

CERIATONE

AMPLIFICATION

AFD #35

Hot Rodded Plexi Series

SQW AMPLIFIER

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1) About the AFD #35 100W amplifier

Our British series of amplifiers has been overwhelmingly popular, and is still the backbone of our amplifier line. We have been pleased to provide many players access to our unique take on these legendary amplifiers. With excitement, we are branching out into another series – the HRP series (“hot-rodded Plexi”).

It doesn’t take a rocket scientist to figure out the top-hatted, cigarette smoking inspiration for this amplifier. Simply put, the tone on that landmark album helped bring back the rock in rock and roll. The tone is aggressive, yet sweet and musical.

Although most closely linked with that album in particular, the tones the AFD #35 provides lend it to all sorts of hard rock tones where both great rhythm crunch and stinging leads are required.

While our work could not have been possible without the gracious information shared over the last decade in the public domain, we hope you appreciate our modifications, component selection, and construction techniques. Most of all, we hope the Yeti becomes an integral part of your tone equation to exhilarate your playing and music.

Rock on!

- Nik Azam

2) QUICK SETUP *(for instant gratification)*

- 1) Plug your guitar using a 1/4" instrument cable into the INPUT on the right of the front panel
- 2) Plug a suitable power cable from the AFD's rear panel MAINS cable inlet to your wall power receptacle
- 3) Plug the AFD into your speaker cabinet using 1/4" speaker cable
- 4) Set the OUTPUT SELECTOR to match the impedance of your speaker cabinet
- 5) Set all rotary controls on the front panel to 12:00 (clock face)
- 6) Set PKR control to the middle right position
- 7) Set Channel to the up position
- 8) Set Master at just above minimum
- 9) Set front panel POWER switch in the "1" position (down position, with adjacent STANDBY switch in the "0"/up position) for 30 seconds to allow tube filaments to warm up
- 10) Set front panel STANDBY switch to "1" mode (down position)
- 11) **ROCK!!!!!!**

3) FRONT PANEL CONTROLS



From left to right:

- 1) **INDICATOR** LED
- 2) **POWER** 2-way toggle switch
- 3) **STANDBY** 2-way toggle switch
- 4) **“MV” (POST-PHASE INVERTER MASTER VOLUME)** control
- 5) **PRESENCE** control
- 6) **BASS** control
- 7) **MIDDLE** control
- 8) **TREBLE** control
- 9) **OUTPUT MASTER** control
- 10) **CHANNEL** 2-way toggle switch
- 11) **“GN2” (GAIN 2)** control
- 12) **“PKR” (PEAKER)** 3-way toggle switch
- 13) **“GN1” (GAIN 1)** control
- 14) **FOOTSWITCH** ¼” instrument jack
- 15) **INPUT** ¼” instrument jack

INDICATOR will illuminate when the AFD is powered by turning the front panel **POWER** toggle switch to the ON position. If **INDICATOR** does not turn on, check your power cable connections, and then the fuse on the rear of the unit.

POWER two-way toggle switch powers the AFD on and off. With the toggle switch in the UP (“0”) position, the AFD is OFF. In the DOWN (“1”) position, the Yeti is ON.

STANDBY applies high voltage to the vacuum tube anodes (and screen grids) during use of the Yeti. To ensure long tube life, first power the unit on with the toggle switch in UP (“0”) position for approximately 30 seconds. Then switch to DOWN (“1”) to use the Yeti. With the toggle switch in the UP position, the Yeti is in STANDBY mode. In the DOWN position, the Yeti is in OPERATE mode

“MV” (POST-PHASE INVERTER MASTER VOLUME) adjusts the overall volume of the amplifier. This volume configuration is unique to most amplifiers, and occurs after the phase inverter in the power section. We will save you the nerdy details, and tell you that this type of volume will give you much of the feel and tone of a cranked amplifier but without the unmanageable volume.

Use this in conjunction with the OUTPUT MASTER to set both the volume level and degree of power amplifier saturation. In other words, nail the vibe and the level!

