CD player - PULSAR CD 1210 R

The **CD 1210 R** employs a fully programmable signal processor (DSP) which can process digital signals in any conceivable way. For this reason it produces better oversampling characteristics than are possible otherwise using ready-made commercially available chips.

Commercial oversampling filters are invariably designed to produce as flat a frequency response as possible, without taking into account time-related characteristics, i.e. those concerning transient response. The inevitable result is long pre- and post-echoes which can seriously distort the listener's perception of the music - especially where peak signals are concerned.

Different types of filter - known as polynomial filters - are now available which exhibit perfect transient signal handling. Unfortunately these filters show a slight drop in treble response at 20 kHz. The **CD 1210 R** makes use of one class of these filters - **BEZIER** polynomial filters - combined with an **IIR** filter in a three-stage oversampling process.

The result is a filter which produces no pre-echoes. The human ear is particularly sensitive to pre-echoes for two reasons: on the one hand they never occur at all under natural conditions, and on the other they are not masked by the main signal - as is the case with post-echoes. This filter also has a flat frequency response, which is a considerable improvement over other polynomial filters (e.g. cubic splines).

Since filters of such refinement cannot be purchased ready-made, the **CD 1210 R** utilises a digital signal processor to fulfil this purpose.

Since the signal processor is completely programmable the **CD 1210 R** is not tied to a particular filter type. As a result we have been able to give the machine a total of five different filter types, each with a different sound character, ranging from the classic **long FIR** filter to the **BEZIER filter**, with **short FIR** filters between the two.

Each of these filters can be activated directly via its own button on the machine's front panel

Internal view of the **CD 1210 R**

Connection elements

Analog Out The analogue output of the CD player supplies a fixed-level

	output signal. It is designed for connection to a pre-amplifier, integrated amplifier or receiver with its own volume control
Digital Out	Optical digital output for connection to an external digital/analogue converter. Optional co-axial digital output.
RC IN	RC input socket for connection to an "R"-series pre-amplifier, integrated amplifier or receiver.
R-Link	Interface for future system expansions

Standard-filter (long FIR-filter)

The long **FIR**-filter is the standard oversampling filter used in digital technology. Advantages: Extremely linear frequency response in the audible range, very high stop band attenuation, linear phase, constant group delay.

Filter 1 (short FIR-filter)

The short **FIR**-filter has similar characteristics to the long **FIR** filter, but very much lower coefficient (160) and consequently considerably lower pre- and post-echoes. Advantages: Extremely linear frequency response in the audible range, high stop band attenuation, linear phase, constant group delay.

Filter 2 (IIR-filter)

This filter is a classic 8th order **IIR**-filter. It exhibits absolutely no pre-echo effects, albeit a slight tendency to post-echo. This is also a feature of natural instruments, and in any case the post-echo is usually masked by the normal audible signal. Advantages: No pre-echo at all, no treble loss, very high stop band attenuation.

Filter 3 (Bezier- / IIR-filter)

This combination circuit consists of three cascaded filters: a Bezier filter, an IIR filter and a second Bezier filter. It represents a good compromise between transient response and frequency response. Advantages: Virtually no pre-echo, minimal post-echo (in masking range), relatively flat frequency response, no pronounced treble loss.

Filter 4 (Bezier filter)

The **Bezier**-filter is the ideal filter in terms of transient response, virtually no pre- or post-echo, linear phase, slight treble roll-off at 20 kHz. Advantages: Optimum transient response, linear phase, constant group delay.

Specifications

Mechanism	Professional, close-tolerance linear disc mechanism with triple-beam LDGU optics, 780 mm semi-conductor laser, 2 mW power
Wow and flutter	Quartz-controlled, not measurable
Mechanical construction	Rigid all-metal case, shielded sub-assemblies, vibration de-coupled
Digital filters	Freely programmable signal processor with four different filter types, 8-times oversampling and 56-bit resolution, FIR short, FIR lang, IIR Bezier, Bezier IIR filters
D/A converter type	Double differential mode. Two 1-bit Sigma-Delta converters with 256-times oversampling

Noise shaping	4th order (ZSNS)
Analogue filter	Phase-linear Bessel filter
	3rd order with 60 kHz limit frequency
Frequency response	2 Hz – 20 kHz
Distortion / intermodulation	< 0,002 %
Effective system dynamics	97 dB
Signal: noise ratio (A-weighted)	109 dB
Signal: noise ratio (unweighted)	106 dB
Channel separation 1 kHz / 10 kHz	106 / 100 dB
Digital output	Data format SP-DIF
	1 x opto = 660 nm / -18 dBm
	optional:1 x coax = 0,5 V / 75 Ohms
Analogue output	nominal 2,6 V eff, 22 Ohms
Dimensions	7,5 x 44 x 39 cm
Weight	8 kg
Colours	Black (9005), silver aluminium, Chrome (Non-standard version)
Remote control	Via R system or as non-standard version

We reserve the right to alter technical specifications.