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## SONY CDP-610ES COMPACT DISC PLAYER

### Manufacturer's Specifications

**Frequency Response:** 5 Hz to 20 kHz,  $\pm 0.5$  dB.

**Dynamic Range:** Greater than 95 dB.

**Channel Separation:** Greater than 90 dB.

**Harmonic Distortion:** Less than 0.003% at 1 kHz.

**Output Level:** Fixed, 2 V rms across 10 kilohms; variable, up to 2.0 V rms across 50 kilohms; headphones, 29 mW across 32 ohms.

**Power Consumption:** 30 watts.

**Dimensions:** 17 in. (43.1 cm) W  $\times$  4 $\frac{1}{4}$  in. (10.6 cm) H  $\times$  12 $\frac{7}{8}$  in. (32.7 cm) D.

**Weight:** Approximately 19 lbs. (8.6 kg).

**Price:** \$850.00.

**Company Address:** Sony Dr., Park Ridge, N.J. 07656.

For literature, circle No. 94



Call it a second-generation CD player, or even a third-generation player. Whatever you choose to call it, Sony's CDP-610ES Compact Disc player offers convenience features and performance which are obviously a result of their experiences with the Models CDP-101 and CDP-701 introduced well over a year ago. Considerably less expensive than the top-of-the-line CDP-701, and even less expensive than the very first Compact Disc player I tested, the CDP-101, the newest addition to the line actually falls midway between the two other models in terms of its capabilities and user features.

According to Sony, the CDP-610ES uses the same laser diode, the same digital-to-analog converter LSI, and the same error-correction circuitry as their top-of-the-line CDP-701ES. Control features include "Automatic Music Sensor" (AMS), which enables you to skip from song to song at the touch of a button; an index search function which locates specially coded index points within a selection, enabling the player to begin play at those points, and two-speed cue and review—not unlike that found on some analog cassette decks—which allows you to scan forwards or backwards while listening to the disc's contents at reduced level and correct pitch.

Packaged with the CDP-610ES is an infrared, wireless, remote control which offers 10-key direct-access track selection and—a feature I've never seen on a CD remote before—control of the variable line output level. This may prove to be the most desirable feature, since the wide dynamic range found in many CDs often takes listeners (and loudspeaker systems) by surprise with sudden, ear-shattering crescendos. Being able to quickly adjust listening level, without having to run across the room to the player, could prove to be most beneficial to your ears and to your equipment from time to time!

This player also has a repeat mode similar to that on Sony's earlier machines; it can be used to automatically repeat an entire disc, an individual selection, or any musical passage between any two points you designate on a disc.

Sony has elected to stay with an all-black front-panel finish for this unit. A "Power" switch, a "Timer" switch (for use with an external timer), and a headphone jack and level control are to the left of the disc drawer. The motorized drawer emerges to accept a disc when a pad on its front surface is touched, and is closed by a second touch of the same area. The drawer will also close when the "Play" button, just to the right, is touched, which also begins play. A "Pause" button is just below "Play"; both buttons incorporate status-indicator lights. The "Automatic Music Sensor" buttons (which advance the laser pickup forward or back by one track for every push you give them), "Index" buttons, and the manual fast-search buttons occupy the remaining space below the large display area.

The display itself tells you a great deal more about what's happening with the player than was the case with the Model CDP-101. Both "Track" and "Index" numbers illuminate, as do the words "Disc" (when a disc is inside the player and is revolving), "Scan" (when the laser is searching for the track or point you have specified), "Minute" and "Second." The time display can show either elapsed time within a track or remaining time on the disc, depending upon the setting of a