PRESENCE adjusts the high frequency response of the power amplifier using negative feedback. Use this control to add sparkle and clarity to your tone.

BASS adjusts low frequencies in your amplifier.

MIDRANGE adjusts the mid frequency response.

TREBLE adjusts the high frequency response.

OUTPUT MASTER sets the overall volume of your amplifier.

Use this in conjunction with the “MV” to set both the volume level and degree of power amplifier saturation. In other words, nail the vibe and the level!

CHANNEL switches between the two channels. In the UP position, it is the high-gain tone that made this amplifier famous. In the DOWN position, the tone is more traditional, not far off from a 2203 or 2204 series amplifier.

Note, that when in the DOWN position, GAIN 2 is not engaged.

“**GN2**” (**GAIN 2**) adjusts the gain in the high gain mode. Specifically, this controls the signal going into the third (of four) gain stages in the high gain channel.

As mentioned above, when in the low gain mode, GAIN 2 is not active.

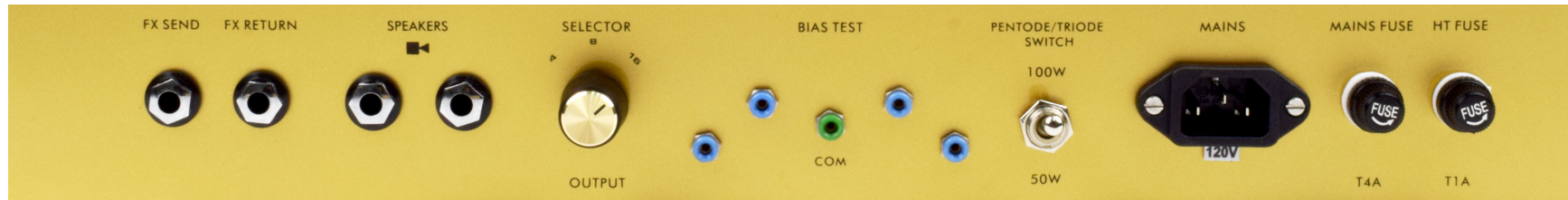
“**PKR**” (**PEAKER**) is a high-frequency boost that can be used to add sparkle *and gain* to your tone. In the middle position, PKR is defeated. In the UP position, it boosts upper mid and high frequencies, and adds noticeable gain. With the toggle switch in the DOWN position, it boosts extreme high frequencies, and adds less gain boost than the UP position. In conjunction with an active PKR, lower “GN1” settings will also trim the bottom end. This high frequency boost / low frequency cut is more prominent as GN1 is turned down.

“**GN1**” (**GAIN 1**) adjusts the signal strength coming out of the first gain stage, and going into the second tube stage. Think of this as a global “gain” control for both channels. Depending on the PKR setting, you can also use this to shape the high and low frequency response of your amplifier.

FOOTSWITCH is a ¼” jack for the supplied footswitch. Plug in the footswitch here.

INPUT is a ¼” jack for instrument cables. Plug your guitar in here.

4) REAR PANEL CONTROLS



- 1) **FX SEND** 1/4" instrument jack
- 2) **FX RETURN** 1/4" instrument jack
- 3) **SPEAKERS** 1/4" speaker jacks (x2)
- 4) **OUTPUT SELECTOR** three-way rotary selector
- 5) **BIAS TEST** probe jacks (x5)
- 6) **PENTODE / TRIODE SWITCH** 2-way toggle switch
- 7) **MAINS** IEC cable inlet
- 8) **MAINS FUSE** T2A slow blow fuse
- 9) **HT FUSE** T500mA fuse

FX SEND 1/4" instrument jack can be used to directly interface the preamp of the AFD, thereby bypassing the power amplifier. Conversely, this is usually used as the SEND of the effects loop. Plug the input of your effects unit, or interface device (ex – C-lator, Klein-ulator) into this jack using 1/4" instrument cable.

