

# WA-412

FOUR CHANNEL DISCRETE MICROPHONE PREAMPLIFIER W/ DI



**WARM**<sup>TM</sup>  
AUDIO

# THANK YOU!

## **REGISTER YOUR WA-412**

**Before we begin, please take the time to visit [www.warmaudio.com](http://www.warmaudio.com) to register your product. To ensure you receive proper and uninterrupted warranty support for your product, please register your unit within 14 days from purchase.**

Thank you for purchasing the Warm Audio WA-412 Four Channel Mic Preamp + DI. We feel this product offers the best in terms of the sound, function, and vibe from the classic era of analog recording. We don't cut corners when it comes to what goes into our products, and the WA-412 is no exception. The WA-412 uses the highest quality custom input and output transformers made by ALTRAN Transformers USA. The WA-412 also features our own custom reproductions of discrete op-amps from the classic recording console era, and features a fully discrete signal path, with all through-hole component topology, built by hand. We are confident you will love recording with the WA-412.

## **Welcome Back To the World Of Analog**

Though digital technology and software have made great strides in their performance in recent years; we still feel that nothing compares to the level of articulation, depth, realism, and responsiveness of a well-built piece of analog gear. When you hear the bottom end presence and top end detail of quality analog gear, the difference can be astounding. The cost of most boutique analog equipment is financially out of reach for many recording artists. Our mission is to change this, and introduce as many people as we can to recording and mixing with real, dedicated hardware. Whether this is the first piece of outboard gear you've ever purchased outside of a recording interface, or merely the first in a long time; we thank you, and welcome you back to the world of analog.

**Bryce Young**

President

Warm Audio

Liberty Hill, Texas USA

# CHAPTER 1: WARRANTY STATEMENT

Warm Audio warranties this product to be free from defect in materials and workmanship for one year from the date of purchase, for the original purchaser to whom this equipment is registered. This warranty is non-transferrable.

This warranty is void in the event of damage incurred from unauthorized service to this unit, or from electrical or mechanical modification to this unit. This warranty does not cover damage resulting from abuse, accidental damage, misuse, improper electrical conditions such as mis-wiring, incorrect voltage or frequency, unstable power, disconnection from earth ground (for products requiring a 3 pin, grounded power cable), or from exposure to hostile environmental conditions such as moisture, humidity, smoke, fire, sand or other debris, and extreme temperatures.

Warm Audio will, at its sole discretion, repair or replace this product in a timely manner. This limited warranty extends only to products determined to be defective and does not cover incidental costs such as equipment rental, loss of revenue, etc. Please visit us at **www.warmaudio.com** for more information on your warranty, or to request warranty service.

This warranty applies to products sold in the United States of America. For warranty information in any other country, please refer to your local Warm Audio distributor. This warranty provides specific legal rights, which may vary from state to state. Depending on the state in which you live, you may have rights in addition to those covered in this statement. Please refer to your state laws or see your local Warm Audio retailer for more information.

## NON-WARRANTY SERVICE

If you have a defective unit that is outside of our warranty period or conditions; we are still here for you and can get your unit working again for a modest service fee. Please visit us at **www.warmaudio.com** to contact us about setting up a repair or for more information.

With proper care, your Warm Audio gear should last a lifetime and provide a lifetime of enjoyment. We believe the best advertisement we can have is a properly working unit being put to great use. Let's work together to make it happen.

# CHAPTER 2: NOW LET'S GET STARTED!

## INTRODUCTION

The WA-412 is our take on the most successful and iconic preamp in the history of classic American console designs. Our goal was to make this type of discrete, transformer coupled mic preamp available for the first time at an affordable price, without compromising any of the design parameters and characteristics that make this type of preamp so desirable... but that alone was not enough. We also wanted to add what we felt were the needed features to make this type of preamp more flexible and versatile, easier to integrate and more capable of sculpting tones. Knowing that the 'sweet spot' of any 312-style mic preamp is often a high-gain setting where the output transformer is on the edge of saturation, output attenuation on every channel was a must. Modern and vintage input impedance options also provide a way to get different sounds from the preamp design. The result, we feel, is a truly world class preamp that finally allows recording studios of all sizes to access coveted impactful drum sounds, huge guitar sounds, and intense vocal sounds that cut through the densest mix. With input and output transformers and discrete op-amps made to the specifications of the classic console modules; the WA-412 will bring you the sounds we've all heard countless times on so many great records.