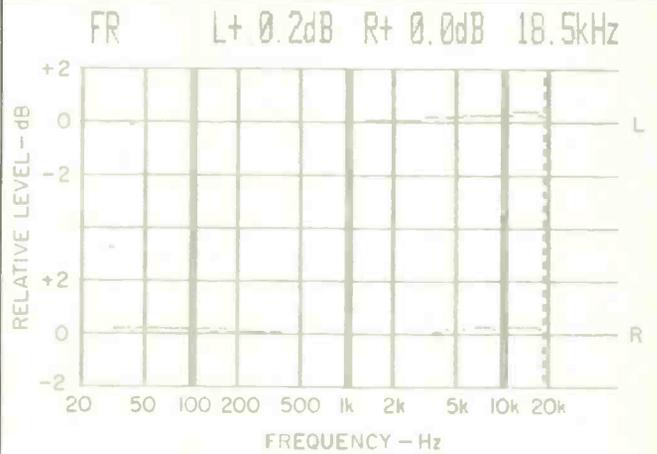


Fig. 1—Frequency response, left (top) and right channels.

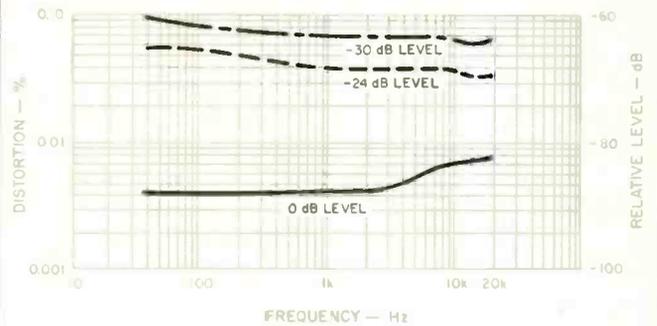


Fig. 2—THD vs. frequency at three recorded levels.

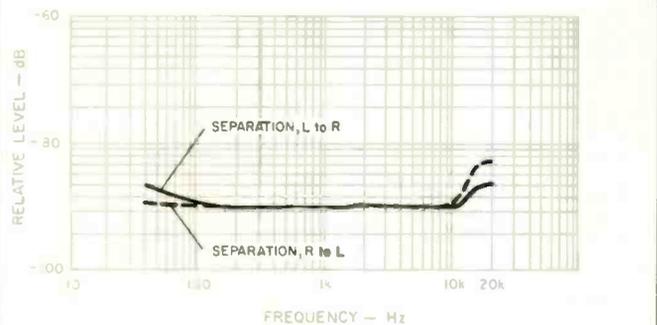


Fig. 3—Separation.

Of greater importance is the ability of a CD player to track properly, and the 610 plays all the way through the Philips "defects" disc.

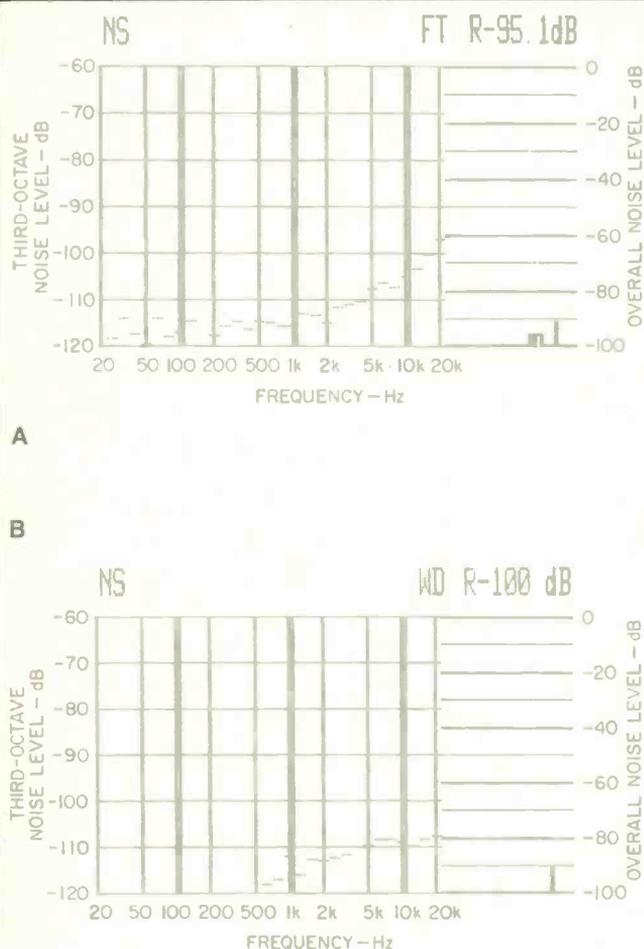


Fig. 4—Analysis of signal-to-noise ratio, unweighted (A) and A-weighted (B).

