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REVIEW / NEUMANN V 402





PURIST

NEUMANN V 402 – MICROPHONE PREAMPLIFIER

The emphasis, however, is on “stand-alone”, because from the 1960s through to the 1990s Neumann’s portfolio included mixing consoles. These were modular in design and of course also featured preamps. Still very popular today is the V 476 B of the 1980s, a first-class fully discrete microphone preamp in the form of a compact Danner cassette. However, after mixing console production was discontinued, Neumann never again brought preamps onto the market either as modules or as stand-alone units. Until now!

Text & Photos: Dr. Andreas Hau



Manufacturer

Neumann

Recommended retail price

2,749.- Euros

www.neumann.com

Our opinion

- +++ highest sound transparency, very low noise
- +++ superb headphone amplifier
- +++ low cut without undesirable side effects
- +++ excellent workmanship
- no cue input for headphone monitoring

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THE HARDWARE The V 402 comes in a 2U rack-mount chassis with a hefty weight of 6.2 kg. Which perhaps isn’t surprising as the enclosure is made of robust sheet steel, and the aluminum front measures about 4 mm in thickness. Certainly not by chance, its look is reminiscent of Neumann microphones. The surface finish of the front panel resembles the nickel-matte associated with Neumann microphones (although most models are also available in black). The red stripe running through the center, which shows the model designation and the labeling of all controls, bears a certain resemblance to the band at the bottom of a microphone body. Even the well-known Neumann diamond is not simply printed on the front panel but attached in the form of a badge – just like on a microphone!

The V 402’s two channels are identically equipped. The central control element of any preamplifier is the gain control. On the V 402 this is a stepped potentiometer with a large metal knob. The following standard functions are actuated by pushbutton switches with illuminated rings. The first is labeled HI-Z; it switches between the rear microphone input and “Hi-Z” instrument input on the front.

Its is in fact very high, i.e. 3.3 megohms, which means the sound spectrum of guitars and basses with passive pickups will be fully captured. This is followed by the obligatory switch for phantom power and a 20 dB pad that extends the V 402's gain range. When the pad is not activated, the microphone gain ranges from 20 dB to 60 dB, while the HI-Z input can be adjusted from 0 to 40 dB. Pressing the pad switch reduces the microphone gain to 0 – 40 dB. The pad also affects the instrument input, which can then be adjusted from –20 to +20 dB. Of course, there are also buttons for polarity inversion and low cut. The latter removes rumble below 60 Hz with a slope of 12 dB/oct. Finding the correct gain setting is facilitated by a bar-graph meter consisting of ten LEDs covering a range from –24 to +24 dBu in 6 dB steps. The top red LED serves as a peak hold indicator which remains lit for 3 seconds in case of short overloads.

Rather unusual for a microphone preamp is the integration of a headphone amplifier. Besides the obligatory control for the overall volume, there is a level control for each channel so the monitoring volume of each channel can be adjusted independently. The level controls affect the headphone path only; the level of main outs on the rear remains unaffected. An additional button allows to switch from stereo to mono so both channels appear in the middle of the stereo panorama.

THE CONCEPT Neumann's marketing literature leaves no room for doubt: The V 402 is not a vintage or retro device that imparts its sonic imprint on the input signal. Quite the opposite, in fact: It is an excep-

The rear panel has a clear layout. Each channel has an XLR input and output. The ground lift switch may be used to prevent hum loops, if necessary. Having the on/off switch on the rear panel may not be optimal from an ecological point of view, but it prevents the preamp from being accidentally switched off during a recording.



tionally clean preamplifier that leaves the sound of the microphone untouched. The concept, thus, is “wire with gain” – that’s how sound engineers have imagined the ideal preamp for decades: It should simply raise the level while remaining as neutral in sound as a piece of wire.

