VERSION 1.0 USER MANUAL

Manual Version 030520

UNIVERSAL AUDIO
analog ears | digital minds

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Notice

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CHAPTER 1

Introduction

Welcome

Thank you for purchasing Universal Audio Plug-Ins for Pro Tools! As a premier manufacturer of high-quality analog processing hardware and a leading developer of advanced DSP modeling technology, Universal Audio is uniquely suited to bring the character and tone of vintage audio hardware to the Pro Tools platform. By modeling not only the frequency response but also the individual components of classic products like the 1176LN and LA-2A compressors, Universal Audio's plugins sound virtually indistinguishable from the original hardware units. If you're working on the Pro Tools platform you owe it to yourself to see just how good plug-ins can sound.

Features

Teletronix LA-2A Leveling Amplifier

- Identical look, controls, and operation of the analog original
- Precision emulation of actual circuitry and sonic performance
- Lag-free, distortion-free optical attenuator emulation
- Frequency-dependent compression behaviour
- Input gain and peak reduction controls
- Limit/compress function switch
- +4, -10, and gain reduction metering
- Full automation capabilities
- 0 to 40 dB gain limiting
- Mono or Stereo operation

1176LN Limiting Amplifier

- Modeled after 1176LN (blackface, versions D and E)
- Precision emulation of actual circuitry and sonic performance
- Unique, analog-friendly, "warm" characteristics
- Ultra-fast attack, FET gain reduction emulation
- Precisely modeled unique program-dependent release
- Adjustable program-dependent compression behaviour
- Characteristic warm analog feel accurately captured
- Input & Output gain adjustment controls
- Adjustable Attack and Release controls
- Compression ratios of 4:1 8:1, 12:1, 20:1
- Popular "All Buttons Mode" supported
- Custom output transformer emulation design
- Flexible VU metering modes
- Full automation capabilities
- Attack time: 20 microseconds to 800 microseconds
- Release time: 50 milliseconds to 1.1 second
- Mono or Stereo operation

1176SE Limiting Amplifier

- “Special Edition” compressor derived from UA 1176LN
- Optimized for efficient DSP usage

System Requirements

System requirements for UA Plug-Ins for Pro Tools are the same as the requirements of the host system that they run within, plus the iLock hardware dongle.

- Digidesign Pro Tools|24 MIX or higher system, including MIX, MIXplus, MIX^3, HD 1, HD 2, or HD 3
- Pro Tools software version 5 or higher
- Mac OS 9.x or Mac OS X 10.2 or higher
- iLok USB hardware dongle (not included)
- CD-ROM drive for software installation
- 20 MB of available disk space

Manual Conventions

This manual assumes you are already familiar with operation of the Macintosh computer and the Pro Tools host system. Refer to the Pro Tools documentation for instructions on how to use Pro Tools.

CHAPTER 2

Software Installation

ReadMe File

Important, last-minute information not included in this user manual can be found in the ReadMe file that is included on the CD-ROM and also in the software installer. Please review the ReadMe document to ensure you are getting the most up-to-date information.

Software Installers

There are two software installers: One for Mac OS 9, and one for Mac OS X. Use the appropriate installer for the operating system that you are using.

The installer allows you to specify which UA plugins will be installed. If other UA plugins were previously installed, they will be overwritten to ensure that you have the latest versions and associated files.

Figure 1. The UA Plug-Ins for Pro Tools Installers

GUI Library

UA Plug-Ins for Pro Tools require the UAD TDM GUI Library to be properly installed. The UA Plug-Ins and GUI Library versions must match or errors may occur. The GUI Library is automatically placed in the correct location during installation. The GUI Library is a support file only, it does not load during statup. The proper location for this file is:

OS 9

- System Folder:Extensions:UAD TDM GUI Library

OS X

- System:Library:CFMSupport:UAD TDM GUI Library X

Installation Procedure

To install the UA Plug-Ins for Pro Tools software:

1. Quit Pro Tools.
2. Insert the CD-ROM disk into the computer. The disk icon appears on the Desktop.
3. Double-click the disk icon to open the CD window.
4. Double-click the Installer icon for the platform (Mac OS 9 or OS X) you are using (Figure 1 on page 8) to launch the software installer application.
5. The Installer application will guide you through the install process. Be sure to review the ReadMe for important information.
6. In the Custom Install window within the Installer, specify which UA Plug-Ins you want to install.
7. Click Install.
8. Click Quit when finished with installation.
9. Re-launch Pro Tools. The UA plugins are now available for use.

