micromega

132 kHz
UPSAMPLING

ARIA

CD player

A Strong history

Since 1987 MICROMEGA has been building top loading CD players. Actually the CDF1 was the first High End audio top loading CD player to gain worldwide recognition and to be acclaimed by almost all reviewers at that time. 19 years later ARIA continues this quest for excellence.

Unique architecture.

ARIA features very unique architecture. This top loading design with its clear 15mm transparent acrylic lid is a unique object which everyone would like to possess.
The brushed milled solid aluminium front and back as well as the laser cut top cover are anodized with two possible colours: silver or black to match different taste.
Internally ARIA is a real state of the art design. The removable 2mm steel bottom plate made is the base of the player and support 3 legs for a perfect stability. The inner chassis made of CNC bended and folded steel supports all boards. The dual power supply uses a very quiet R-Core type transformer for the digital section while the analog section is powered by the ACTS® power supply. Both supplies are mechanically decoupled to prevent any transmission of vibration to the chassis. They are also shielded under a specific internal cover to avoid any magnetic interference between the supplies and the rest of the unit. A 3mm solid copper ground bar creates a 0Ω impedance ground path between the ACTS® supply and the main board where regulation takes place after the special dual smoothing inductor.

ACTS® Power Supply

ARIA benefits from the latest MICROMEGA power supply technology. A specific leaflet has been produced to cover this rather complex subject.
However it is important to put things back into perspective to try to understand why such a power supply is so important and brings so much listening benefit.
The maximum output voltage at full scale for most CD players is 2V rms. ARIA follow this rule. At the nominal resolution of 16 bit the player should be able to reproduce signals with amplitude as small as 30μV. This is VERY small and gives immediately the perspective of what we are trying to achieve.
On another end, the quality of the mains is getting worse every day and things are not going to improve as we are already transmitting data like Internet or Digital TV through the mains supply lines. These techniques will be exploited on a much larger scale in the near future. For the music lover or the audio fanatic this is a shame and creates tremendous problems with equipment where this aspect has NOT been taken into account.
We strongly believe that the **ACTS®** technology will prove its value over the years and allow audiophile to enjoy music for many more years.

The Drive mechanism: a reliable and tested solution.

For good reasons the MICROMEGA design team did not wish to innovate in this field. The undeniable success of MICROMEGA CD players as well for their sound quality as for their exemplary reliability led the designers to keep of it the playback solution which gives whole satisfaction to the level reliability, performance in time and tolerance of reading to the even damaged discs. It is thus the wisdom which prevailed.
ARIA is equipped with a Philips VAM1202 mechanism of last generation. The control of the drive mechanism is entrusted to a Philips SAA7377 IC controlled by a MICROMEGA proprietary software program whose particularly neat errors correction algorithms were dedicated to the audio reproduction whereas many CD players are optimized for CD rom reading.
Indeed, the audio CD reading is done at the nominal speed whereas in the case of CD rom one sees players active until 52x nominal speed. It is a different aspect but it is not most significant.
During the Cd rom reading, it is possible, if a train of data contains errors, to retrogress and to read again the passage then to choose the best strategy of interpolation of the errors which remain. This solution is absolutely unimaginable in audio because one tries in the event of errors to privilege the continuity of the musical message so that the listener does not realize that the player is correcting erroneous data. It is not obviously possible to stop the reading and to take again a passage several times to free itself from a stripe, of a any other element or finger mark having activated the system of errors correction.
Finally the suspension of the mechanism has been designed specifically for ARIA. A specific silicone extrusion has been designed and manufactured for ARIA. Great care was given to the tuning of the suspension resonant frequency and damping of all unwanted effects to achieve the best playability possible.
The puck, which is necessary in a top loading CD player has been designed to reach the same goal. There are different ways to address this complex problem. Generally most manufacturers are using a rather heavy puck and even sometimes a mat over the disc itself. MICROMEGA has experienced this technique in the past and we even had a specific Carbon fibre composite mat in the SOLO player. However, during the design phase of ARIA this aspect was completely reengineered and the team came up with a magnetic puck made of a rubber centre and a Plexiglas ring. The weight of this puck is as low as possible to minimize unwanted interference between the servo software and the behaviour of the turntable motor. In this case the servo software decides the ideal speed of the disc for the best data recovery. The turntable motor is not forced to a specific speed by the inertia of the puck.

