

**Model 2-610**  
**Dual Channel**  
**Tube Preamplifier**

**Universal Audio Part Number 65-0008**

**Revision 1.2/WS**

## The 2-610 Dual Channel Tube Preamplifier

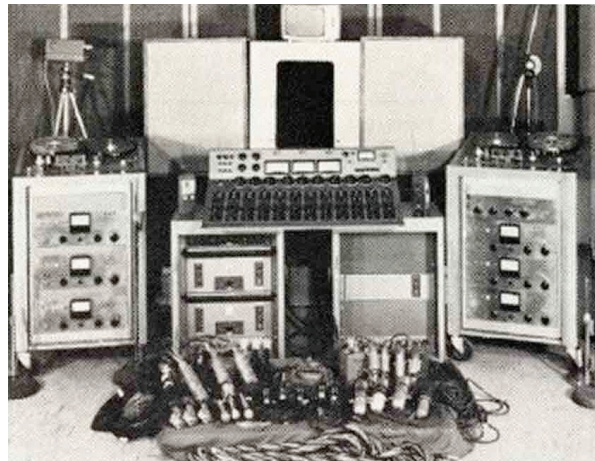
Thank you for purchasing the 2-610 Dual Tube Microphone Preamplifier. The 2-610 is inspired by the microphone preamp section of the 610 console designed by my father, M.T. “Bill” Putnam, in 1960. The 610 was a rotary-control console and was the first console of a modular design. Although technologically simple compared to modern consoles, the 610 possessed a warmth and character that kept it in demand for decades. As a prominent part of my father’s United/Western Studios, the 610 was used on many classic recordings by Frank Sinatra and Sarah Vaughan. The Beach Boys *Pet Sounds*, the Doors *LA Woman*, and Van Halen’s debut album were all recorded on the 610. The legendary Wally Heider used the 610 in his remote truck for many of his best known live recordings. At Ocean Way Studios (formerly United), the 610 is lovingly preserved and still used in Studio B.

Most of us at Universal Audio are musicians, recording engineers, or both, and we wanted to build a mic preamp that we’d be delighted to use ourselves. We love the recording process, and we really get inspired when the basic tracks are beautifully recorded. Our design goal for the 2-610 was to capture the original character of the 610, creating a preamp that would induce that “*a-ha*” feeling we’ve felt when hearing music recorded in its most natural, inspired form.

The controls of the 2-610 are simple and essential: we added only those features required for practical use without needless duplication of functionality found elsewhere in most studios. The transformers and tubes received much of our R&D attention. We settled on a transformer design featuring double-sized alloy cores with custom windings. Our tubes are carefully selected and tested individually. This extra effort is well worth the time and cost because the result is a truly outstanding, easy-to-use mic preamp!

These products have been quite an enjoyable adventure to develop and we’re sure the next phase will be even more fun! We thank you for your support and we thank my father, Bill Putnam.

-Bill Putnam Jr.



**Wally Heider's Remote Recording Rig, with 610 Console**

In addition to the 2-610, Universal Audio has released reproductions of the classic Teletronix LA-2A Leveling Amplifier and 1176LN Limiter as well as the remaining 610 tube preamp family of products such as the TEC Award winning 6176 and LA-610. Modern tools such as the flagship 4110 & 8110 Precision Microphone Preamplifiers bring tonal flexibility to the multi-channel mic preamp, while the *Desktop Console Series* Remote Preamp and Monitor Master bring large format console features to desktop recordists. Universal Audio also creates software emulations of vintage hardware and innovative mixing tools that run on our UAD DSP platform. All of these products are designed to meet the demands of the modern recording studio, yet retain the character and quality of vintage equipment. See more at [www.uaudio.com](http://www.uaudio.com), including the SOLO mic pre series, and 2192 Master Audio Interface A/D and D/A.

## IMPORTANT SAFETY INSTRUCTIONS

Before using this unit, be sure to carefully read the applicable items of these operating instructions and the safety suggestions. Afterwards keep them handy for future reference. Take special care to follow the warnings indicated on the unit, as well as in the operating instructions.