Software installation is now complete. See “Plug-In Authorization” on page 10 **for the authorization procedure.**

Software Removal

To remove the UA Plug-Ins for Pro Tools software:

1. Quit Pro Tools.
2. Insert the CD-ROM disk. The disk icon appears on the Desktop.
3. Double-click the disk icon to open the CD window.
4. Double-click the Installer icon for the platform (Mac OS 9 or OS X) you are using (Figure 1 on page 8) to launch the software installer application.
5. When you get to the Custom Install window, select “Uninstall” from the pull-down menu at the upper left of the installer window.
6. Click the Uninstall button. The software components are deleted.

Software removal is now complete.

Plug-In Authorization

UA Plug-Ins for Pro Tools use iLok™ technology for copy protection. To enable the plugins, the iLok hardware dongle is required. It is available at many on-line retailers. Please visit www.iLok.com or www.uaudio.com/iLok for information on where to purchase the iLok. The iLok requires a free USB port.

The UA Plug-Ins package includes a hardware license card that is used to authorize the iLok. There is one authorization per license card.

Important: *The authorization cannot be transferred back to the license card, so make sure the iLok you are authorizing is the correct dongle.*

To complete the authorization process, the Pace Interlock extensions must be installed. The authorization software will attempt to connect to the internet to download them if they are not already installed. They can be acquired at www.paceap.com.

To authorize UA Plug-Ins:

Important: *Do not click outside of the iLok authorization window during the installation process.*

1. After completing the UA Plug-Ins installation procedure (see "Installation Procedure" on page 9), launch Pro Tools.
2. When Pro Tools loads an unauthorized UA plugin, a window appears providing the option to Try, Buy, or Quit. Clicking Try asks for a demo authorization, and Buy asks for a full authorization. Quit will not ask for authorization or launch the plugin.
3. Click Buy. The next screen that informs you that an iLok and license card is required. Important: Do not click outside of the iLok authorization window during the installation process.
4. Click Next.
5. Detach the small license card from the larger plastic card. Carefully break the tabs on each side of the card, then rock the card back and forth to break it free from the bottom tab. Caution: It is possible to rip the metal traces off the card if not removed correctly!
6. Insert the license card into the iLok. The metal traces must face towards the metal contacts inside the iLok. You can see the contacts through the translucent plastic. **Important**: The authorization cannot be transferred back to the license card, so make sure the iLok you are authorizing is the correct dongle.
7. The authorization is transferred from the license card into the iLok, and the authorization window updates to show that the authorization is complete.
8. Click the Finish button.

Plug-In authorization is now complete.

iLok Registration

We highly recommend registering your iLok at www.iLok.com. If you have any problems such as damage to the iLok or the iLok has stopped working, iLok.com will have a record of what plugins are authorized on your iLok. Repair or replacement will be much faster, but ONLY if you register. If you have any other iLok-related questions, please see the FAQ at iLok.com for up-to-date information.

For more information and details about Universal Audio-specific iLok policy, please visit www.uaudio.com/iLok. For technical support, call 831-466-3737 or email tdmsupport@uaudio.com.

CHAPTER 3

Using UA Plug-Ins for Pro Tools

Overview

Once the UA Plug-Ins for Pro Tools have been properly installed and authorized, the plugins are accessed and used just like any Pro Tools plugin. All UA Plug-Ins for Pro Tools can run concurrently with each other in any combination.

All UA Plug-Ins for Pro Tools support 24-bit resolution at sample rates up to 192kHz.

Adjusting Parameters

The parameter settings for each of the UA Plug-Ins can be adjusted to achieve a desired effect. Parameter values are easily modified by dragging sliders, rotating knobs, clicking switches and buttons, or by selecting values in a pop-up menu. The function of all parameters are detailed in later chapters.

