

Stereo
PRESTIGE & IMAGE

REVIEW: I22 INTEGRATED AMPLIFIER AND CD22 CD PLAYER
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Primare I22 / CD22

With the CD22 player and the matching I22, Primare offers two designs at the forefront of digital and analogue technologies created to process and amplify music from the CD or on-line sources. The result is sound with a sense of rhythm, accuracy of timbre pitch and the holographic spatial positioning of performers.

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This player/converter/amplifier system has proprietary technologies, which feature new power, filtering, conversion and amplification (see our chapters on technology by image) circuits. The result is a truly coherent sound aesthetic of great beauty without any auditory fatigue and with many opportunities to adapt to personal tastes.

Listening Conditions

We first listened to the I22 and the CD22 separately, then together, to determine their best operating conditions. First of all, and critically, the I22 requires a very long run-in period (as with all switch-mode power supply and switching amplification) of about one week to deliver its full open, analytical abilities and optimal dynamic capacity.

We stress this point because if you remove the I22 from the box and plug it in, you are unlikely to hear the potential of this amplifier. After run-in, it requires at least half an hour to stabilize its performance. After that, the choice of power leads is critical to get the best separation, precision of timbre and the layering of sounds. We used power cords from MIT, O2A and Silent Wire to replace the original. Interconnects with an upper-midrange emphasis must be avoided and the most neutral chosen to expose excellent dynamic capability. Finally, as far as speakers are concerned, we found that, without changing the sound character, the I22 is capable of driving the most complex loads with a disconcerting ease. Furthermore the I22 is quite astounding in its ability to retain bass quality and speed. The remarkable CD22 player was auditioned while making many comparisons between the various sampling frequencies it offers. The conclusions will go against many preconceived ideas. In general the 44.1 kHz frequency appears to offer the best spatial coherence, with robust, well-structured timbres. The higher the oversampling frequency, the more micro-information is defined, but at the cost of a little control over bass, dynamics, timbre accuracy and stereo width. Thus, at 192 kHz, rich micro-detail gives an impression of greater transparency: a quite ethereal character especially from large orchestral works, but with a slightly shortened stereo image width. To paraphrase the title of a Pirandello play, one is tempted to say "to each his own truth", but be aware, you must already have speakers with great definition to really appreciate these minute differences. In the end, we opted to listen at 44.1 kHz where all the parameters appeared the most balanced to us.

Listen



With the BWV70 Cantata by Bach, the Primare set reveals the entire character of the performance under the direction of John Eliot Gardiner, while distinguishing, with an extremely precise analytical capability, between the different instruments of the orchestra, in particular the trumpet and the reverberant oboe, whose pitch is finely in tune, without nasal effect. The chorus, in two sections that respond to each other, has a very warm tonal togetherness characterised by extremely rich textures that do not dry out through the upper-midrange. Given the complexity of the message for reproduction, the Primare CD22/I22 system gives a naturally faithful rendition without lapsing into

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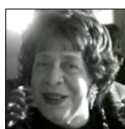
cold analysis. Even the most turbulent sequences of this cantata seem to flow with a fluidity, which is so removed from the disjointed character, of conventional switching amplifiers. One is struck by the quality of the bass vocal, by the warmth of its timbre and its humanity. Through the Primare system intelligibility is exceptional; the smallest dynamic intonations are revealed. In the third movement, the Primare set differentiates the pitch of viola and cello, preserving all the harmonic richness of these instruments, even with the marked differences in level. With increasing volume there is often a break-down of the timbral structure of stringed instruments that quickly becomes tiresome. The Primare system avoids all these problems with great distinction.



There were more excellent surprises: in the monumental performance of Bach's Toccata and Fugue, the organ rises with extraordinarily expressive power. Clearly the I22 has plenty in reserve: the sub bass is free of any artificial fullness. Indeed, with unusual clarity, extreme bass notes are beautifully wrought, expressing perfectly the dynamic capacity of the Primare system. In balancing direct and reflected sounds the effect of the nave of the Cathedral of Dresden can easily be detected.