1. **Water and Moisture** – Do not use the unit near any source of water or in excessively moist environments.
2. **Object and Liquid Entry** – Care should be taken so that objects do not fall, and liquids are not spilled, into the enclosure through openings.
3. **Ventilation** – When installing the unit in a rack or any other location, be sure there is adequate ventilation. Improper ventilation will cause overheating, and can damage the unit.
4. **Heat** – The unit should be situated away from heat sources, or other equipment that produce heat.
5. **Power Sources** – The unit should be connected to a power supply only of the type described in the operating instructions, or as marked on the unit.
6. **Power Cord Protection** – AC power supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them. Pay particular attention to cords at plugs, convenience receptacles, and the point where they exit from the unit. Never take hold of the plug or cord if your hand is wet. Always grasp the plug body when connecting or disconnecting it.
7. **Grounding of the Plug** – This unit is equipped with a 3-wire grounding type plug, a plug having a third (grounding) pin. This plug will only fit into a grounding-type power outlet. This is a safety feature. If you are unable to insert the plug into the outlet, contact your electrician to replace your obsolete outlet. Do not defeat the purpose of the grounding-type plug.
8. **Cleaning** – The unit should be cleaned only as recommended by the manufacturer.
9. **Nonuse Periods** – The AC power supply cord of the unit should be unplugged from the AC outlet when left unused for a long period of time.
10. **Damage Requiring Service** – The unit should be serviced by a qualified service personnel when:
  - a. The AC power supply cord or the plug has been damaged; or
  - b. Objects have fallen or liquid has been spilled into the unit; or
  - c. The unit has been exposed to rain; or
  - d. The unit does not operate normally or exhibits a marked change in performance; or
  - e. The unit has been dropped, or the enclosure damaged.
11. **Servicing** – The user should not attempt to service the unit beyond that described in the operating instructions. All other servicing should be referred to qualified service personnel.

## **Notice**

This manual provides general information, preparation for use, installation and operating instruction for the Universal Audio 2-610 Microphone Preamplifier.

The information contained in this manual is subject to change without notice. Universal Audio, Inc. makes no warranties of any kind with regard to this manual, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Universal Audio, Inc. shall not be liable for errors contained herein or direct, indirect, special, incidental, or consequential damages in connection with the furnishing, performance, or use of this material.

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## **Contents**

This package should contain:

2-610 Preamplifier  
2-610 Manual  
IEC Power Cable  
Registration Card

## **Warranty**

Warranty for the 2-610 and all Universal Audio hardware is one year, parts and labor.

## **Trademarks**

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## 2-610 Specifications

<b>Microphone Input Impedance</b>	Selectable, 500 $\Omega$ or 2k $\Omega$
<b>Balanced Line Input Impedance</b>	13.8 k $\Omega$
<b>Hi-Z Input Impedance</b>	Selectable between 2.2 M $\Omega$ or 47 k $\Omega$
<b>Maximum Microphone Input Level</b>	+3.5 dBu
<b>Maximum Output Level</b>	+20 dBm
<b>Internal Output Impedance</b>	60 $\Omega$
<b>Recommended Minimum Load</b>	600 $\Omega$
<b>Frequency Response</b>	20 Hz to 20 kHz +1 dB
<b>Maximum Gain</b>	61 dB
<b>Signal-to-Noise Ratio</b>	Greater than 82 dB
<b>Tube Complement</b>	One 12AX7 and one 12AT7 per channel
<b>Power Requirements</b>	115V/230V
<b>Power Consumption</b>	30 watts
<b>Dimensions</b>	19"W x 3.5"H x 12.25"D
<b>2-610 Weight</b>	12.25 lb.

## Preamp Operating Instructions

The 2-610 is a two-channel, vacuum-tube microphone/instrument/line preamplifier. Each channel has two gain stages that each utilizes a dual-triode tube operating in a class A single-ended configuration. Variable negative feedback is applied to both of these stages to control gain, distortion, and frequency response. Balanced inputs and outputs are transformer coupled.

