

CES 2010**Nagra launches its new Nagra MSA amplifier and unveils the project of an integrated 300B**

Las Vegas, USA – 7 January 2010. The Nagra MSA transistor amplifier was presented as a prototype at CES 2009. This year, it returns in its final version. The MSA is already a commercial success on market places where it is proposed.

The **Nagra MSA** casing is faithful to the distinctive look and to the aesthetic standards of the brand. The front face is equipped with the traditional Nagra iconic elements: the elegant modulometer and the large rotating selector. The size of the Nagra MSA is consistent in width and depth (275 x 230 mm without connectors) with the compactness of the PL-L, PL-P and VPS preamplifiers and the Nagra CD players family. The MSA is a stereo amplifier with 60 watts RMS output power per channel into 8 Ω ; the two channels can be parallel-bridged to reach a double mono output power of 120 watts RMS into 4 Ω .

As hinted by the generous heat sink mounted on the top of the unit – a beautifully machined single block of aluminium – the Nagra MSA amplifier achieves amazingly robust performances. A traditional endeavour at Nagra, the MSA relies on original solutions, such as the specifically designed PFC driven power supply and power output stages. These are based on a double current transfer driver stage and a pair of MOSFET transistors per channel in a common source push-pull configuration with the output on the drains. This arrangement allows comfortable operation under any situation, with no trace of instability, even when running in parallel-bridged mode, with very low impedances loads. Above all, it guarantees a transparency and neutrality that only an authentic Nagra electronics can.

Nagra is also pleased to introduce, for the privileged CES 2010 attendees, one of its latest and most coveted developments, the exclusive **Nagra 300i** stereo push-pull integrated amplifier, which in its right turn will be showcased as a prototype. Nagra engineers went out of their way to bestow totally modern attributes to this new piece of equipment and yet base it on one of the most reputed and mythical tube available, the venerable 300B, which first came about at the beginning of the 20th century! The Nagra 300i displays 20 watts RMS per channel – a remarkable feat considering the 300B characteristics – and remains steadfast when required to dive into low frequencies.

The size of the Nagra 300i also conforms to that of the compact series. It is of course furnished with all the latest features giving it the easiest of operation. A power version, called 300p will soon follow. The launch of both versions of the 300B is planned for 2011.

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About Nagra and the Kudelski Group

Nagra Audio (www.nagraaudio.com) - the audio division of the Kudelski Group - develops, manufactures and markets a prestigious range of products in the high-end high-fidelity market and a complete range of analogue and digital recorders with a firmly established reputation for quality and reliability among professional sound recordists.

The Kudelski Group (www.nagra.com) is a world leader in digital security. Its technologies are used in a wide range of applications requiring access control and rights management, whether for securing transfer of information (digital television, broadband Internet, video-on-demand, etc.) or to control and manage access of people and vehicles to sites and events. The Kudelski Group is headquartered in Cheseaux-sur-Lausanne, Switzerland.



Nagra MSA stereo transistor amplifier
Development review

1. AT THE HEART OF A PRICELESS HERITAGE

Nagra is a Swiss company that enjoys a privileged position in the audio world. In 1951, the first portable recorder that could be used in a professional environment was developed. A revolutionary device, with mechanical and electronic features of such fine quality that it forever changed the way in which sound was captured around the world. Over the years, new generations of recorders stemming from this first design, as well as other exceptional realisations have contributed to strengthen the mythical status of the brand.

Ten years ago, Nagra started developing high-end products for music enthusiasts. The extensive know-how acquired by the engineers while developing professional solutions can therefore now also be used to tackle the domestic market, which today has reached very high quality standards.

As a matter of fact, professional and high-end devices are developed and manufactured by the same team at the headquarters in Switzerland. Manufacturing workshops are shared by both product lines. This ensures that the approach is the same for all Nagra products and remains a characteristic of the brand:

- An electronic design totally focused on the preservation of the full integrity of the signal. A Nagra device stands out by virtue of its rigour and its truthfulness: it always operates as close as is possible to the original sound source. To achieve this challenge, Nagra is always on the lookout for solutions that are both rational and highly efficient at the same time, while constantly developing new ideas and innovative designs. Some essential components are impossible to find on the market if they are to stand up to Nagra quality requirements, then they are made “in-house”.
- Choice of components – electronic or mechanical – without compromise, often to military specifications, because one single weak link can jeopardize the quality of the whole product.
- High precision mechanics, praised workmanship and perfect finishing ensure robustness and reliability.