In a world where home, mobile, and on-location recording is becoming more and more the norm, one of the biggest remaining gaps between the home studio and the larger commercial facilities has been the number of available high quality, discrete mic preamp channels. Though the importance of room acoustics, quality mics, great instruments and players cannot be emphasized enough, the WA-412 does bring everyone one step closer to the coveted large studio sound, regardless of location or budget. We look forward to hearing what you record with the WA-412.

## THEORY OF OPERATION

As a discrete, transformer coupled, high gain microphone preamplifier, the WA-412 works great with all types of microphones, including dynamic, ribbon, and condenser microphones. Dynamic microphones and ribbon microphones are generally lower output devices and require no external power source. Condenser microphones are generally more sensitive than dynamic and ribbon microphones and typically require external +48V phantom power, which the WA-412 provides.

The WA-412 also works well with a variety of instruments, via the onboard active instrument DI.

## FEATURES

The WA-412 is a completely discrete, high voltage, dual-transformer microphone preamplifier designed for high gain (+65dB), high headroom, low noise, and an exciting sonic performance – great for all types of recording applications. A high quality mic preamp is one of the most critical pieces needed to achieve the elusive 'larger than life' sound, and the WA-412 is more than capable of delivering it. Both the mic input and line output are transformer balanced using

# CHAPTER 3: TECHNICAL SPECS

ENGLISH

WARRANTY

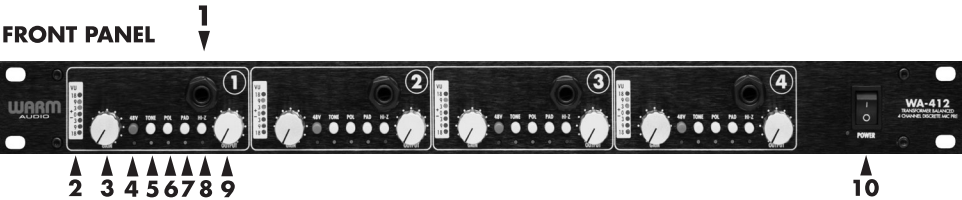
NOW LET'S GET STARTED

TECHNICAL SPECS

HOOKUP DIAGRAMS

RECALL SHEETS

large, custom-wound transformers by Altran, and are made in the USA. The WA-412 is based around a discrete op-amp, our own X520, which is a reproduction of the classic console 2520-style op amp, and features all discrete, through-hole components. We've avoided 'potting' the discrete op-amp to allow better heat transfer off the components. The X520 can achieve vibrant, clean and lifelike tones; but can also be driven into mild saturation at much higher gain levels. The effects can be subtle, but very pleasing to the ear. The WA-412 can also accept any discrete op-amp on the market which conforms to the standard 2520-style footprint and voltages.



## 1. HI-Z Input

The front panel  $\frac{1}{4}$ " input provides an active DI buffer circuit, which boosts and then sends the instrument's signal through the entire preamp circuit, including the input transformer, discrete op amp (operational amplifier) and output transformer. The thorough layout of the HI-Z's signal path ensures that instruments are subject to the same tone-shaping options as microphones. You can connect a variety of instruments via the HI-Z input on the front panel of the WA-412, including: acoustic (with pickup) guitars and electric guitars, bass guitar, as well as keyboards, samplers, synth modules, and drum machines.

## 2. Meter Display

The LED meter displays the output level of the WA-412 (pre-attenuation), and can be a valuable tool for monitoring peak level activity and ensuring a safe recording level is achieved, as well as how much saturation has been dialed in from preamp gain.

## 3. Gain knob

This controls the amount of gain the preamp circuit applies to the source signal. The gain control is variable and adjusts the WA-412's gain from +23db to +59db or from +29db to +65db when the "TONE" switch is engaged. The "PAD" feature lowers the minimum and maximum gain ranges by -20db when engaged.

## 4. +48 Volt Phantom Power

The WA-412 has +48V phantom power available. This assures optimum performance of your condenser microphones that require phantom power.