### 2-610 Front Panel

The front panel has two identical channels (figure 1) each with Input Select, Gain, Level, EQ, Pad and Polarity controls as well as a Hi-Z Input. The center section between the channels (figure 2) has the Power On/Off switch and light and a 48 V phantom power On/Off switch for each channel. Each control is discussed in the following sections.

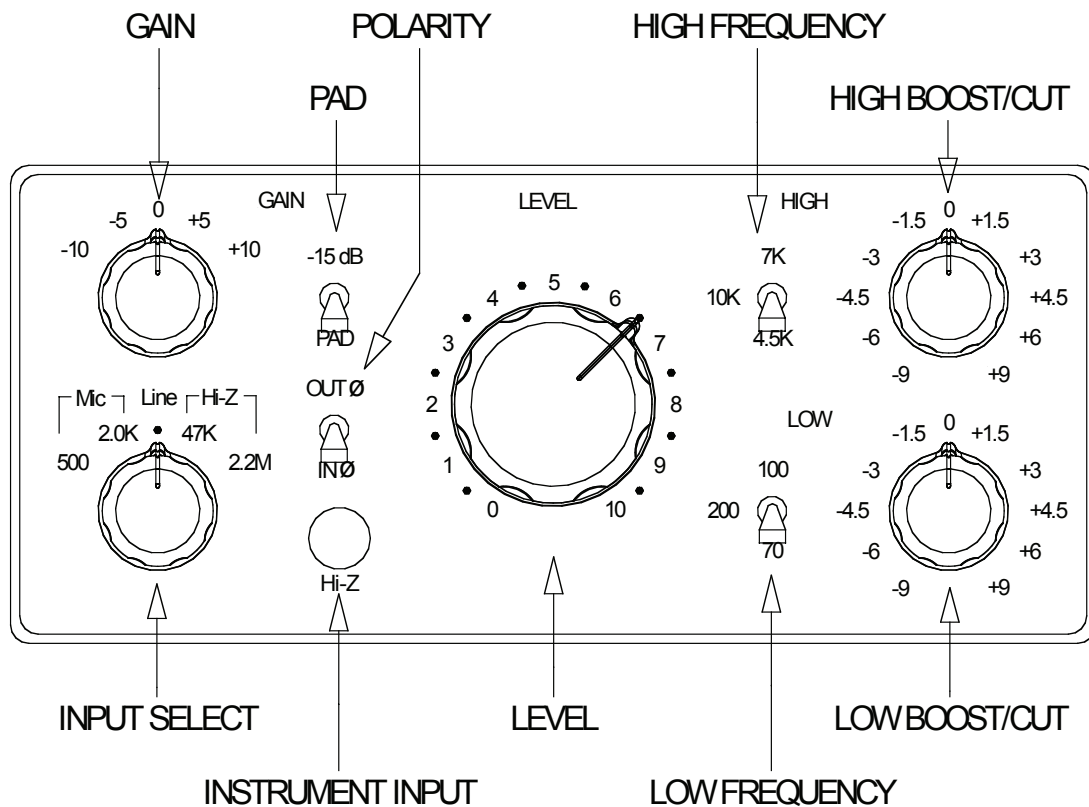


Figure 1: 2-610 front panel channel controls

## Input Select

The input select switch determines which input is active: Mic, Line, or Hi-Z. Both the Mic and Hi-Z inputs include two settings to select between unique input impedances.

### Mic

Selects the signal input from the balanced rear panel MIC INPUT connection. The impedance for the MIC INPUT can be set to  $500\Omega$  or  $2.0K\Omega$ . Switching between these two positions while listening to a connected microphone may reveal a different tonal quality and/or gain difference. Typically a microphone preamplifier should have input impedance roughly equal to about 10 times the microphone output impedance. For example, if your microphone has output impedance between  $150\Omega$  and  $200\Omega$ , set the switch to the  $2.0K\Omega$  position. However, since making music is not necessarily about adhering to technical specifications, feel free to experiment with the settings to attain the desired sound. You will not harm your microphone or the 2-610.

