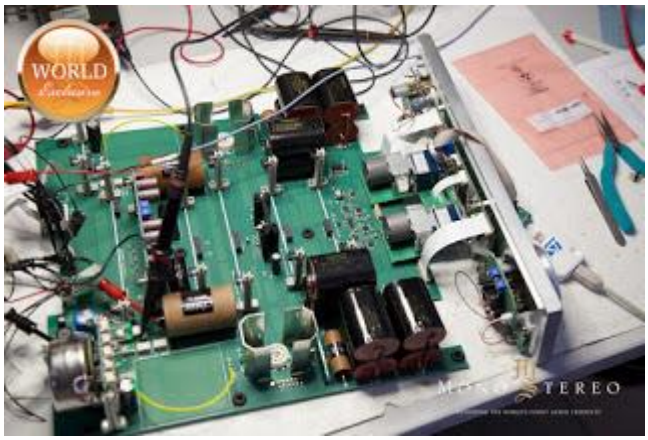
Nagra HD PREAMP HV review part one

As I type, **Nagra's** Research & Development Product Manager (Audio Technology Switzerland SA) Philippe Chambon prepares the Nagra HD PREAMP with the latest HV upgrade for a review at Mono and Stereo. Everything except the new (200 V HV) power supply, everything is the same as the originally released HD PREAMP, and all lucky owners will be able to upgrade it (ex factory).

The Nagra HD PREAMP HV is one of the few products where my audiophile and music-loving blood boils instantly for many reasons. It has been almost three years since I last visited the Nagra factory in beautiful Lausanne. Every visit to Nagra headquarters is special for many of the reasons, but this particular visit was special because I was able to see exclusively the hands on development of the HD PREAMP and hear the first prototype version.

Matthieu Latour and Philippe Chambon took all the time to passionately explain and present the new proud creations, and I was speechless about what an enormous, time-consuming and financial challenge the HD PREAMP project was.

There is simply too much that is run through the HD PREAMP base to cover every single detail completely, but I will do my best to cast the extremely complex structure of the HD PREAMP into tangible and simple, reader-friendly text.



RADIANT NUCLEUS WITH UNPRECEDENTED HERITAGE

ATS (Audio Technology Switzerland S.A.) was founded in 2012. The Swiss company, formerly known as Nagra Audio Division, is the designer and manufacturer of Nagra products. It enjoys a privileged position in the audio

world. In 1951, it developed the first portable recorder that could be used in a professional environment. A revolutionary device with mechanical and electronic features of such fine quality that it changed forever the way sound was recorded throughout the world. Over the years, new generations of recorders that have emerged from this first design, as well as other exceptional realisations, have helped to reinforce the mythical status of the brand.

In 1996, Nagra began developing high-end products for music lovers. The extensive know-how acquired by its engineers in developing professional solutions can now be transferred to the domestic market, which has now reached very high quality standards.
In fact, professional and high-end equipment is developed and manufactured by the same team at the headquarters in Switzerland. Both product lines share the same production facilities. This ensures that the approach is the same for all Nagra products and remains a hallmark of the brand:

- *An electronic design entirely dedicated to maintaining the full integrity of the signal. A Nagra device is characterized by its rigor and truthfulness. It always works as close as possible to the original sound source. To meet this challenge, Nagra is constantly seeking solutions that are both rational and highly efficient, and is constantly developing new ideas and innovative designs. Some essential components are not to be found on the market; if they are to meet Nagra's quality requirements, they are manufactured "in-house" or made to measure for us.*
- *Choice of components - electronic or mechanical - without compromise, often to military specifications, because a single weak link can jeopardize the quality of the entire product.*
- *High-precision mechanics, praised workmanship and perfect finishing ensure robustness and reliability.*

https://youtu.be/9CeA1mmd5Bw

The joy of owning a Nagra not only comes from knowing that it houses some of the finest electronic equipment, but also from the very concrete understanding - both visual and tactile - that each hand involved in its assembly was a caring and highly skilled hand. Many Nagra devices built over the last sixty years still function perfectly and give their owners the same pleasure as on day one. At Nagra, the idea of planned obsolescence has never prevailed.

This is the path followed by the new Nagra HD PREAMP HV, which follows in the footsteps of the Nagra PL -P, the Nagra PL -L, the Nagra Jazz models and, more recently, the Nagra -L Nagra Classic Preamp. In 1997, after

more than 40 years of continuous success in the professional recording market, the Nagra Audio Division launched its very first high-end consumer product. The Nagra PL -P preamplifier was a Class A line and phono preamplifier based on triodes, which immediately set new standards in sound reproduction.

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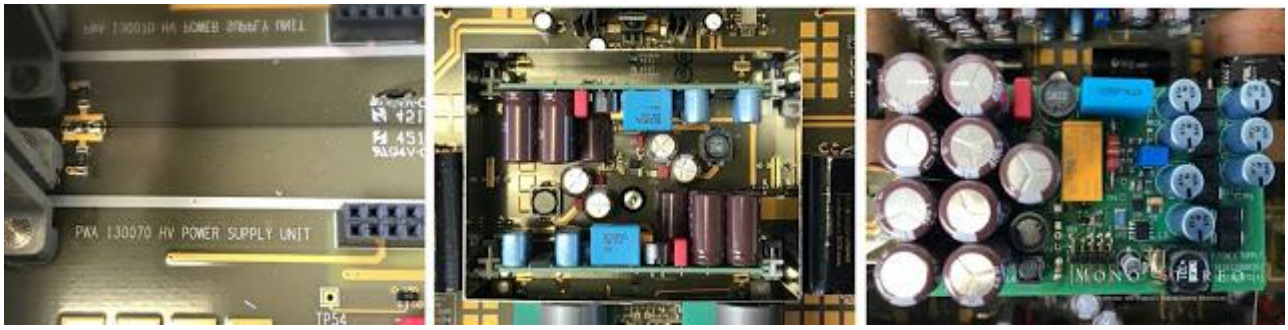
Twenty years later, the Nagra HD tube-based Nagra HD PREAMP HV, is an entirely new product inspired by the same philosophy of perfection. It is now able to take over the mantle of its prestigious predecessors and comes closer to absolute fidelity than any other Nagra preamplifier before it. Its name HD PREAMP HV lets everyone know that it is part of the Nagra HD product line.

THE SOUND OF SILENCE

Nagra's unique approach to audio product development is based on 65 years of experience in the field, a large and competent R&D group and extensive listening sessions. The result is often very organic and natural sounding. To ensure that the final product is faithful to the theoretical work, high-end custom components have been carefully selected. The unit includes in-house custom-made components such as audio transformers. As a result, the HD PREAMP HV contains several patent-pending technologies that take the music listening experience to new heights.