It won’t come as a surprise, therefore, that the V 402 is a transformerless design as transformers almost inevitably cause signal coloration. Which, although it may sound rather pleasant, would nevertheless be a falsification of the original signal. The circuit design is unusual. At this point we often praise discrete circuits made up of single transistors rather than integrated circuits. The circuitry of the V 402 is the exact opposite – and that’s a good thing, too! As a matter of fact, common reservations about IC opamps date back to a long time ago, when the first general-purpose ICs like the infamous 741 found their way into audio circuits. The sound quality dropped audibly, which is why many manufacturers of studio equipment continued to rely on discrete circuits. But for quite a long time now, there have been opamps specifically developed for audio offering a high degree of linearity that would hardly be possible with discrete technology. Still, transformerless microphone preamplifiers, even today, tend to use a discrete transistor input stage. That’s because, until recently, there were hardly any IC opamps that were able to amplify a source impedance as low as that of a studio microphone without audible noise. The solution was an input stage with special low- R_{bb} -transistors. The same topology is replicated by the special purpose preamp chips found in many audio interfaces – these are not operational amplifiers but a partially discrete preamp in miniature.

The V 402 is the first microphone preamp I’ve come across that relies on IC opamps throughout, even in the input stage. I couldn’t detect a single transistor in the entire unit. Instead, Neumann use high-performance audio opamps from TI/Burr Brown. The input stage is made up of several OPA1611s, a relatively new type, specially designed for low source impedances. Expensive audiophile types are used throughout. The V 402’s consequent “un-discrete” design, therefore, is certainly not a cost-cutting measure. On the contrary, these premium opamps cost about 10 to

100 times as much as a single transistor! So, why opamps? Well, discrete circuit technology does have its benefits where sound is created or shaped. But if you want to keep the sound image as pure as possible, free from distortion and any form of coloration, modern audio opamps have a clear advantage.

No costs were spared elsewhere, either. The input capacitors, which block the phantom voltage from the circuit, are high-quality MKT film capacitors rather than the usual cheap electrolytic capacitors. For gain control no normal low-cost pot is used but an expensive double-level precision potentiometer from the Japanese manufacturer Alps. For the integrated power supply, Neumann use a low-leakage toroidal core transformer. That’s because the switched-mode power supplies found in many modern devices are prone to create high-frequency interference in their chopper circuits which may creep into the audio circuitry. This can lead to problems, especially in a preamplifier, because such interference could be amplified by as much as 60 dB along with the audio signal. However, switched-mode power supplies do have a practical advantage in that they automatically adapt to the respective mains voltage; linear power supplies can’t do this. Well, usually they can’t! In the V 402 (as with the U 67 Reissue), Neumann have integrated a clever circuit which automatically sets the correct voltage range (100–120 V or 220–240 V, 50/60 Hz).

The build quality of the V 402 is excellent throughout. The circuit boards look extremely clean. For the most part, surface mount components are used as many of them are not even available in through-the-hole versions. The individual sections such as the preamps, the headphone amplifier and the power supply are on separate boards, which makes it easier to replace them in case of service.

IN USE The V 402 sounds extremely clean, indeed. Not even listening very closely could I detect any distortion artifacts or sonic discoloration. The microphone signal seems completely unaffected – and audibly more so than with less expensive preamplifiers. Certainly, the preamps built into audio interfaces, which are almost always based on those preamp chips mentioned above, don’t sound bad, either. They are fairly low-noise and linear, but if you listen closely, you can still detect a slight coloration which becomes more and more apparent the further you turn up the gain control: The harmonic distortion increases and the

highest treble frequencies become increasingly dull. That's not the case with the Neumann V 402; its sound image – or rather its “invisibility” – remains constant over its entire gain range.

Since I own a pair of Neumann V 476 B preamplifier modules from the 1980s, I was curious to put these up against Neumann's new offering. Although the V 476 B's sound coloration is rather benign compared to many other vintage preamps, there is still a world of difference compared to the V 402. Although the V 476 B is one of my favorite preamps, I'm not sure that its sound coloration is always appropriate. When recording vocals with a relatively neutral microphone, a bit of extra character from the preamp won't hurt. But if you have an extensive microphone collection at your disposal, you better choose a microphone with the desired sound character to begin with, for example a large diaphragm condenser microphone with tube electronics. A preamp which adds its own character on top may already be too much. The harmonic enrichment of the tube circuitry and the euphonic distortion of the preamp do not simply add up, they multiply! Every overtone is enriched with artificial overtones again. Which may result in slightly “fuzzy” tones.

