OWNERS MANUAL

MANUAL NO. 01

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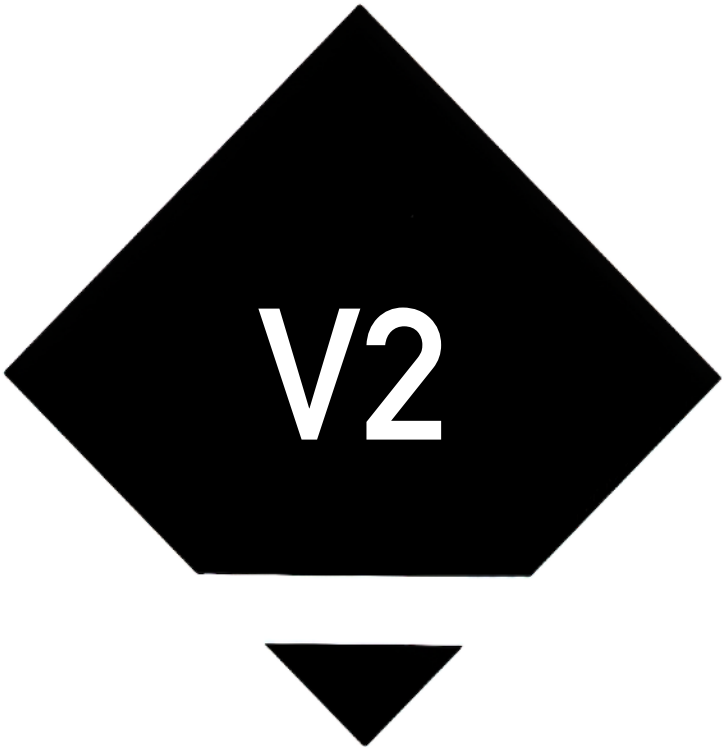
The DynaGrid Rectifier



Exotic Replacement for 5U4G / 274B rectifier tube.

MODEL DGR-JRv2

DECWARE

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OVERVIEW

The DynaGrid Jr. was designed for people who like to explore the different sonic signatures of rectifier tubes. A rabbit hole that can be quite expensive and at the same time enlightening as you hear how large the difference in overall sound quality can be from one rectifier tube to another. The DynaGrid Jr. is a plug-in replacement for a 5U4G / 274B or compatible rectifier tube.

Of course the reason for exploring different rectifier tubes in the first place is to find the one that brings the best possible sound from your amplifier/preamp. There is no rectifier tube that sounds as good as a DynaGrid Jr. It is a step beyond rectifier tubes.

DESCRIPTION

The DynaGrid Jr. is a stand-alone component that uses a large high-voltage triode vacuum tube to replace the 5U4G compatible rectifier in your component. It has a grid supply that allows it to automatically adjusts the voltage drop across the tube. There is a cable with an octal tube base on one end that plugs into your component where the rectifier tube normally goes. The DynaGrid Jr. uses it's own power supply to heat the large 845 triode, so your component no longer has to provide a heater voltage and will often run cooler as a result.

DynaGrid Jr. lets you monitor the actual B+ (unfiltered high voltage) of your amplifier and the total current draw. These two variables are largely responsible for many of the differences people hear when swapping out rectifier tubes. But they have no idea how each tube affects these variables so there is little if any science to it, just trying dozens of rectifiers until you find one you think sounds the best.

SPECIFICATION

DynaGrid Jr. has a maximum voltage of 500 volts DC. Most components are well below that, but if you have a fairly high power amplifier using a 5U4G you should research what the B+ voltage is and see that it is below 500 volts.

DynaGrid Jr. has a maximum current rating of 500 mA, higher than a 5U4G rectifier tube.

DynaGrid Jr. requires 120V power outlet and grounded power cord. The total power draw from the outlet is around 50 watts.