### Hi-Z

Selects the signal input from the unbalanced front panel Hi-Z  $\frac{1}{4}$ " connection. The impedance for the Hi-Z input can be set to  $47K\Omega$  or  $2.2M\Omega$  and is intended for electric guitar, electric bass, or any instrument with a magnetic or acoustic transducer pickup. The  $47K\Omega$  setting is best suited for -10 dBv level signals, typically found on active basses and guitars. The  $2.2M\Omega$  setting is appropriate for instruments with passive pickup systems. Since an instrument's output impedance may be somewhere between the active and passive levels, feel free to experiment to achieve the best sound at the desired level.

### Line

Selects the signal input from the balanced rear panel LINE INPUT connection. LINE INPUT has an input impedance of approximately  $13K\Omega$  and is intended to accommodate mixers, tape machines, other mic preamps or any device with a line level output, such as keyboards, sound modules and drum machines. The 2-610 may be used as a "tone box" in this configuration, offering a variety of sonic colors based on the front panel control settings.

## Gain

Adjusts the gain of the input stage in 5 dB increments. Turning the Gain switch clockwise reduces the negative feedback, which raises the gain. In addition to changing the input volume, the Gain switch also alters the amount of the input tube's harmonic distortion, a major contribution to the warm sound characteristic of tube equipment. The greater the gain, to more color the 2-610 will impart to the recorded signal.

## Level

The Level knob determines the amount of signal from the preamplifier gain stage sent to the output stage. For the cleanest, most uncolored signal from the 2-610, set the Gain switch to a lower setting (-10 or -5) while turning the Level knob until the appropriate output signal is attained. Altering the Gain, Impedance, and Output controls together provides many useful tonal variations.

*Note: The numeric values for the Level knob are NOT specific dB values.*



## -15 dB PAD

Reduces the input signal by -15dB; Recommended in reducing the incoming signal in cases where undesired distortion is present at low gain levels.

## Polarity

The front panel toggle switch labeled IN  $\emptyset$  and OUT  $\emptyset$  determines the polarity of the LINE OUTPUT. When IN  $\emptyset$  is selected, pin 2 is hot (positive). When OUT  $\emptyset$  is selected, pin 3 is hot (positive). Polarity reversal may be useful in cases where more than one microphone is utilized in recording a source.

## EQ Controls

The 2-610 has both low and high frequency shelving-type equalizers, each with two controls.

### Frequency

This toggle switch selects the corner frequency for each of the filters. High: 4.5K, 7K, 10K; Low: 70, 100, 200.

### Boost/Cut

This switch selects the amount of boost or cut applied to the frequency shelf. The positive and negative numbers on the front panel denote dB values(-9, -6 -4.5, -3, 1.5, 0, 1.5, 3, 4.5, 6, 9).

## +48 V

Most modern condenser microphones often require +48 phantom voltage to operate. Each channel of the 2-610 has a toggle switch that applies 48 V to the MIC INPUT when the switch is up. It is good practice to keep phantom power off (switch down) when it is not required. To avoid loud transients, always keep phantom power off when connecting or disconnecting microphones. It is recommended that the power requirements of your microphone be checked with the manufacturer before applying phantom power.

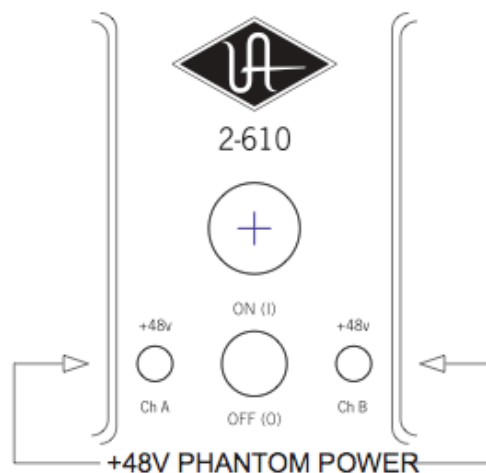


Figure 2: 2-610 front panel center section

## Power

The 2-610 provides the user with a front panel power switch. It is recommended to power off the unit when the 2-610 is not used for extended periods of time.