## 5. Tone Switch

This control switches the input transformer configuration from a 1:5 (step up) turns ratio to a steeper 1:10 (step up) turns ratio, drawing out a greater degree of

## CHAPTER 3: TECHNICAL SPECS

coloration and impact from both the input transformer as well as the discrete op-amp. When engaged, the input impedance of the WA-412 is 150 ohms. When disengaged, the input impedance of the WA-412 is 600 ohms. The 150 ohm (switched-in) setting will increase the gain of the WA-412 by +6db, changing the maximum gain from +59 to +65db. This feature will make a noticeable tone change to most microphones and instruments. The Microphone and Hi-Z inputs are all altered by this feature; as every input source ultimately will pass through the affected components. The 600 ohms impedance setting is recommended for condenser and dynamic microphones, and 150 ohms is recommended for ribbons and lower output dynamic mics. This switch is labeled "Tone" for a reason though; most listeners will find the normal setting to be more open, natural, and detailed, and the tone-engaged setting to be more punchy, aggressive, or thick. The tone-engaged setting is essentially how the vintage console preamp that inspired the WA-412 is wired as a default; however the tone-disengaged setting is more akin to how many more modern types of solid-state preamps are normally designed. We strongly suggest you experiment with both settings on all sources to find the best possible tone for your recordings. As with all things, let your ear and artistic taste be the final judge on which settings to use for any given situation.

### 6. POL Switch

This feature inverts the polarity of the balanced microphone input signal. This can be useful in aligning the phase of 'opposing' microphones in some recording scenarios, such as microphones placed on the top and bottom of a snare drum, microphones in front of and behind the speaker in an open-back guitar cabinet, etc.

### 7. -20dB PAD Switch

Engaging this feature applies -20db to the incoming signal. This is a very useful feature for reducing the level coming into the WA-412 and thus preventing the signal from clipping or distorting. This may occur due to high output level from a microphone or other device. Padding the input serves to provide increased "headroom" for the operator while lessening the likelihood of signal overload.

### 8. HI-Z Switch

This feature engages the front panel 1/4" input and turns off the back panel XLR input.

### 9. OUTPUT Knob

This control acts as the 'channel fader' to the preamp's output, providing seamless attenuation to the output signal. This can be highly useful in 'sculpting' the sound of the preamp. For example, higher gain with lower output tends to produce a more overdriven, harmonically rich sound; while lower gain, higher output tends to produce a more open, dynamic, clean, and articulate sound. As with all things, let your ear and artistic taste be the final judge on which settings to use for any given situation.

# CHAPTER 3: TECHNICAL SPECS

## 10. Power Button

The power button is used to power the unit on and off. To extend the life of the electronics, please turn the unit off when not in use.



## BACK PANEL

### IEC power cord input

#### 115v/230v AC voltage selector

Please select the correct voltage for your territory before connecting the WA-412 to mains power.

### Microphone input

Microphones and mic-level signals may be connected via the rear XLR connector.

### Legacy earth-grounding lug

Mostly a relic from the days of ungrounded (2-prong) wiring installation, this connector can be used to ground the chassis of equipment to an earth ground source (grounding rod). In modern electrical installations, earth grounding is provided by a third pin on the electrical outlet and carried to the device on a 3-pin IEC power cord, making this connection rarely needed. If, however, you do use this connection to ground your equipment; ensure that the device is not already grounded via the IEC power cable, as this could result in an audible ground loop.

### XLR & TRS balanced output

Output is provided by an XLR and ¼" TRS output connector for convenience, both wired in parallel to the output transformer. We recommend for best results to use only one output at a time. For unbalanced operation, use an unbalanced ¼" TS cable. Pin 1 (sleeve)=GND, pin 2 (tip)=positive, pin 3 (ring)=negative.

### XLR balanced input

This is a 3 pin balanced microphone input for the WA-412. Pin 1=GND, pin 2=positive, pin 3=negative.

# CHAPTER 3: TECHNICAL SPECS

## WAXING PHILOSOPHICAL

Getting one step closer to the 'full console' sound.

Nearly half a decade after releasing our first preamp model, taking a fresh look at this legendary console preamp design and the several 'stand-alone' versions that exist has allowed us to think outside the box and put much thought into what could be done to make an already great preamp design better and easier to use.

The first addition we knew we would want to have is an output adjust that would allow for better control and gain staging. Experienced recording engineers have always know that the 'sweet spot' for this style of preamp lies within a very high gain setting that allows the output transformer to mildly saturate; however, capturing that signal has always presented a particular engineering challenge because the desired signal is too hot to be directly captured by any A to D converter or interface. Precise output attenuation allows for this, as well as for much more creative 'tone sculpting' possibilities, from very clean (low gain/full output) to a pleasing overdrive (high gain/low output), and many places in between. The attenuator stage we use maintains a constant output impedance and is as sonically neutral as possible. It is strategically placed post-metering and post-output transformer; so that the output transformer can saturate as desired, and the amount of gain/saturation can be monitored closely on the channel LED meter without being affected by attenuation.