The Master Clock

The Master Clock is the heart of the CD player. The quality of this particular circuit is extremely important to guarantee precise D/A conversion without negative effects caused by jitter.
ARIA master clock is a discrete design based on a fundamental 16.9344 Mhz crystal mounted in a Colpitts type Jfet oscillator followed by an ultra fast differential comparator to provide a clean and jitter free clock. One of the two outputs of the differential comparator feeds directly the D/A converter IC (AD1853). The second output feeds the SRC IC (CS8421) at the fundamental frequency and is also divided by two (8.4676 MHz) to feed the Servo-decoder IC (SAA7377) working in the best conditions at this particular frequency. The power supply section of the master clock has been designed to remove any glitch from the supply lines and to provide the master clock an absolutely clean power, unique condition for low jitter operation.

The 132kHz up sampling: listening rather than the figures

For some time, many players arrive on the market equipped with this technique commonly called SRC. These three letters, **S**ample **R**ate **C**onverter seem magic and the manufacturers quickly made adopt this technique allowing them to make gleam figures and having often thanks to the eyes of the consumers. And listening in all that? Before detailing the reasons of the choice towards which directed itself the MICROMEGA team, it is advisable to explain a little, without being too theoretical, the operation of a SRC and the reasons which prevailed with the development of this type of component.
With the advent of the digital techniques in the professional audio field, it quickly appeared necessary to convert signals having different sampling rates. The most outstanding example is that of the difference in sampling rate between the DAT and CD. First is sampled with 48 kHz and the second with 44.1 kHz. Other frequencies seemed since 32 kHz for the digital radio, then 96 kHz and more recently 192 kHz with the DVD Audio. It is thus significant to have a footbridge which makes it possible to convert in any direction a sampling rate towards another. It is what one calls ASRC **S**ample **R**ate **C**onverter or asynchronous sampling frequency converter. The asynchronous word means that the sampling rates that one will convert are not multiples between them. Thus one will be able to convert a sampled signal with 44.1 kHz into sampled signal with 96kHz and even with 192kHz.
Obviously at first glance, that seems fantastic but while digging a little one realizes quickly that the disadvantages take precedence over the advantages and that despite of the figures which can mislead a neophyte, it is not the best solution. Indeed, to convert 2 frequencies, which are not multiples between them, it is necessary to have 2 clocks. The first clock is a multiple of the first frequency and the second a multiple of the second. The circuit will operate multiplications then round-offs until arriving to its ends. However, the two clocks will create problems of beat which will be extremely difficult to suppress and which will have inevitably reflected harmful on the quality of the musical message.
All these reasons prevailed and it is towards a SYNCHRONEOUS conversion that the MICROMEGA team turned itself. While choosing the frequency of 132.3 kHz is 3 x 44.1 kHz, MICROMEGA succeeded in taking advantage from the undeniable advantages of the sampling rate conversion without having to pay heavy the tribe of asynchronism. The ratio of 3 between the two frequencies was intentionally selected according to long hours of listening which proved that an odd order had advantages on an even order.
This system thus makes it possible to have only one clock for the two frequencies since those are multiple between them. This clock can thus be the subject of the greatest care, in particular on the sound level of phase and its spectral distribution, factor determining in the quality of reproduction. The choice went towards a specific design as mentioned earlier. The frequency chosen for this clock is of 16.9344MHz is 128 times the final sampling frequency of 132.3 kHz.
In addition, the SRC makes it possible to exploit the current digital-analog converters as well as possible. Indeed, it is wise to recall that the original resolution of CD is of 16 bits. To in no case this native resolution could not be increased, on the other hand the SRC represent an ideal interface between the audio data formatting circuit and the digital-analog converter. The formatting circuit exports its data with 44.1 kHz with words of 16 bits length.
All the modern digital-analog converters accept in input words of 24 bits and this in particular since the arrival of the DVD. If the resolution of CD remains of 16bits the SRC will transform its word length into 24bits and internal oversampling with the SRC will make it possible to benefit as well as possible from the capacities of digital-analog converter.

