Portico 5045

Primary Source Enhancer

By: RUPERT NEVE DESIGNS

Serial #: ☐☐☐☐☐☐

Operations Manual

Portico 5045: Primary Source Enhancer

Thank you for your purchase of the 5045 Primary Source Enhancer. Everyone at Rupert Neve Designs hope you enjoy using this tool as much as we have enjoyed designing and building it. Please take note of the following list of safety concerns and power requirements before the use of this or any Portico Series product.

Safety Instructions

1) Read these instructions.
2) Keep these instructions.
3) Heed all warnings.
4) Follow all instructions.
5) Do not use this apparatus near water.
6) Clean only with dry cloth.
7) Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
8) Do not install near any heat source such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9) Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10) Protect the power cord from being walked on or pinched, particularly at plugs convenience receptacles and the point where they exit from the apparatus.
11) Only use attachments/accessories specified by the manufacturer.
12) Unplug this apparatus during lightning storms or when unused for long periods of time.
13) Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as when power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
14) Do not expose this apparatus to rain or moisture.
15) The apparatus shall be connected to a mains socket outlet with a protective earthing connection.

Consignes de sécurité

1) Lisez ces instructions.
2) Conservez ces instructions.
3) Respectez tous les avertissements.
4) Suivez toutes les instructions.
5) Ne pas utiliser cet appareil près de l'eau.
6) Nettoyer seulement avec un chiffon sec.
7) Ne pas bloquer les ouvertures de ventilation. Installez-le dans Installer accord en conformité avec les instructions du fabricant.
8) Ne pas installer près d'une source de chaleur comme les radiateurs, registres de chaleur, poêles ou autres appareils (y compris les amplificateurs) qui produisent de la chaleur.
9) Ne supprimez jamais la sécurité de la fiche polarisée ou de type. Une fiche polarisée possède deux lames dont l'une est plus large que l'autre. Une fiche de terre comporte deux lames et une broche de terre. La lame large ou la troisième broche sont fournies pour votre sécurité. Si la fiche fournie ne rentre pas dans votre prise, consultez un électricien pour remplacer la prise obsolète.
10) Protégez le cordon d'alimentation ne soit piétiné ou pincé, particulièrement au réceptacles

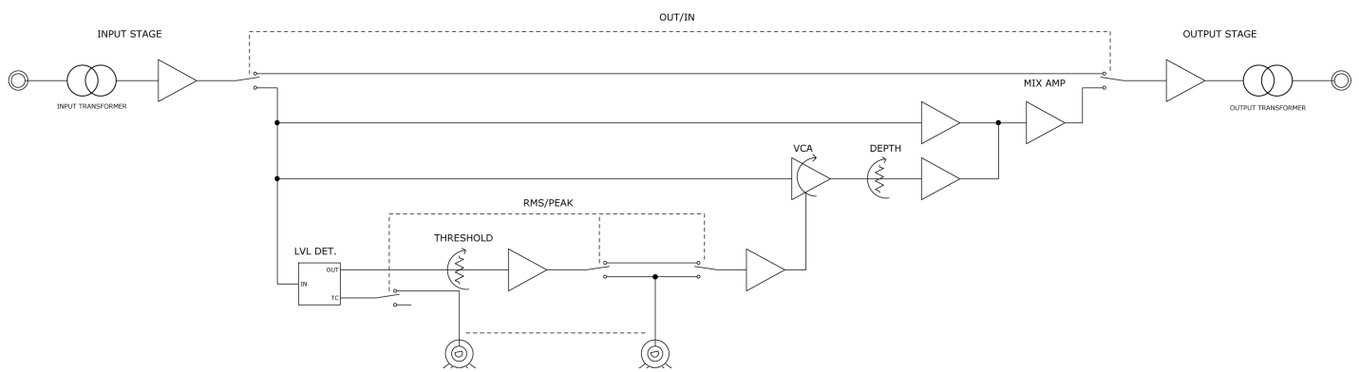
bouchons et le point où ils sortent de l'appareil.
11) N'utilisez que des fixations / accessoires spécifiés par le fabricant.
12) Débranchez cet appareil pendant les orages ou si inutilisé pendant de longues périodes de temps.
13) Confier toute réparation à un personnel qualifié. Une réparation est nécessaire lorsque l'appareil a été endommagé de quelque façon, par exemple lorsque le cordon d'alimentation ou la fiche est endommagé, liquide a été renversé ou des objets sont tombés dans l'appareil, l'appareil a été exposé à la pluie ou l'humidité, ne fonctionne pas normalement, ou s'il est tombé.
14) Ne pas exposer cet appareil à la pluie ou l'humidité.
15) L'appareil doit être raccordé à une prise secteur avec une prise de terre.