We consulted with the engineers at Altran, a high end US audio transformer company, on how to best approach a modern reproduction of the classic transformers for this type of mic pre. The end result was an input and output transformer which precisely match the turns ratios of the current design, but with a winding technique that closely emulates the style and smoother sonic signature of the original parts from the golden era of large console recording. We also gave the input transformer two input impedance options, accessed via the tone button, for more tonal options. Lastly, by re-engineering the output transformer, we were able to increase the number of output windings by 30% from the vintage part, vastly improving inductance specs and extending low frequency response deeper into the subharmonic region, lower than you will find on any modern or vintage specimen of this design. This was a crucial step toward our goal of extending and reinforcing the bottom end response of our preamp, which was one of the defining differences we heard when comparing tracks recorded on a full console vs. the typical racked preamp design. The difference is very subtle; but if you use a microphone capable of capturing deep lows, and are recording a bass guitar cabinet, kick drum, or floor tom, you will hear the extended low end.

Rather than go with one of our existing discrete op-amp reproductions, we opted to release the WA-412 with our new X520, a fully discrete, all through-hole component reproduction of the vintage era 2520-style operational amplifier. Every channel of the WA-412 is socketed for easy replacement with any standard 2520-style, six-pin discrete op-amp.



# CHAPTER 4: HOOKUP DIAGRAMS

## ENGLISH

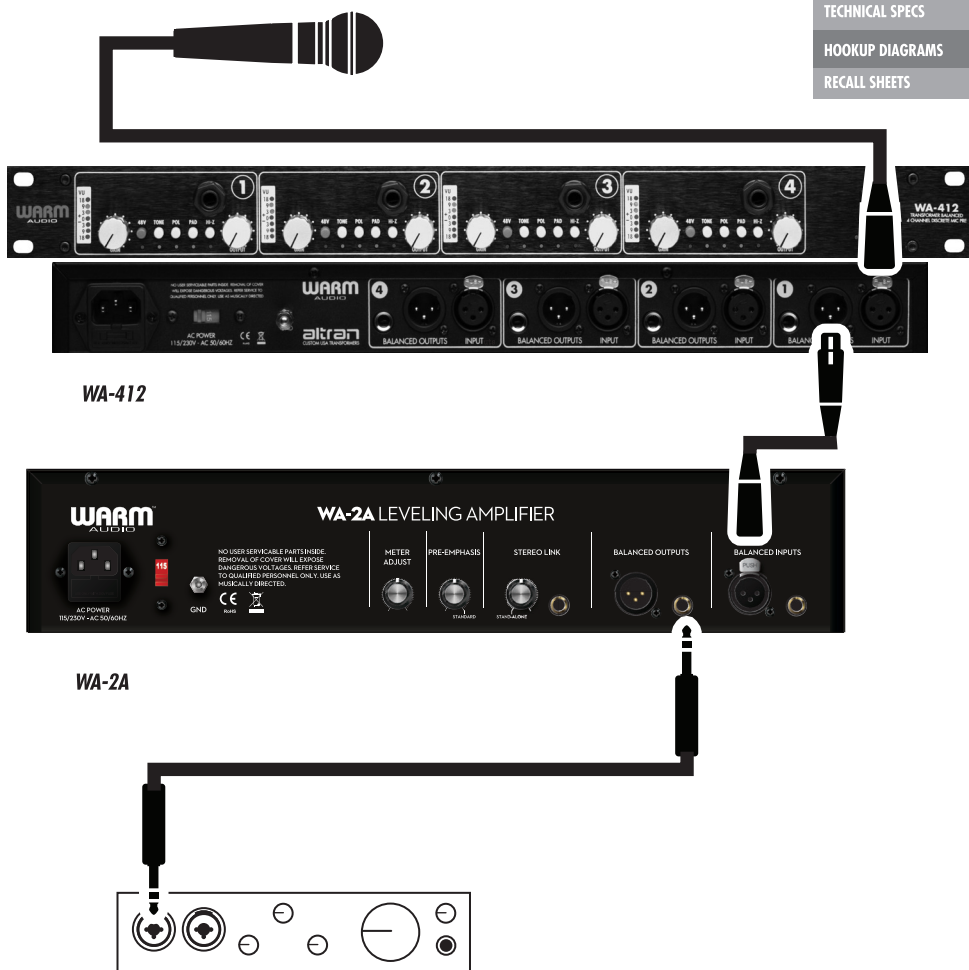
WARRANTY

NOW LET'S GET STARTED

TECHNICAL SPECS

HOOKUP DIAGRAMS

RECALL SHEETS



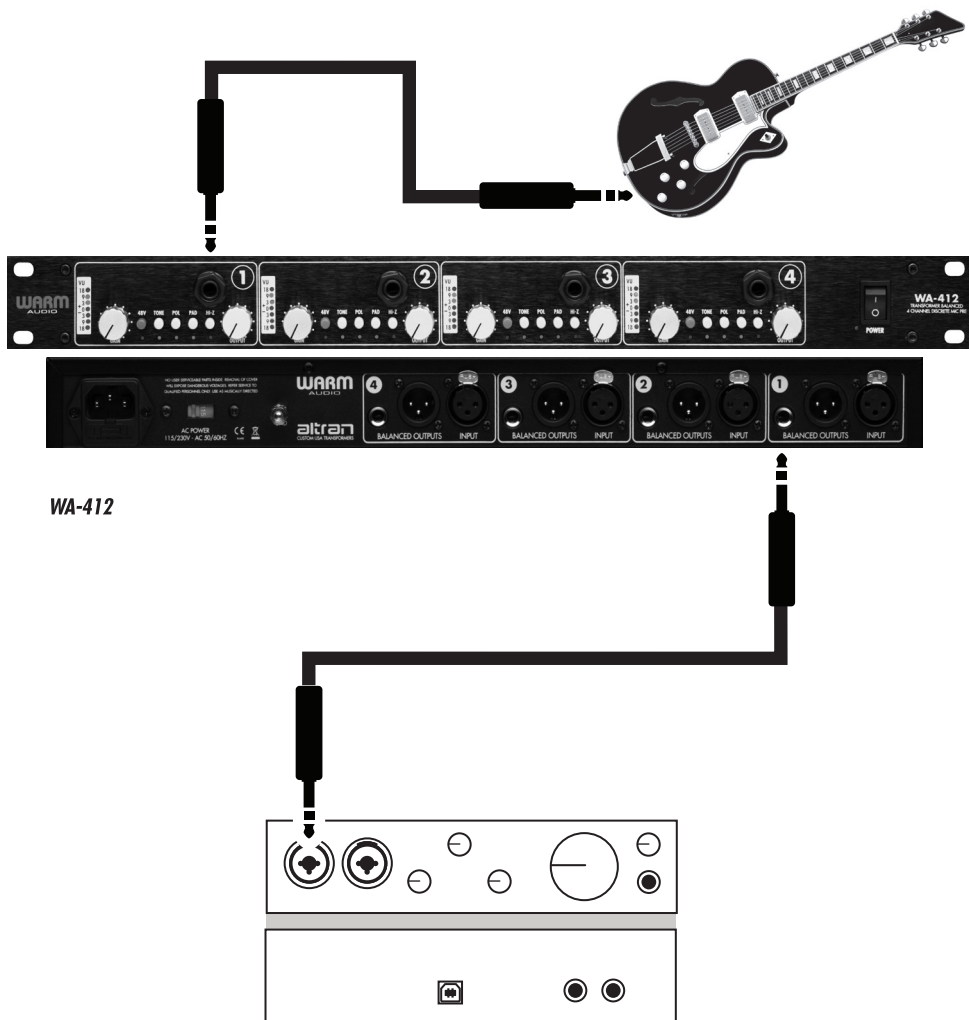
WA-412

WA-2A

Recording interface

In this example, a microphone is feeding into a WA-412, which feeds in to the WA-2A via a balanced XLR patch cable, which feeds in the LINE LEVEL input of your recording interface/recorder.

**Note:** it is important to use a line level input on your recording device as opposed to a microphone or instrument level input.



**WA-412**

**Recording interface**

In this diagram, the WA-412 is used as an active direct box and preamplifier to send an electric guitar signal into a recording interface. It is important to go from the WA-412 into a true LINE INPUT on your A/D converter or recording interface. Never use a dedicated microphone or instrument input on your interface.

# CHAPTER 5: RECALL SHEETS



Session: \_\_\_\_\_ Track: \_\_\_\_\_ Notes: \_\_\_\_\_  
Date: \_\_\_\_\_ Instrument: \_\_\_\_\_ Notes: \_\_\_\_\_



Session: \_\_\_\_\_ Track: \_\_\_\_\_ Notes: \_\_\_\_\_  
Date: \_\_\_\_\_ Instrument: \_\_\_\_\_ Notes: \_\_\_\_\_

ENGLISH
WARRANTY
NOW LET'S GET STARTED
TECHNICAL SPECS
HOOKUP DIAGRAMS
RECALL SHEETS



© 2016 **Warm Audio**™ LLC.

Liberty Hill, Texas USA | [www.warmaudio.com](http://www.warmaudio.com)