



MICROMEGA

CD10

The heritage of the CD range

CD10 is the first in a range of CD players which are widely recognized as being best sellers in their category due to their excellent sound quality and first class reliability. At MICROMEGA we set our heart on developing a CD player whose performances would be exceptional while maintaining unbeatable value for money.

The chassis

Made entirely out of metal, the frame's role is to provide a stable and rigid base for the CD mechanism. It also protects the CD's electronic circuits against external electromagnetic disturbances and high frequency exposure, which are very common in today's environment. The aluminum front panel adds a special touch to all of the models of this range, providing an impression of elegant soberness, where minimalism and user-friendliness combine harmoniously. The blue 10 character dot matrix display, driven by MICROMEGA software, displays all necessary information in real time. The aluminum anodized top cover, which comes in either black or silver, matches the front panel perfectly. The brushed effect of the front panel gives the product an unrivalled distinctive touch.

The power supply

Like all the players, CD10 depends on the user's mains source for its power supply. Unfortunately this source is increasingly subject to interference, especially since the arrival of switching mode power supplies used by computers as well as by numerous other consumer electronics goods, for example TV sets, DVD players, video tape recorders, and satellite devices among others. All these power supplies, even if according to CE standard, they are supposed to prevent any input or output disturbance, emit towards the mains high frequency signals likely to disturb the CD's musical reproduction. The effect is more significant the more powerful the device is. If that seems paradoxical, it should be kept in mind that the maximum output signal of a CD player is 2V RMS; therefore the weakest signal that a CD player must be capable of reproducing is about 30 micro-volts. That gives a good idea of the scale of what we are talking about. The CD10's transformer is an R-Core type. These very specific models have very interesting characteristics from the point of view of mains interference filtering. Contrary to toroidal transformers, which have a very broad bandwidth, R-Core transformers, due to the way there are made, have a very narrow bandwidth. This makes them the ideal choice when the current requirement is moderate. CD10 is equipped with a linear power supply made up of several distinct sections in order to avoid the problems of cross talk from the power supply, in particular between the digital and analog sections. The digital power supply provides the necessary current to the drive mechanism, the feedback circuits and to all of the user interface section. In addition, linear regulators with high power supply rejection guarantee a perfectly noise-free power supply for all of the digital elements. As for the analog section, it requires a very different technique. After rectification and filtering, the regulation of the analog power supply is carried out by a very sophisticated circuit, which calls upon high impedance, low noise power, combined with tracking regulators. The rejection level of this power supply is higher than 100dB and this from 20Hz to 20 kHz. The digital section of the digital-analog converter features a constant power source and a shunt type, very low noise regulator.

The drive mechanism

The MICROMEGA team's wish was to be innovative in this field and to use a DVD mechanism; this was for very good reasons. Due to the success of DVD, DVD mechanisms produced today are of top, reliable quality, simply because they are mass produced and therefore subject to extremely tough quality control procedures inherent to mass production. It is for this reason that we took the wise decision to equip the CD10 with the latest generation SONY KHM313 or SANYO SFH850 DVD mechanism. The mechanism control is ensured by a Philips SAA78247 circuit and a MICROMEGA proprietary software program featuring error correction algorithms which are particularly efficient and designed for audio reproduction. At present and in many cases, CD players are optimized to read CD ROM. Indeed, audio CD is read at nominal speed, whereas in the case of CD ROM, some players reach up to 52 times nominal speed. It's a different aspect but it is not the most significant. When reading CD ROM, it is possible, if a batch of data contains errors, to go back and to re-read the passage, before choosing the best remaining error interpolation strategy. This solution is absolutely unthinkable in audio terms, because in the event of errors the aim is to privilege continuity of the musical message so that the listener doesn't realize that the player is correcting inaccurate data. Obviously, it's impossible to stop the reading and to repeat a passage several times to remove a scratch, a finger mark or anything else which could have triggered the error correction system. In light of this, we can see how important it is to adopt a specific strategy to audio reading and why the MICROMEGA team invested so much energy and time into developing the most appropriate solution in terms of musical reproduction.