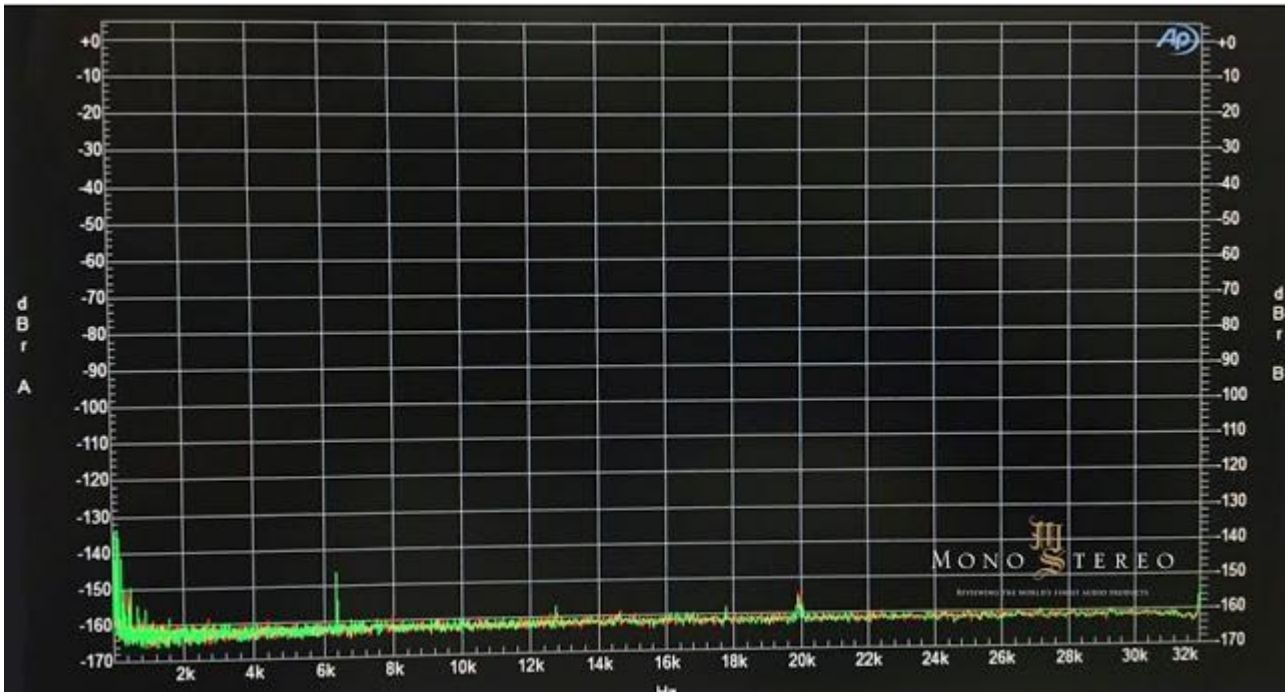
The silence of an electronic circuit is one of the main criteria for the listener's assessment of what he or she is hearing. The human ear, whether consciously or unconsciously, calibrates itself to the background noise produced by a machine in order to estimate the dynamic range generated by

the music. The lower the noise threshold, the greater the "space" in which this dynamic range can be expressed, which is correctly perceived as open, clean and natural, thus enhancing the impression of a realistic sound.



Location of the HV power supply boards on the main board (left), overview of the HV psu boards inserted in the slots of the main board (middle) with mu-metal shielding cage, view of the components (right)

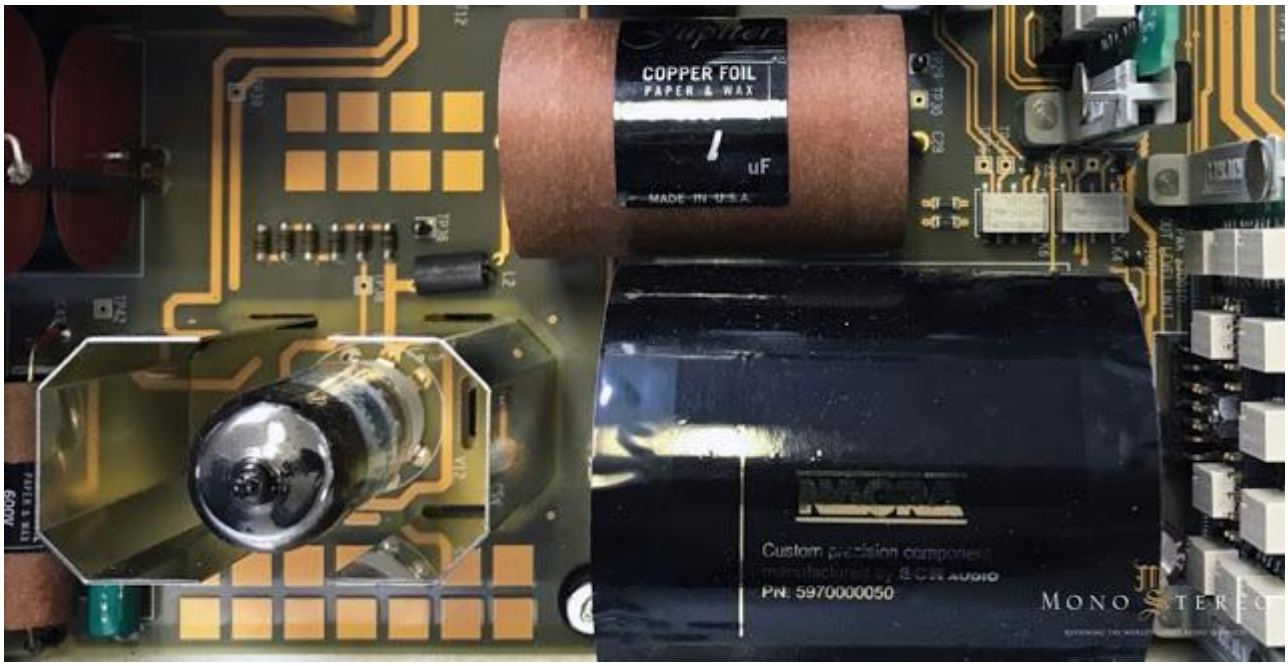
An important part of the work carried out by the engineers in developing the Nagra HD PREAMP HV focused on this aspect. Nagra's engineers took as their starting point the critically acclaimed power supply arrangement of the Nagra PL -P preamplifier and imagined a state-of-the-art version of it incorporating advanced technologies. The sophisticated power supply was housed in a separate enclosure and, like the original audio circuitry, used components of the highest quality specified for extreme applications. Similar to the PL -P, batteries were used to isolate the unit from external interference, the HD PREAMP HV power supply uses a unique virtual battery technology that provides a superior result than a conventional battery without the inconvenience of charging time and battery life. As a result, the noise floor level at the preamplifier reaches new levels. At -160dB over the entire audio bandwidth, it is the lowest ever measured with a Nagra product, which makes it an ideal preamplifier as it does not generate any additional noise that would be amplified by the downstream power amplifiers.



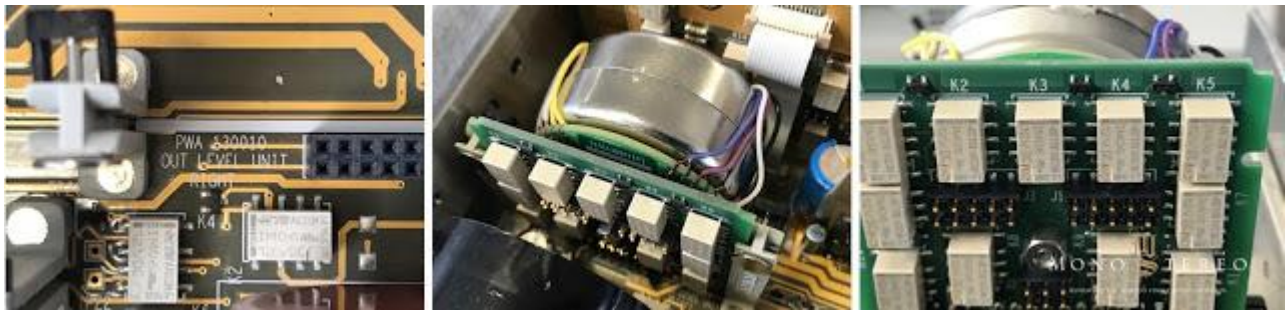
The noise floor level at the preamplifier output, measured at -160dB. This is quite spectacular provided measurement and unusual for tube electronics.

COMPLEXITY SIMPLIFIED

The progress achieved in electronics not only increases performance potential but also contributes to a general reduction in complexity and the size of the circuitry. The engineer makes the most of this to create solutions that are increasingly stripped down and simplified, in order to benefit from all the advantages that this implies, such as the reduction of the noise threshold, the generated heat, the power consumption and the risk of breakdowns. Actually the design of the Nagra HD PREAMP HV has followed a radically different way. The audio path has been designed as shortest as possible to bolster its immunity to disturbances and radiation.