The pleasure of owning a Nagra not only springs from the knowledge that it hosts some of the finest electronics available, but also has to do with the very concrete understanding – visual and tactile – that every hand involved in the process of putting it together was a caring and highly qualified one. Many Nagra devices built during the last sixty years are still working perfectly and bring to their owners the same joy as they did on the very first day. At Nagra, the notion of planned obsolescence has never prevailed.

2. DEVELOPMENT OBJECTIVES

2.1 A judicious approach to power

The Nagra MSA stereo amplifier is the result of a two-fold development objective: to devise an electronic design capable of gracefully dealing with the vast majority of speaker systems on the market, including those that are known to be difficult to drive, and to fit it into a harmonious casing expressing the traditional design lineage of previous Nagra equipment.

The MSA displays 60 watt RMS power per channel at 8 ohms. The two channels can be parallel-bridged to reach 120 watt RMS at 4 ohms, in mono mode: in such a configuration, the output current capacity is also doubled.

Such a power range is considered by Nagra engineers to be perfectly adequate to meet the requirements of most of today's speakers, which, although much more efficient than in the past (sensitivities nowadays easily reach 92 to 95 dB), in reality reach their physical and acoustic limits way before the 60 watt boundary.

By tackling power issues in a rational way, Nagra has been able to avoid any unnecessary complexity in its amplifier circuits, which is always a good course to take when seeking maximum transparency in sound transmission. In electronics, if you want more power, you have to pay the price for it: in particular, output stages must host multiple transistors, a situation which causes unavoidable difficulties in terms of component matching, stability, energy supply, heat emission and premature ageing.

2.2 Stable performances in all situations

Speakers are more and more efficient in terms of output; however, they remain complex loads to control, often with very irregular impedance curves. Amplifiers must then deal with sudden impedance variations of great magnitude, especially in the lower frequency ranges, and this can affect the stability of the circuits.

To guarantee an unwavering handling of the sound signal under all circumstances, the power supply must be able to instantly react to an abrupt increase of the electrical current demand and still perfectly maintain stable voltage levels. To this effect, Nagra engineers have developed an advanced solution consisting of a power supply that incorporates an active power correction system, known as PFC – Power Factor Correction. This technology benefits from the vast experience of Nagra engineers, who are constantly adapting it to the evolution and the requirements of the audio world.

The MSA project development also focused on a judicious balancing of the different stages: power supply, input driving and power circuits.

At Nagra, the engineering success of an amplifier is measured by the overall balance of the circuits within it, which determine, more than the criterion of sheer power itself, an outstanding behaviour and excellent sound performances.

3. A DESCRIPTION OF THE ELECTRONICS

A new piece of Nagra equipment is rarely designed from scratch. The developments that were undertaken for generations of previous achievements often represent priceless pillars upon which new evolutions and the latest improvements are based.

The Nagra MSA can thus be considered as an evolution of the MPA amplifiers, and more recently of the PSA and PMA pyramidal amplifiers. The global topology of the circuits is mostly the same, with some in-depth improvements affecting several specific aspects.

The circuits for example were completely redrafted. New components were affected to parts where they could bring better performance.