Digital-analog conversion: AD1853 the summit

ARIA calls upon the best dedicated digital-analog converter currently existing. The choice was made on the Analog Devices AD1853 whose performances remain unequalled to date. This converter with its dynamics of 116dB, his signal to noise ratio of 116dB and its THD+ Noise < -104dB is the ideal complement of the CS8421 chosen for ARIA. The ACTS® power supply with precise tracking regulators ensures a total immunity to external disturbances and feeds each amplifier with an absolutely clean supply free from any noise.
The local decoupling carried out starting from capacitors with very low inductance and very low series resistance guarantee the integrity of the data for the analog stages.

Digital-analog conversion: AD1853 the summit (following)

The signals coming from the CS8421 enter the AD1853 at 132.3 kHz. They are converted internally and over sampled in a digital filter whose out of band rejection is higher than 100 dB pushing far away from the audio band the first images of the digital filter. That allows having analog filters of low order while minimizing the quantity of energy transmitted outside of the band. The pcb layout, carried out with the means of the most modern software, is optimized to take into account the extraordinary possibilities of the components chosen for which the least error of design treats to cash as well on the level measurements as of listening.
The AD1853 differential mode current outputs make it possible to develop the intrinsic dynamics of the signal by designing IV conversion stages to the height of the ambitions of the project.
In the spirit by what precedes, it was necessary to design current to voltage conversion stages not calling into question the performances of the other components. The choice was difficult because, the specialists know it well, measurements and listening always do not go hand in hand and there remains an empirical part where the experiment in the audio field is essential.
IV conversion calls upon Jfet operational very critical for the final result. It was in the same way for the choice of the passive components. Certain resistors in critical points of the circuit required long hours of listening to reach the expected result. All the capacitors used in the output filters are polypropylene film type with very tight tolerances to maintain a perfect coherence during production. Although smd components are often denied by the most extreme purists, once again the experiment proved that it is not that simple and it is advisable to be wary of short cuts often very reducing. Each technology has its advantages and disadvantages but it is clear that when one operates with frequencies of clock like those of the ARIA, smd components represents an undeniable advantage to maintain the integrity of the signal at distances which must be shortest possible.
Lastly, the type of alignment of the analog output filters does not owe anything randomly and the use of a third order Bessel filter appeared like giving the best results. The cut-off frequency was placed at 75kHz, well beyond the audio band, guaranteeing a perfectly linear phase from 20Hz to 20kHz and a constant group delay on all the band. Balanced and unbalanced outputs are available and the Digital output, when unused, can be switched off for better signal integrity

ARIA TECHNICAL CARACTERISTICS.

CD Mechanism	VAM1202
Servo Decoder IC	SAA7377
Servo technology	Digital
Native sampling frequency	44.1kHz
Native resolution	16 bits
SRC conversion type	Synchroneous
Final sampling frequency (3x)	132.3 kHz
Final resolution	24 bits
SRC dynamic range	144dB à1kHz
Digital to Analog converter	AD1853
D/A conversion type	Multibit Σ Δ
Analog filter	Bessel 3rd order
Cut-off frequency	75kHz –3dB
Bandwidth (± 0.1dB)	DC – 20kHz
Linearity at –100dB	< 0.5dB
Signal to Noise ratio + THD	< -100dB à1kHz
Crosstalk	> 100dB à 1kHz
Output impedance	< 600 Ω
Output level	2V RMS / 0dB

Power Supply

Power consumption	30 W
Fuses	T 160mA / 250V (slow-blow) T 315mA / 130V (slow-blow)

Dimensions: (W x D x H mm)	330 x 300 x 100
Weight	8.0 kg

MICROMEGA S.A 4, rue Vermont 78700 Conflans Sainte Honorine FRANCE
Tel: +331 3490 2500 Fax: +331 3919 8323 E-mail: info@micromega-hifi.com Internet: www.micromega-hifi.com