But even if the chosen circuit is basically extremely simple, i.e. an input stage capacitor based on a cathode follower triode coupled to an output stage for volume control of the transformer, the implementation was complex and concentrated only on the very best technical solutions, which are anything but synonymous with size reduction and cost-saving. The design philosophy is nothing other than the same as the acclaimed HD DAC plus some very unusual features. The circuit topology is double mono without any kind of negative feedback anywhere in the signal path. A double triode input stage provides the current amplification, while the voltage amplification output stage operates passively with a patented toroidal audio transformer developed by Nagra and made in-house in Romanel. Coupling is achieved via a stack of custom-made foil capacitors, which are selected after intensive listening sessions. Excellent quality components are used all around, some of which are custom built to Nagra's strict specifications. The audio signal does not pass through any kind of potentiometer. Instead, the overall gain is adjusted thanks to special audio transformers whose voltage ratio is digitally controlled by a microprocessor (Nagra audio patent application).



Location of one Nagra transformer board on the main board (left), left channel Nagra transformer board (middle) and switching relays (right).

The variation is binary logarithmic from -80dB to 0dB on a 0.5dB step basis. The signal output of the HD Preamp is floating across the audio transformer, i.e. no ground loop with the power amplifier, and its impedance is very low for a tube preamp, i.e. less than 0.2 ohms when the volume is set to -30dB. As you would expect from such upper-echelon electronics, the sophisticated HD PREAMP HV power supply is located in an external chassis. It uses components of the highest quality, specified for utmost demanding and military applications, and virtual battery capacitors for extremely low noise levels.

The design of the HD PREAMP HV chassis and its HD power supply eliminates the influence of external interferences and drastically reduces any of naturally inherited resonances. In addition, stacking the units does not affect the mechanical damping characteristics.

VOLUME CONTROL

Compared with the traditional potentiometer method, the advantages of Nagra transformer volume control of the HD PREAMP HV are essential. With this technique, the signal power remains intact after voltage-to-current conversion by the transformer, while a potentiometer renders the signal powerless. For many years, some high-end manufacturers have adopted the multi-stage secondary transformer volume control, but the convenience of a potentiometer is missing due to the high voltage gap between the attenuation stages. Fortunately, thanks to many years of intensive work by the Nagra's Research and Development department, Nagra technology combines the best of both worlds.

However, the simplicity of this design hides two compromises. First, the overall attenuating resistor is connected in series with the audio signal, and Ohm's law states that a resistor through which a current flows creates a voltage drop and consumes current. Therefore, an audio signal attenuated in this way loses some of its power, which is converted into heat. Secondly, a potentiometer or resistive attenuator is often located across the input of a preamplifier. Its value must be high in order not to overload the source. As soon as current flows, a thermal noise, called Johnson-Nyquist noise, is generated proportional to the resistive value. It contributes to the overall noise of the circuit and affects the noise-to-signal ratio.

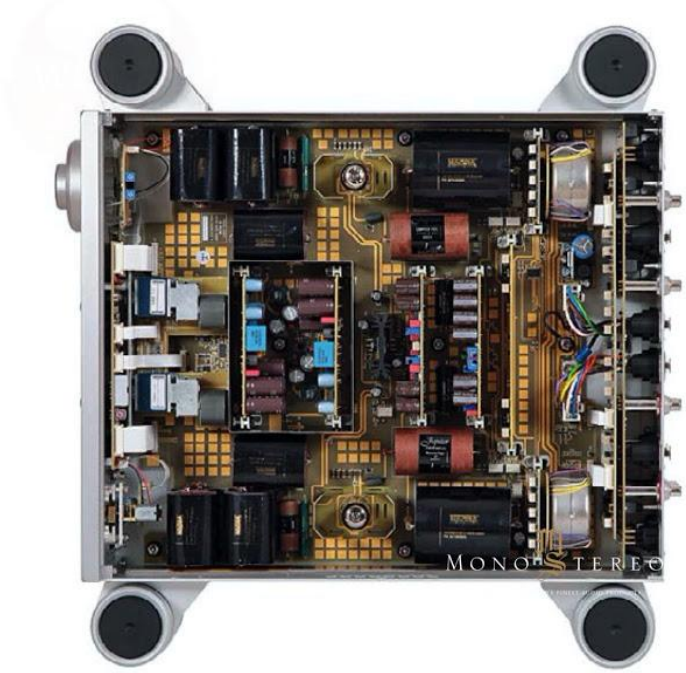
My reference The Bespoke Audio Company's Ultimate Silver preamplifier is well known and appreciated among audiophiles and music lovers. Two custom-made, high-quality audio transformers with a multi-tap winding are used to attenuate the signal by switching taps. It has proven in many systems that it provides excellent gain distribution and I always use it as a reference for the straight wire gain principle because it comes as close as possible to the actual concept.

The transformer act as galvanic isolation, it isolates the input, i.e. the primary winding, from the output, i.e. the

secondary winding, thus avoiding ground loops. It adapts the output signal according to the transformation ratio of its windings without losing power. In other words, the audio signal is not converted into heat as it passes through the windings, regardless of attenuation.

https://youtu.be/jzl6pRRNYxE

Impedance matching is much more flexible than with a potentiometer, and the output impedance of a TVC remains extremely low within the usual adjustment range, as it operates "very" step-down as a step transformer.



The inductive structure of TVC makes it a natural low-pass filter for RFI and EMI interference. Nevertheless, the resistive attenuation has two major advantages over passive TVC: bandwidth and phase response. A transformer must deal with parasitic capacitances of the windings.

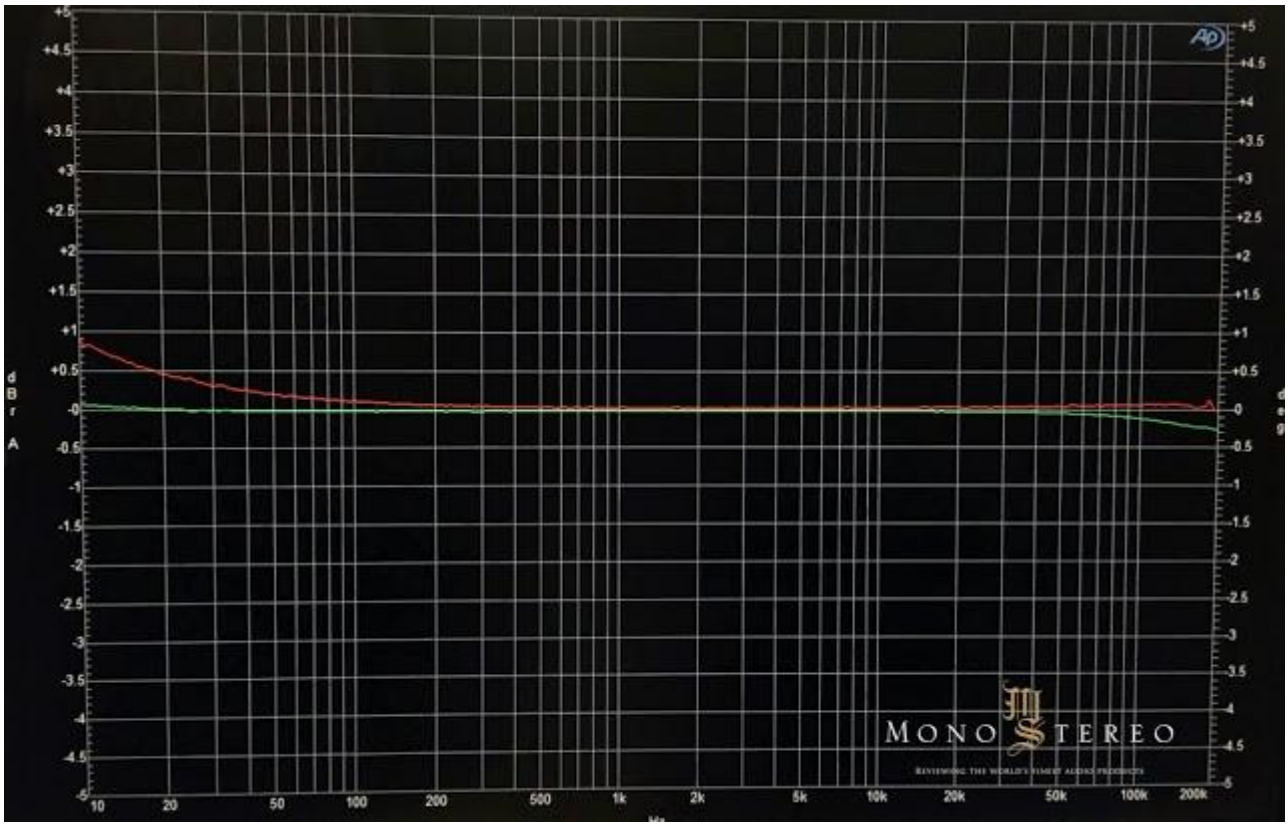
Fortunately, the Bespoke Audio Company excels when it comes to winding technology, core material, wiring, etc. However, if the TVC phase rotation and frequency response at both ends of the audio spectrum are compromised the audio signal passing through suffers greatly.