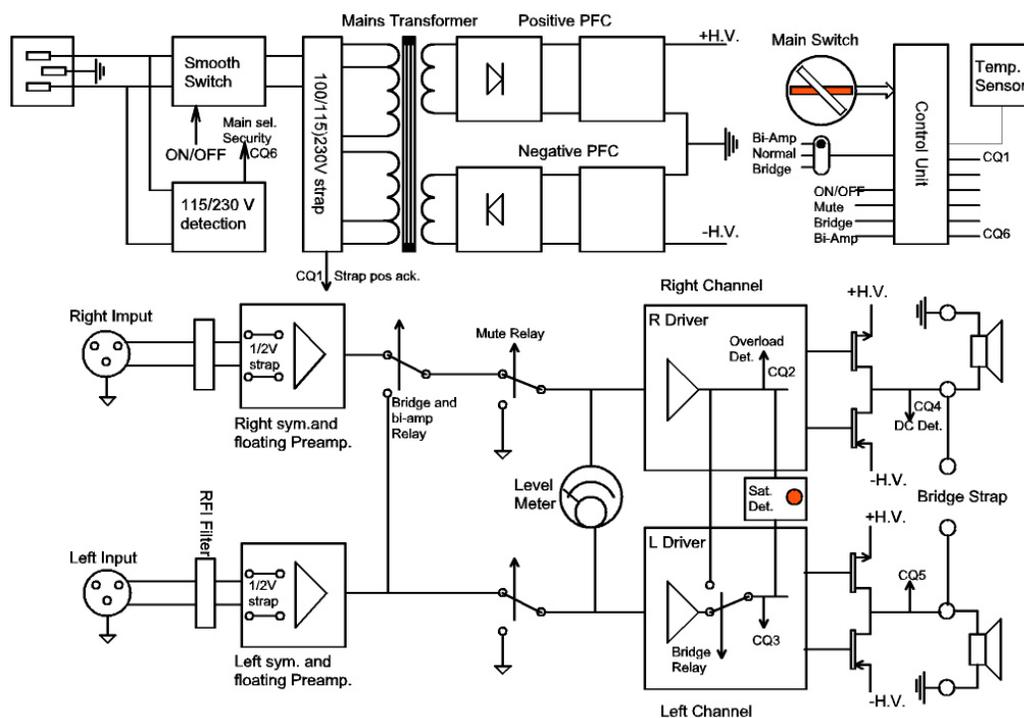
The MSA includes a mother board fixed to the bottom of the large heat sink, as well as six other secondary circuits: the input, control, power filtering, drivers, the PFC power factor correction (one board per channel) and the output connectivity circuits.

All circuits have gold-plated print on epoxy resin boards and are the result of advanced developments aimed at improving the ground planes, as well as fine-tuning the component

lay-out, in order to prevent ground loops and interference radiation. For the same reasons, the number of wired connections is reduced to the strict minimum. Supply and power transistors that need to be cooled are mounted upside-down on the mother board, which allows them to be directly fixed to the heat sink.

The mains transformer is located above the mother board on a thick metal plate that acts as both a support and as an electronic shielding.

Nagra MSA circuitry



3.1 Supply circuits

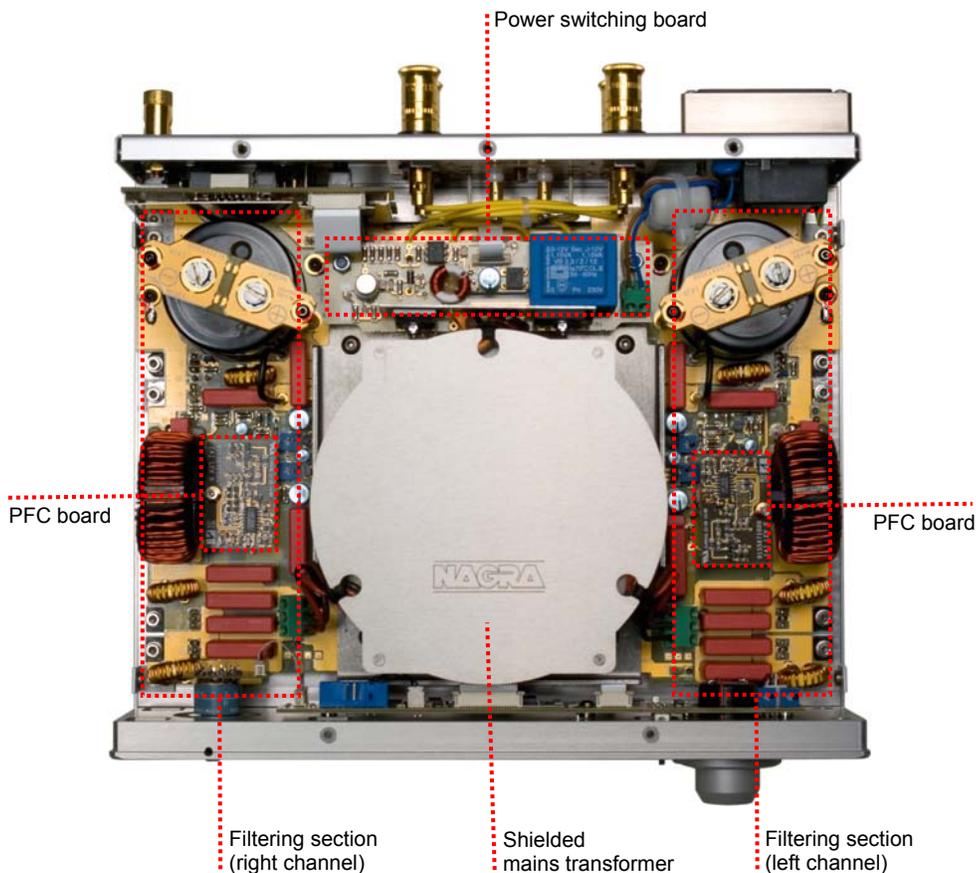
With a PFC-driven power supply, the electrical current is always kept in phase with the voltage, in a perfect sinusoidal curve, with no interfering peaks and no distortion. From the network's perspective, this type of power supply is seen as a pure resistance and it avoids polluting it: in a way it behaves as if there was electrical decoupling with the network. Another obvious advantage is the cleanness of the current that is propagated downstream to other circuits.