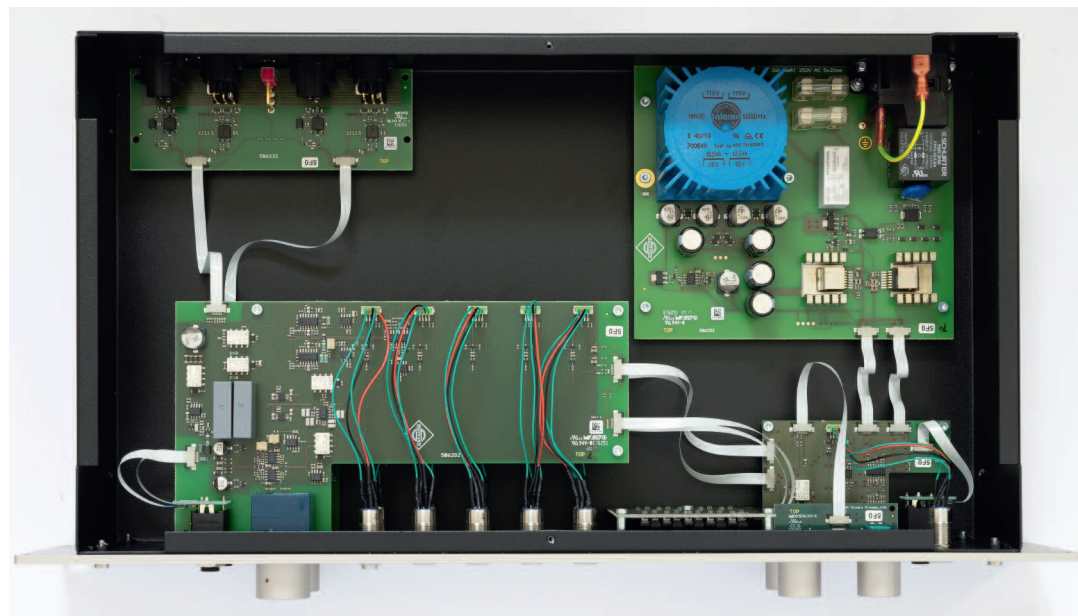
And that's probably what Neumann's marketing slogan for the V402 is supposed to convey: “Discover the True Voice of Your Microphones”. There is some truth to that! In most cases, the microphone already has all the crunch and character you could wish for. Apart from tube mics and vintage FET mics, this also applies to dynamic microphones, which also display inherent distortion. Or if you deliberately choose a linear microphone, such as a small diaphragm condenser, in order to capture the natural sound of the instrument as accurately as possible, it wouldn't make

sense to choose a preamp that would blur this natural image. That's not to say there is no room for colorful preamps. Music and sound perception aren't governed by logic, and sometimes what seems nonsensical is exactly sends you into rapture. But that's the exception rather than the rule. Insofar a super clean mic preamp like the V 402 tends to have a much wider range of applications than, say, a Neve clone.

There is one thing, however, that the V 402 has in common with its ancestor, the V 476 B: The switchable low cut is of the same high quality. To be honest, I rarely use a low cut at the recording stage, either on the mic or on the preamp, because I usually feel that the sound quality in the pass band suffers audibly. My only exception, so far, was the 80 Hz low cut of the Neumann V 476 B, which gently cleans up the audio signal without diminishing its appeal. The 60 Hz low-cut of the V 402 I like even better because it sounds just as artifact-free, and although it sets in below the lowest frequency of a male singer, it still manages to remove pops and structure-borne noise very effectively.

A little more tech talk: The impedance of the microphone input is 3,000 ohms, a sensible value for both dynamic and condenser microphones. The equivalent input noise is not specified in the preliminary data sheet. I would estimate it around -128 dBu, which doesn't set a new record. But it is a good enough value to operate ribbon microphones and low-sensitivity moving coil mics without apparent noise. However, the maximum gain may be a bit low for some applications. 60 dB gain from the V 402 should be enough for a rock shouter in front of the popular Shure SM7B, but using the same mic for podcast,

As is typical for Neumann, the V 402 is very well manufactured. Its metal chassis is extremely robust. The power supply unit works with a low-leakage toroidal transformer.



you'd run out of gain. Neumann probably had their own product line in mind, which of course consists almost exclusively of condenser microphones. Due to their high sensitivity, these rarely require more than 40 to 50 dB gain. The only dynamic mic in Neumann's portfolio is the BCM 705 broadcast microphone – which has a significantly higher sensitivity than its American counterpart, the Shure SM7B. So 60 dB gain should be sufficient.

