

Model 2-1176
Dual 1176LN Limiting Amplifier

Manual Number 65-0801

Revision 1.00

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The 2-1176 Dual Channel 1176LN Compressor

Thank you for purchasing this version of the classic 1176LN compressor. When my father designed this product, he was very proud of his accomplishment. Being a recording engineer himself, this was a piece of gear he used extensively. He was also very proud of its reception by his peers in both the recording and broadcast industries.

In making our version of this classic piece of equipment, we have taken great care to make a product that my father would have been proud of. Throughout the development of this product our philosophy has remained clear: Stay true to the original. There are good reasons why certain pieces of gear have become classics, and we wanted to make sure that we captured this accurately.

You may be familiar with the fact that there were many versions of the 1176 produced throughout the years. We patterned our reproduction on the D/E versions. These versions were characterized by the transformer input stage, LN circuitry, and the class A (1108 style) output stage. Later versions replaced the class-A output stage with a push-pull class-AB output stage, and eventually replaced the transformer input with a differential op-amp circuit. That highly recognizable blackface 1176 sound was best captured by the version that we are reproducing.

In addition to the 1176LN and 2-610, Universal Audio has released reproductions of the classic Teletronix LA-2A Leveling Amplifier and the 2108 microphone preamplifier which is based on the 1108 line amps that were used in my father's studios. Universal Audio also creates software emulation's of our vintage hardware that run on our UAD-1 DSP card as well as Digidesign's Pro Tools platform. All of these products are designed to meet the demands of the modern recording studio, yet retain the character of vintage equipment.

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 Sr.

Thank you,

Bill Putnam

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 itself, 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. **Carts and Stands** – The unit should be used only with a cart or stand that is recommended by the manufacturer. The unit and cart combination should be moved with care. Quick stops, excessive force and uneven surfaces may cause the unit and cart combination to overturn.
9. **Wall Or Ceiling Mount** – The unit should be mounted to a wall or ceiling only as recommended by the manufacturer.
10. **Cleaning** – The unit should be cleaned only as recommended by the manufacturer.
11. **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.
12. **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.
13. **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.

FCC Compliance

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the

following measures:

- * Reorient or relocate the receiving antenna.
- * Increase the separation between the equipment and receiver.
- * Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- * Consult the dealer or an experienced radio/TV technician for help.

Caution: Changes or modifications not expressly approved by Universal Audio could void the user's authority to operate the equipment.

Notice

This manual provides general information, preparation for use, installation and operating instructions for the Universal Audio 2-1176 Limiting Amplifier.

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2-1176 Specifications

Input Impedance:	Selectable, 15k Ω or 600 Ω
Output Load Impedance:	600 Ω (floating)
External Connections:	XLR Connectors
Frequency Response:	+/- 1 dB. 20Hz to 20 kHz
Gain:	40 dB, +/- 1dB
Distortion:	Less than 0.5% T.H.D. from 50 Hz to 15 kHz with limiting, at 1.1 seconds release setting. Output of +20 dBm with no greater than 0.5% T.H.D.
Signal-Noise Ratio:	Greater than 85 dB
Attack Time:	Adjustable from 20 to 800 microseconds
Release Time:	Adjustable from 50 milliseconds to 1.1 seconds
Stereo Operation:	Chan. A Attack and Release links to Chan. B via LINK mode

General:

Power Requirements:	100V - 240V operation. Auto sensing power supply
Dimensions:	3.5" vertical, for mounting in standard 19" rack (2RU)
Weight:	9.6 lbs. (Shipping weight 14.8 lbs.)

1176LN Operating Instructions

This section of the manual describes the controls and function of a single channel.

Both channel A and B controls are identical and behave as described below (except in Stereo Link mode). See page 8 for using the 2-1176 in Stereo Link mode.