DynaGrid Jr. uses an 845 triode vacuum tube. The tube is replaceable with any brand 845 triode, however with the expected lifetime of the tube, it would rarely require replacement.

HOW IT WORKS

The DynaGrid Jr., replaces the standard 5U4G (or compatible) rectifier tube. Set the DynaGrid Jr. near the tube rectified component you want to upgrade, remove the component's rectifier tube, and install the high voltage cable with the octal (8 pin) tube base in it's place.

The DynaGrid Jr. uses high current solid state diodes to rectify the voltage with minimal voltage drop so it is fed into a 50 watt silicon resistor that dampens the output of the diodes and emulates the voltage characteristics of a 5U4. This rectified and dropped voltage is then fed into the 845 triode as a pass thru device, that simulates the sag characteristics of a rectifier tube.

When you turn on your component, the component uses the DynaGrid Jr. to rectify the AC into high voltage DC current, which is to say that all the high voltage and current comes from the component, not the DynaGrid Jr. The only power the DynaGrid Jr. creates on it's own, is the 10 volts for the heater of the 845 tube.

Since your component no longer needs to power the heater of a rectifier tube, the component will run cooler with the DynaGrid Jr. than it will with it's original rectifier tube.

For maximum tube life, The DynaGrid Jr., should be turned on first so that the 845 tube can heat up prior to turning on your component. Expected life span of an 845 tube in the DynaGrid Jr. is between 2000 and 4000 hours. Turning on the component first and then the DynaGrid Jr. repeatably will shorten the life of the 845 tube.

The DynaGrid Jr. draws less than 50 watts from the wall outlet when the 845 tube is lit.

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When your amplifier needs its high-voltage DC supply (often called the **B+**), the alternating current (AC) from the amplifier's power transformer must first be **converted to direct current (DC)**. Traditionally, this was done with a *tube rectifier* (such as a 5U4), which has a characteristic behavior engineers and musicians call **"sag"** — a dynamic drop in voltage during high current demand. This sag isn't a flaw; it influences the amplifier's dynamics and feel by making available voltage change with load.

In the DynaGrid Jr, this rectification and sag behavior is achieved in two stages that take advantage of modern components **without sacrificing the dynamic traits of a tube supply**:

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BENEFITS

Besides the obvious of being the best sounding rectifier available, there are several advantages to replacing your 5U4G or compatible rectifier with a DynaGrid Jr.

1) Reduced Stress on your amplifier's power transformer and filter caps by using the DynaGrid Jr. as a soft-start. Simply turn your amplifier on first, and then the Dynagrid for a softer startup.

2) Disables the 5 volt rectifier tube heater windings in your component, allowing the power transformer to run cooler.

3) Allows you to monitor your components B+ voltage and resulting current in real time.

4) Eliminates the rabbit hole of buying and trying different tubes because no rectifier tube will sound this good, not to mention the 845 tube in the DynaGrid Jr. is estimated to last the life of the product so it may never need replacing.

5) Your amplifier is fed with cleaner power and lower ripple than when it uses a rectifier tube. This is because there is pre-filtering inside the DynaGrid Jr. that a rectifier tube doesn't have.

6) Eliminates rectifier tube replacement and failures. High dollar rectifier tubes still fail, and have limited lifespan. The DynaGrid Jr., uses an 845 tube at a fraction of it's capacity thus the lifespan is greatly increased. Many customers will never have to replace the 845 tube.

LIFETIME WARRANTY

There is nothing inside a DynaGrid that would ever fail under normal use, and is therefor covered by a lifetime warranty to the original owner. The 845 tube and the high voltage interconnect cable are warranted for 1 full year from date of delivery.

NOTE: The 845 tube is only covered if it is not used in other components, such as amplifiers.