Nagra has developed an active circuit (patent pending) that uses an exclusive in-house TVC as a volume control. The manufacture of a transformer takes a very long time, i.e. one day, due to the very complex interleaving of the windings around a magnetic toroidal core. The circuit offers excellent solutions for a perfect adaptation of TVC technology to any type of electronic environment. Each channel of the HD PREAMP HV operates basically in two stages, a current buffer as input stage is capacitor-coupled to a voltage amplifier as the output stage.

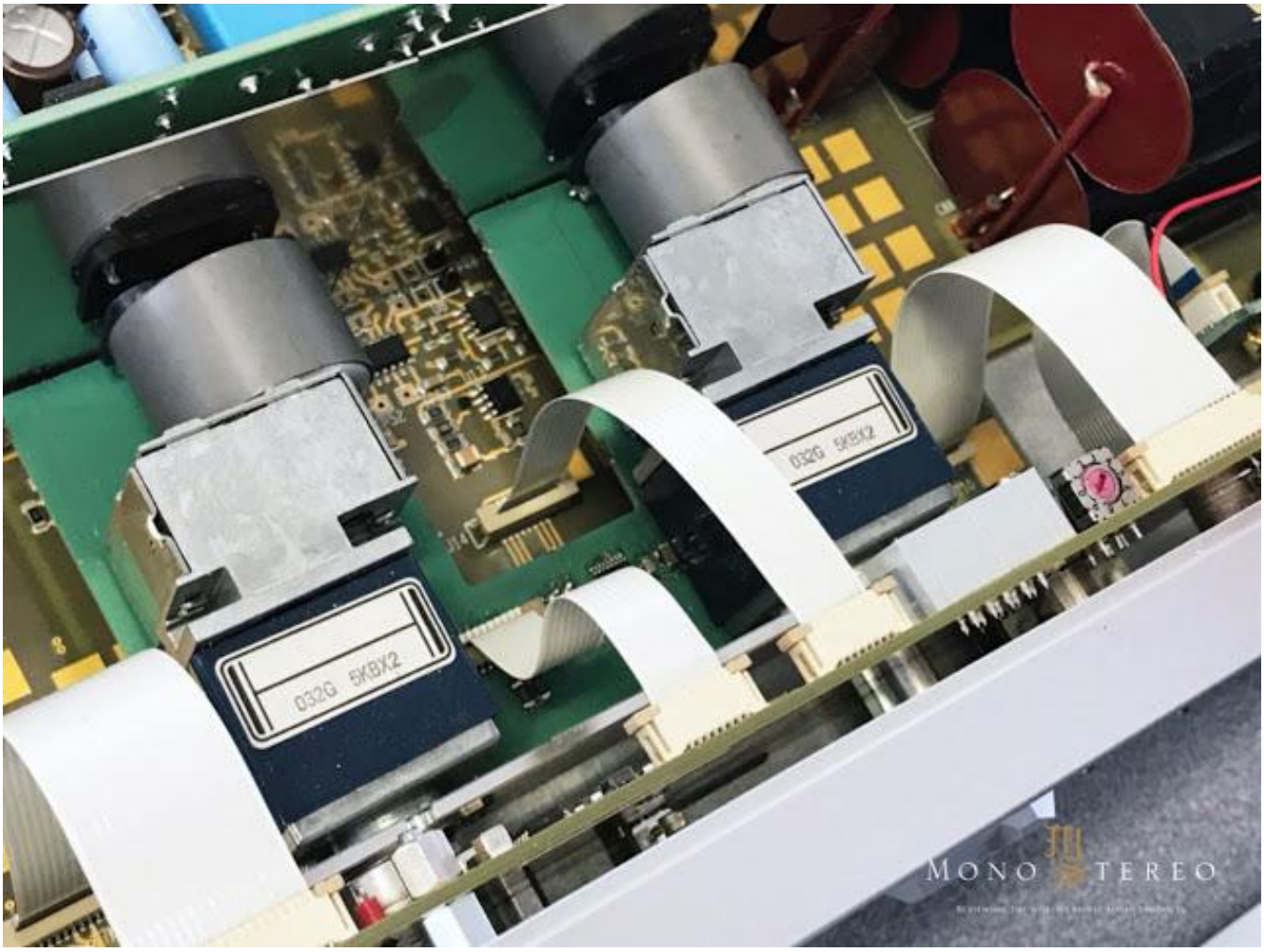
The current buffer is a tube cathode follower with a very high input impedance for the source and a very low output impedance for the output stage. The coupling capacitor is DC blocking. The output stage is a very high quality toroidal multi-winding transformer designed and manufactured in-house by Nagra and acting as a TVC. Instead of a single multi-tap secondary winding, the Nagra TVC has several secondary and primary windings. Depending on the position of the volume control, relays switch the windings together, so that the output level in 0.5 dB steps meets the user's requirements. The relays are digitally controlled by a microprocessor, and the Alps

potentiometer attached to the volume button sends only voltage information to the microprocessor, which converts it into the correct relay circuit.

Switching windings instead of taps of a single winding is more complicated to design, but it pays off a lot of problems. The frequency response of the human ear is about 16 kHz. However, the temporal resolution of the ear between two transients is less than 10 microseconds, i.e. 100 kHz, and even less than 5 microseconds for "golden ears". This means that the phase of the signal must be maintained at least up to 100 kHz in order to obtain the correct timing between the fundamental frequency and the overtones of a note. In addition, the frequency response must also be as linear as possible up to at least 100 kHz in order to obtain the correct level of fundamental and harmonics of a note. Switching the taps of a single secondary winding makes the mutual coupling between the primary and secondary winding inaccurate, as it changes tap after tap, so that the frequency response and phase response also change. We can easily understand that such a TVC does not have the same specifications when set to 0 dB (full secondary winding) or to -40 dB (a few turns of the secondary winding to the full primary winding). The Nagra method is quite different, as multiple secondary windings not taps are switched for attenuation. Each volume position connects the windings to a specific arrangement, so that coupling with the primary windings remains optimal at each attenuation level and all unwanted inductive and capacitive effects are eliminated for excellent frequency and phase linearity.