With the Sersé excerpt from Max Emmanuel Cencic, the Primare CD22/I22 system restores the voice of the counter-tenor exhibiting a warm, uncompressed and very natural evolution from low-midrange to treble. Unlike many Class D switching amplifiers, the I22 does not react abruptly to strong level differences, and preserves the counter-tenor's complex harmonic structure. He remains perfectly positioned relative to the orchestra. Again, we were surprised by the quality and sustain of the bass in the string sections, which remain un-blurred emphasising the grain of bristles on strings. Without accentuated effect in the upper midrange, the acoustics of the venue modulate naturally without becoming a reverberation chamber.



When switching to a totally different musical genre: Yesterday, played by Shirley Horn, the Primare system communicates the melancholy of the singer with a rare accuracy. Intonations are relayed with a completely warm aspect at odds with that of conventional switch-mode power supplies and switching power stages. In this respect, among others, we can detect the hard work of Primare's engineers in developing switching circuits to overcome the problems of this technology. The presence of the voice is always warm and with a correct focus, good level balance with the beautiful

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sound of the piano, perfectly stable in space. Again, the energy of the sub-bass communicates the deeply resonant character of the concert instrument. Similarly, the attack of the notes are well defined and continuous with those that follow.



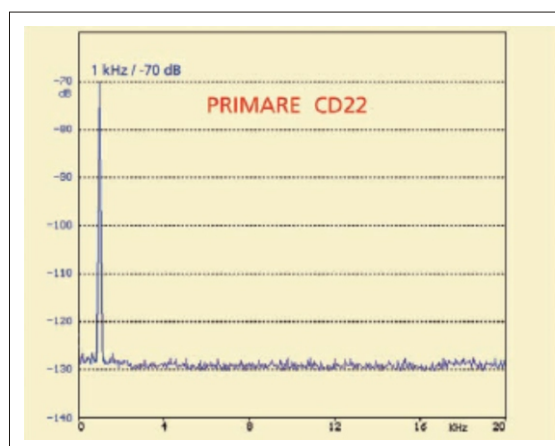
With the album Fourplay, the Primare system gives full force to the timpani beats that punctuate the introduction. It does justice to the sound of the mallet striking the huge stretched skin, then its relaxation, creating the characteristic pressure on the eardrums. The attack of Lee Ritenour's guitar is perfectly recognisable, the Primare system does not simplify it, but highlights it. We can raise the volume without concern. Hyper-dynamics and an exceptional sub-bass foundation are always in sync.



With the introduction of Millénaire, and in an excerpt from Pôle Ouest by Michel Jonasz, the electric bass is portrayed with a great intensity: a real acoustic pressure and subjectively impressive. We ask how a 2 x 80 W amplifier can transcribe with such intensity and such transient speed the quality of low frequencies while retaining perfect control of the bass drivers in low output speakers as well as those with higher output. The voice of Michel Jonasz remains as a warmer, more convincing entity, devoid of nasal intonation. No wheezing or explosive passages are accentuated. Intelligibility is not disrupted by the effects of inter-modulation, despite the rather apocalyptic attack of the bass.

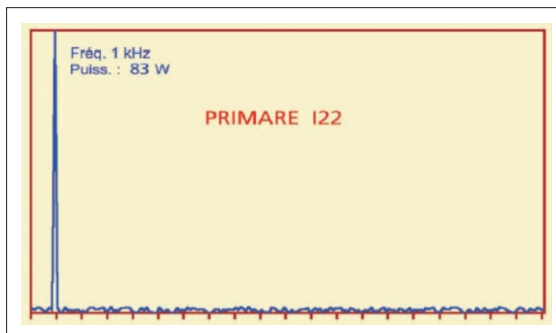
Summary of the Sound Aesthetic

Primare's engineers truly have an exceptional mastery of digital and analogue circuit configuration. They prove it not only with the CD22 player's quite exceptional analytical capability and well structured rendering of timbres, but also with the I22, defying all the prejudices regarding switch-mode power supplies and switching power levels. Thanks to their very interesting UFPD architecture (creating unconditional stability of operation regardless of the type of speakers) and the selection of sampling frequency from the CD22, the reproduction allows listening in complete serenity, without aggression, from these two perfectly matched electronics.

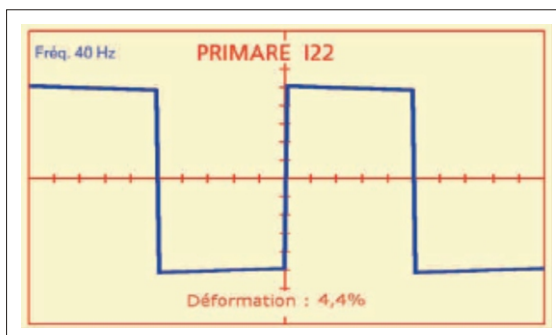


Noise minimum at -130 dB, expect definition and dynamic capacity!