METERS AND AJUSTMENTS



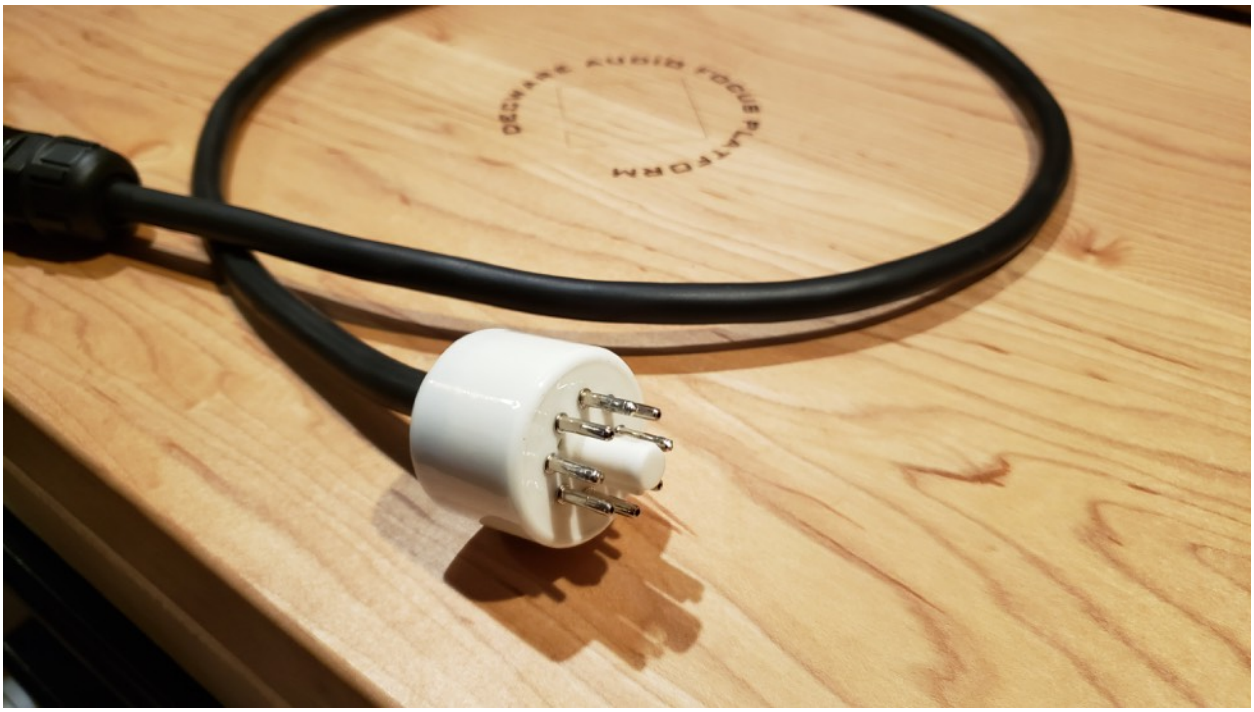
The DynaGrid Jr. has two meters on it. One is the voltage of your component and the other is how much current the component is drawing.

The DynaGrid Jr. is fully automatic, meaning there is nothing to adjust. It simply adjusts itself to be similar to a normal rectifier tube based on the current draw of the component.

The Original DynaGrid, (Yes there is another model) has a fully adjustable bias supply on the grid of the 845 that allows you to adjust the voltage drop by either increasing it or decreasing it over stock. Of course this makes the meters far more meaningful, especially when you take into account that the B+ voltage will increase and decrease based on slight variations in voltage at the wall outlet. When the B+ increases as a result, the total current draw will also increase. This is the case with most tube gear, but you have no way of knowing it is happening. With the meters you can see what the voltage and currant are at any given time during operation with either model.

THE HIGH VOLTAGE CABLE

The DynaGrid Jr. comes with a high voltage interconnect that connects the DynaGrid Jr. to the rectifier tube socket of your component. This cable is by default 1 meter in length however a 1.5 and 2 meter length are also available.



To install the cable, first connect it to the DynaGrid with the twist lock connector, and then to the component by inserting it exactly as you would a rectifier tube. Be sure both units are turned off before you begin.