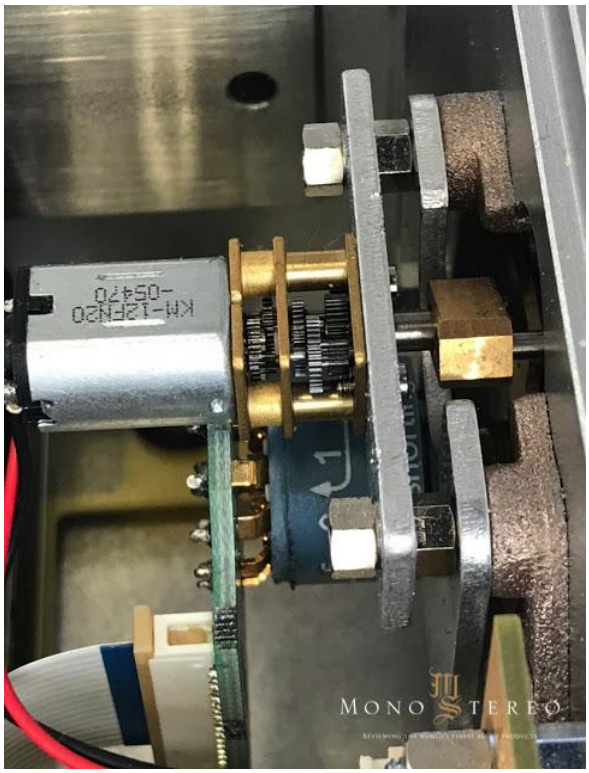


The bandwidth (green line) will extend linearly from less than 10 Hz at 0,1dB up to more than 200 kHz at – 0,3dB. The phase response (red line) is as impressively linear with only a slight phase shift of less than 1 degree at 10 Hz.



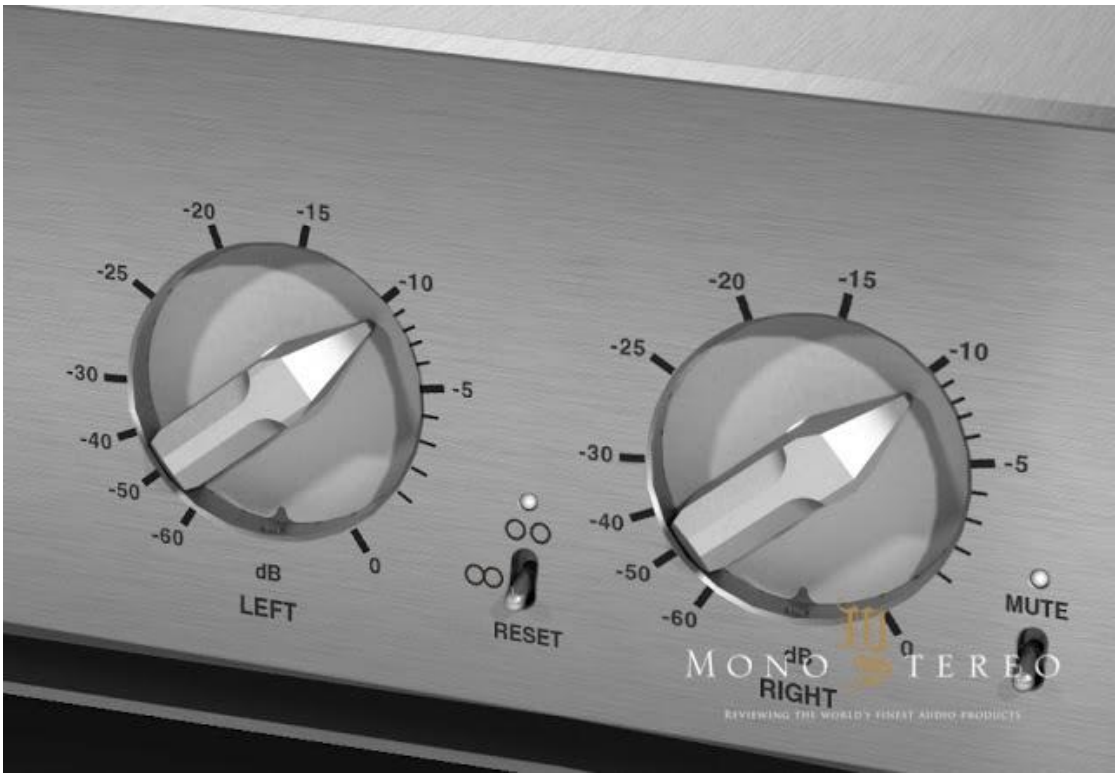
The volume of both channels is also synchronized by the microprocessor so that if one volume button is turned left or right, the other is turned at the same time in the same way. A toggle switch between the volume knobs stops the synchronization, so each knob can be turned independently to adjust the balance in steps of 0.5dB from -2.5dB to +2.5dB. When the balance is adjusted and the toggle switch is back in the sync position, the volume knobs will rotate back together again, maintaining the balance offset. Finally, when the toggle switch is pushed all the way down, the balance is reset and the volume controls are returned to the same position.

The motorized Blue Velvet potentiometers are manufactured by Alps. These components, known for their precision in pairing tracks and their reliability over time, are not used for volume control. Instead, they send a signal to the microprocessor about the position of the left and right volume buttons, so that the microprocessor can switch the windings of the output transformers by relay and adjust the gain of the Muses circuit accordingly.



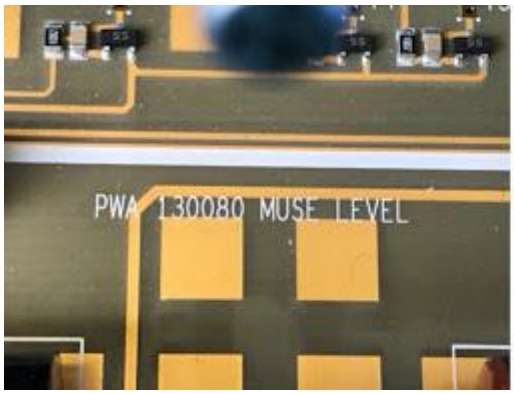
Above is a view of the mechanism at the back of the Nagra main rotary selector. The tiny motor on the left is activated when a selection is made with the remote control.

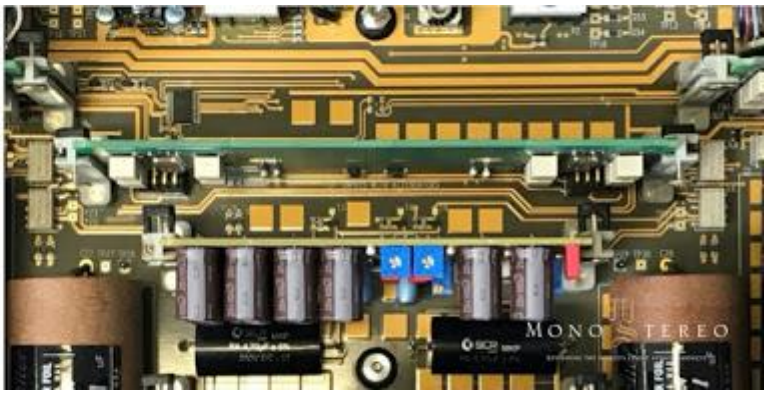
On the picture a balance offset of a few dB between the two buttons was set. The toggle switch "Reset" in the middle position causes the offset to remain the same when a knob is turned manually or with the remote control.



The volume controls on the front panel are only used to indicate how to adjust the volume on both channels. While the volume is being adjusted, an active preamplifier consisting of Muses chips and active drivers bypasses the tube-transformer circuitry until the relays have correctly switched the windings to avoid any noise when the relays are switched. I.e. when the volume is adjusted, the tube-transformer circuit plays, and when the volume is adjusted, and only during this time-lapse, the Muses preamplifier circuit plays.

In fact a very short time, as only 20 ms are needed per 0.5 dB step change. The microprocessor is the brain of the volume control. It adjusts both the winding circuitry and the Muses output level so that they are perfectly matched. When the HD preamplifier is turned on, regardless of the position of the volume control, the microprocessor reads the position of the Alps potentiometer, then sends information to the Muses chip and switches the relays for connecting the transformer windings so that the output level of the Muses chip and the output level of the transformer are always the same.