1176LN Front Panel

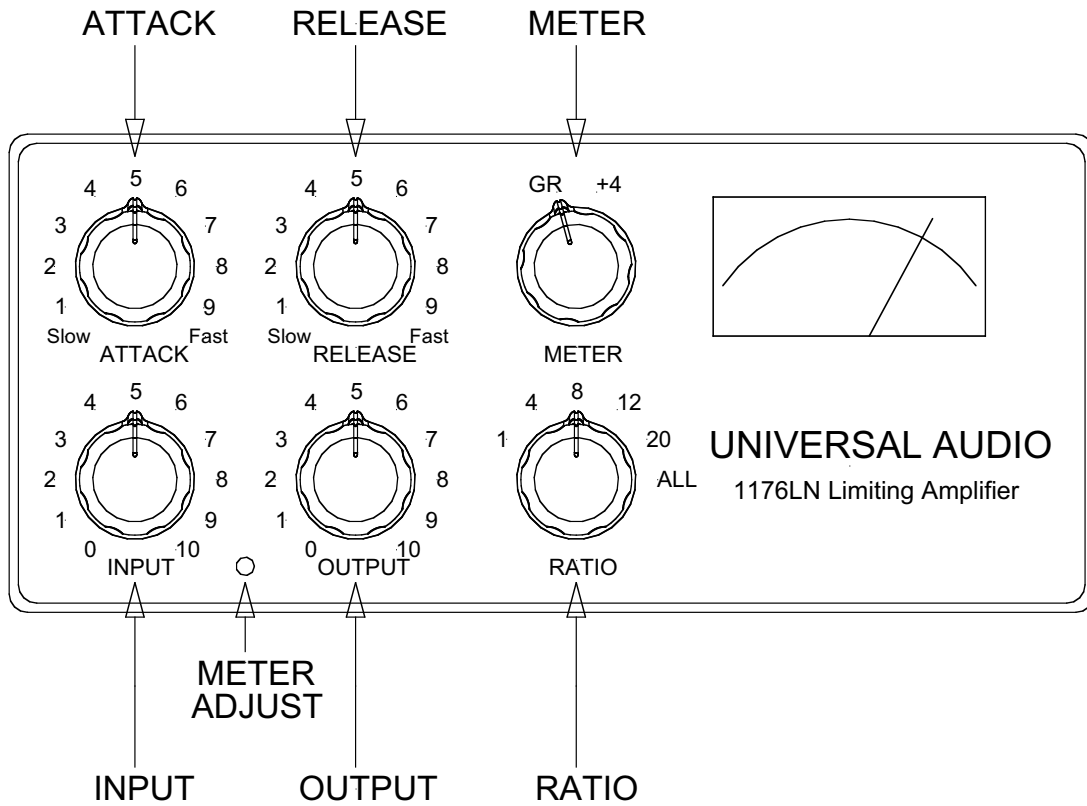


Figure 1: 1176LN Front Panel

Input

The 1176LN Input control determines when the compressor receives a signal “loud” enough to trigger gain reduction as well as total output level. Higher settings will increase the relative amount of compression.

In order to set the limiter to provide a specific amount of compression, first adjust the Input and Output controls to their full counterclockwise (CCW) position. Set the Attack and Release controls to “5”. Set the Meter switch to GR (Gain Reduction). Rotate the Input Level control CW until the meter bounces down to -3 to -5 dB. Now set the Meter Switch to +4 (output level), turn the Output control CW until the desired output level is achieved. Switch back to GR and fine tune Input and Output controls to achieve optimum compression and output level.

Output

The Output control determines the final output level from the 1176LN. Once the desired amount of limiting is adjusted by setting the Input Control, the Output Control can be used to set the required output level. Setting the meter switch to +4 will allow monitoring of the output level.

Attack

The Attack control adjusts the time it takes the limiter to respond to an input signal and initiate gain reduction. The Attack control allows for an adjustable response time of 20-800 microseconds. The fastest attack time is achieved when the Attack Control is in its full CW position.

Release

The Release control allows for an adjustable release time of 50 to 1100 milliseconds. The fastest release time is achieved when the control is in its full CW position.

Compression Ratio

The Ratio control allows 6 different modes of operation.

1: This position passes signal through the 1176LN with NO GAIN REDUCTION. (This is the same as turning the Attack knob on vintage units full CCW until it clicks OFF). A common use of the 1176 for adding “color” without compression.

4: This position selects a 4:1 compression ratio.

8: This position selects an 8:1 compression ratio.

12: This position selects a 12:1 ratio (mild limiting).

20: This position selects a 20:1 ratio (hard limiting).

All: This position implements the “4 button trick”. This mode increases distortion and the Meter goes wild, often maxing out. This is what happens when all 4 ratio push buttons on a vintage 1176 are pushed in. Also known as “British Mode”.