Power Requirements

The Portico 5045 dissipates about 15 watts, which means that it will get warm in use. Each Portico 5045 module has an internal high quality DC to DC converter that provides carefully stabilized and filtered +/– 17.5 VDC for the amplifiers. The meticulous audio quality of your Portico is protected by the internal converter and does not depend primarily on the external mains power supply. The input is protected from reverse polarity. The connector center pin must be positive.

One of the advantages of the Po ; that external power units will work from almost any of the ver and frequencies that are found world-wide. While many different types of mains power wall sockets are found in different countries, Portico 5045 module power units leave the factory with standard US power cords. If required, any suitable connecting cord may be substituted that does not defeat the 3rd pin grounding of the AC cord. Avoid using a mains power outlet that is on the same circuit as air conditioning or other equipment that regularly switches on and off. Unplug your Portico power units during a thunder storm or if it will be unused for a long period.

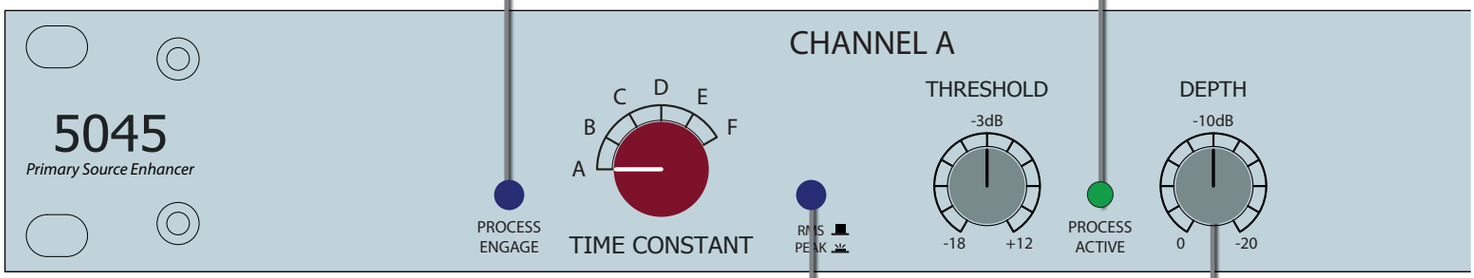
Portico 5045: Block Diagram



Portico 5045: Front Panel

Process Engage
Engages the PSE Circuitry

Process Active
Indicates when the primary source is being enhanced



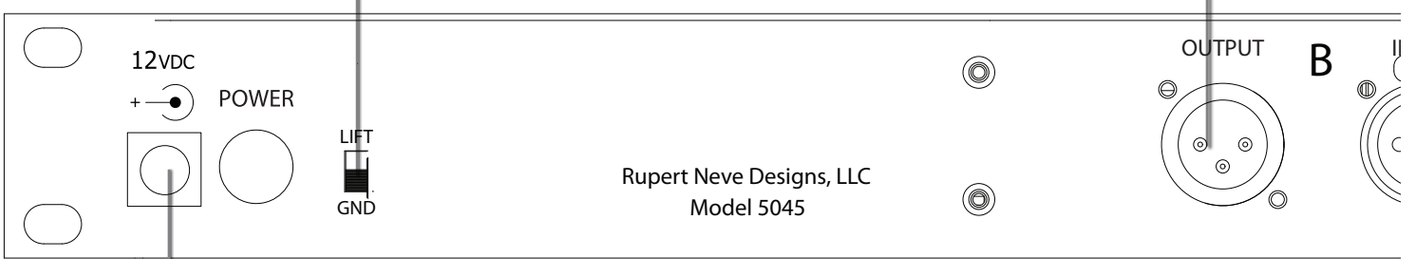
RMS / Peak
Selects between RMS and Peak Detection