THE CHASSIS

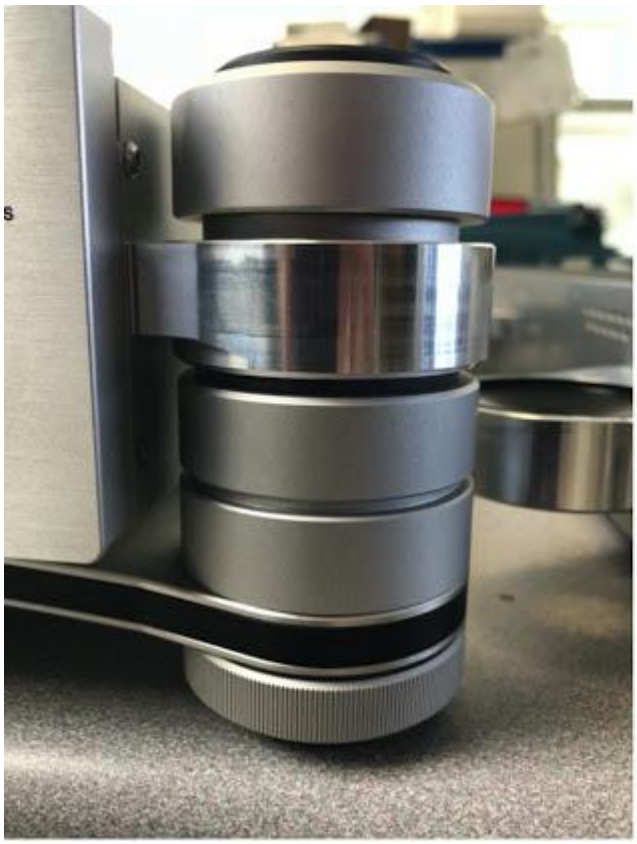
With HD PREAMP HV, no corners were cut off, and the same applies to the custom-built chassis. During my visit I saw the prototype and was introduced to the engineer who worked on it extensively. Imagine a full-time engineer working on it full time, dedicated to one aspect only...

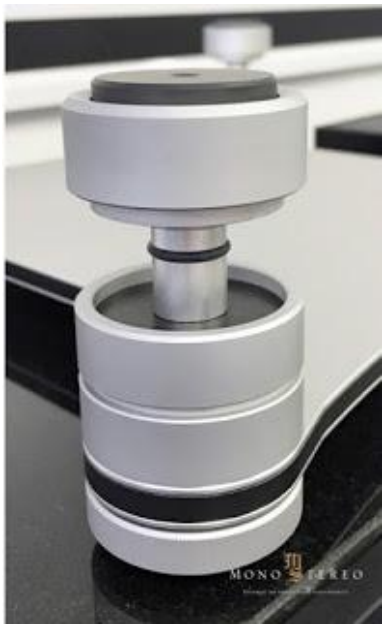
The HD PREAMP HV and HD HV PSU chassis are brand new Nagra designs designed to completely eliminate all external and internal vibrations and resonances. The starting point for their development was the Classic range and the VFS stands. Despite the good results achieved in terms of vibration and resonance control, the VFS stands lose efficiency when the load becomes too heavy, as is the case with the HD PREAMP HV and HD HV power supply. This means that the special Alpha-gel® feet of the VFS are loaded and do not properly absorb the vibrations. In addition, the aluminium plate has some resonances that could cancel out the absolute performance of the HD PREAMP HV.

From there, Nagra engineers developed a very specific concept of "floating" machines that are completely decoupled from the ground. To this end, they imagined a chassis with four "ears" that could be inserted into four heavy and rigid metal columns, one with an adjustable foot at each corner of the chassis. The ear would be mechanically isolated from the column with damping material, so that there would be no direct metal-to-metal contact between the ear and the column. And the columns would be

firmly attached to a plate such as a VFS to provide a very stable mechanical reference to the ground. Since the chassis and feet would be softly coupled thanks to the damping material between the column and the chassis, one could imagine stacking an infinite number of chassis without compromising the mechanical damping properties. And to optimise immunity to mechanical interference, the chassis would use thicker aluminium plates.

The chassis of the HD PREAMP HV and HD HV power supply are made of finely brushed, anodized aluminium plates with a thickness of 3 mm compared to the 1.5 mm of the Classic series. The 14 mm thick front panels are milled from solid block material. The rear side and the chassis are made of edged aluminium sheet. Internal additional plates make the chassis even stiffer. The "floating" system consists of several parts.





The column consists of a metal column with threaded ends for the adjustable foot at the lower end and the coupling ring at the upper end. The coupling ring tightens the ear attached to the chassis around the column. The bottom of the coupling ring and the polymer piece at the top of the ear adopt a tapered profile to allow the chassis to center itself on the column. A small rubber O-ring prevents metal-to-metal contact with the ear. The underside of the ear is placed on a large sorbothane ring whose damping properties have been determined after listening sessions. The ring with double height in the middle tightens the column to the plate that connects all four columns. Instead of just aluminum, the plate consists of a sandwich of a thick sheet of a mixture of phenolic resin and paper fibers, selected after listening sessions and, preferred to linen fibers, between two thin aluminum sheets. All plates are ordered separately and then joined together with seven screws. The screws are tightened precisely in order to distribute the mechanical loads easily so that no resonance peak occurs at certain frequencies.

The thick ring of sorbothane (left) between ear and double ring, the conical shapes of the lower side of the coupling ring (middle) and the upper side of the ear (right).

The height and horizontality of the chassis are adjusted by rotating each foot around the column. When the sorbothane ring is placed around each column (top left), the chassis is placed with the ears on the columns (top middle). Then the coupling rings are screwed on (top right) and a black hard plastic top cover is screwed over the coupling ring (left). In the middle of the cover a small hole is milled. A ceramic ball can be inserted into this hole for precise decoupling when stacking the chassis.
The picture shows the plate connecting the four columns and the seven screws used to join the aluminium and phenolic resin plates together with a precise torque.

OPERATIONAL

Like the Nagra Classic Preamp, a microprocessor board manages all functions of the preamplifier. But while the many features can be adjusted Nagra Classic Preamp via a menu to be as user-friendly as possible, the HD PREAMP HV is not so flexible. It has been designed in a minimalist way only in terms of maximum performance and unsurpassable musicality. All efforts and attention have therefore been focused on the schematic details, on the selection of components and on technical solutions, in order to obtain the most transparent and pleasant preamplifier ever produced by Nagra. Of course, user-friendliness has not been

forgotten completely, and the HD PREAMP HV is extremely easy to run every day and the basic features are assessable either manually or using the remote control supplied.

The microprocessor connects the controls to the corresponding circuits. It manages the usual functions such as input and output selection, switching of the volume relays, synchronization of the left and right volume controls, switching of the input sensitivity setting, switching of the balancing or unbalancing feature of the RCA output, switching of the ground lift of the XLR outputs, remote actions, muting of the gain stages and controls of the Nagra modulometer. It also enables the machine to be started up smoothly by delaying the high voltage on the valves for 2.5 minutes after power-up to protect them from premature wear.

Front panel

1 2 3 4 5 6 7 8 9

1. Modulometer light intensity switch. Push up for more intensity, push down for less intensity. There are 7 intensity levels.
2. Nagra Modulometer. Indicates input or output level in dB. Reference 0 dB = 1 V
3. Monitoring selection switch between input or output level
4. Left channel volume control.
5. Synchronization switch of the two volume controls, warning LED for pre-heating and channels out of balance
6. Right channel volume control
7. "Mute" switch with reminder LED
8. Selection switch between RCA or XLR outputs
9. Nagra main rotary selector

Rear panel

1 2 3 4 5

1. XLR and RCA outputs right channel
2. XLR and RCA input right channel
3. "BYPASS" XLR inputs and power supply LEMO connectors
4. XLR and RCA inputs left channel
5. XLR and RCA outputs left channel

The topology of the HD PREAMP HV circuit is single-ended or unbalanced. This means that the RCA and XLR inputs all send an unbalanced signal to the input stage. The HD PREAMP HV has six inputs. Five of them are unbalanced, i.e. two XLR and three Cinch inputs. They are managed by the entire internal circuitry and allow the preamplifier to be connected to a variety of sources. All of these inputs are floating and allow the signal to be managed pseudo-balanced until it reaches the amplifier circuit. Each input is filtered to eliminate radio magnetic interference (RMI) through a combination of inductors and capacitors.