On the other end of the dynamic scale, very high-sensitivity microphones shouldn't cause problems: With the pad switch engaged, the V 402 can handle a input levels of up to +28 dBu without distortion. This way the V 402 can also be used for line sources; it does not have a dedicated line input. Of course, phantom power should be deactivated, since line outputs are not always voltage-proof. As always, I measured phantom power, because correct supply voltage is a prerequisite for condenser microphones to sound at their best. At 47.82 volts and a maximum current of 13.54 mA, it is in accordance with the P48 specifications – which is to be expected from the company that invented 48 volts phantom power.

The Hi-Z inputs, too, are of the highest quality. At 3.3 megohms, their impedance is higher than usual (around 1 megohm), which helps to expose some extra detail in the upper frequencies that makes the sound appear particularly well-defined. Still, the sound is not harsh or shrill but simply clean – and exceptionally low-noise! Which is excellent for re-amping or amp modeling applications. Apart from guitars and basses, the Hi-Z inputs can also be used for synthesizers and other unbalanced sources as they can handle high levels (up to +21 dBu according to the data sheet).

Let's move on to the monitoring section. Generally speaking, I like the idea of integrating a headphone output into a preamp. I've used a Universal Audio DCS Remote Preamp for many years for recording and microphone testing purposes because it allows latency-free headphone monitoring. In terms of sound, the V 402 is superior to the DCS, both in terms of the preamp section and the quality of the headphone amplifier. However, the V 402 lacks a cue input to feed the DAW signal. That's unfortunate especially when recording overdubs because, obviously, you need to be able to listen to the already recorded tracks for orientation. In the case of mono overdubs, a possible workaround is to feed the DAW signal (in mono) into the V 402's second channel. The two level controls in the



Ancestor: The V 476 B preamplifier module of the 1980s represents the state of the art at that time. Today it is popular for its subtly colored character.

monitoring section can then be used to adjust a pleasant, latency-free headphone mix. If you want to record two channels, however, this option is not available. That's a pity, because the integrated headphone amplifier is of excellent quality. It harmonizes perfectly with Neumann's – so far – only headphone, the NDH 20.

CONCLUSION The V 402 is Neumann's first reference preamp after a long, long hiatus. The last known model was the V 476 B module, which was introduced in 1979 and built until the early 1990s. This was followed by a few digitally controlled preamp modules, which are long forgotten today. The V 476 B, however, is still very popular today, and I'm sure some would have wished for a reissue. In terms of sound, the V 402 has little in common with its ancestor. Conceptually, it does: In both cases the Neumann's engineers strive for maximum sonic transparency, "wire with gain". Thanks to the latest advances

in circuit technology, the V 402 is much closer to this ideal than the V 476 B was back in 1979. The V 402 impresses with its low noise level, a finely detailed sound reproduction and almost unsurpassable transparency. That's not everyone's cup of tea, especially when it comes to pop/rock/rap vocals, and yes, sometimes a splash of 1073 mustard is exactly what makes your Shure-type sausage so tasty. But those who seek purity in sound will certainly be happy with the Neumann V 402. And: Purity is not boring! Usually, the microphone signal already comes with all the character that the recording may require. The V 402 brings this out clearly and faithfully. But if you believe that the microphone shouldn't add anything to the recording at all, that its task is to capture the natural sound of the instrument without artifacts and coloration, then the V 402 is a congenial partner to your neutral and linear small-diaphragm condenser microphones. The V 402, thus, has a wide range of applications.

I'm somewhat divided on the integrated monitoring: The lack of a cue input hurts, but the headphone amplifier is of the highest quality. The V 402 operates completely transparent from the input to the phones output. In an ideal world, I would use it from now on for testing and comparing microphones! In the real world, the nice things in life usually don't come cheap. This is no exception. The Neumann V 402 is listed with a recommended retail price of 2,749 Euros. Looks like I'll have to write a few more reviews to earn enough for that! ←

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