UA Plug-Ins for Pro Tools control knobs operate in “relative circular” mode. In relative circular mode, the knob value does not jump to the mouse position when clicked. Instead, the knob value is modified relative to its original value.

With this method you can click anywhere on the knob to make an adjustment originating at the original value. You don’t have to click on the current knob position.

Note: *To increase resolution when adjusting rotary controls, increase the radius of the mouse relative to the knob while dragging (i.e. move the mouse farther away from the knob while dragging).*

Text Entry

Parameter values can be modified directly with text entry. To enter a parameter value using text entry, single-click the parameter value text. The text value will highlight indicating it is ready to receive a new value. Type in a new value, then press Return, Enter, or Tab, or click outside of the text box. Press Esc if you want to revert to the prior setting without entering the new value.

Values entered via text entry are rounded to the closest significant digit. If an entered value is out of range, it will be ignored.

Shortcuts

Table 1 on page 13 lists keyboard shortcuts that are available for modifying parameter values. When using keyboard shortcuts, the last edited control will be modified.

Table 1. Keyboard shortcuts

Keyboard Action:	**Result:**
Shift + Click parameter	Select parameter for keyboard control (without changing its value)
Command + Click	Fine Control
Shift + UpArrow (or RightArrow)	Increment Fine
Shift + DownArrow (or LeftArrow)	Decrement Fine
Option + Click parameter	Toggle initial editor setting
Option + Shift + Click parameter	Revert to initial editor setting

Automation

Every UA TDM Plug-In parameter can be automated. Consult the Pro Tools documentation for specific instructions on using automation.

Launching a UA Plug-In

Consult the Pro Tools documentation for specific instructions on loading and using plugins with the application.

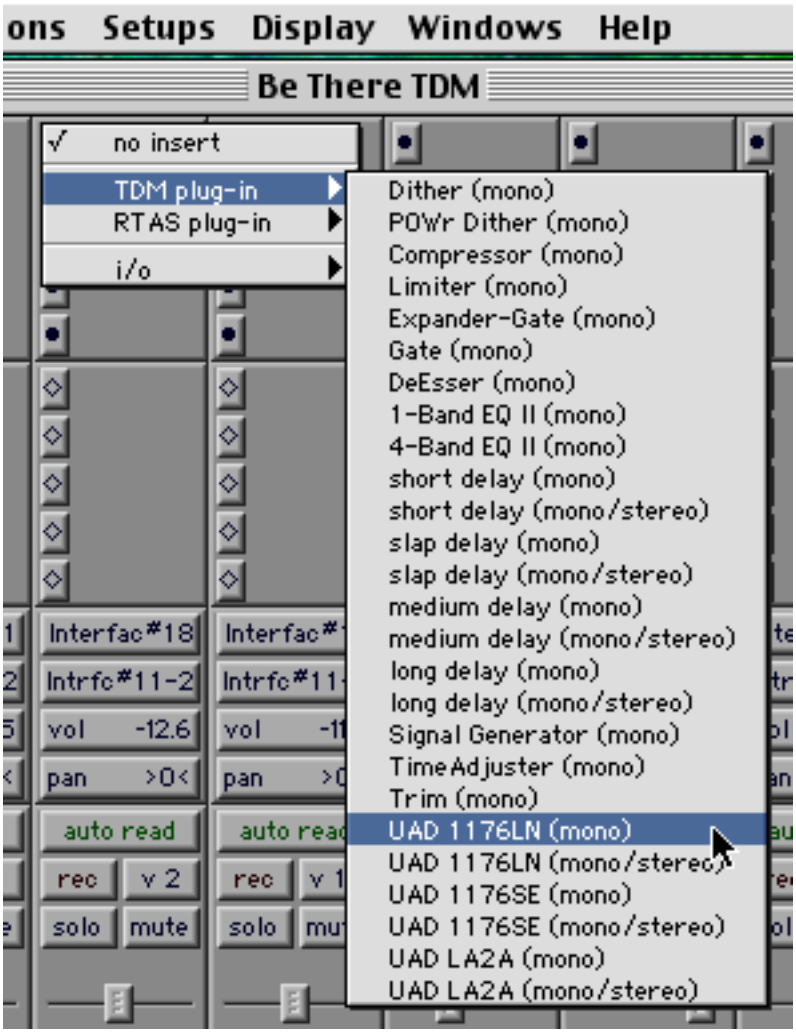

Figure 2. Launching a UA TDM Plug-In

Instance Counts

The table below lists the per-chip instance counts for UA Plug-Ins within Pro Tools TDM systems.