WARNING: This cable contains **high voltages** and must not be altered or damaged in any way. If you have pets inspect the cable to be sure it hasn't been chewed on before use.

THE HIGH VOLTAGE CABLE CONT.



The DynaGrid Jr. has the high voltage interconnect cable jack located in the rear. The picture above shows the cable installed into the jack.

FUSE

The IEC connector shown between the power switch and the cable jack, has a 1.6 amp fuse located inside and contains a spare fuse. This is the mains fuse for the unit. If the 845 tube doesn't light up you either have no power, or the fuse is blown suggesting an issue with the tube.

845 TUBE

The DynaGrid Jr. is designed specifically for the 845 directly heated triode tube. No other substitutions will work. Attempting to use any other tube will void the warranty and could cause damage to the unit.

The 845 tube does not do the rectification, instead it is wired as a series pass thru device so it only see's DC voltage. 845 tubes are rated for 100 watts, the DynaGrid Jr. uses around 11 watts through the tube and about 25% of it's rated voltage so it lasts for a very long time.

COMPATIBLE RECTIFIERS

5U4G Compatible Rectifier Tubes (Part 1: 5U4 Variants and 5AR4/GZ34 Family)

Tube Type	Key Specs (Filament, Max Current, Voltage Drop, Max PIV)	Notes
5U4G	5V/3A, 225mA, 44V, 450V	Baseline reference tube (coke-bottle shape).
5U4GA	5V/3A, 250mA, 44V, 450V	Very similar to 5U4G; slightly higher current rating.
5U4GB	5V/3A, 275mA, 50V, 450V	Straight bottle; higher current, but may increase B+ voltage if subbed for 5U4G—check circuit.
5AR4 (GZ34)	5V/1.9A, 250mA, 17V, 450V	Indirectly heated; lower filament draw and voltage drop (higher B+ output); common upgrade/substitute.
GZ32 (5V4 equiv.)	5V/1.9A, 125-150mA, 22V, 375V	Lower current rating than 5U4G; softer start.
GZ37	5V/2.8A, 275mA, 50V, 500V	Similar to 5U4GB; higher current capability.
GZ31	5V/2A, 200mA, ~40V, 500V	Rare; intermediate ratings.
GZ33	5V/3.2A, 500mA, 60V, 500V	Higher current and PIV; for demanding circuits.

COMPATIBLE RECTIFIERS CONT.

Part 2: 5R4 and 5Y3 Families

Tube Type	Key Specs (Filament, Max Current, Voltage Drop, Max PIV)	Notes
5R4G (GY/GA/GB/GYA/GYB)	5V/2A, 250mA, 63-67V, 750-900V	Higher voltage drop (sag/compression) and PIV; lower filament draw; good for guitar amps.
5Y3 (5Y3G/5Y3GT)	5V/2A, 125mA, 60V, 350V	Lower current rating; higher drop; common in lower-power amps but may sag more.

Part 3: 5V4 and 5V3 Families

Tube Type	Key Specs (Filament, Max Current, Voltage Drop, Max PIV)	Notes
5V4G	5V/1.75A, 175mA, 25V, 375V	Lower current and filament; indirect heated; softer start.
5V3	5V/3.8A, 350mA, 47V, 425V	Higher current; higher filament draw—check transformer.

COMPATIBLE RECTIFIERS CONT.

Part 5: Other Compatibles

Tube Type	Key Specs (Filament, Max Current, Voltage Drop, Max PIV)	Notes
5AS4 (5AS4A)	5V/3A, 275mA, 50V, 450V	Similar to 5U4GB; higher current.
5AU4	5V/3.75A, 325mA, 50V, 400V	Higher current and filament—may overload transformer.
5AW4	5V/3.7A, 250mA, 46V, 450V	Similar to 5AU4; high filament draw.
5T4	5V/2A, 225mA, 45V, 450V	Metal shell; similar ratings, lower filament.
596	5V/3A, ~250mA, ~50V, 450V	Similar to 5U4G/GB; military/industrial.

