RUPERT NEVE DESIGNS

Portico™ 5012

Duo Mic Pre

USER GUIDE

Serial No:

1	2						

IMPORTANT

For your convenience, write your serial number on the box above and keep this guide in a safe place. The number can be found on the bottom of the product and also on the packaging materials.

This number must be quoted in all communications in order to obtain technical support and spare parts from either the factory or your dealer.

Built on cornerstones of tradition
Soaring to transcend the confines of convention

INTRODUCTION

Thank you for your purchase of the 5012 Duo Mic Pre. 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

It's usual to provide a list of "do's and dont's" under this heading but mostly these amount to common sense issues. However here are some reminders:

- The Portico 5012 dissipates about 35 watts, which means that it will get warm in use. The heat generated is radiated through the case work and by convection through the ventilation holes. Therefore the holes should not be covered or blocked. Portico modules may be stacked horizontally on a desk top or vertically in a rack without heat problems. The anti-slip feet may be removed while used in a rack, but should be retained for desktop use. Porticos should not be stacked immediately above or adjacent to other equipment that gets hot. Also bear in mind that other equipment may radiate strong hum fields which could spoil the performance of your Portico module.

- Electronic equipment and liquids are not good friends. If any liquid was spilled such as soda, coffee, alcoholic or other drink, the sugars and acids will have a very detrimental effect. Sugar crystals act like little rectifiers and can produce noise, "crackles" etc. SWITCH OFF IMMEDIATELY because once current starts to flow the mixture hardens, can get very hot (burnt toffee!) and cause permanent and costly damage. Please contact support as soon as possible at support@rupertneve.com for resolution.
- Don't operate a Portico in the rain! If it gets wet and you suspect that good clean water may have got in, Immediately unplug the unit, and remove it from the source of water. Take the cover and knobs off by removing the 2 back-most screws on both sides only. The cover and front panel will now slide forward and free of the unit. Gently wipe off any water that's visible with a soft cloth. Water may have percolated under the PCB and be hidden between the bottom cover and the PCB. Use a hair drier to blow and dry out any residual moisture. leave the unit for a few hours to completely dry out. If the moisture was due to CLEAN water, your Portico should be up and running without any further problem.

- Rear connecting cables can get very untidy when a number of Portico modules are stacked on your bench. It's a good idea to use cable ties to bunch the cords into a tidy form.

- Don't be tempted to operate a Portico with the cover removed. The cover provides magnetic screening from hum and R.F. stray fields.

Power Requirements

Each Portico 5012 module has two built in DC to DC converters that provide +/– 17.5 VDC for the amplifiers and + 48 VDC for microphone Phantom volts. The input is protected from reverse polarity. The connector center pin must be positive.

The converters will work from any DC supply from 9 to 18 volts that is reasonably "clean". Avoid using a Power Outlet on the same circuit as air conditioning or other equipment that regularly switches on and off. Unplug the Portico power unit(s) during a thunder storm or if it will be unused for a long period.

When using a 12 volt battery, choose one that has enough capacity to power your Portico 5012 - or your complete assembly of Portico modules – for the expected duration of your session. For example, a 48 ampere-hour battery will power 8 Portico 5012 modules for 6 hours. *See power requirement on specifications page.

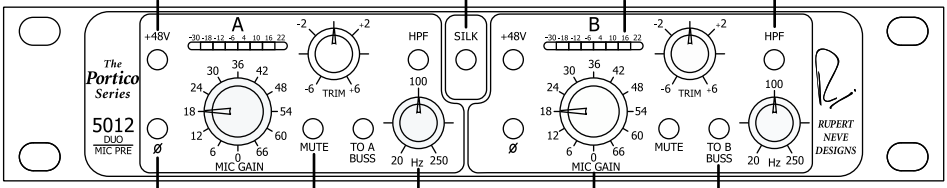
5012 Duo Mic Pre - Front Panel

SILK
Reduces negative feedback and adjusts the frequency spectrum to provide a very sweet and musical performance.

