.

Flat EQ is achieved with this control set fully counterclockwise.

## **Additional Information on Flat EQ**

Although, technically, flat EQ is achieved with the Treble and Bass controls at around 11 o'clock, the Middle control fully clockwise, and the Cut control fully counterclockwise, most guitar players are used to playing amplifiers with a mid-scooped sound, so the D<sub>2</sub>O may actually sound subjectively neutral with all controls set at 12 o'clock.

It is difficult to make this amplifier sound bad! Experimentation with extreme and bizarre EQ settings is highly encouraged. Don't be afraid to try setting knobs all the way up or all the way down. Try a lot of different settings and see what works for you.

## **Matching Speaker Load**

A common point of confusion is how to set the output impedance of the amplifier in order to match the attached speaker load. If only using a single speaker cabinet, this is easy. Set the impedance selector switch to match the impedance of your speaker cabinet and plug your speaker cabinet into the **MAIN** speaker output.

The two speaker outputs on the D<sub>2</sub>O are wired in parallel. When connecting two speaker cabinets, using both the **MAIN** and **AUX** outputs, the rule is that both speaker cabinets must be the same impedance and the total impedance seen by the amplifier will be *half* the impedance of one speaker cabinet by itself. For example, if you connect two 8Ω speakers, one to each output jack of the D<sub>2</sub>O, you should set the impedance selector switch to 4Ω.

## Power Tube Rolling

The output tube sockets of the D<sub>2</sub>O Amplifier are wired in such a way that they are compatible with both 6L6GC and EL34 power tubes, as well as many similar tube types with compatible pin outs. Thanks to cathode biasing, there is no need to rebias the power amp when swapping tubes.

Different tube types do sound different from one another, and a little experimentation can open up some new and different possibilities. The extent to which this might be worth it to you depends somewhat upon how you use the amp. If you tend to play clean, differences between different tube types will tend to be subtle. The harder you push the output tubes the more the differences among tube types becomes apparent—with different tube types having distinctly different breakup characteristics.

Some tubes that are known to work include: 6L6GC, EL34, E34L, KT66, KT88, KT120, 6550, and 7581.

**Avoid 6L6GB or 6L6GA, as these are not rated for the power or voltage seen in the D<sub>2</sub>O circuit and may fail catastrophically in the worst case and just not last as long in the best case.** There are no current production tubes of this type, so you would only encounter these among vintage tubes. Our advice is to save your vintage and new old stock tubes for circuits that are specified to use those tubes.

7591s are not pin compatible, nor would they work in this circuit unmodified even if they were. **6V6s cannot handle the conditions found in the D<sub>2</sub>O and should never be used.**

## Routine Maintenance

The D<sub>2</sub>O Amplifier doesn't really require much in the way of routine maintenance and should be able to be used for years at a time without doing anything.

The following are things you are likely to encounter:

### Replacing Tubes

The most common maintenance task is replacement of the vacuum tubes, as these do wear out or intermittently fail. To replace the tubes, power off the amplifier and let the amplifier sit long enough for the tubes to cool off enough to be handled. **Power tubes get quite hot in the course of normal operation and can cause serious burns if handled while hot.** Once the tubes have cooled, remove the amp's lid by removing the four screws that hold the lid onto

the bottom chassis—two on each end—and remove the lid. Remove the old tubes from their sockets and insert new tubes. Replace the lid and the four screws that hold it in place when finished.

The preamp tubes should be replaced only with tubes of the same type: 6SL7. At the time of this writing, the only current production tube of this type available is the Tung-Sol brand. These are good, reliable tubes, and less prone to microphonics than vintage tubes.

You may also find Sovtek 6SL7s available for purchase. These are actually new old stock Soviet-era tubes, and our experience with them is that they sound good until they start getting microphonic or noisy—which tends to be early and often. For this reason, Sovteks are not recommended. Preamp tubes, in general, don't wear out in the same way as power tubes, so unless a tube is noticeably problematic, there's probably not much reason to replace it.

As far as replacing the power tubes, see the above section on **Power Tube Rolling**.

There are a bewildering variety of manufacturers and tube types that will work as the power tubes in this circuit. The good news is that they almost all sound pretty good, so don't sweat it too much. We use Tung-Sol 6L6GC "STR" tubes and recommend these without reservation. The performance of power tubes can degrade over time, so sometimes replacing the power tubes can create an impression of breathing new life into an amplifier. How long this takes to happen varies and, of course, depends upon how often and how hard the amp is played. In "typical" usage, power tubes should last several years before replacement yields a noticeable improvement.