## 2-610 Rear Panel

The rear panel (figure 3) has two identical channels each with MIC INPUT, LINE INPUT, and LINE OUTPUT XLR connectors. The center of the rear panel has an AC Power input with a fuse holder and a voltage selector switch. These connectors and controls are discussed in the following sections.

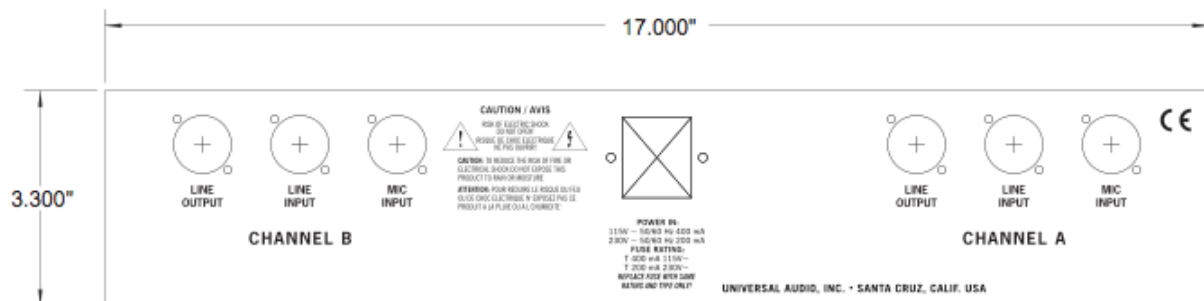


Figure 3: 2-610 rear panel

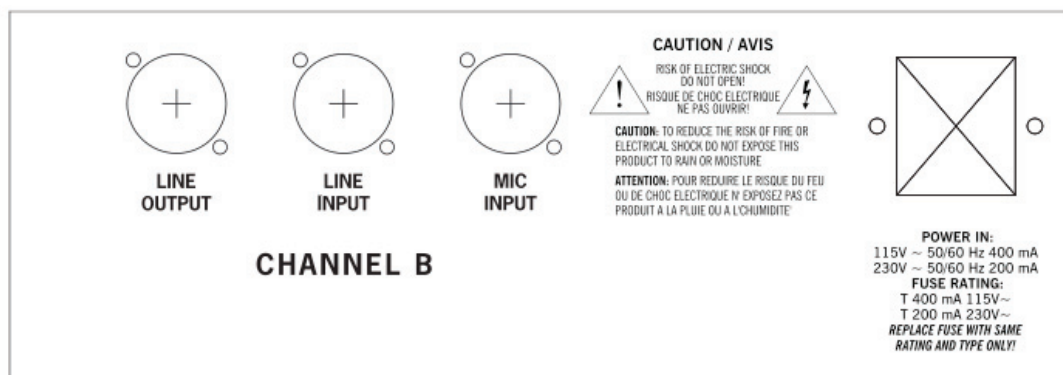


Figure 4: Detail of 2-610 rear panel

## Input/Output

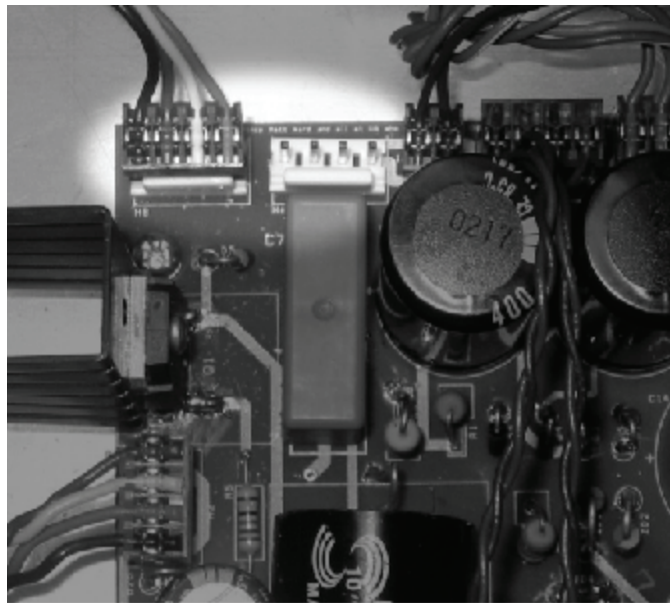
Standard XLR input and output connectors are provided on the rear panel. Pin 2 is wired positive (hot) on the LINE and MIC INPUTS> Pin 2 is positive on the LINE OUTPUT when the front panel Polarity toggle switch is down (IN  $\emptyset$ ). Pin 3 is positive on the LINE OUTPUT when the front panel Polarity switch is up (OUT  $\emptyset$ ).

## AC Power

The 2-610 uses a standard, detachable IEC power cable.