FX RETURN 1/4" instrument jack can be used to directly interface the power amp of the AFD, thereby bypassing the preamp and using the amplifier as a power amplifier. Conversely, this is usually used as the RETURN of the effects loop. Plug the output of your effects unit, or interface device (ex – C-lator, Klein-ulator) into this jack using 1/4" instrument cable.

SPEAKERS 1/4" speaker cable jacks. Use a 1/4" speaker cable to connect your speaker cabinet to the amplifier using these jacks. If you use one speaker cabinet, either jack is acceptable.

NOTE – *never turn your amplifier to OPERATE mode (“1” / DOWN position on STANDBY) without connecting the amplifier to a speaker cabinet or suitable dummy load! Failing to do so may damage your amplifier!*

OUTPUT SELECTOR three-way rotary selector. Set to the position that matches the impedance of your speaker cabinet.

NOTE – *if you are using two speaker cabinets in parallel (ex – two 16 Ohm cabinets), set the impedance selector to half that of a single cabinet (in this case, 8 Ohms).*

BIAS TEST multimeter probe jacks – use this for external bias current measurements (see Section 5)

PENTODE / TRIODE switch – allows user to further control the power and response of the amplifier. In 100W position, the power section is in pentode operation, and provides greatest headroom and dynamics. In 50W position, the power section is in triode operation. This not only reduces output power, but compresses attack, softens high frequency transients, and provides a softer attack.

MAINS IEC cable inlet – plug a suitable IEC power cable into this inlet to power your amplifier

MAINS FUSE slow-blow fuse – used to protect your amplifier from voltage spikes or excessive current draw. Replace only when necessary. 3A is used for amplifiers used with a 120VAC country supply, and 2A is used with 240VAC.

HT FUSE T500mA fuse – used to protect your amplifier from voltage spikes or excessive current draw. Replace only when necessary.

5) TUBE COMPLIMENT AND EXTERNAL BIAS JACKS AND ADJUSTMENT



From left to right:

- V1 – 12AX7/ECC83 (input stage 1 and gain stage 2)
- V2 – 12AX7/ECC83 (gain stage 3)
- V3 – 12AX7/ECC83 (gain stage 4 and tonestack driver)
- V4 – 12AX7/ECC83 (phase inverter for power amplifier)
- V4 – 6550
- V5 – 6550



In this diagram, we have color coded five features for simplicity

- 1) Red (solid) arrow = probe jack, V5
- 2) Blue (solid) arrow = probe jack, V6
- 3) Green arrow = probe jack, GROUND
- 4) Orange (dashed) arrow = bias adjustment potentiometer shaft

To measure your power tube bias, carefully follow these steps ***with the amplifier in OPERATE and connected to a speaker load (not doing so may damage your amplifier!)***:

- 1) Turn on a digital multimeter (DMM), and set it to read millivolts (mV) in the 100mV range (this will vary from DMM to DMM)
- 2) Plug a black probe into the color-coded jack on your DMM, and do the same for a red probe
- 3) Insert the black probe tip into the GROUND probe jack (green arrow). This is GROUND in the amplifier.
- 4) Insert the red probe tip into the V5 probe jack (red solid arrow) on the far left. This measures bias for V5.
- 5) Write down DMM reading
- 6) Remove the red DMM probe tip from the V5 probe jack (red solid arrow), and insert into V6 probe jack (blue solid arrow). This measures bias for V6.
- 7) Compare readings, they should be fairly similar (within 2-4mV).
- 8) Adjust bias adjustment (orange dashed arrow) SLOWLY until your DMM reads approximately 55mV (see calculations below).

To calculate bias, there are two pieces of information you need to know: your amplifier's power tube plate voltage, and the published value for maximum plate dissipation for the power tubes used in your amplifier. To save you some time and energy, here are those two values:

- Approximate 6550 plate voltage for AFD #35 series amplifiers = 450VDC
- Maximum plate dissipation for 6550 (depending on brand) = 35-42W
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...and now some math. The formula for calculating bias is as follows:

$$\frac{\text{maximum plate dissipation}}{\text{amplifier plate voltage}} \times \text{percent of maximum dissipation} \times 1000 = \text{bias current (mA)}$$

In most cases, amplifiers are biased between 50% and 75% dissipation. We bias the AFD to approximately 50-55mV on a DMM, which is around 60% dissipation, depending on brand.