By precisely superimposing current and voltage, the PFC power supply generates little losses. It guarantees a very efficient energy transfer and doesn't collapse when the load increases: it is therefore capable of reacting extremely rapidly to stress situations, even paroxysmal ones, as is required by power output stages in an amplifier.

The Nagra MSA PFC power supply is built in ways that distinguish it fundamentally from other more conventional switching mode power supplies. In particular, it has no flyback

transformer and no snubber circuit, which can lead to hot-spots on the printed circuit board. Instead, it is fitted with a sizeable 200 VA toroidal transformer that reduces the voltage level to suit the power stage ($\pm 35\text{ V}$), and from which all other voltages are derived. This transformer runs at the power grid's frequency, and therefore avoids generating any residual HF noise.

The filtering section of the power supply, which takes up a good portion of the mother board's space, was also very carefully devised. The quality of the final result depends significantly on the calculations' accuracy, on the nature and the choice of the components used, as well as on their size. For example, multiple polypropylene capacitors are used, and also generously dimensioned self-inductance coils and two sturdy 84'000 μF electrolytic capacitors in the power supply output stage.

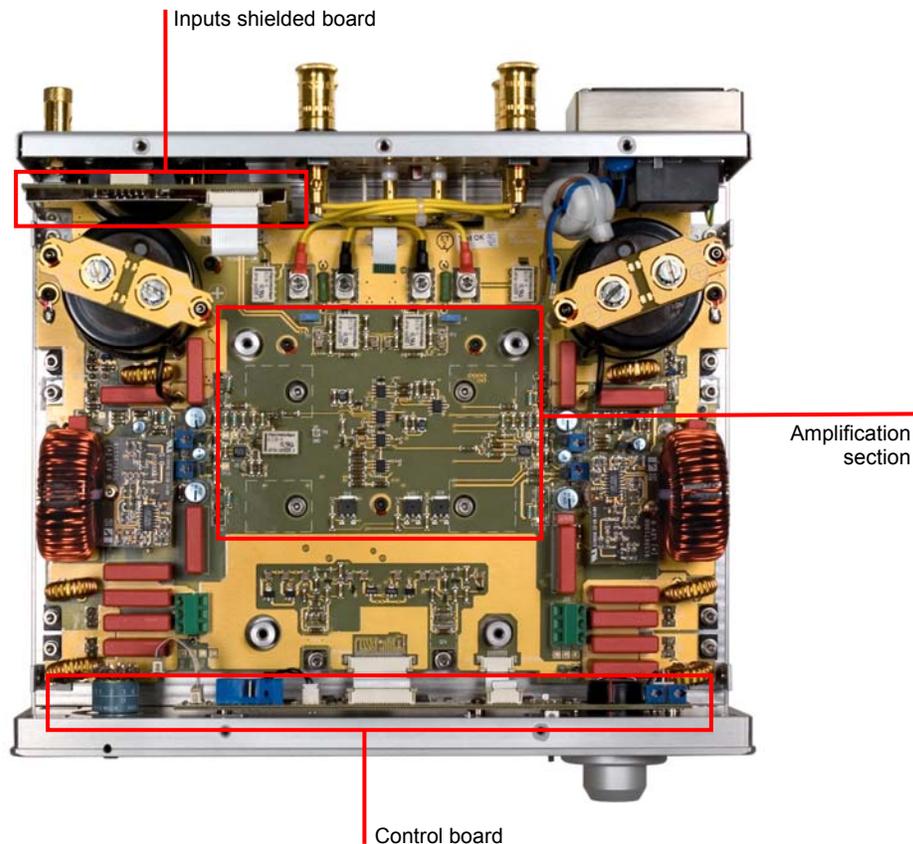


3.2 Input circuit

Snugly parked behind a μ -metal shielding plate, and fixed directly above the mother board behind the XLR connectors that are directly soldered to it, the input circuit consists of a set of high-precision and low-noise operational amplifiers, which run symmetrically.

The input circuit allows the input voltage sensitivity to be adjusted to 1 or 2 V, and to determine the mode in which the unit will work: stereo, parallel-bridged or dual mono.

It also includes a detection mechanism in charge of switching the unit on as soon as a signal reaches the input terminals and for engaging the standby mode after 15 minutes without signal. This mechanism comes into play as soon as the “automatic” mode is activated through the main selector on the front panel of the unit. In standby mode, consumption is reduced to less than 2 watts.



3.3 Amplification circuit

The amplification section takes up the central third of the mother-board. It is based on a thrifty architectural design with, as chief result, an impeccable stability while running.