Digital to analog conversion: AD1853

CD10 calls upon one of the best dedicated digital-analog converters currently available. We chose the Analog Devices AD1853 because of its unbeatable value for money. This converter with its dynamics of 110dB, its signal to noise ratio of 112dB and its THD + Noise figure of $< -100\text{dB}$ is the ideal converter for treating signals from the SAA7824 as accurately as possible. The power supply with constant current source and shunt regulators ensures total immunity from external disturbances. The local decoupling ensured by very low inductance, very low series resistance capacitors, guarantees better signal integrity for the analog stages. The signals generated by the SAA7824 enter the AD1853 at 44.1 kHz. They are converted internally and oversampled 8 times in a digital filter whose out of band rejection is higher than 115 dB, pushing very far back 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 critically important and the MICROMEGA team put all its know-how into this part, which represented a challenge in more ways than one. The circuit, which was designed using the most modern software, is optimized to take into account the extraordinary possibilities of the selected components. Any design error can be costly, both in terms of measurements and listening quality. The AD1853's current outputs in differential mode enable it to preserve the intrinsic dynamics of the signal and to reject in common mode any disturbance which could have affected the signal. Despite all the precautions taken in terms of the layout, it may be that at certain times some external phenomena affect the signal. In this particular case, the differential mode proves to be extremely effective. Indeed, the principle of differential mode consists of conveying a signal in two separate branches, one of which is in opposite phase to the other. If a disturbance affects the signal it will simultaneously affect the phase of the two branches. When the differentiator comes into play between the two signals, this disturbance will be totally cancelled. It is what we call in technical jargon *the common mode*. Therefore, we can affirm that a differential signal saves 6 dB of dynamics and totally rejects any signal in common mode, taking into account the differentiator's common mode rejection factor. A subject often discussed is that of symmetrical

connections. These were invented in the past in the professional field to transmit low level signals such as microphone signals, to eliminate ambient disturbances and in particular, hum due to mains cable radiation at 50 Hz.

The analog stages

Bearing in mind what has been previously discussed, the differentiating stages had to be as equally efficient as the other component's performances. The choice was difficult because, as specialists know well, measurements and listening do not always go hand in hand; there is always an empirical part which remains and experience in the audio field is thus essential. Although SMD components are often rejected by the most extreme purists, once again experience proved that it is not as simple as that. You have to be wary of taking shortcuts as they often turn out to be very limiting. Each technology has its advantages and disadvantages, but it is clear that when working with signals of very low amplitude, the simplest way is often the best and SMD components do allow a substantial saving in space, which in our case is essential. Finally, the type of alignment of the analog output filters was not left to chance and the choice of a third-order Bessel filter turned out to produce the best results. The frequency cut-off was placed at 75 kHz, well beyond the audio band guaranteeing a perfectly linear phase from 20 Hz to 20 kHz and a constant group delay on the full audio band. For the last pole of this alignment, we deliberately selected a passive element in series with the signal in order to reject all high frequency residues which could have slipped through even the tightest of nets. The output signal is free from any DC component due to the use of a specific circuit, which allows a low impedance connection without resorting to a coupling capacitor. Very often this capacitor has to be electrolytic in order to eliminate low load impedance which is characteristic of certain amplifier inputs. Finally, a high-speed circuit which detects presence or absence of AC power supply sends the signal to the CD10 to emit DC bursts when switched on or in the event of sudden mains cut off.

Conclusion: A challenge achieved

To produce a CD player at a reasonable price is not easy when your aim is to achieve the highest level of musical reproduction, which is as faithful and transparent as possible. CD10 reaches that point admirably and the thousands of owners of this model are only full of praise. For once you can rightly appreciate the positive effects of a rumor. CD10 will make you love music.

TECHNICAL CHARACTERISTICS

Drive mechanism	SONY KHM 313 or SANYO SFH 850
Servo IC	SAA7824
Servo technology	Digital
Native sampling frequency	44.1 kHz
Native resolution	16 bits
Digital to analog converter IC	AD1853
Digital filter	Internal to AD1853
Oversampling factor	8x
Digital to analog conversion type	Multi-bit $\Sigma \Delta$
Bandwidth (± 0.1 dB)	DC – 20 kHz
Linearity at -100 dB	0.5 dB
Signal to Noise ratio + THD	< -100dB to 1 kHz
Crosstalk	> 100dB to 1 kHz
Output impedance	< 600 Ω
Output level	2V RMS / 0 dB

Power supply

Power consumption	11 W
	Fuse T 160mA / 250V (Slow blow)
	T 315mA / 130V (Slow blow)

Dimensions: (W x D x H mm) 430 x 265 x 69

Weight: 3.5 kg

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