There is no CPU load difference between mono and stereo.

Table 2. Plugin Instance Counts

	Pro Tools Mix	**Pro Tools HD**
	@ 44.1kHz & 48kHz	
LA2A	3	4
1176SE	5	6
1176LN	1	1
	@ 88.2kHz & 96kHz	
LA2A	N/A	2
1176SE	N/A	3
1176LN	N/A	N/A
	@ 176.4kHz & 192kHz	
LA2A	N/A	1
1176SE	N/A	1
1176LN	N/A	N/A

CHAPTER 4

Vintage Compressors

Overview

The LA-2A and 1176LN 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. 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; older devices such as the 1176LN 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.

Compressor Basics

Before discussing the LA-2A and 1176LN plugins, this section will cover some compressor basics. A *compressor* automatically adjusts the gain of a signal by a predetermined ratio. 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.

Figure 3 depicts the input and output characteristics of a compressor and perfect amplifier. When operated within its specified range, an amplifier provides a constant amount of gain regardless of the input signal level. In Figure 3, the signal level of a perfect amplifier is represented with a constant

output gain of 10 dB. In this example, a signal with an input level of –30 dB results in an output level of –20 dB, which is an increase of 10 dB. Similarly, an input level of 0 dB results in an output level of 10 dB (the gain stays fixed at 10 dB regardless of the input level).

In contrast to an amplifier, whose function is to present a constant gain, a compressor varies its gain in response to the level of the input signal. Large input signals result in less gain, thus reducing or *compressing* the dynamic range of the signal. In Figure 3, a compressed signal with an input level of –30 dB results in an output level of –20 dB, indicating a gain of

10 dB. However, with input levels of –20 dB and –10 dB, the compressor exhibits gains of 5 dB and 0 dB (respectively), thereby illustrating that the gain decreases as the input signal increases. This increase in output level by 5 db for every 10 dB is defined as a compression ratio of 2:1 (reduced from 10:5).

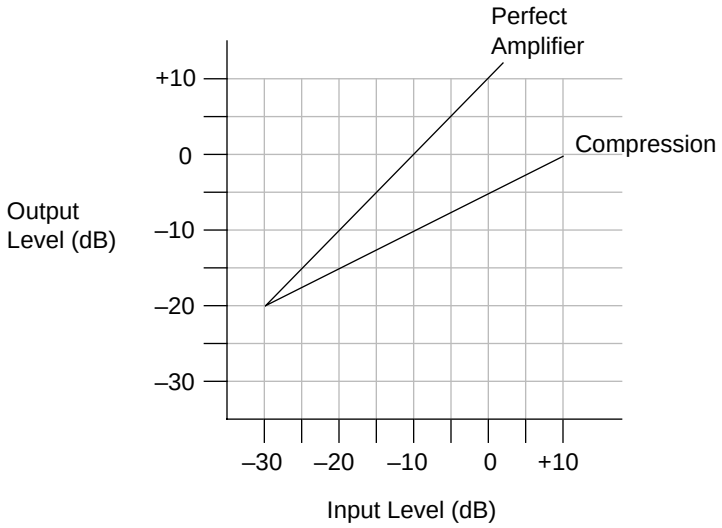

Figure 3. Input and output characteristics of a compressor and perfect amplifier

The amount of compression, or gain reduction, typically expressed in decibels (dB), is defined as the amount by which the signal level is reduced by the compressor. Graphically, this can be represented (see Figure 4) by the difference in output levels between the original signal (without compression) and the compressed signal. The LA-2A and 1176LN display this value when their VU Meters are set to Gain Reduction.