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No spectrum of distortion during clipping for class D amplifiers.**Spectrum of distortion at - 1 dB**

No trace of distortion measured in our conditions at 83 W.

Square signal at 40 Hz

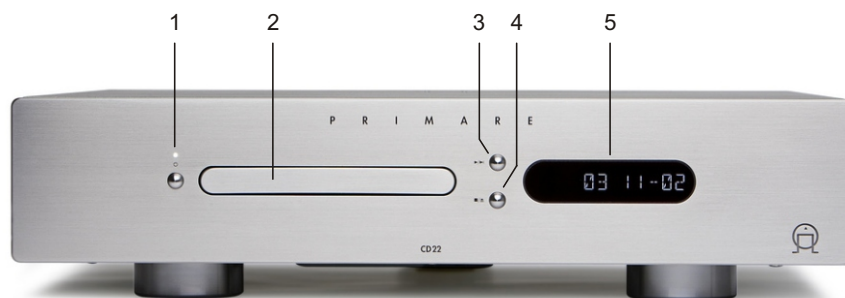
Excellent result: Light filtering against the continuous (very low distortion and non-existent at 1 kHz).

Measured specifications

Effective power (8 ohms)	2 x 105 W
Pulse power (8 ohms)	2 x 105 W
Input sensitivity (nominal output power)	320 mV
S/N ratio at nominal power	>103 dBA (produced)
S/N ratio for 1 W output	> 83 dBA (produced)
Square signal distortion 1 kHz	0 %

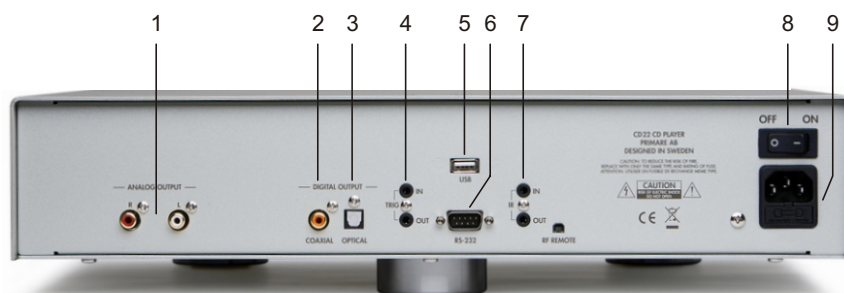
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Technology By Image



CD Front View

- 1 'Power / Standby' button.
- 2 Loading tray.
- 3 'Play / Skip' button. Pressing this starts playback if the CD is stopped. During playback, pressing this proceeds to the next track and holding it returns to the previous track.
- 4 'Stop / Open' button. During playback, pressing this pauses the CD. Pressing it again stops the playback. Holding it controls the opening/closing of the tray.
- 5 Multi-function display (track number, elapsed time, remaining time, etc.).

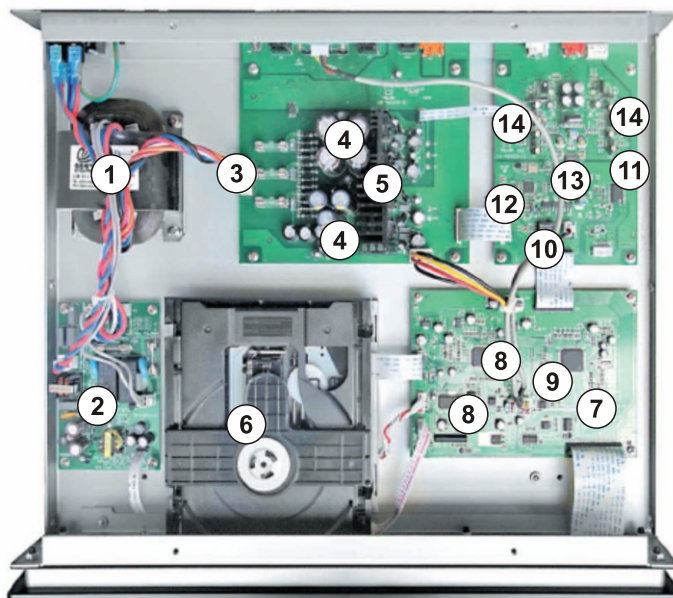


CD Rear View

- 1 Asymmetric Cinch analog outputs.
- 2 Cinch coaxial digital output.
- 3 TosLink optical digital output.
- 4 'Trigger' input and output: switch on and remote control.
- 5 USB A input : connection with a USB key or hard drive, for example.
- 6 RS-232 port (connection to a home automation system).
- 7 Wired remote control input and output (repetition of infrared remote control).
- 8 Main On / Off switch.
- 9 Power cord and fuse connection.