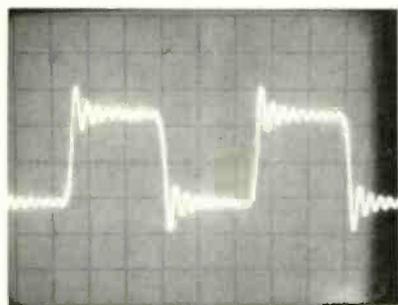


Fig. 5—Reproduction of 1-kHz square wave.

toggle touch-pad located to the right of the display area. Other controls at the right end of the panel include a "Stop (Reset)" button, a variable line-output level control, four "Repeat" programming buttons (whose functions were described earlier), and an "Auto Pause" button which, when depressed, causes the player to pause after playing a track.

The hand-held remote control houses a 10-number key pad, a "Clear" key, and a "Start" key in addition to all the function keys and buttons already described. The remote control can be used to directly access a given track by number without having to touch the "Automatic Music Sensor" keys over and over again to bring the laser pickup to a high-numbered track.

The rear panel of the CDP-610ES is equipped with two pairs of output jacks (fixed and variable) and with a "Beep" switch. With the "Beep" switch on, a sound is heard every time you send a command from the remote control, giving audible verification that the command was received and is being executed. I found after a few minutes of operation that I was able to "trust" the machine (and its remote control) and was grateful that Sony had provided a means for turning off the reassuring beep. I never turned it back on again during all of my lab and listening tests—and I never missed it either.

The rear panel of this unit also incorporates that "mysterious" multi-pin connector, about which I've received numerous inquiries from readers and others who own earlier Sony CD players that were equipped with the same connector. By now I have some pretty good clues as to what the ultimate purpose of this connector will be. Suffice it to say that the words "computer control" and "digitally generated graphics and pictures" come to mind, though all Sony will say at this time is that this accessory connector will be "used to extend the utility of this Compact Disc player by providing for the connection of optional equipment which will be available in the future. . . ." Okay, Sony, if you want to play it cagey, that's all right with me. I can wait till you spring the next surprise on us!

#### Measurements

Figure 1 is a plot of frequency response for both stereo channels, extending from 20 Hz to 20 kHz. The vertical scale has been purposely expanded to 2 dB per division to disclose minor deviations from flat response. In this case, they were minor indeed, never exceeding +0.4 or -0.2 dB at any frequency within the audible range.

Figure 2 is a plot of harmonic distortion versus frequency for three different output levels. As is true in any digital system of this kind, THD rises with *decreasing* recorded levels, rather than the other way around. Thus, at 0 dB recorded level (maximum), THD ranged from a low of 0.004% at low and mid-frequencies to a high of 0.0075% at 20 kHz. At -30 dB recorded level, THD ranged from around 0.07% to just under 0.1%.

The CDP-610ES exhibited one of the most accurate linearity characteristics I have yet measured for any CD player. Linearity was within -0.3 dB even at 80 dB below maximum recorded level, and it was absolutely accurate down to 70 dB below maximum output level. Separation characteristics, plotted in Fig. 3, were virtually identical for

While differences between CD players still remain fairly subtle, the 610 does show a slight sonic improvement over the earlier CDP-101.



both channels except at the extreme low and high ends of the spectrum. Typically, separation measured around 88 dB over most of the useful audio range.