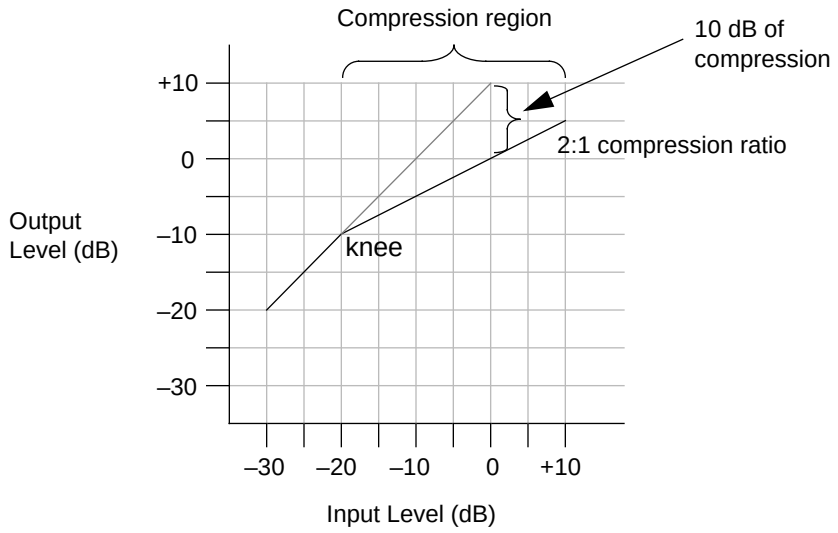

Figure 4. Input and output curve of compressor with 2:1 ratio and –20 dB threshold

As mentioned previously, the compression ratio is defined as the ratio of the increase of the level of the input signal to the increase in the level of the output signal. In Figure 4, the input level is increased by 10 dB while the output level increases 5 dB. This is a compression ratio of 2:1. Lower compression ratios such as 2:1 result in mild compression. A compression ratio of 1:1 yields no compression.

Note: *Compression ratios above 10:1 are commonly referred to as "limiting" or "peak-limiting," where amplitude peaks are reduced.*

Compressors often let you set a threshold, the point at which gain reduction starts to take place. When the level of an audio signal is below this threshold there is no gain reduction. As the level of the signal increases above the threshold level, gain reduction and compression occurs. The point at which a signal transitions into compression is commonly referred to as the *knee*. In practical compressors, this transition is more gentle than what is depicted in Figure 4.

Most modern compressors provide a control that adjusts the threshold directly. In the case of the LA-2A, the Peak Reduction control adjusts both the threshold and the amount of gain reduction. Similarly, the 1176LN uses its Input control to adjust the threshold and amount of gain reduction.

Teletronix LA-2A Leveling Amplifier

Background

Audio professionals passionate about their compressors revere the LA-2A. The original was immediately acknowledged for its natural compression characteristics. A unique electro-optical attenuator system allows instantaneous gain reduction with no increase in harmonic distortion – an accomplishment at the time, still appreciated today.

The LA-2A is known for adding warmth (such as for vocals, guitar, or synths) and fatness (such as for drums or bass) to signals.

LA-2A Signal Flow

A functional block diagram of the LA-2A Leveling Amplifier is provided in Figure 5. The input transformer provides isolation and impedance matching. After this the signal is fed into both the side-chain circuit and the gain reduction circuit. The side-chain is comprised of a voltage amplifier, a pre-emphasis filter, and a driver stage that provides the voltage necessary to drive the electro-luminescent panel. This signal controls the gain of the compressor. After the gain reduction circuit, the signal is sent through an Output Gain control and a two-stage output amplifier, followed by the output transformer.