When replacing power tubes you should purchase and install matched pairs, replacing both power tubes at the same time. There is no such matching requirement for the preamp tubes.

### **Replacing the Fuse**

You might also have a fuse fail, in which case it should be replaced with a fuse of the same type and rating. Make sure any replacement fuse is a slow-blow type. 2A fuses are used in countries with 120V and 100V power. 1A fuses are used in countries with 230V. The fuse holder is located on the rear of the amplifier. If the fuse fails more than once in a short period of time this indicates that there is a problem with the amplifier, in which case it should be referred to Dusky Electronics or a qualified technician for repair.

## Electrolytic Capacitors

The only other maintenance task that is likely to come up might be changing the electrolytic capacitors. Electrolytic capacitors contain a dielectric gel that can dry out over time and compromise the performance of the capacitor. In general, this takes a *very long time* to happen, if it happens at all. With modern, high-quality parts, like those used in the D<sub>2</sub>O Amplifier, we're probably talking something on the order of 20 years or so. This task must be performed by a qualified repair technician.

## Troubleshooting

We've tried to think of some scenarios you might encounter and how you might go about troubleshooting them.

### **The amp does not power on.**

Hopefully you've checked to make sure it is plugged in. If it is plugged into a surge protector you've made sure that that surge protector is plugged in and is turned on. Check the fuse. **Make sure the amplifier is turned off before checking the fuse.** Remove the fuse from the fuse holder and examine the fuse visually. Usually, if the fuse has burnt out you will see some black char inside the glass envelope, and you'll see that the filament is no longer continuous from one end of the fuse to the other. If you have a multimeter you can check for electrical continuity across the fuse. Replace the fuse with the proper type of fuse. See the above section on replacing the fuse. If the amp still does not power on or if a new fuse burns out, your amp will need to be seen by a qualified repair technician.

### **The amp powers on but no sound comes from the speaker.**

When you turn the volume up all the way, do you hear any hiss coming from the speaker? If yes, then the power amplifier is working and you have a solid connection to the speaker cabinet. (Turn the amp to your normal usable level.) Check to make sure you're actually getting a signal at the input. If you have any effects between your instrument and the amplifier, try removing them from the signal chain and plugging your instrument directly into the input of the amplifier. If there is still no sound, make sure the volume control is up on your instrument. Try swapping out the instrument cable to see if that makes a difference. If you have another amplifier, try plugging your instrument into that to see if there is a problem with the instrument.

If there is no hiss coming from the speaker cabinet with the volume all the way up, then there is a problem with amplifier, the amplifier's connection to the

speaker cabinet, or the speaker cabinet itself. Is the **STDBY** switch in the **up** position? Is there a speaker cabinet plugged into the **MAIN** speaker output? Have you tried a different speaker cable? Most speaker cabinets make the electrical connection to the speakers via quick connect tabs that can sometimes fall off. Check to make sure each speaker in the cabinet has two secure wired connections to it and there are no dangling, disconnected wires inside the speaker cabinet. If you have another amplifier, use it to test the speaker cabinet.

If you determine the problem is with the amplifier and not with the instrument, instrument cable, speaker cabinet, or speaker cable, your amp will need to be seen by a qualified repair technician.

**There is unwanted noise coming from the speaker or the amp suddenly sounds bad.**

In the vast majority of cases, *this will be caused by a failing vacuum tube*. See the section above on replacing tubes. If the problem persists despite replacing tubes, your amp will need to be seen by a qualified repair technician.

## **Frequently Asked Questions**

**Do I need to bias my amp when changing power tubes?**

Because the Dusky Electronics D<sub>2</sub>O Amplifier's power section is cathode biased, which is self-adjusting, no adjustments need to be made when changing power tubes—even for tubes of different types. See the section above on power tube rolling.

**Is there a special *power on* procedure I should follow?**

The short answer is “no.” If that satisfies you, you can move on.

Most users of tube guitar and bass amplifiers will be familiar with lore regarding power on and power off procedures along the lines of “turn on the power first, wait 30 seconds, then turn on the standby.”

The conventional wisdom behind this procedure is that applying full power to the tubes before their heaters have had a chance to warm up can lead to cathode stripping, where material is literally pulled off of the tube's cathode and pulled to the tube's plate, damaging the tube. While this is a real phenomenon that affects large radio transmission tubes that operate at kilovolt and megavolt potentials, there is no evidence that this phenomenon occurs at the smaller scale of receiving tubes used by audio amplifiers.