## Internal Voltage Selector

The 2-610 can operate at 115V or 230V. To change the mode, wait 5 minutes after power down, **unplug the AC power cord from the rear chassis**. Remove the top cover. As shown below, there is a connector that can be plugged in to one location or another location to configure the unit for 115V or 230V operation. This figure shows the unit configured for 230V operation. The connector can be identified by its wire colors; Black, Blue, White, Orange. This connector should be plugged into location H8 for 230V operation and location H6 for 115V operation. The connector is part of the wiring that comes from the power transformer located at rear center of the 2-610. **When changing operating voltage, fuse value must be changed as well.** *Make sure the 2-610 is properly set for the voltage in your area before applying AC power to the unit!* Failure to do so may damage the unit.



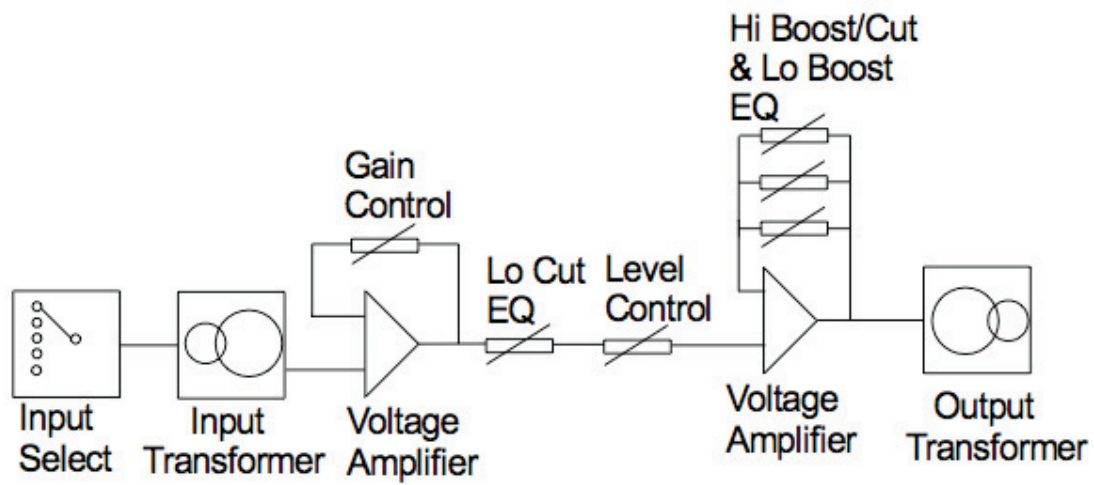
**Figure 5:** Operating Voltage Selector

## Fuse/Mains/Bulbs

The AC power fuse is located in the AC power connector block. Remove the power cord before checking or changing the fuse.