The topology is unique: the driver stage is organised in what is known as a double current transfer configuration, which gives the power stage a considerable tolerance to residual ripples coming from the power supplies. It relies on a pair of AB-biased MOSFET type transistors assembled on each channel in a push-pull common source arrangement (output on the drains). These components, chosen for their excellent audio characteristics, are very carefully hand-selected. The result is so precise that the circuit requires only very little negative feedback. It allows the MSA to perform smoothly under all circumstances, with no sign of instability, even when it is running in bridged mode, with very low impedance loads. Above all, it is a true Nagra electronic ambassador, by virtue of its transparency and its integrity.

3.4 Security circuit

The Nagra MSA is equipped with all the necessary safeguards to protect it against potential problems. An appropriate array of sensors and surveillance circuits will detect, if ever needed, any over-heating or output stage overload.

As soon as an anomaly is detected, the control circuit deactivates all inputs by triggering a drop-out relay sequence and inhibits the power circuits.

The MSA also hosts a soft-start switch-on circuit that makes sure the relays only start up a few seconds after the unit is powered up, which preserves the electronics and prevents switching noise from reaching the loudspeakers.

3.5 Control circuit

Fixed immediately behind the unit's front panel, the control circuit uses a microprocessor to handle the MSA's main functions: start, stop, standby, automatic and silence modes. It also controls the security circuit and delivers the clock signal to the PFC circuits.

3.6 Output circuit

The support plate, fixed to the back of the unit's rear panel is equipped with two pairs of terminals to connect the loudspeakers, and with sockets into which the user may insert, when required, the parallel-bridging jumper for the amplification stages.

4. A DESCRIPTION OF THE MECHANICAL PARTS

4.1 Main body

The casing of the Nagra MSA amplifier is entirely made of finely brushed anodized aluminium, in true respect of the distinctive look and aesthetic standards of the brand. Its dimensions are of course adjusted so that it can blend with other members of the Nagra audio family, such as the PL-L, the PL-P and the VPS preamplifiers or the Nagra CD compact disc players. The width and the depth are identical (W x D: 275 x 230 mm without connectors), whereas the height is slightly greater (H: 115 mm) due to the hood's heat sink construction covering the top of the unit.