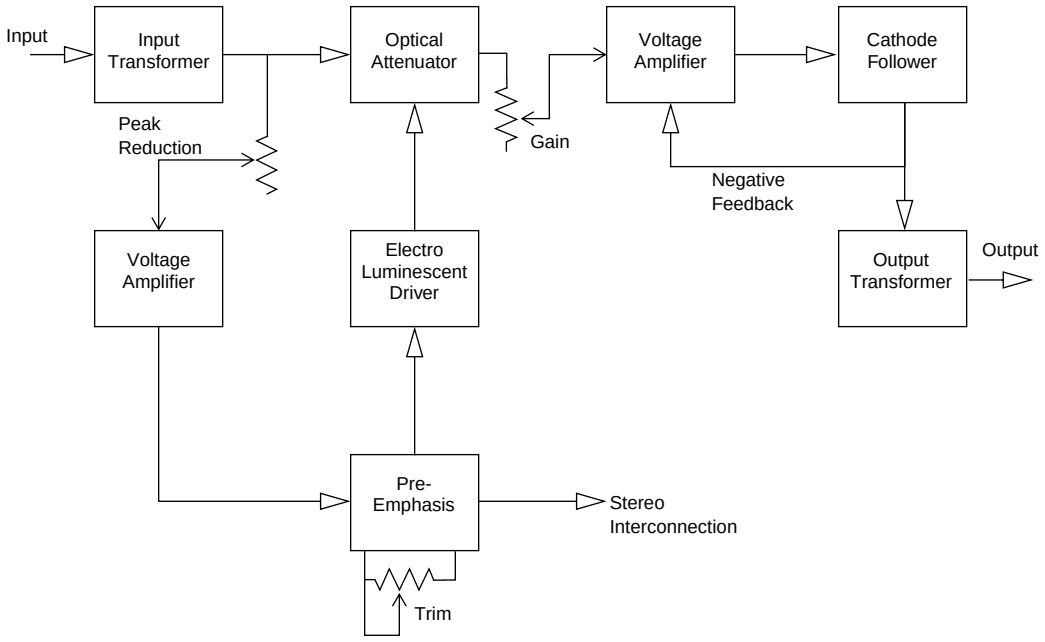

Figure 5. LA-2A signal flow

LA-2A Controls

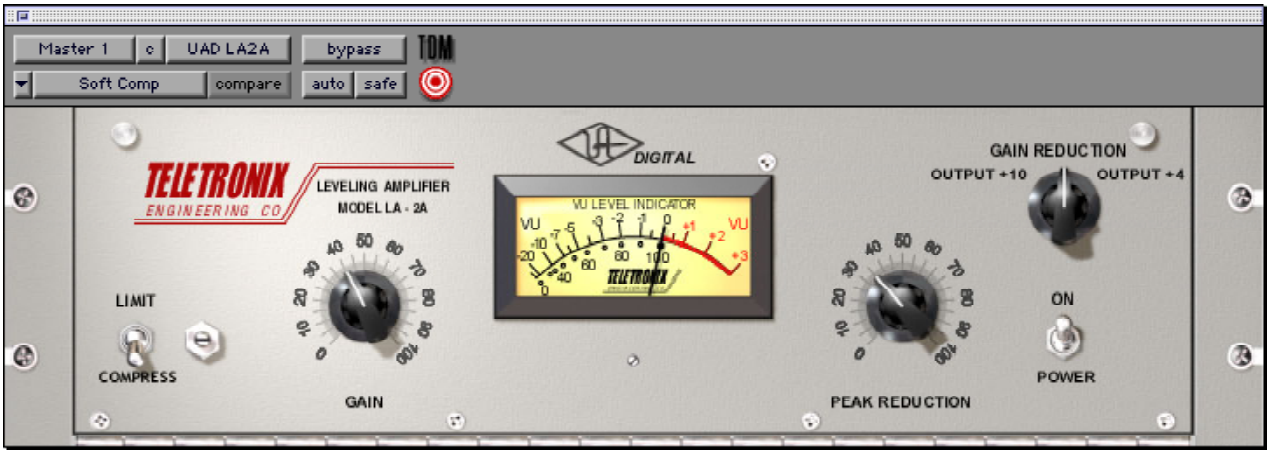

Figure 6. The LA-2A plugin window

Limit / Compress Changes the characteristics of the compressor I/O curve. When set to Compress, the curve is more gentle, and presents a low compression ratio. When set to Limit, a higher compression ratio is used.