Meter Function

The VU meter can be used to indicate Gain Reduction (GR) or Output Level (+4). The Meter function is determined by rotating the two position knob to the left of the meter. When GR is selected, the meter reads Gain Reduction level in dB. When +4 is selected, a meter reading of 0 corresponds to an output level of +4 dBm at the associated channel output connector.

Meter Calibration

The 0dB gain reduction reading may need to be calibrated.

- 1) Turn the 2-1176 on and warm up for 5 minutes.
- 2) Set the meter knob to the GR position.
- 3) With the Input control full off (CCW) adjust the GR Zero Set trim pot so the meter reads 0 dB. Turn pot slowly and watch how meter settles.
- 4) Each channels GR Zero Set pot is located through a small hole on the front panel between the Input and Output knobs, near the bottom of the black face plate (see drawing on page 5).

2-1176 Center Section

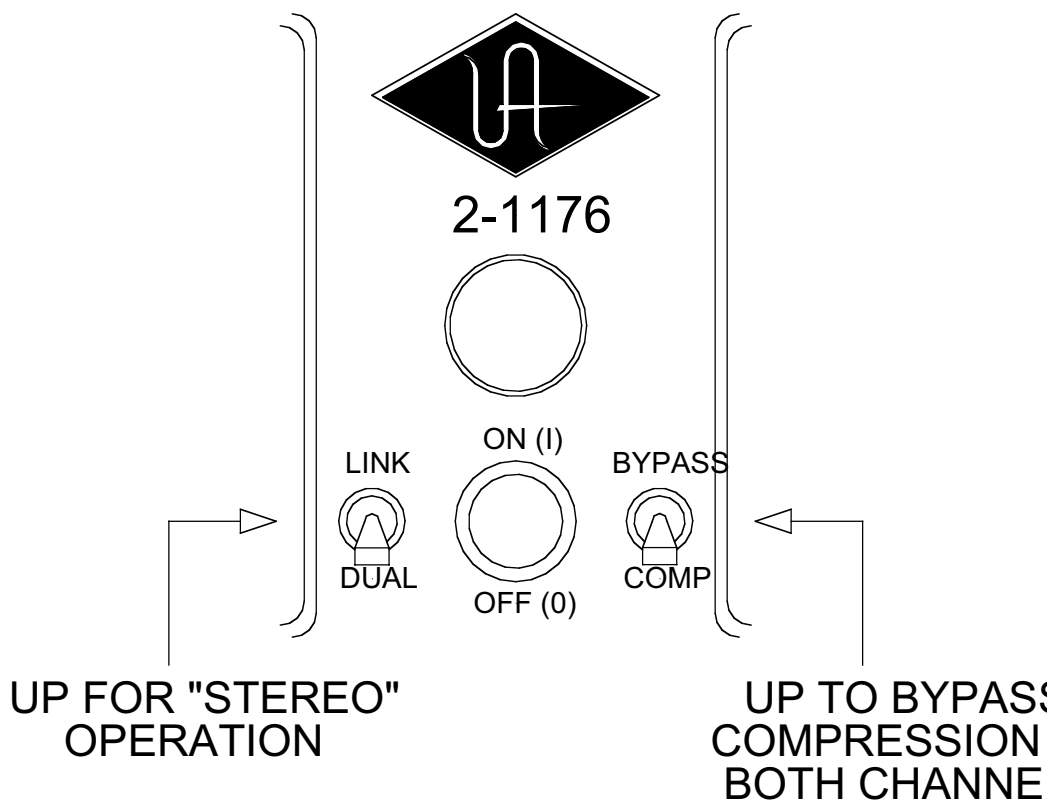


Figure 2: Front Panel center section

Bypass / Comp

The center section toggle switch labeled BYPASS / COMP is a global bypass switch. This switch is just to the right of the center power switch and will put both channel A and channel B in the 1:1 Compression Ratio mode, which disables compression. This switch will always turn compression off on both channels, regardless of the stereo LINK switch setting. Compression is turned off when the switch is up (BYPASS).

Link / Dual

The center section toggle switch labeled LINK / DUAL enables Stereo Link operation. This switch is just to the left of the center power switch. The Link (up) position will cause channel A attack and release knobs to control both channel A and B. When the switch is down (Dual) each channel of the 2-1176 performs as an independent compressor. See Stereo Operation below for more details.