SMPTE-IM distortion measured 0.002% at maximum recorded level, increasing to 0.014% at a -20 dB recorded level. CCIF (twin-tone) IM, using 19- and 20-kHz signals (which combined produced a "0-dB" output level), measured 0.0019%, increasing to 0.0056% at -10 dB level. As in previous tests of CD players, signal-to-noise analysis was conducted both without and with an A-weighting network. Results are shown in Figs. 4A and 4B. Overall signal-to-noise ratio measured 95.1 dB, unweighted, and precisely 100 dB A-weighted.

Square-wave reproduction of a 1-kHz, digitally generated square-wave test signal, shown in Fig. 5, was typical of that encountered with CD players which utilize multi-pole, analog, low-pass filters (in this case, eleventh-order filters are used) in post-D/A circuitry. The same holds true for the reproduction of a digitally generated unit-pulse signal, shown in the 'scope photo of Fig. 6. The usual phase displacement between a 200-Hz, left-channel test signal and a 2-kHz, right-channel test signal is obvious in the 'scope photo of Fig. 7. For perfect phase linearity, positive crossing of the zero axis would occur at the same time for both test signals, and that is clearly not the case here.

Purists will argue interminably about the sonic merits or demerits of this or that CD player design, but when you get right down to it, the sonic differences between players remain fairly subtle, at best. What I believe to be of far greater importance is the ability of a CD player to track properly, to utilize as much of the error-correction capability as was "built into" the Compact Disc standards developed by Philips and Sony, and to withstand mechanical shocks and vibration any piece of equipment is likely to undergo during normal use.

With these points in mind, I subjected the Sony CDP-610ES to the usual tests which employ my special Philips "defects" test disc (the one with the ever-widening opaque wedge, the black "dust" dots of increasing diameter, and the simulated fingerprint smudge). The CDP-610ES joins the ranks of those very few players that were able to play through that entire disc without so much as a single mute or a single moment of mistracking. It came as no surprise, after these tests were completed, to find that the player was also highly resistant to mistracking caused by blows to its top and sides.

#### Use and Listening Tests

Over the course of several weeks, I had an opportunity to listen to the CDP-610ES for a considerably longer time than I usually devote to a single piece of equipment I review for

*Audio.* I not only came to appreciate the superb sound quality delivered by this machine (yes, I *could* hear a slight sonic improvement compared with the CDP-101), but I became rather attached to it because of its excellent human engineering and especially the speed with which it accessed any track on a disc. Now that I have a few discs with indexing, I greatly appreciate the ability to access the indexed locations on those discs as well.

In addition to trying out some of my old CD favorites (so that I can compare them with how they sounded on earlier machines), I make it a practice to try out several newer CDs each time I get my hands on a new player. A few that sounded especially great on the Sony CDP-610ES were Telarc's *Malcolm Frager Plays Chopin* (CD-80040) and *Bach on the Great Organ at Methuen*, played by Michael Murray (CD-80049), as well as Denon's *Bach: Concertos in D Minor and A Minor* (38C37-7064). Listening to any one of these masterfully recorded CDs simply reinforces my faith in this new medium as well as my conclusion that the Sony CDP-610ES ranks very high indeed in the growing list of superior, second- and third-generation CD players.

Leonard Feldman

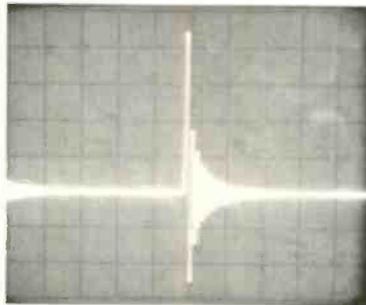


Fig. 6—Reproduction of single pulse.

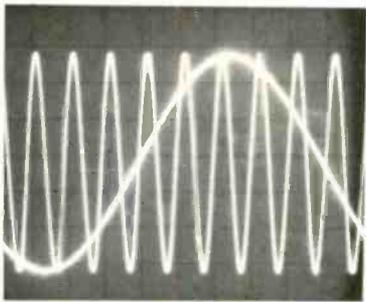


Fig. 7—Phase error check using 200-Hz and 2-kHz tones; see text.