Gain Adjusts the output level (by up to 40 dB). Make sure to adjust the Gain control *after* the desired amount of compression is achieved with the Peak Reduction control. The Gain control does not affect the amount of compression.

Peak Reduction Adjusts the amount of gain reduction, as well as the relative threshold. A Peak Reduction value of 0 yields no compression. Rotate this control clockwise until the desired amount of compression is achieved (to monitor the Peak Reduction, set the VU Meter to Gain Reduction). The Peak Reduction should be adjusted independently of the Gain control.

Meter This knob (in the upper right) sets the mode of the VU Meter. When set to Gain Reduction, the VU Meter indicates the Gain Reduction level in dB. When set to +10 or +4, the VU Meter indicates the output level in dB.

On / Power Switch Determines whether the LA-2A plugin is active. When the Power switch is in the Off position, the plugin is disabled and DSP usage is reduced.

Stereo Operation Phase-coherent stereo imaging is maintained when the LA-2A plugin is used on a stereo signal.

1176LN Solid-State Limiting Amplifier

The 1176LN is known for bringing out the presence and color of audio signals, adding brightness and clarity to vocals, and “bite” to drums and guitar.

1176LN Signal Flow

A functional block diagram of the 1176LN Limiting Amplifier is provided in Figure 7. Signal limiting and compression is performed by the Gain Reduction section. Before the signal is applied to the Gain Reduction section, the audio signal is attenuated by the Input stage. The amount of attenuation is controlled by the input control potentiometer. The amount of gain reduction as well as the compressor Attack and Release times are controlled by Gain Reduction Control circuit. After Gain Reduction a pre-amp is use to increase the signal level. The Output Control potentiometer is then used to control the amount of drive that is applied to the output amplifier. The 1176LN is a feedback style compressor since the signal level is sensed after the gain reduction is applied to the signal.

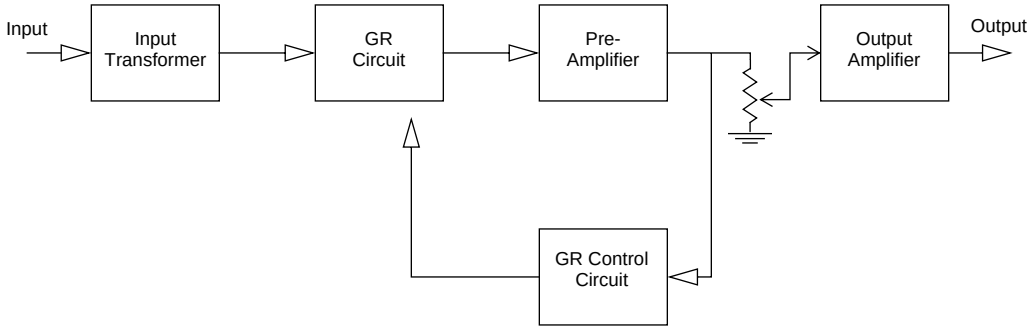

Figure 7. 1176LN signal flow

1176LN Controls

Figure 8. The 1176LN plugin window

Input Adjusts the amount of gain reduction as well as the relative threshold. An Input value of ∞ (turned fully counterclockwise) yields no compression (and no signal level). Rotate this control clockwise to increase the amount of compression.

Output Adjusts the output level (by up to 45 dB). Make sure to adjust the Output control *after* the desired amount of compression is achieved with the Input and Attack controls. To monitor the Output level, set the VU Meter to +8 or +4. The Output control does not affect the amount of compression.

Attack Sets the amount of time (from 20–800 microseconds) that must elapse once the input signal reaches the Threshold level before compression is applied. Faster attack times are achieved by rotating the Attack control clockwise. The faster the Attack, the more rapidly compression is applied to signals above the threshold.

Release Sets the amount of time (from 50–1100 msec.) it takes for compression to cease once the input signal drops below the threshold level. Faster release times are achieved by rotating the Release control clockwise. Slower release times can smooth the transition that occurs when the signal dips below the threshold, especially useful for material with frequent peaks. However, if you set too large of a Release time, compression for sections of audio with loud signals may extend to lengthy sections of audio with lower signals.