- A 400 mA time delay (slow blow) fuse is required for operation at 115 V.
- A 200 mA time delay (slow blow) fuse is required for operation at 230 V.
- A 6.3 V bulb (1847) is used for the power indicator light.

## Block Diagram



Wally Heider's Remote Recording Van

## Historical Notes

Bill Putnam Sr. was awarded the 2000 Technical Grammy for his multiple contributions to the recording industry. He was highly regarded as a recording engineer, studio designer/operator and inventor. Putnam was considered a favorite of musical icons including Frank Sinatra, Nat King Cole, Ray Charles, Duke Ellington, Ella Fitzgerald and many, many more. The studios he designed and operated were known for their sound and were an experimentation ground for his continuing desire to push the envelope. Universal Recording in Chicago, United and Western in Los Angeles (now Ocean Way and Cello) all preserve elements of his room designs.

The companies Putnam started, Universal Audio, Studio Electronics, and UREI, built products that are still in regular use decades after their development.

In 1999 Bill Jr. and James Putnam re-launched Universal Audio and merged with Kind of Loud technologies – a leading audio software company – with two goals: Reproduce classic analog recording equipment designed by their father and his colleagues, research and design new recording tools in the spirit of vintage analog technology. Today Universal Audio is fulfilling that goal, bridging the worlds of vintage analog and DSP technology in a creative atmosphere where musicians, audio engineers, analog designers and DSP engineers intermingle and exchange ideas every day. Analog or digital, UA remains committed to the “hand assembled” ideal that has been forgotten by many audio manufacturers. Whatever the endeavor, every project taken on by the UA team is driven by its historical roots and a desire to wed classic analog technology with the demands of the modern digital studio.

## The 610 Preamp

The 2-610 was inspired by the Putnam-designed 610 console built in 1960 for his United Recording facility at 6050 Sunset Boulevard in Hollywood (now Ocean Way). As was the case with most of Putnam’s innovations, the 610 was the pragmatic upshot of a recurring problem in the studio: how to fix a console without interrupting a session. The traditional console of the time was a one-piece control surface with all components connected via patch cords. If a problem occurred, the session came to a halt while the console was dismantled. Putnam’s solution was to build a mic-pre with gain control, echo send and adjustable EQ on one modular chassis using a printed circuit board. While modular consoles are commonplace today, the 610 was quite a breakthrough at the time.

While the 610 was designed for practical reasons, it was aesthetic appeal that made it popular with the recording artists who frequented United and Western in the 60’s. The character of the mic-pre in particular made it favorite of engineers like Bruce Swedien, Bruce Botnick, Lee Hershberg and Jack Joseph Puig; and artists including Sarah Vaughan, Frank Sinatra, Ray Charles, and The Beach Boys. Swedien describes the character of the preamp as “clear and open” and “very musical”.

Studios 2 and 3 at Western, which featured the 610 console, were the site of many classic recordings of the 60’s, including the Mamas and the Papas (Bones Howe), Up, Up and Away by the Fifth Dimension, Herb Alpert, Sergio Mendes (Bruce Botnick), and of course Pet Sounds.

Legendary engineer Wally Heider, manager of remote recording at United, used his 610 console to record many live recordings including Peter, Paul and Mary “In Concert” (1964), Wes Montgomery’s “Full House” (1962), and all of the Smothers Brothers Live albums. Heider’s console was later acquired by Paul McManus in 1987, who spent a decade restoring it. [We thank Paul for his efforts and his contribution to our efforts to trace the history of the 610.]

At least one 610 module is still in use at Ocean Way. Allen Sides, who purchased the studio from Putnam to open Ocean Way, personally traveled to Hawaii to collect the 610 console that was used to record the live “Hawaii Calls” broadcasts. Jack Joseph Puig has been ensconced in Studio A with the 610 (and a stunning collection of vintage gear) where he has applied the vintage touch to acts including Beck, Hole, Counting Crows, Goo Goo Dolls, No Doubt, Green Day and Jellyfish.