The heat sink itself is a complex slab of aluminium, milled from a massive aluminium block weighing 10 kg before machining and 3 kg once finished. Its construction plays a key role in stabilising the amplification stages: thanks to the strong moment of inertia of its central part, the heat sink acts as an energy storage space so that the transistors fixed to it can release their peaking capacity without fearing a sudden rise in temperature.

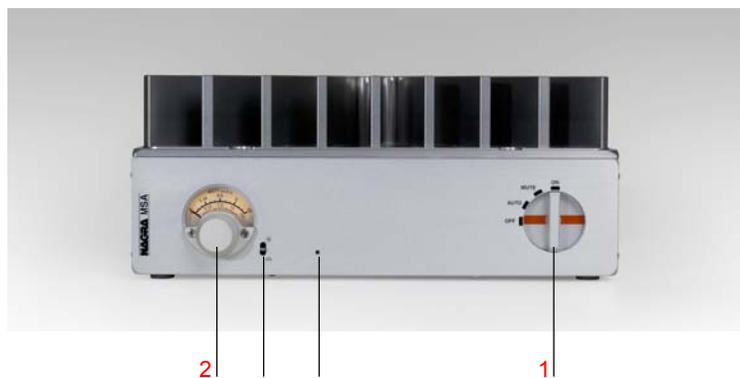
The front panel, 10 mm in thickness, is also machined from a solid block, whereas the sides and the rear panel are made from folded sheets.

4.2 Front panel

The front panel of the Nagra MSA is equipped with the brand's famous rotating selector (1) to turn the unit on and off, activate manual or automatic modes and mute the power stages.

The traditional Nagra modulometer (2), which expresses the power output levels of the amplifier, is escorted by a toggle switch (3) to illuminate the display.

Finally a small red LED (4) acts as a sentinel, should the power stages reach saturation.



4.3 Back panel

On the back panel, an independent element integrating an anti-interference RFI filter carries the mains power switch (1), the fuse holder (2) and the IEC connection slot (3) for the external power supply cable.

Available connections include two XLR symmetrical input connectors (4), two pairs of gold screw-down terminals to connect the speaker cables (5), two sockets to accommodate the parallel-bridging jumper for the power stages (6) and a gold threaded terminal (7) to enable the grounding of the unit's chassis.

The back panel also gives access to selectors to adjust the input sensitivity levels (8) (each channel can be adjusted separately) and to define the operating mode, stereo, parallel-bridged or dual-mono (9).



5. TECHNICAL SPECIFICATIONS

Amplifier class	AB
Power	2 x 60 watts RMS stereo 8 Ω , 1 V or 2 V input 1 x 120 watts RMS parallel-bridged 4 Ω
Bandwidth	10 Hz to 75 kHz, +0/-3 dB
Channel separation	>85 dB
Signal-to-noise ratio	Typically 109 dB (ASA A-weighted)
TDH+N	< 0.08 % @ 60 W
Input impedance	>100 kOhms
Automatic start	Input level >10 mV
Protection	Deactivates the amplifier when: – overheating above 60° C (140° F) – DC protection for loudspeakers above ± 2.5 V DC
Monitoring	Level indication: blue LED on front panel (can be disengaged) Clipping indication: red LED on front panel (for I>12 A or U>42V)
Input connectors	XLR balanced
Output connectors	Gold screw-down terminals (bare wires up to 4,2 mm; banana plugs; 6,35 mm spade lugs)
Operating range	90-132 V; 180-264 V, 50-60 Hz
Consumption	350 W (sine wave current draw complies with EN61000-3-2 regulation)
Size	275 x 230 x 115 mm (W x D x H), (10.8 x 9 x 4.5 inches)
Weight	10 kg (20 lbs)

Specifications subject to change without prior notice.

















MAGRA MSA





AC LINE INPUT FOR NOMINAL PERFORMANCE
100-127V - or 200-253V -
JAPAN 87-115 V -
50 - 60 Hz max. 200 W



MADE IN SWITZERLAND

SN 5501813548003

FUSE: T 3.15A L, for 250V;
T 6.3A L, for 110/115V.