Part 6: British/Military Equivalents

Tube Type	Key Specs (Filament, Max Current, Voltage Drop, Max PIV)	Notes
U52	5V/3A, 225mA, 44V, 450V	British equivalent to 5U4G.
CV575	5V/3A, 225mA, 44V, 450V	Military designation for 5U4G.
VT-244	5V/3A, 225mA, 44V, 450V	US military equivalent to 5U4G.

COMPATIBLE RECTIFIERS CONT.

Part 4: 274B Family and Russian/Chinese Equivalents

Tube Type	Key Specs (Filament, Max Current, Voltage Drop, Max PIV)	Notes
274B	5V/2A, 160-200mA, 75V, 450V	Often used as substitute but lower current; higher drop; not always recommended for high-demand circuits.
5C3S (5U3C/5C3M)	5V/3A, 225mA, ~44V, 450V	Direct equivalent to 5U4G; interchangeable.
5Z3P (5Z3PA/5Z3P-J)	5V/3A, 225mA, ~44V, 450V	Octal version of 5Z3; direct substitute.

DYNAGRID JR METERS



The DynaGrid Jr. has both a voltage and a current meter, as previously mentioned, but for those new to tube amps, this section will give you a better understanding of what you should expect in the way of readings.

First we'll talk about the current meter on the left. mA stands for milliamps. This is total current draw of your amplifier or preamplifier. It is possible for preamplifiers and phono stages to draw less than 50 mA so don't be alarmed if the need only reads 2 or 3 places off zero.

Amplifiers, will draw more current. In the picture the connected amplifier is drawing a total of 150mA. The largest reading you would see for big tube amps is 250mA with rare exception. The DynaGrid Jr. can handle up to 500mA but anything higher than 250mA may indicate a problem with the amplifier, like perhaps a shorted output tube.

The meter on the right, is the high voltage meter, showing you DC voltage. This meter can read anywhere between around 200V all the way to 500V depending on the component. Preamplifiers often run at lower voltages when compared to amplifiers.

Specifically, this voltage meter is showing you the amplifier's rectified DC voltage before it is filtered with any capacitors. This is often referred to as the amplifier's B+ voltage.

DYNAGRID JR METERS CONT.

It is useful to understand that the rectified high voltage can be 100 volts higher than the amplifiers operating voltage because capacitor filters in the power supply drop the voltage by that much. So the reading you see on the DynaGrid Jr. is a lot higher than what your output tubes actually see.

FRONT INDICATOR LAMP

On the DynaGrid JRv2, a small red indicator lamp was added below the meters. This is NOT an ON/OFF indicator. In fact you should not see it light up unless there is a problem with the tube. If an 845 tube's grid begins to draw anything other than benign amounts of current, the lamp will begin to glow. A soft barely discernible glow in a dark room is fine. The lamp is actually wired in series with the tube's grid, so it is an automatic protection device for the tube. If the grid draws current by some defect in the tube, then the lamp will increase in resistance to drop the current causing it to glow.

POWERING EVERYTHING UP

Your amplifier or preamplifier once connected to the DynaGrid Jr., is what supplies the high voltage as well as the current draw you see on the DynaGrid Jr. meters. This means that if you have the DynaGrid Jr. powered up first and then turn on your component, you will see the Voltage meter rise pretty rapidly whereas the Current meter will come up much slower as the tubes warm and begin to draw current.

If you have your component turned on first, then the tubes will be warm and drawing current immediately when the DynaGrid Jr. is turned on.

It does not technically matter which you turn on first. However, turning on the DynaGrid second because of the 845 tube in the DynaGrid Jr., will give your component a softer start than it would have from a directly heated rectifier tube, which can enhance the life of the tubes, and the capacitors in the power supply itself.