HD audio MICROMEGA

CD30

The heritage of CD10 and CD20

CD30 is the top model of this Cd player range. It shares much functionality with CD10 and CD20 whose sound qualities and exemplary reliability made of these products best sellers in their category. MICROMEGA had in heart to develop a CD player whose performances would be exceptional while preserving a quality-price ratio without equivalent.

The chassis

Entirely metal, the frame has the role to bring a stable and rigid base to the CD mechanism and to protect its electronic circuits against the external disturbances as well electromagnetic as high frequency of which we today are largely surrounded. The aluminum front panel gives to this unit and all those of the range a class impressed of sobriety where minimalism and user-friendliness cohabit harmoniously. The blue 10 characters dot matrix display, driven by MICROMEGA software, gives access to all information necessary in real time. The aluminum anodized top cover and whose color Black or Silver and finish harmonizes themselves perfectly with the brushing of the front panel gives to the product an incomparable distinction.

Power supply: the lungs of the player

Like all the players, CD20 depends for his power supply on the user's mains supply. This source is polluted unfortunately more and more in particular since the advent of the switched mode power supplies which supply the computers but also considerable consumer electronics units like the television sets, the DVD players, the video tape recorders, and the satellites receiver among so much of others. All these power supplies, even if they comply with CE standard, supposed to prevent any entering or outgoing disturbance, emit towards the mains parasites and high frequency signals likely to disturb the reproduction of the units, and this more especially as the latter are powerful. If that can seem paradoxical, it is advisable to recall that the maximum signal of output of a Cd player is of 2V RMS thus that the signal more the low which must be capable to reproduce a player is about 30microvolts. That gives an idea of the scale of the things about which we speak. The transformer of CD20 is of R-Core type for the digital section. These very particular models show very interesting mains disturbances filtering characteristics. In comparison with the toroidal transformers whose band-width is broad, the R-Core transformers have, by construction, a very narrow band-width making their use ideal when the request for current is low. The digital power supply provides the current necessary to the drive mechanics, the servo and decoding circuits and all the section of the user interface. To generate the specific voltage to the VFD display used in CD20, it is called upon a specific winding making it possible to isolate the power supply from this element whose purists know well the negative effects on the very high level musical reproduction. In addition, of the linear regulators with strong rejection guarantee to the whole of the digital elements a power supply free from noise. For the analog section, CD20 benefits from the latest MICROMEGA **ACTS®** 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. CD20 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

The MICROMEGA did wish to innovate in this field and this for good reasons. With the success of DVD, DVD drive mechanisms are produced in very large quantities and with extreme quality control inherent to mass production. It is thus the wisdom which prevailed and CD20 is equipped with last generation DVD mechanism SONY KHM313 or SANYO SFH850. The control of mechanism is entrusted to a circuit Philips SAA78247 controlled by a MICROMEGA software program whose particularly neat errors correction algorithms were dedicated to the audio reproduction whereas many Cd players are optimized at the present time for the 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. One thus sees at which point it is significant to adopt a strategy specific to the audio reading and why the MICROMEGA team invested as much energy and time in the development of the solution most appropriate to the musical reproduction.

132kHz oversampling: listening rather than figures

For some time, a many players arrive on the market equipped with this technique if enticing on paper and commonly called SRC. These three letters, Sample Rate Converter 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 44.1kHz. Other frequencies seemed since 32kHz 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 Sample Rate Converter 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 192 kHz. 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 synchronous conversion that the MICROMEGA team turned itself. While choosing the frequency of 132.3 kHz is 3x 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 component whose jitter is lower than 1ps on a range of 1 kHz for any frequency lower than 52 MHz. The frequency chosen for this clock is of 16.9344 MHz 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.

The Digital to Analogue conversion: AD1853

CD10 calls upon the one of the best dedicated digital-analog converters currently existing. The choice was made on the Analog Devices AD1853 whose price ratio remains unequalled. This converter with its dynamics of 110dB, his signal to noise ratio of 112dB and its THD+Noise figure < -100dB is the ideal converter to treat most accurately possible the signals coming from the SAA7824. The power supply with constant current source and shunt regulators ensures a total immunity the external disturbances. 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. The signals resulting from the SAA7824 enter the AD1853 at 44.1kHz. They are internally converted and oversampled 8 times in a digital filter whose out of band rejection is higher than 115 dB pushing back very far from the audio band the first images of the digital filters. That makes it possible to have analog filters of a relatively low order while minimizing the energy transmitted out of the band. The design of the printed circuit is of primary importance and the Micromega team put all her know-how in this design which represented a challenge in more than one way. The circuit, 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 is paid cash as well on the level measurements as of listening.
The current outputs in differential mode of the AD1853 make it possible to preserve the intrinsic dynamics of the signal and to reject in common mode the disturbing signals which could have affected the signal. Despite everything the precautions taken on the level of the layout, it may be that at certain times of the external phenomena come to influence the signal and the differential mode proves at this time there of a rare effectiveness. Indeed, the principle of the differential mode consists in conveying a signal in two separate branches of which one is in opposition of phase with the other. If a disturbance comes to affect the signal it will affect in phase the two branches simultaneously. When the differentiation comes to make the difference between the two signals, this disturbance will be cancelled in fact. It is what it is agreed to call in technical jargon the common mode. One can thus affirm that a differential signal saves 6dB of dynamics and rejects completely, in the measurement of the factor of rejection of common mode of the differentiator, any signal in common mode. One often speaks about symmetrical connections which were invented in the past in the professional field to transmit low level signals such as for example the signals of the microphones and to free itself from the ambient disturbances and in particular from the radiation of the mains cables at 50Hz.

The analogue stages

In the spirit by what precedes, the differentiating stages were to be within 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. Although smd components often rejected by the most extreme purists, once again the experiment proved that it is not also simple and that 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 signals of very low amplitude, the shortest way is often the best and smd components allow a substantial saving in space which in our case proves to be essential. Lastly, the type of alignment of the analog filters of output does not owe anything randomly and the use of filter of third order Bessel appeared that giving the best results. The frequency cut-off was placed at 75kHz well beyond the audio band guaranteeing a perfectly linear phase from20Hz to 20kHz and a constant group delay on the full audio band. The last pole of this alignment was voluntarily selected as passive element in series with the signal in order to reject all the high frequency residues which could have passed through the net however quite narrow. The output signal is free from any DC component by adoption of a specific circuit allowing a low impedance connection without having recourse to a coupling capacitor which very often must be electrolytic to be freed from the low impedances of load that the inputs of certain amplifiers can represent. Finally a high-speed detection circuit of presence or absence of ac power supply, avoids CD30 to emit dc bursts with the powering on or in the event of abrupt mains interruption.

Conclusion: Challenge reached

To carry out a Cd player at a reasonable price is not easy thing when one aspires to address the tops of the musical reproduction most faithful and most transparent possible. CD30 reaches that point admirably and the thousands of owners of this model do not tare praises in its connection.

TECHNICAL CHARACTERISTICS

Drive mechanism	SONY KHM 313 ou SANYO SFH 850
Servo IC	SAA7824
Servo technology	Digital
SRC IC	CS8421
Native sampling frequency	44.1kHz
SRC sampling frequency	132.3kHz
Native resolution	16 bits
SRC resolution	24 bits
Digital to analogue converter IC	AD1853
Digital filter	Internal to AD1853
Oversampling factor	8x
Digital to analogue conversion type	Multibit Σ Δ
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	25 W
Fuse	T 160mA / 250V (Slow blow) T 315mA / 130V (Slow blow)

Dimensions : (L x P x H mm)	430 x 265 x 69
Weight	4.5 kg

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