An example is as follows:

$$\frac{42W}{450VDC} \times 65\% \times 1000 = \textit{about } 56mA$$

You might wonder why your DMM is set to millivolts and not milliamps – simply, we have a 1 Ohm resistor placed between your probe jacks and ground to convert a current reading to a voltage reading. That way, a bias current of 56mA measures as 56mV on your DMM.

NOTE – *Only set your DMM to mV for measuring bias on the amplifier. Not doing so may damage your DMM.*

A FEW COMMENTS ON BIASING

Due to the nature of vacuum tube amplification, there are inherent risks when biasing your amplifier. Extremely high-voltages are present, and vacuum tubes reach high temperatures during use.

The risk of electrical shock and/or skin burns should ALWAYS be kept in mind. Therefore, bias at your own risk, and only while paying attention and taking all precautionary measures.

Biasing should only be done on a clean workbench with no distractions. Do not wear loose clothing or any jewelry. Take your time, and think carefully before each step.

Even though the bias test points and adjustment is external to reduce risk of electrical shock, all precautions must be taken while biasing.

Again, bias at your own risk. Ceriatone Amplification is not responsible for any damages or injuries resulting from user biasing.

FREQUENTLY ASKED QUESTIONS

How do I hook up this thing?

- See Section 2, beginning on page 3.

Is the FX loop series or parallel? Active or passive?

- The FX loop is series, and is currently parallel. However, we have plans to release an option for a tonally transparent solid-state FX loop. Stay tuned!

When I plug effects into the effects loop, my tone noticeably changes. Sometimes the effects don't sound quite right. What's the deal?

- Generally, what you're hearing is a significant mismatching of impedances, and/or an overloading of the effect unit itself. Most rack-mount units have different input impedance than pedals, and thus can *sometimes* function fine without a buffer before them. In addition, *some* of these rack-mounted effects can pad the volume they receive, preventing it from overloading. Pedals do not have proper input impedance or padding ability, and therefore do not play nicely.
- For best results, an effects loop interface like the C-lator or Klein-ulator should be used with the Yeti amplifiers. These units prevent impedance mismatching, as well as provide the ability to pad down the volume sent to the effects units hence preventing any overloading.

Can I substitute different tube types for the 12AX7/ECC83s or 6L6GCs?

- Although you can try 12AT7s, 12AU7s, 5751s without any harm, the design is optimized for 12AX7s, and are therefore the only recommended tube in the preamp positions. Usage of other power tubes (ex – 6550s, 6L6GCs, modern 6V6s like Electro-Harmonix, JJ) may be possible, but please first consult Ceriatone Amplification or your local competent amplifier technician.

What settings do you recommend?

- See Section 2, Page 3.

Do I need to use a matched and balanced phase inverter?

- It is not necessary. Feel free to experiment with different tubes (of the same type) in your Yeti, though!

I've read that the components used in this type of amplifier are really important. What is inside my Yeti?

- We use a combination of parts custom-made for us to our specifications (power transformer, output transformer, choke, high-temperature / low-ESR electrolytic capacitors) and those used in our British series (1/2W carbon composition resistors, 1W carbon film resistors, Mallory 150M polyester film capacitors, high-voltage silver mica capacitors, Belton tube sockets, and Alpha potentiometers, Cliff jacks). Finally, we occasionally use NOS components from our vast surplus parts collection in locations they work well and complement the voicing or enhance the performance of the amplifier.

I like to use rack-mounted multieffects units. What is the output level straight from the EFFECTS LOOP SEND jack, -10dB or +4dB?

- While not exact, -10dB is a better approximation than +4dB. The actual output level will depend on your settings, particularly the volume controls. +4dB is usually reserved for recording/P.A. equipment with balanced connections.