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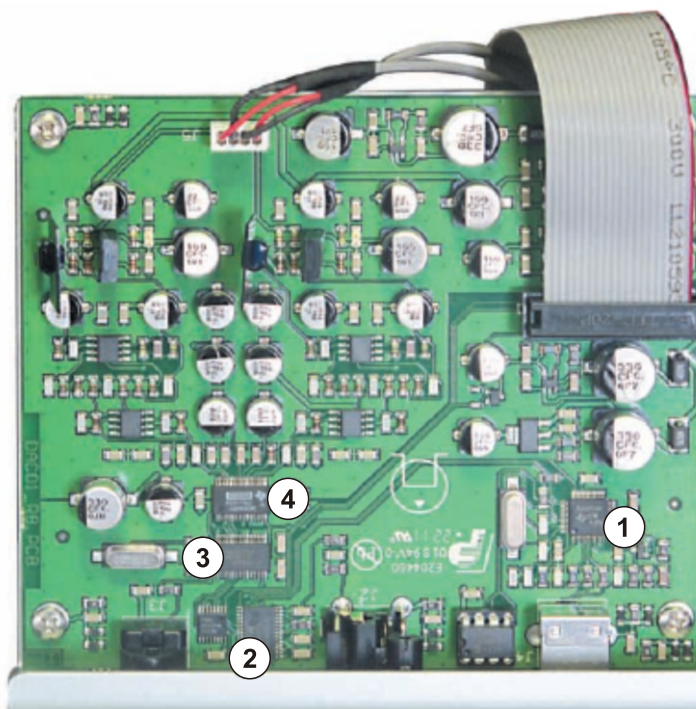


Internal View of the CD22

- 01 R-Core transformer for powering the digital audio stages, analogue audio and mechanics
- 02 Switch-mode power supply for the processor level, monitoring and display
- 03 Three different power supplies for analogue audio, digital audio and mechanics
- 04 Filtering by 4 2200 μ F/50V capacitors plus three 2200 μ F/35V capacitors, and three chokes (inductors)
- 05 Regulation of power supplies by circuits mounted on heat sinks
- 06 'Hi-fi' player system (and not computer CD-Rom) from Asatech with Sanyo optical block
- 07 Digital signal processor card
- 08 Management and mechanical control circuits and signal extracted from the block with Mitsumi MM1669 circuit and Servo Toshiba circuit TC94 series including a buffer level of 5 seconds. The data from the player or the USB are stored in memory and then extracted at a hyper-regular rate with an ultra-precise clock circuit. This fully asynchronous mode of operation largely eliminates the jitter and compensates for possible playback defects associated with shock (lack of data from the block after a shock)
- 09 TMP92 32-bit microcontroller with USB interface for conversion to SPDIF
- 10 Digital / analogue management card. The signals (SPDIF in symmetric AES / EBU form) pass through a galvanic isolation micro-transformer
- 11 STC LE5204 microcontroller
- 12 Burr-Brown SRC4392 sampling frequency converter circuit. It can work up to a frequency of 216kHz (192 kHz in the Primare). The working frequency (ie sampling of the signal) can be chosen by the user: 44.1 kHz (bypass), 48 kHz, 96 kHz or 192 kHz
- 13 'DAC' Burr Brown PCM1792 converter, Delta Sigma, 24 bits / 192 kHz
- 14 Current-voltage conversion and analogue outputs with operational amplifiers (OPA134) and discrete components (Mosfet transistors, current source). There is no capacitor in the signal path.