High-quality sealed relays switch the inputs. Only the ground of the active input is connected, all others are removed from the circuit, so that no static loops with and between the inactive sources occur. The sixth, an XLR, called bypass, connects the input signal directly to the XLR outputs in a truly balanced configuration. When the bypass input and output connections are used, the preamp circuitry is completely bypassed, allowing the HD PREAMP HV to be connected to a high-end home theater processor. The bypass signal is switched even when the unit is not operating or is disconnected from the mains.

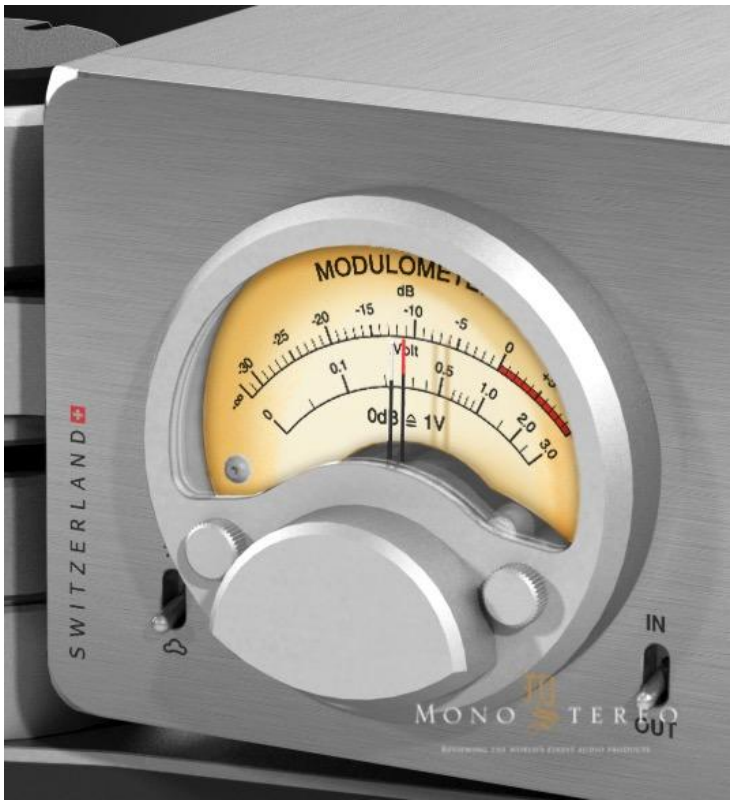
All types of sources, both digital and analog, which are likely to be connected to a preamplifier nowadays, provide a signal that can vary considerably. A signal that is too weak and the pre-amplifier does not allow the full power of the amplifier to be used. If the signal is too strong, the amplifier is driven into saturation before the volume even reaches its maximum. The HD PREAMP HV offers a solution to this problem by providing a variable input level on one RCA and two XLR inputs. A toggle switch next to the left input of RCA3 does not provide any gain (low) or adds 12dB gain (high) to RCA3 on both channels. And a toggle switch next to each left XLR input sets no gain (low), 12dB gain (high), or 10V input voltage capacity (studio level) for each XLR of both channels.

The HD PREAMP HV has five outputs, i.e. three RCA and two XLR outputs. All of them are originally unbalanced and ungrounded, since the transformer volume control output is naturally floating and is not connected to ground. Therefore all outputs, either RCA or XLR outputs, are true differential outputs. If a ground loop occurs between a RCA output of a preamplifier and a RCA input of an amplifier, noise can be generated, so using an ungrounded or balanced RCA output of the preamplifier can easily solve the problem. However, there are grounding switches on the rear panel that unbalance two of three RCA outputs and ground pin 1 of each XLR output connector.

There are only two large circuit boards mounted on the back of the HD PREAMP HV with all input and output connexions soldered directly to the board to avoid any wiring. It carries all the sealed relays that are used to switch the input and output selection, and since the topology of the circuitry is single-ended or unbalanced, it also converts any balanced signal coming into the XLR input connector to unbalanced.

Nagra modulometer

And of course, there is no full-blooded Nagra instrument without the modulometer. The HD PREAMP adopts a new modulometer, which is a duplication of the Nagra PL -P preamplifier modulometer. The two pointers show the left and right input or output level in volts and in dB, 0dB corresponds to 1V RMS. The switch on the left makes the backlight more or less intense and the switch on the right selects input or output monitoring.



The remote

As a convenience, the HD PREAMP HV comes with a remote control that offers various functions such as on/off switch, volume, mute and source selection. Using the widely used Philips RC -5 communication protocol, the unit can also be used with a multifunction remote control. Nagra has recently launched a new dedicated remote control in solid aluminum with a matching stand.

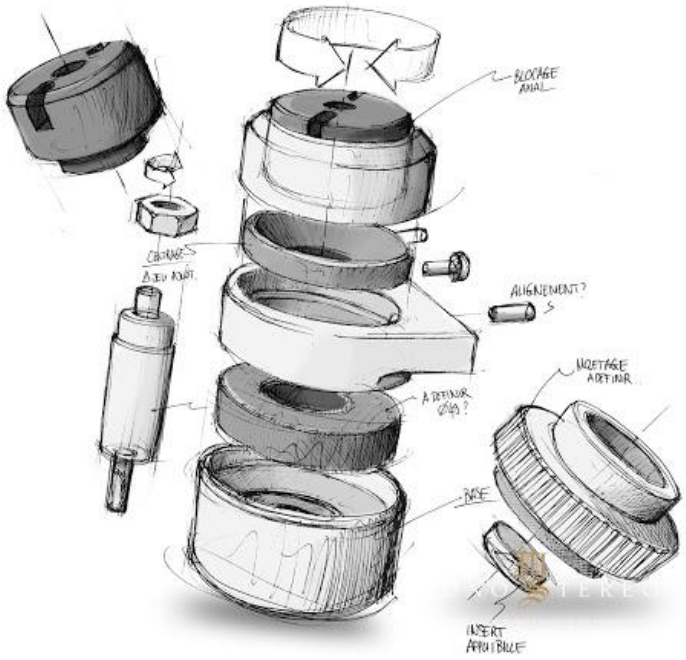
Upgradability

The Nagra HD PREAMP HV has both RCA and XLR inputs and outputs. It has been designed to be adapted to various applications. It is possible to route balanced signals through the XLR inputs by installing the optional shielded mu-metal transformer boards, available separately, to create a fully balanced floating signal. Various up and down ratios will be available. These transformers are wound internally by hand by Nagra to meet the high standards of the design specifications. It should be noted that the use of these boards is only recommended when the end user is dealing with balanced signals, i.e. with long cables between preamplifier and amplifier for example. The single-ended topology distributes all odd and even harmonics of the audio signal, whereas a balanced circuit eliminates all even harmonics and works only with odd harmonics, i.e. you have to introduce some negative feedback to get the signal back on its feet. The addition of optional components, even if their qualities are undeniable, such as Nagra transformers, must therefore be carefully analyzed and understood, otherwise it could affect the overall performance of the product.