+48V Phantom Power
For appropriate microphones
Warning! *Mute output prior to engaging/disengaging Phantom power*

High Pass Filter
Bypass / Engage

Level Meter
-30 dBu to +22 dBu
With reference to the output



Phase Invert
Flips phase
180 degrees

High Pass Filter
Fully variable from
20Hz to 250Hz

To Buss
Sends signal
To Buss output

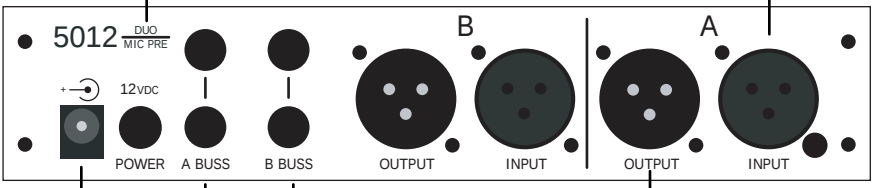
Mute
Main Output Mute
(Meter & Buss feed stay active)

Mic Gain
Precision gain switch
(0 to +66dB in 6dB steps)

5012 Duo Mic Pre - Back Panel

Power Switch
Disconnects supply
from internal power converters

Input
TLA Fully Balanced Input
1 = GND 2 = HOT 3 = COLD

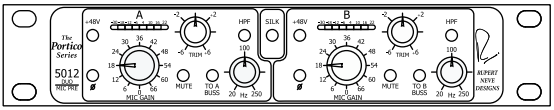


DC input jack
2.1 x 5.5 x 9.5mm
Center Positive

Output
Transformer coupled
Fully balanced and floating
1 = GND 2 = HOT 3 = COLD

Portico™ Bussing System
Connect as many units together as you'd like to create your own mixes using optional bussing modules
Top and bottom rows are normalled together to allow for an IN / OUT / THRU configuration

The PORTICO ™ Series



The new RND "Portico"™ modular preamplifiers and analogue audio processors constitute a range of building blocks that may be used independently or in combination to provide key elements that were traditionally included in large format Sound Control Consoles.

Your 5012 Duo Mic Pre

Microphone Input

The microphone input is balanced but not floating, being a variant of an instrumentation amplifer using a "Transformer-Like-Amplifier" (T.L.A.) configuration with a toroidal Common Mode Rejection Low Pass Filter that excludes frequencies above 150 kHz.

The T.L.A. is followed by an actual input transformer permitting a full +26 dBu input signal to be handled at unity gain without an input pad over the whole audio spectrum.

This combines the advantages of both an "Electronically Balanced" and true Transformer input. When the Phantom voltage is switched off, this input serves as a very high quality Line Input.

A microphone is a voltage generator, not a power amplifier. Most microphones give their most accurate performance when they are not loaded by the input impedance of a traditional preamplifier.

Years ago transformer inputs with tubes were used for microphone preamps. It was convenient to design the input for an impedance of 1,000 0r 1,200 ohms. Some microphones are still designed to work well into a low load impedance. If the microphone has an inductive source (such as would be the case if it has a transformer output) a low input impedance would cause the high frequencies to roll off. This can be an advantage with some microphones!

If the microphone has an electronic circuit output, loading this with a low impedance will stress the mic amplifier, causing slew rate and compression. A high input impedance allows the microphone to "breathe" and give of its best, particularly advantageous with very high level percussive sounds.

If it is desired, nevertheless, to present a lower input impedance to the microphone, we suggest that an XLRF and XLRM assembly be made up with the desired resistor value connected between pins 2 and 3. (If there is sufficient demand we may be offering this as a catalog item later)

High Pass Filter

The High pass filter is a valuable aid in any signal chain but particularly so in a microphone preamplifier. Signals between 20 and 250 Hz can be attenuated, leaving the range above this unaffected. This gets rid of building rumble, air handling motor hum etc.

Meter

An eight segment LED bar-graph meter is fitted for each channel, calibrated in dBu as follows:

- 30 dBu, - 18dBu, - 12dBu, -6dBu, + 4 dBu, + 10dBu, + 16dBu, + 22dBu

With reference to the balanced output signal level.

The input level can be determined by reading the Meter indication, then subtracting the Gain settings of the Sensitivity switch and the Trim control.

For example, if the meter is reading + 10 dBu, with the Trim control at, say, +2 and the main Gain switch is at 42, the level of the input signal is 10 - 42 - 2 = -34 dBu.