Depth
Controls the maximum amount of the effect

Portico 5045: Back Panel

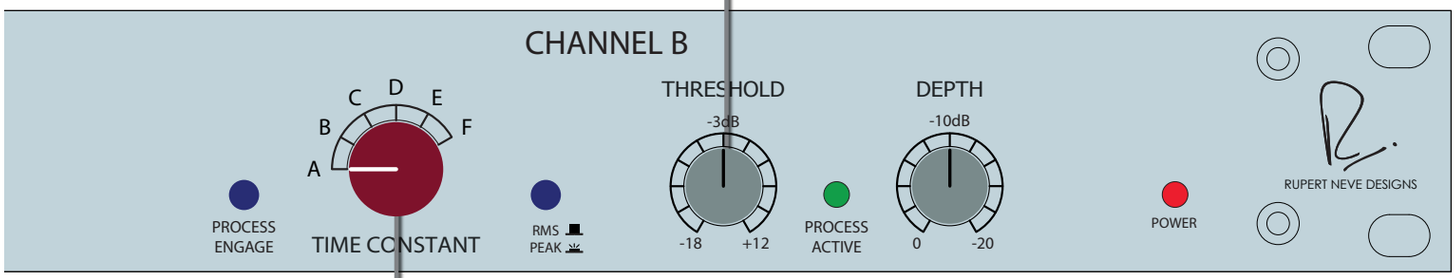
Ground Lift
Lifts the audio ground from the chassis

Line Out
Transformer coupled fully balanced and floating
1=GND 2=Hot 3=Cold



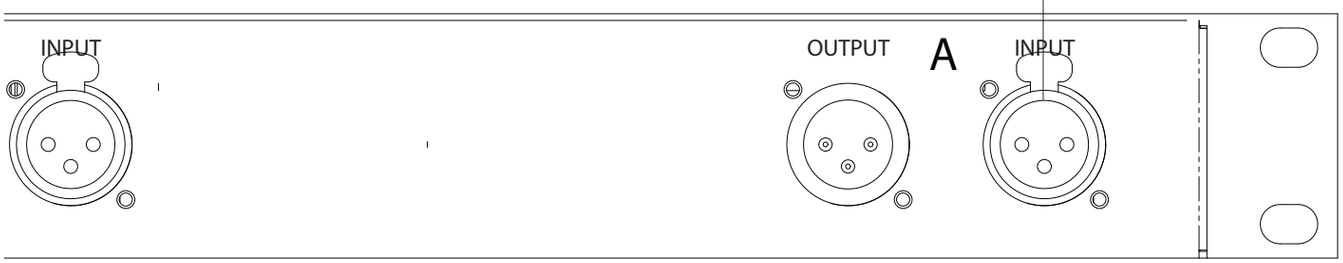
DC Input
12V DC Input
Center Positive

Threshold
Sets the level at
which the PSE activates



Time Constant
Selects the attack
and release time constant

Line Input
Transformer
Balanced, 10K Ohm
1=GND 2=Hot 3=Cold



A NOTE ON DISTORTION

The human hearing system is a remarkably complex mechanism and we seem to be learning more details about its workings all the time. For example, Oohashi demonstrated that arbitrarily filtering out ultrasonic information that is generally considered above our hearing range had a measurable effect on listener's electroencephalo-grams. Kunchur describes several demonstrations that have shown that our hearing is capable of approximately twice the timing resolution than a limit of 20 kHz might imply (F=1/T or T=1/F). His peer reviewed papers demonstrated that we can hear timing resolution at approximately with 5 microsecond resolution (20 kHz implies a 9 microsecond temporal resolution, while a CD at 44.1k sample rate has a best-case temporal resolution of 23 microseconds).

It is also well understood that we can perceive steady tones even when buried under 20 to 30 dB of noise. And we know that most gain stages exhibit rising distortion at higher frequencies, including more IM distortion. One common IM test is to mix 19 kHz and 20 kHz sine waves, send them through a device and then measure how much 1 kHz is generated (20-19=1). All this hints at the importance of maintaining a sufficient bandwidth with minimal phase shift, while at the same time minimizing high frequency artifacts and distortions. All of the above and our experience listening and designing suggest that there are many subtle aspects to hearing that are beyond the realm of simple traditional measurement characterizations.

The way in which an analog amplifier handles very small signals is as important as the way it behaves at high levels. For low distortion, an analog amplifier must have a linear transfer characteristic, in other words, the output signal must be an exact replica of the input signal, differing only in magnitude. The magnitude can be controlled by a gain control or fader (consisting of a high quality variable resistor that, by definition, has a linear transfer characteristic.) A dynamics controller - i.e. a compressor, limiter or expander - is a gain control that can adjust gain of the amplifier very rapidly in response to the fluctuating audio signal, ideally without introducing significant distortion, i.e. it must have a linear transfer characteristic. But, by definition, rapidly changing gain means that a signal "starting out" to be linear and, therefore without distortion, gets changed on the way to produce a different amplitude.

Inevitably our data bank of "natural" sound is built up on the basis of our personal experience and this must surely emphasize the importance of listening to "natural" sound, and high quality musical instruments within acoustic environments that is subjectively pleasing so as to develop keen awareness that will contribute to a reliable data bank. Humans who have not experienced enough "natural" sound may well have a flawed data bank! Quality recording equipment should be capable of retaining "natural" sound and this is indeed the traditional measuring stick. And "creative" musical equipment should provide the tools to manipulate the sound to enhance the emotional appeal of the music without destroying it. Memory and knowledge of real acoustic and musical events may be the biggest tool and advantage any recording engineer may possess.