Stereo Operation

When using the 2-1176 for limiting or compressing stereo signals, select LINK on the front panel as described in the paragraph above. The 2-1176 is primarily a dual mono unit but will work for processing stereo. With the Link/Dual switch in the LINK position, channel A Attack and Release controls become master controls and the channel B Attack and Release controls have no effect.

Important Note! Both channels will be “sensed” by the compressors and the gain reduction circuits will act in tandem (stereo action). The channel A “master” Attack and Release controls are simply providing a single set of knobs to adjust the time constants for both channels. This means that both compressors will be effected by peaks, regardless of which channel the peaks occur on. In other words, either channel will “slave” to the other in terms of controlling when compression happens.

2-1176 Rear Panel

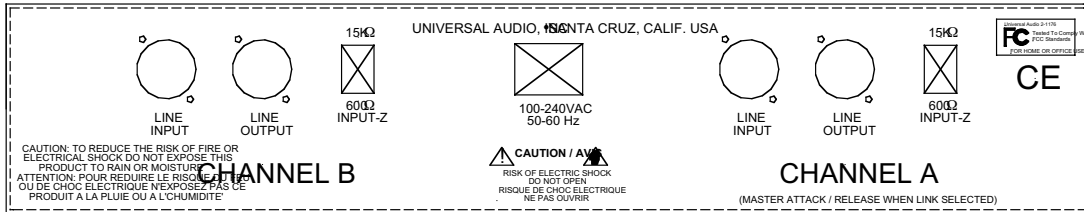


Figure 4: 2-1176 Rear Panel

Input/Output

Standard XLR input and output connectors are provided on the rear panel. Pin 2 is wired positive (hot) on the LINE INPUTS and OUTPUTS.

1176LN Input Loading

The 1176LN Input Loading switch is located to the right of the LINE OUTPUT XLR. This switch will select an input impedance of 600 ohms, typical of older vintage gear, or 15K ohms. Depending on what is feeding the 1176 input XLR, you may perceive a “brighter” tone by using the 15K ohm position.

AC Power

The 2-1176 uses a standard, detachable IEC power cable.

Fuse/Mains

The AC power fuse is on the power supply circuit board inside the 2-1176. The fuse is located directly behind the AC power connector and can be accessed by removing the top panel of the 2-1176. **Remove the power cord before checking or changing the fuse.** Be sure to always use the proper fuse type and value! **T2A 250V, 5mm x 20mm**

Voltage Select

The 2-1176 can operate from 100 V to 240 VAC / 50-60 Hz. The internal power supply is self sensing and will automatically work throughout this voltage range.

History

1176LN

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 600 ohms. 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 600 ohms. These two jobs are accomplished by the primary and secondary windings whose turns' ratio defines the impedance ratio.

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.

Opinion has it that the D and E blackface revisions sound the most "authentic".

Both the 1176 and the LA-2A remain in daily use. Busy engineers and producers' comments about both the 1176 and the LA-2A demonstrate their impact on the industry:

Mike Shipley (Def Leppard, Shania Twain, Blondie): "I grew up using 1176s --- in England they were the compressor of choice. They're especially good for vocals, which is also what I primarily use the LA-2 for. Most anything else I can do without, but I can't be without at least a pair of 1176s and an LA-2A. For example, on the Enrique Iglesias project I'm currently mixing, I'm using both an 1176 and an LA2 on his voice, which is not unusual for me.

"The 1176 absolutely adds a bright character to a sound, and you can set the attack so it's got a nice bite to it. I usually use them on four to one, with quite a lot of gain reduction. I like how variable the attack and release is; there's a sound on the attack and release which I don't think you can get with any other compressor. I listen for how it affects the vocal, and depending on the song I set the attack or release--faster attack if I want a bit more bite. My preference is for the black face model, the 4000 series--I think the top end is especially clean."

Allen Sides has always been known for his golden ears when it comes to the sound of equipment. The owner of Ocean Way Studios in Los Angeles and Nashville, he's also a speaker designer and engineer who is especially respected for his work with live musicians, including orchestra and string dates. Among his recent credits are work with the Goo Goo Dolls, Alanis Morissette and Green Day. Sides brings his different perspectives into play when he talks about using the 1176.