Main Output

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 another Portico module or one of the many high quality vintage modules still in current use.

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 5012 is connected.

Buss Output

The To Buss output is unbalanced and has a high impedance output. It is intended for use with the Portico Buss Amp/Monitoring modules. A TRS patch cord is used to connect the 5012 Buss output to one of these bussing modules. The Monitor connection is derived pre mute on the 5012 and will produce a signal at the output of the buss modules that is equal in level to that at the 5012 output. The Monitor output cannot be used for any other purpose.

Silk

Much could be written about this feature, suffice to say, that it gives a subtle option to enhance sound quality in the direction of vintage modules. The Silk button reduces negative feedback and adjusts the frequency spectrum to provide a very sweet and musical performance. We suggest you try it and make your own judgment.

SPECIFYING THE NOISE PERFORMANCE OF THE RND 5012

Noise: is specified in 3 ways:

With Gain at Unity Better than –100 dBu
With Gain at 66 dB Better than –62 dBu
Equivalent Input Noise Better than –128 dBu

Decibels are used to express relationships and to make comparisons. One could state that amplifier "a" has 3 dB less noise than amplifier "b" but unless you have a point of reference for one of the two amplifiers, you would not know how good they were by comparison with other amplifiers. "a" and "b" might both be pretty bad amplifiers but you would only know that "a" was less bad than "b" by 3 dB *(dBu is derived from the original telephone standard, dBm indicating 1 mW of power in a 600 ohm circuit. This worked out at 0.775 Volts. However, today we use many different impedances in Pro Audio. The term dBu indicates the same 0.775 Volts RMS as a voltage level, not a power level.)*

There are several types of electrical Noise but here we are mainly concerned with Noise from the devices used in amplifiers plus Noise from circuit resistance that is heard, ideally at an extremely low level, as a "hiss" accompanying the music signal.

Thermal or Johnson noise results from the Brownian motion of ionized molecules within a resistance. Thermal noise is entirely fundamental and cannot be eliminated.

Present day microphones are designed to have a source resistance (more correctly, impedance) of between 150 and 300 ohms. So even if there is no sound input to the microphone, its own source resistance will be generating Noise that depends on its resistance.

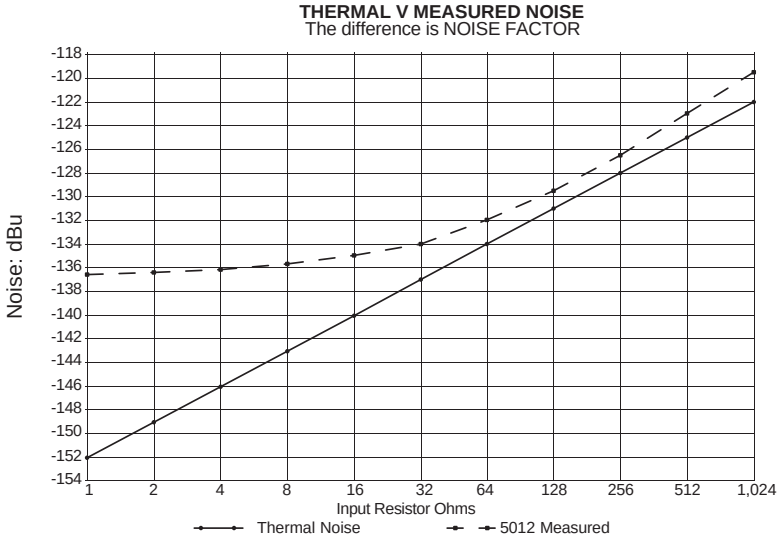
The amplifier to which the microphone is connected also generates noise from its amplifying devices and circuit resistances. When these two noises – the external and the internal noises are added together, we have an "Equivalent Input Noise". A microphone signal is often at a very low voltage level and needs a considerable amount of amplification.

Assume that we provide 66 dB of gain:
Noise from the input, measured at the output of the amplifier is now, obviously 66 dB greater than at the input. This output noise is relatively easy to measure but, as we've seen, it consists of the microphone source resistance noise plus the amplifier noise. Taking gain into account, this is the Equivalent Input Noise (or E.I.N.). But, as I have tried to show, it does not really tell us how good the amplifier is.