One needs to be very careful when one hears traces of distortion prior to recording because some flavors of distortion that might seem acceptable (or even stylish) initially, may later prove to cause irreparable damage to parts of the sound (for example, "warm lows" but "harsh sibilance") or in louder or quieter sections of the recording. Experience shows that mic preamps and basic console routing paths should offer supreme fidelity otherwise the engineer has little control or choice of recorded "color" and little recourse to undo after the fact. Devices or circuits that can easily be bypassed are usually better choices when "color" is a consideration and this particularly is an area where one might consider comparing several such devices. Beware that usually deviations from linearity carry at least as much long-term penalty as initial appeal, and that one should always be listening critically when recording and generally

"playing it safe" when introducing effects that cannot be removed.

1. Tsutomu Oohashi, Emi Nishina, Norie Kawai, Yoshitaka Fuwamoto, and Hishi Imai. National Institute of Multimedia Education, Tokyo. "High Frequency Sound Above the Audible Range,Affects Brain Electric Activity and Sound Perception" Paper read at 91st. Convention of the A.E.S.October 1991. Section 7. (1), Conclusion.

2. Miland Kunchur,Depart of Physics and Astronomy, University of South Carolina. "Temporal resolution of hearing probed by bandwidth restriction", M. N. Kunchur, Acta Acustica united with Acustica 94, 594–603 (2008) (http://www.physics.sc.edu/kunchur/Acoustics-papers.htm)

3. Miland Kunchur,Depart of Physics and Astronomy, University of South Carolina.Probing the temporal resolution and bandwidth of human hearing , M. N. Kunchur, Proc. of Meetings on Acoustics (POMA) 2, 050006 (2008)

5045 USER NOTES

The 5045 Primary Source Enhancer is a two channel device that is exceptionally useful for reduce the tendency of feedback ringing and effectively increase the level a microphone can be raised before feedback occurs in a live sound environment. The controls are easy to use and understand and generally require minimum adjustment once set properly.

The 5045 shares some traits with conventional "noise gates" but operates with a different principal involved. One common aspect is that both reduce the gain during the absence of signal, or more specifically, it begins to attenuate when the level of a signal falls below a certain threshold that the operator can set. The 5045 senses when someone is speaking or singing into the mic and allows the signal to pass through, and senses when the person has stopped talking or singing and reduces the gain appropriately, which tends to help reduce the tendency of a system to feedback. Most importantly, the 5045 does not introduce filtering and digital processing to achieve significant benefits.

Operation is simple. The 5045 accepts line level signal such as the output of a microphone preamplifier or the "Insert" send of a console. The 5045 outputs are also line level that typically feed a console line input or "Insert" return. Because the 5045 uses transformer coupled inputs and outputs it easily connects to virtually any combination of balanced or unbalanced inputs and outputs provided you have commonly available appropriate adapters.

Once the 5045 is connected and power turned on the next steps are relatively simple. A good safe initial starting point is; "PROCESS ENGAGE" not pressed, "TIME CONSTANT" set to C or D, "RMS/PEAK" button not pressed (RMS mode), "THRESHOLD" all the way down or -18, and the "DEPTH" also all the way down at 0.

Now, have someone talk or sing into the microphone and press the "PROCESS ENGAGE" button and if the 5045 is connected properly there should be no change in level. As the person is talking or singing, adjust the "THRESHOLD" so that the green "PROCESS ACTIVE" LED glows solidly when they talk and dims when they stop talking (for example between sentences). Gently increase the "DEPTH" knob to about -10 dB as a starting point.

If the sound system was previously on the edge of feeding back, the above procedure should have helped. If the system volume was set low to "play it safe" and well under the feedback zone, as you learn the new box, you can try increasing the volume of the channel slowly and adjusting the "DEPTH" to achieve more volume before feedback sets in. The 5045 will not eliminate the chance of feedback given enough volume, but is generally effective at allowing both increased levels along with less chance

of annoying feedback.

5045 FEATURES

THE LINE OUTPUTS

The main output signal comes from the output transformer secondary which is balanced and ground free. A ground free connection guarantees freedom from hum and radio frequency interference when connected to a balanced destination such as the input to a mixer. However, the transformer may be used with one leg grounded without any change in performance. It is not necessary to "ground" one leg at the Portico output. It would normally get a ground connection when fed to equipment that is not balanced. Maximum output level is + 25 dBu, which provides a large margin over and above the likely maximum requirement of any destination equipment to which the 5045 is connected.