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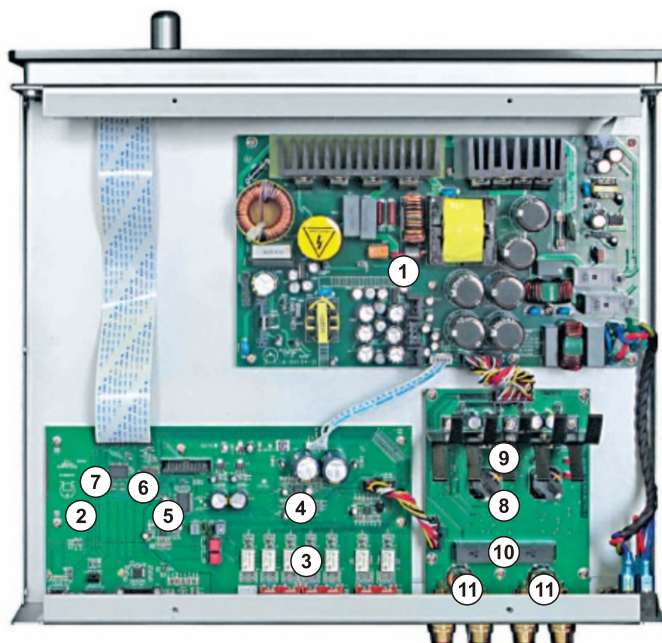
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**View of the optional DAC card**

- 1 USB interface (TAS 1020 24 bit/96 kHz)
- 2 AK4113/24 bits/192 kHz digital receiver
- 3 SRC Analog Devices AD1895 (24/192 kHz) frequency conversion circuit
- 4 Burr Brown PCM 1792 (24/192 kHz) digital/analog converter.

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Internal view of the I22 without the card

- 01 Switch-mode power supply card developed by Primare. These power supplies are of the PFC (Power Factor Control) type that control the mains for a pure sinusoidal signal, of the same frequency and without phase shift with respect to the power (avoids drawing more power than is necessary, unlike that produced by other types of power when a very strong spike in current causes a phase shift). Separate power supplies for power stages, those for pre-amps, those for standby
- 02 Pre-amp card (optional DAC digital module removed)
- 03 Source selection: switching by relay
- 04 Buffer levels by op amplifiers
- 05 National Semi Conductor LM 1972 volume control circuit (switched resistance microphones)
- 06 74HC595D circuit register (asynchronous with a clock) that syncs the conversion stage of the PWM signal with the output stages in class D
- 07 LVC 244 circuit buffer driver
- 08 Power stage card in class D for switching. The digital signal feeds each channel's MosFet power transistor (International Rectifier IRFI 4212H double transistors in each, designed specifically for Class D amplifiers). The pattern of this Class D amplifier was made and developed by engineers from Primare, it is called Ultra Fast Power Device (UFPD). It adopts a configuration circuit with gain adjustable to frequency and power requirements. This arrangement is stable. The usual distortions in the treble are absent
- 09 Integration and filtering with choke and condenser
- 10 Switching relay
- 11 Output chokes to prevent the risk of over modulation.

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Manufacturer Specifications**I22 Amplifier**

Continuous power :	2 x 80 W/8 Ohms 2 x 160 W/4 Ohms
Bandwidth :	10 Hz - 20 kHz – 0.5 dB
Harmonic distortion :	< 0.05 %
Signal/noise ratio :	95 dB
Number of analog inputs :	4 assymetric Cinch
Number of outputs :	1 fixed recording, 1 variable pre-amp
Optional digital card :	Yes, the modules provided for France are originally equipped with this card Inputs : 1 x USB/B, 1 x optical Toslink, 1 coaxial Cinch
Dimensions :	43 x 42 x 10.6 cm
Weight :	10 kg

CD 22

Mechanics :	Asatech 8210, Sanyo block
Converter :	1 x Burr-Brown PCM1792, 24/192 kHz
Analog outputs :	1 assymetric Cinch, 2.1 Vrms
Output impedance :	100 Ohms
Digital outputs :	1 x S/PDIF coaxial Cinch; 1 x optical TosLink
Frequency response :	20Hz – 20 kHz (+0/-0.5dB)
S/N ratio (20Hz – 20kHz linear) :	-100dB
Total harmonic distortion plus noise (20Hz – 20kHz) :	<0.01%
Other inputs :	USB; RS232; Trigger in/out 3.5mm
Dimensions :	430 x 375 x 106 mm
Weight :	10.5 kg
Colour :	Black or Titanium