Fortunately if we know all the factors that govern Thermal noise, such as Temperature, Bandwidth and, of course the value of the Resistance itself, we can calculate Thermal noise very accurately. So with this figure calculated, any difference between our measured noise and the Thermal noise must be amplifier noise.

Most designers of good microphone amplifiers just quote the E.I.N. because this figure is often so close to the calculated resistor noise that amplifier noise must obviously be very small indeed.

There are two ways to provide more information about the noise performance of a microphone amplifier:



A graph can be drawn showing Noise against Resistance. Thermal, or pure Resistor noise is a straight line whilst Amplifier noise is a curve that depends upon the optimum source resistance for that particular amplifier. The difference between the two noise measurements in dB is the “Noise Factor”. (“N.F.” Familiar to R.F. and communications designers.)

Such a graph can be very informative if we substitute impedances of an actual (silent) microphone, because microphone source impedances are not the same at all frequencies - but that subject is for another day!

A second method that reveals more than just the E.I.N. combined figure, is to measure the combined amplifier and resistor noise over a range of resistances right down to zero resistance. At zero resistance connected to the input (in other words when the input is short-circuited), there is, theoretically, NO resistor noise so any residual measured noise must ALL be due to the amplifier. We then calculate the value of a resistor that would produce noise equal to the residual measured amplifier noise.

So we can also state the amplifier noise performance by equivalence to a resistor having the same noise. This is a good way because it’s easy to measure and takes account of any resistance in the amplifier circuit such as Printed Circuit tracks, connector resistance and length of cable between the amplifier proper and the point at which you have applied an input short circuit. (Little point in having a superb amplifier noise performance, equivalent to a very low resistance, if we then add a microphone cable or snake that worsens the noise by several dB!)

DYNAMIC RANGE

Traditionally, high quality microphones such as ribbons, had very low source impedances – as low as 30 ohms at the output of a ribbon matching transformer. Moving coil microphones were higher but had not been standardized as they are today. Condenser microphones, before the days of semiconductors, used tube head amplifiers that were coupled to the outgoing line with a transformer.

Microphone amplifiers, such as in a mixing console, also used tubes and these typically have a high input impedance.

Microphones are Voltage generators, not Power generators. It is always desirable to deliver the maximum possible signal voltage into the amplifier. It was traditional to provide an amplifier input impedance of about 1,000 or 1,200 ohms; about 5 or 6 times the source impedance of the microphone. This provided relatively low loading on the microphone – whatever its type – and went a long way to avoid voltage loss.

In the early 1960's when the "Pop" music scene was exploding and sound levels in the Studio became very high, there was concern that the head amplifiers in Condenser microphones would overload if the Console input impedance was too low.

In the early days of Consoles I was asked to provide higher input impedance than the normal 1,000 ohms. This of course, resulted in less "step-up" in the Console input transformer and there were then fears that we would lose out at the other end of the scale; Noise. The fact that microphones were less heavily loaded allowed an increased microphone signal. The reduced loading also resulted in less deviation of frequency response due to variation of microphone impedance and consequently less distortion at high levels.

The RND "Portico"^{TM} 5012 Microphone amplifier provides an input impedance of 10,000 ohms which means that variations in microphone source impedance with frequency, have only a very small effect on the sonic quality. This high input impedance has minimal effect on microphone output and loading with the result that microphone distortion is very low adding up to a noticeable improvement in "transparency".

Frequency Response:

Main Output, no load,

–0.2 dB @ 10 Hz
–3 dB @ 160 kHz

Buss Output measured at the **5014** Monitor Buss-mix Amplifier Output

–0.2 dB @ 10 Hz
–3 dB @ 160 kHz

Noise:

Measured at Main Output, unweighted, 22Hz-22kHz,
Terminated 150 Ohms.