## The 1176LN Limiting Amplifier and LA-2A Leveling Amplifier

The LA-2A and 1176 compressor/limiters long ago achieved classic status. They're a given in almost any studio in the world — relied upon daily by engineers whose styles range from rock to rap, classical to country and everything in between. With so many newer products on the market to choose from, it's worth looking at the reasons why these classics remain a necessary part of any professional studio's outboard equipment collection. The basic concept of a compressor/limiter, is of course, relatively simple. It's a device in which the gain of a circuit is automatically adjusted using a predetermined ratio that acts in response to the input signal level. A compressor/limiter "rides gain" like a recording engineer does by hand with the fader of a console: it keeps the volume up during softer sections and brings it down when the signal gets louder. The dynamic processing that occurs at ratios below 10 or 12 to one is generally referred to as compression; above that it's known as limiting. Modern day compressors offer a great degree of programmability and flexibility while older devices such as the 1176 and the LA-2A are more straightforward in their design. Perhaps it is this fact that has contributed to their appealing sound and the longevity of their popularity.

### The 1176LN

The original Universal Audio 1176LN was a major breakthrough in limiter technology — the first true peak limiter with all transistor circuitry offering superior performance and a signature sound. Evolved from the popular Universal Audio 175 and 176 vacuum tube limiters, the 1176LN retained the proven qualities of these industry leaders, and set the standard for all limiters to follow. It was Bill Putnam himself who, in 1966, was responsible for the initial design of the 1176. Its circuit was rooted in the 1108 preamplifier, which was also designed by Putnam. As is evident from entries and schematics in his design notebook, he experimented with the recently developed Field Effect Transistor (F.E.T.) in various configurations to control the gain reduction in the circuit. He began using F.E.T.s as voltage variable resistors, in which the resistance between the drain and the source terminals is controlled by a voltage applied to the gate. His greatest challenge was to ensure that distortion was minimized by operating the F.E.T.s within a linear region of operation.

After several unsuccessful attempts at using F.E.T.s in gain reduction circuits, Putnam settled upon the straightforward approach of using the F.E.T. as the bottom leg in a voltage divider circuit, which is placed ahead of a preamp stage.

The output stage of the 1176 is a carefully crafted class A line level amplifier, designed to work with the (then) standard load of 600Ω. The heart of this stage is the output transformer, whose design and performance is critical. Its primary function is to convert the unbalanced nature of the 1176 circuit to a balanced line output, and to provide the proper impedance matching to drive the line impedance of 600Ω. This transformer is critical due to the fact that it uses several additional sets of windings to provide feedback, which makes it an integral component in the operation of the output amplifier. Putnam spent a great deal of time perfecting the design of this tricky transformer and carefully qualified the few vendors capable of producing it.

The first major modification to the 1176 circuit was designed by Brad Plunkett in an effort to reduce noise—hence the birth of the 1176LN, whose LN stands for low noise. Numerous design improvements followed, resulting in at least 13 revisions of the 1176. The D and E 'black-face' LN revisions are widely considered to be the best-sounding models; therefore Universal Audio modeled our reissue after these two models.

### The LA-2A

The LA-2A leveling amplifier, a tube unit with hand wired components and three simple controls, was introduced in the early 1960s. It utilized a system of electro-luminescent optical gain control that was quite revolutionary; gain reduction was controlled by applying the audio voltage to a luminescent driver amplifier, with a second matched photoconductive cell used to control the metering section. With its 0 to 40 dB of gain limiting, flat frequency response of 0.1 dB from 30-15,000 Hz and a low noise level (better than 70 dB below plus 10 dBm output,) the LA-2A quickly became a studio standard. Originally patented by Jim Lawrence, it was produced by Teletronix in Pasadena, California, which became a division of Babcock Electronics Corp. in 1965. In 1967 Babcock's broadcast division was acquired by Bill Putnam's company, Studio Electronics Corporation shortly before he changed the company's name to UREI®. Three different versions of the LA-2A were produced under the auspices of these different companies before production was discontinued around 1969.

## Notes