It's safe to say that most of the lore around the proper way to turn a tube amplifier on or off is apocrypha with little basis in practical application. Which makes sense if you think about it. If tube amplifiers were really such fragile objects that they require a special procedure to turn them on or off, careless musicians would be damaging their gear all the time. In practice, musicians regularly use vintage tube amplifiers that haven't seen any kind of service in decades that continue to function reliably.

The universal absence of a standby feature on tube hi-fi gear should be another clue that such a feature is not strictly necessary for preventing damage to the amplifier.

Around here, we tend to leave the **STDBY** switch in the up position and only flip it to the down position when the amp is already on and we want to temporarily mute its output. This is, in fact, the intended function of the **STDBY** switch.

### **Can I change the power switch setting while the amp is on?**

Yes. This feature is hot switchable. *You might hear a little bit of a pop.* There is no need to power off the amplifier or engage standby.

### **Can I unplug or plug in speakers while the amp is on?**

When plugging in or unplugging speakers, the amp should be powered off or the standby should be engaged.

### **Can I change the output impedance setting while the amp is on?**

When adjusting the impedance selector switch, the amp should be powered off or the standby should be engaged.

### **What if I plug a speaker cabinet into the AUX output with nothing attached to MAIN?**

The **MAIN** output uses a shorting jack that shorts the amplifier's output when no speaker is connected in order to prevent damage to the amplifier in the event that a user mistakenly powers the amplifier on without a speaker connected to the output. Therefore, if you plug a single speaker cabinet into the **AUX** output with no speaker attached at the **MAIN** output, the amplifier's output will remain shorted and little or no signal will reach the connected speaker.

### **What if I run the amp with no speaker attached?**

Generally speaking, it's not a good idea to run a tube amp without an attached speaker load. This can cause damage to the power amplifier tubes or the output transformer. *The output transformer is a fairly expensive part that you don't want*

*to have to replace.* The use of a shorting jack for the **MAIN** output provides some measure of protection if you forget to plug in a speaker cabinet. Mishaps do happen, and we're as air-headed as anyone around here. We have accidentally run amplifiers without speaker loads for short periods of time with no ill effects. We do think, however, that it's better to be safe than sorry.

### **Why isn't there an effects loop?**

Guitar amplifiers that include effects loops as a feature tend to employ a modern architecture that uses a high-gain preamp section that can generate distortion followed by a high-power, clean power amp used to drive the speaker cabinet. In such a case, it can be useful to insert some effects, such as delay and reverb, after the preamp so that they can process the already distorted signal before passing the signal along to the power amp.

The D<sub>2</sub>O Amplifier on the other hand employs a "classic architecture" that features a clean preamp that can drive the power amp into distortion with large enough signals. Because distortion in the D<sub>2</sub>O is produced primarily by overdriving the power amp section, there is no convenient point to insert an effects loop that would allow processing the overdriven signal.

The D<sub>2</sub>O Amplifier is often touted as a great clean pedal platform, because of its wide bandwidth and robust headroom. If you are looking to add processing to your signal after an overdriven stage, we recommend using an external processor, such as the Dusky Electronics Toasted Drive, for an overdriven sound.

## **Warranty and Service**

If you are the original, registered owner, your Dusky Electronics D<sub>2</sub>O Amplifier comes with a lifetime warranty on workmanship and a 5 year warranty on materials *except for tubes*. Tubes are warrantied for 6 months. The warranty does not cover any accidental damage or damage resulting from abuse, misuse, natural or supernatural disasters, or any kind of divine or diabolical intervention.

Please save all original shipping materials and use the original box and shipping materials for shipping the amp should you need service. The customer pays for shipping to Dusky Electronics. Dusky Electronics pays for return shipping on warranty work.

You are, of course, welcome to take your Dusky Electronics D<sub>2</sub>O Amplifier to any qualified repair technician for repair, but only Dusky Electronics can perform warrantied service. Even out of warranty, we hope you bring it to us. If

something does break on one of our amps, we like to see what happened so that we can improve the amplifiers we make in the future.

Should you need anything, don't hesitate to get in touch. We will provide a quote or estimate for any out-of-warranty work on one of our amplifiers. The D<sub>2</sub>O is a fairly simple circuit and is designed with serviceability in mind, so repairs should generally be rare, easy to perform, and inexpensive. Of course, we know our amps better than anyone.

## **Contact Us**

Up to date contact information can be found on our website at:  
<https://duskyamp.com/contact>

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