With gain at unity	better than –100 dBu
With gain at 66 dB	better than –62 dBu
Equivalent Input Noise	better than –128 dBu
Noise Factor	1.5dB

High Pass Filters:

Continuously variable swept frequency from 20 Hz to 250 Hz.
Slope: 12 dB/Octave

Gain:

Unity to +66dB in 6 dB steps,
Trim continuously adjustable from –6dB to +6dB

Buss Output:

Output is designed to feed the **5014** Monitor Buss-mix Amplifier at the internal system level of -2.5 dBu.
Output level of the **5014** is equal to that of the **5012.**

Maximum Output Level:

Maximum output from 20 Hz to 40 kHz is +25 dBu.

Mute:

Mutes Main Output only.

Total Harmonic Distortion and Noise:

@ 1kHz, +20 dBu output:

Main Output:	Better than 0.001%

Buss Output measured at the **5014** Monitor Buss-mix Amplifier Output:
Better than 0.002%

@ 20Hz, +20 dBu output:

Main Output:	Better than 0.002%
Silk Engaged:	Better than 0.2% Second harmonic

Crosstalk:

Measured channel to channel:
Better than –90 dB @ 15kHz.

Phantom Power:

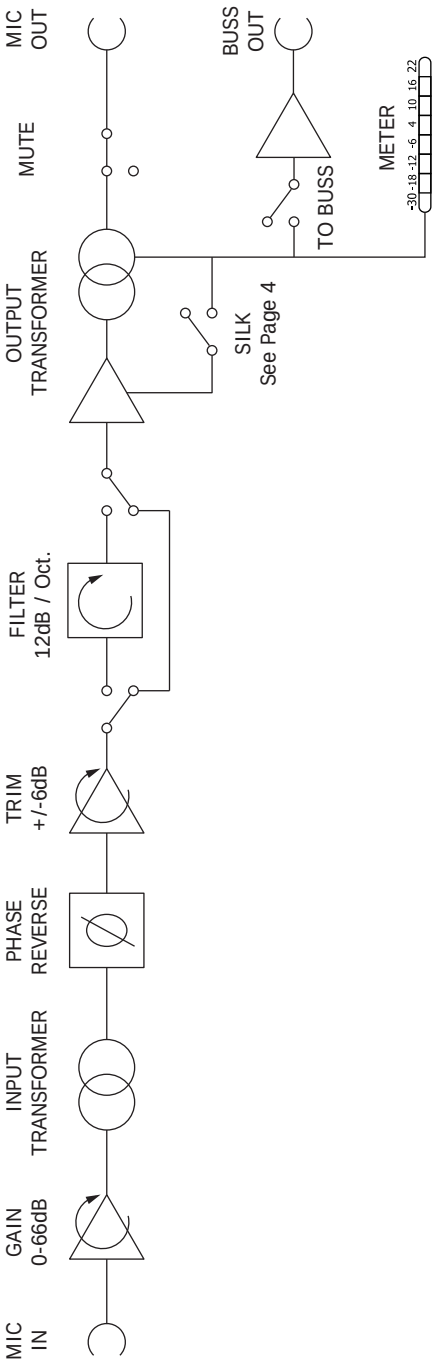
+48 Volts DC +/- 1%

Power requirements:

Voltage range: 9 to 18 Volts DC

Current consumption:

@ 9VDC	Current is	1.3 A typical:	Power = 11.7W
@ 12VDC	Current is	1.0 A typical:	Power = 12.0 watts
@ 15VDC	Current is	800 mA typical:	Power = 12.0 watts
@ 18VDC	Current is	650 mA typical:	Power = 11.7 watts


MIC IN
GAIN 0-66dB
INPUT TRANSFORMER
PHASE REVERSE
TRIM +/-6dB
HIGH PASS FILTER 12dB / Oct.
OUTPUT TRANSFORMER
SILK See Page 4
MUTE
MIC OUT
BUSS OUT
TO BUSS
METER
-30 -18 -12 -6 4 10 16 22

PRODUCT WARRANTY

Rupert Neve Designs 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 dry cell battery, 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

If you suspect a defect in this product, please call us at 512-847-3013 or email us at support@rupertneve.com to discuss the suggested defect (it is possible that a suspected defect could be due to improper usage) and to obtain a return authorization number. It shall be your responsibility to pay for shipping the product to us, and, if the product is determined to be defective, our responsibility to pay for shipping the product back to you.