Ratio These four pushbutton switches (to the left of the VU Meter) determine the compression ratio. Ratios of 20:1, 12:1, 8:1, and 4:1 are provided. The 20:1 and 12:1 settings are typically used when peak-limiting is desired, while the 4:1 and 8:1 settings are used for general dynamic range compression.

All Buttons mode

Just like the hardware version of the 1176LN, it is possible to depress all the Ratio buttons simultaneously, a well-known studio trick.

In this mode, the ratio is around 12:1, and the release happens faster, and the shape of the release curve changes. With lower amounts of compression, the attack is delayed slightly, as there is a slight lag before the attack attenuated the signal. That attack value remains at whatever the value is on the Attack control.

To enter All Button Mode

Shift-click any of the Ratio buttons. All of the buttons will appear depressed.

To exit All Button Mode

Click any Ratio button without the shift key modifier.

Grit

One trick you can do with the 1176 is turning the attack and release up all the way to their fastest setting. This has the audible effect of adding distortion to the audio source, and is especially pronounced in all-buttons mode. What happens here is the attack and release are happening so fast that minute level fluctuations sound like distortion. It can add a very useful, gritty compression effect.

This effect is useful on bass, where you might need compression and distortion at the same time, and the 1176 can provide both in a unique way. This trick also sounds great on screaming lead vocals. And yes, the hardware does this too!

Meter

These four pushbutton switches (to the right of the VU Meter) determine the mode of the VU Meter, and whether the plugin is enabled. When set to GR, the VU Meter indicates the Gain Reduction level in dB. When set to +8 or +4, the VU Meter indicates the output level in dB; when set to +4, a meter reading of 0 corresponds to an output level of +4 dB.

In gain reduction mode with all buttons depressed, the VU meter will appear to behave strangely. This is normal behavior in the hardware 1176LN, and is faithfully recreated in the plugin.

When the Meter Off switch is selected, the 1176LN plugin is disabled and DSP usage is reduced.

Stereo Operation

Phase-coherent stereo imaging is maintained when the 1176LN plugin is used on a stereo signal.

1176SE “Special Edition”

Figure 9. The 1176SE plugin window

Overview

The 1176SE is derived from the 1176LN. Its algorithm has been revised in order to provide sonic characteristics similar to the 1176LN but with significantly less DSP usage. It is provided to allow “1176LN-like sound” when DSP resources are limited.

The 1176SE behavior is practically identical to the 1176LN. Its sound is nearly identical too, but certain compromises had to be made in order to squeeze the extra DSP performance that the 1176SE provides. At nominal settings the sonic difference is negligable. At extreme (cranked) settings, nobody with “golden ears” will say it sounds exactly like the 1176LN, but it still sounds great and is very usable in most situations.

1176SE Controls

The 1176SE controls are exactly the same as the 1176LN. Please refer to the the 1176LN section for 1176SE control descriptions (see “1176LN Controls” on page 22).

CHAPTER 5

History

LA-2A

The LA-2A leveling amplifier, a tube unit with hand wired components and three simple controls, was introduced in the mid-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, a balanced stereo interconnection, flat frequency response of 0.1 dB from 30-15,000Hz 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 Corporation. in 1965. In 1967 Babcock's broadcast division was acquired by the legendary 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.

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. Legend has it that the D and E blackface revisions sound the most “authentic”.

The original Universal Audio 1176LN designed by Bill Putnam 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.

Thank You

We would like to thank you again for becoming a Universal Audio customer. We urge you to fill out your registration card and send it back to us as soon as possible so we can keep you informed about new UA TDM Plug-In products that we will be releasing in the months to come.

We always like to hear from our customers and welcome your comments and suggestions. If you have any questions you can email us at:

tdmsupport@uaudio.com

In case your audio toolbox needs might include hardware such our UA Classics series please be sure to have a look at our web site for more information about the entire UA family of products at:

http://www.uaudio.com

The Universal Audio Team

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