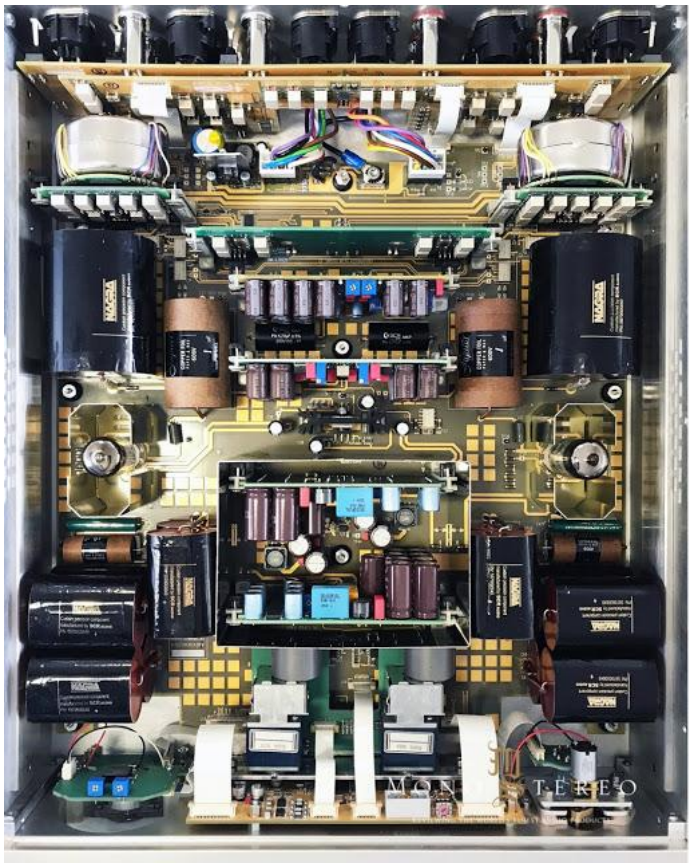
The upgrade can be factory or installed later, i.e. the machine can be retrofitted at any time.

THE SUM UP

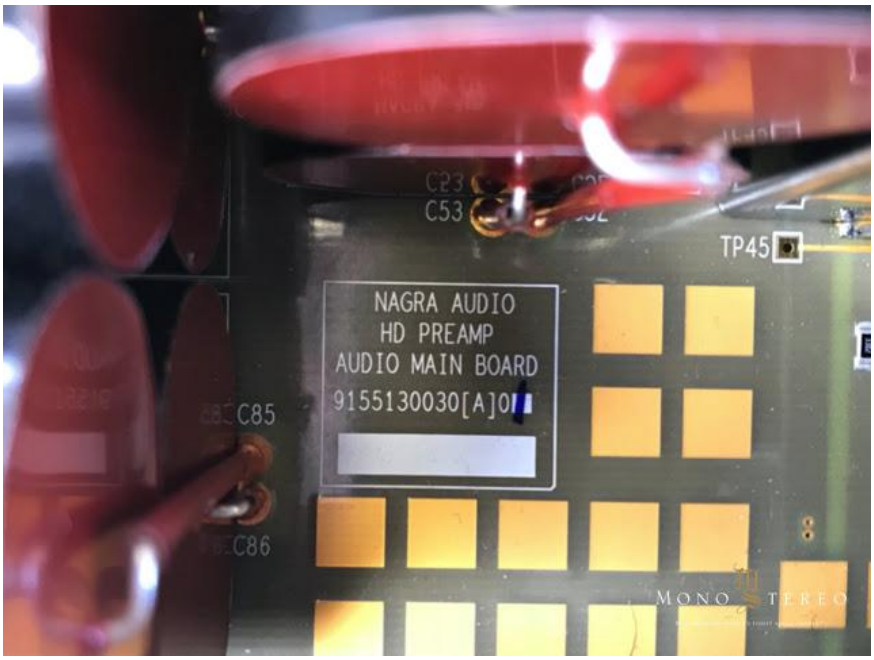
During the development of the HD PREAMP HV the aim was to achieve pure audio reproduction so that the circuits do not spoil any musical detail of the music. This means that all parts of the HD PREAMP HV required special care to ensure that no electrical noise, mechanical vibrations and mains pollution were transmitted. In order to obtain the widest possible dynamic range, attention was therefore paid to the power supply units supplied by the HD HV power supply.



All printed circuit boards are varnished, gold plated epoxy glass circuits. Two toroidal transformers provide all necessary low voltage signals, which are rectified, filtered and deeply regulated. Banks of 22000uF Rubycon high-temperature electrolytic capacitors serve as pre-filters before the voltages are routed to various circuit boards, which generate the required voltages for each circuit.



The 2-stage overall structure of the HD PREAMP HV was essentially designed according to the "wire with gain" concept, which is not so easy to implement. The input stage of each channel is built around one N.O.S JAN 6922 double triode per channel, which is surrounded by a mu-metal shielding to improve immunity against external noise. The two triodes are connected in parallel and are biased in a Class A configuration. The military specified tube was chosen for the perfect fit of the triodes inside the bulb, for its reliability and of course for its musicality. The stage acts as a buffer stage with very high input impedance and very low output impedance. The interconnected grids are coupled to the selected input via a Jupiter capacitor made of copper foil and paper in the oil DC blocker Jupiter capacitor and a small ferrite to avoid any signal HF capture. The output stage is coupled to the input stage via a custom-made SCR polypropylene capacitor. It is entrusted to a shielded Nagra toroidal transformer with several windings, which provides the voltage attenuation. The attenuation is achieved by a combination of primary and secondary windings switched by relay depending on the position of the volume knobs. The microprocessor controls the process, which results in a precise voltage ratio of the transformer at each position of the volume controls. It also receives the sensitivity information from the toggle switches on the back and adjusts the switching windings accordingly.



The ground layer is made of small gold plated squares. They screen out disturbances and radiation while they avoid static loops then prevent from hum.

All components and four printed circuit boards are injected over a unique main board. This motherboard connects all components and circuits with each other, the circuit tracks are laid out in such a way that the signals do not interfere with each other.

A large proportion of the HD PREAMP HV components were manufactured for Nagra under very strict specifications. All components along the signal path were carefully and finally selected after hours of intensive listening sessions. Only high-quality capacitors are used in the HD preamplifier, such as polypropylene capacitors specially manufactured by SCR for high-voltage decoupling and stages coupling, and paper in oil and copper foil custom made by Jupiter for grid coupling.

As far as valves are concerned, they are subject to the most stringent selection and testing. They are burn-in for 48 hours and then individually measured and sorted according to several criteria: gain, hum and vibration sensitivity (microphonic effect). At the end of the test more than 60% of them are rejected and the remaining valves are paired.

Knowing the effort, money and technical effort put into the Nagra HD PREAMP HV, the price is indeed objectively reasonable compared to some exuberantly priced preamplifiers on the market, where neither the sonic nor the technological background can be proportionally assessed.

I don't think there is a single high-end audio brand in the industry that has invested so much time and money in developing a high-end audio preamplifier.

Combined with Nagra's heritage, the result is an exceptional technical achievement, accompanied not only by an immediately recognizable and highly valuable iconic esthetic, but also by an ultra-complex but highly refined inner heart designed to reproduce music to its full potential.

In the second part, I will focus directly on the music, making the usual references to the qualities of the Nagra HD PREAMP HV and concluding the results.•

Stay tuned.

Matej Isak

THE PRICE

- $65.900

TECHNICAL SPECIFICATION

- Input impedance: > 50 K Ohms
- Output impedance: < 0.2 Ohms Volume on -15 dB
- < 40 Ohms Volume on 0
- Frequency Response: dB
- Dynamic range: > 150 dB Volume at -15 dB
- Input level for 0 dB (on modulometer): Low: 1.0 V rms Volume at 0 dB
- High: 2.0 V rms Volume at 0 dB
- Studio: 10 V rms Volume at 0 dB
- Harmonic Distorsion:
- (THD + N) See graphics FFT THD+N
- @ 1 kHz, 1 V out, no load on the output
- Crosstalk: > -130 dB 1V rms 1 kHz
- > -110 dB 1V rms 20 kHz

- Tubes: 2 x E88CC New Old Stock
- Selected and tested by Nagra
- Dimensions: 438 x 396 x 121 mm / 17.3 x 15.6 x 4.8 inches
- Weight: 30 kg / 66 lbs preamp and power supply

CONTACT

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