“The 1176 is standard equipment for my sessions. I just used them last night, as a matter of fact, on a project for singer Lisa Bonet that Rob Cavallo was producing at Ocean Way. We were recording drums and I used them on the left/right overheads as effects limiters. It's something I learned from (engineer) Don Landy, who worked with Randy Newman a lot. I mult the left and right overheads and bring them back on the console, then insert a pair of 1176s into a pair of the mults. Push in 20 to one and four to one simultaneously and it puts the unit into overdrive creating a very impressive sound.”

Murray Allen is a veteran engineer and Director of Post Production for the San Francisco Bay Area company Electronic Arts. He has a fascination for gear both old and new and he explains why he thinks the 1176 has been so popular for so long. “It has a unique sound to it that people like, it's very easy to operate, and it does a great job. You have just two controls relative to the ratio of compression. You have input and output and you have attack and release. That's all there is. It's still my favorite limiter for Fender basses and string basses, because you don't know it's working. It doesn't change the way the bass sounds, it just keeps the level at a more controllable place.”

Mixer Ken Kessie (En Vogue, Tony! Toni! Tone!, Celine Dion) is known for being experimental. “Seems like everybody knows the basic tricks for the 1176,” he says, “But here are two that might be lesser known. If you turn the attack knob fully counterclockwise until it clicks, the 1176 ceases to be a compressor and acts only as an amplifier. Sometimes this is the perfect sound for a vocal. And of course the unit can be overdriven, adding another flavor of distortion in case your plug-ins are maxed out!”

“Then, for that hard-to-tame lead vocalist (the one that backs up from the mic to whisper and leans in for the big ending chorus), try an 1176 followed by a DBX 165. Use the 1176 as a compressor, and the DBX as a peak limiter...it's guaranteed to be smooth as silk.”

Jim Scott shared a Grammy for Best Engineered Album for Tom Petty's Wildflowers. He's also known for his work with Red Hot Chili Peppers, Natalie Merchant and Wilco. “I use 1176s real conservatively and they still do amazing things,” he comments. “I'm always on the four to one button, and the Dr. Pepper--you know, 10 o'clock, 2 o'clock, and it does everything I need. “

“I always use them on vocals. I use them on room mics, on acoustic guitars--sometimes in mixing I'll sneak a little on a snare drum or a separated channel of a snare drum. I'm not one of those guys who leaves it on everything, but I'd have to say I've used an 1176 on everything at one time or another.”

“They have an equalizer kind of effect, adding a coloration that's bright and clear. Not only do they give you a little more impact from the compression, they also sort of clear things up; maybe a little bottom end gets squeezed out or maybe they are just sort of excitingly solid state or whatever they are. The big thing for me is the clarity, and the improvement in the top end.”

“The 1176 has that same kind of phenomenon, where, when you patch something through a Neve equalizer and you don't even engage the EQ, it sounds better. It's just a combination of the amps.”

“I've also used the 1176 as a stereo buss compressor-you just have to be a little bit careful that your mixes don't go one sided. Tom's [Petty's] records have often been mixed through 1176s. I've also done that with LA-2As --they are of course, more inconsistent piece to piece than the 1176s, because of the tubes and the difference in fatigue of the tubes.”

“My big mentors were Andy Johns and Lee DeCarlo and Ron Nevison because they were all Record Plant guys. I learned how to make a rock and roll record from them. Although over the years it's become my own thing, my style still tends to be that Record Plant style, U87s, 1176s, LA-2As, 47 F.E.T.s...it's what I like.”

Producer/Engineer Mike Clink (Guns N' Roses, Sammy Hagar, Pushmonkey) also comes from the Record Plant school of recording. "I find that I actually use 1176s more now than I ever did," he comments. "I like them because they bring out the brightness and presence of a sound--they give it an energy. It seems like when I'm mixing I end up using an 1176 on the vocals every time. And if I want to compress a room sound I'll take a mono room mic, put an 1176 across it and push in all the buttons."

Bruce Swedien is a master engineer who needs no introduction. He also is a die-hard 1176 fan. “I have two silverface 1176LNs in my rack that Bill Putnam personally picked out for me," he says. "I remember sitting at Bill's place in the Channel Islands, and talking about the 1176 and how I wanted a pair. The next time we went over he'd picked this pair out and they were sitting in his garage waiting for me. I love them on vocals. All of the Michael Jackson and James Ingram vocals that everyone has heard so much were done with at least one of those 1176s. I couldn't part with them for anything. They sound fabulous.”