DEPTH

Sets how much attenuation is applied after the signal falls below where the "THRESHOLD" is set. "0" implies zero attenuation and the 5045 won't effect the signal gain. -10 dB is moderate attenuation and reasonably safe from accidentally chopping off a word or part of a word. -20 dB attenuates deeper, but it can audibly cut off words with certain sources. In fact, setting up the 5045 so that it does not chop off bits of quietly spoken words while fighting a difficult feedback problem can be a challenge sometimes, especially with singers that sing quietly one moment and loudly the next while demanding loud monitors.

THRESHOLD

Everything else being equal, typically louder voices (or hotter signal levels) will be associated with higher "THRESHOLD" settings or more clockwise settings than quieter voices that may require "THRESHOLD" relatively more anti-clockwise. In either case, the key thing to watch is the "PROCESS ACTIVE" LED that should always be lit when the person is talking or singing and the LED should only dim after they stop vocalizing. Adjust the "THRESHOLD" accordingly.

TIME CONSTANT

Sets how quickly the attenuation occurs in the quiet sections between words or sentences. "A" is the fastest and "F" is the slowest. "A" will quickly soften the level which can be advantageous when the singer is consistent and feedback howl is challenging. "F" is the safest in terms of slowly fading down, but might be a bit slow fading up again, and might be a bit slow for controlling some pesky feedback situations. "C" and "D" are moderate settings that should fit many situations and generally fade down slow enough so that the ends of words are not affected, yet fast enough to control feedback. But one can choose whichever "TIME CONSTANT", "A" through "E" that seems to best fit and not soften the beginnings and endings of phrases, yet diminishes the tendency to feedback.

RMS/PEAK

The "RMS/PEAK" button allows some finessing of the timing of the 5045. With the "PEAK" button pushed in the 5045 tends to return to normal level from attenuation faster. This may help prevent the beginnings of some words from being cut off. It also opens the door for some creative dynamics shaping if one wants to use the 5045 on musical instruments.

SPECIFICATIONS

Threshold:

Continuously variable from -20 to 10dBu.

Depth:
Continuously variable from 0 to 20dBu.

Time Constants:

RMS Mode:

A: 50mS
B: 100mS
C: 200mS
D: 750mS
E: 1.5S
F: 3S
* RMS Mode Time Constant data collected using 10dB bursts.

Peak Mode:

Attack: fixed 20mS

Release:

A: 20mS
B: 200mS
C: 1S
D: 2S
E: 5S
F: 30S

Maximum Output Level: +25dBu

Total Harmonic Distortion and Noise:

@ 1kHz, +20dBu output level, no load
Main Output, feedback suppressor bypassed: Better than 0.002%
Main Output, feedback suppressor engaged: Better than 0.002%

Noise:

Measured @ Main Output, un-weighted, 22Hz-22kHz, 50 ohm terminated input.
Feedback suppressor bypassed Better than -100dBu
Feedback suppressor engaged Better than -95dBu

Frequency Response:

Main Output @ 20Hz -3dB
@150kHz -3dB

Crosstalk

Measured Channel to Channel Better than -80dB @ 16kHz

Power requirements:

12V DC Input
1 Amp

PRODUCT WARRANTY

Rupert Neve Designs and Yamaha Commercial Audio Systems warrants this product to be free from defects in materials and workmanship for a period of one (1) year from date of purchase, and agrees to remedy any defect identified within such one year period by, at our option, repairing or replacing the product.

LIMITATIONS AND EXCLUSIONS

This warranty, and any other express or implied warranty, does not apply to any product which has been improperly installed, subjected to usage for which the product was not designed, misused or abused, damaged during shipping, damaged by any chemicals, or which has been altered or modified in any way. This warranty is extended to the original end user purchaser only. A purchase receipt or other satisfactory proof of date of original purchase is required before any warranty service will be performed. THIS EXPRESS, LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, TO THE EXTEND ALLOWED UNDER APPLICABLE STATE LAW. IN NO EVENT SHALL RUPERT NEVE DESIGNS BE LIABLE FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES RESULTING FROM THE USE OF THIS PRODUCT. Some states do not allow the exclusion or limitation of consequential damages or limitations on how long an implied warranty lasts, so this exclusion may not apply to you.

WARRANTY SERVICE

This Portico 5045 product manufactured by Rupert Neve Designs is distributed by Yamaha Commercial Audio Systems, Inc. Please process all warranty claims through your local Yamaha service facility.

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