

SPDIF Connection

Internal SPDIF Connection

Many users and technicians must have already noticed that CD and DVD drives have an output called SPDIF and many sound cards, especially the more expensive sort, also have a connector labelled SPDIF. But what is it?

SPDIF stands for Sony/Philips Digital Interface. It is a standard for digitally transferring audio. Digital transference, as opposed to analogue transmission, is immune to noise and accordingly is the kind of transmission loved by audiophiles, musicians and professional people in the audio field that use computers as a tool.

In many cases, however, the computer provides a SPDIF connection capability, unused due to unfamiliarity of user's or technician that assembled the computer.

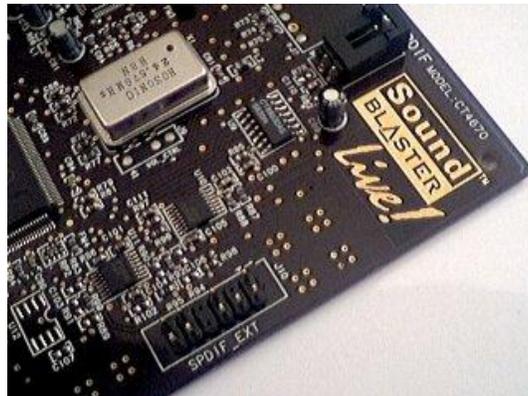


It goes like this: when an audio CD is inserted in a CD-ROM drive, this drive has to convert data, read in digital format, into an analogue audio signal, seeing that sound is an analogue signal. This analogue signal is then sent to the sound card via a suitable cable. For people that care for the signal's noise level, there are two points here that can lower the quality of audio. In the first place, the CD-ROM drive can use a poor quality D/A (digital-analogue) converter and so generate noise. In second place, seeing that transmission between the CD-ROM drive and the sound card is carried out in analogue format, the cable used for connecting may pick up noise from electromagnetic interference inside the computer.

Therefore, if your sound card has a SPDIF input and your CD-ROM drive has a SPDIF output, instead of using the analogue connection you should opt for a SPDIF connection. This connection allows the A/D conversion to take place in the sound card and not in the CD-ROM drive. The connection is set up via two wires and a small two-terminal plug. This cable is easy to make or can be bought ready-made in specialized outlets.

Figure 1: CD-ROM Drive SPDIF Output (two pins on the left).

Figure 2 shows in detail a Sound Blaster Live! Sound card. We can see on its upper part the two-pin SPDIF connector for SPDIF-linking the CD-ROM drive and under it the SPDIF EXT connector for connecting external digital sources to the computer over a SPDIF connection.



a Blaster Live! Sound Card Type Sound

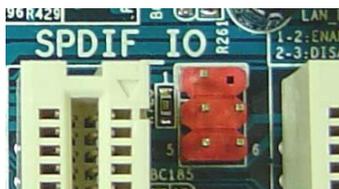


Figure 3: Detail of a Motherboard with on-board audio with a SPDIF Connector.

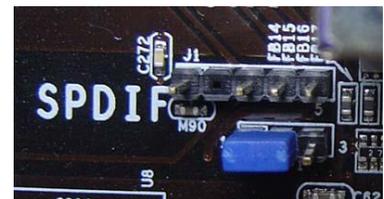


Figure 4: Another example of a Motherboard with on-board audio with SPDIF Connector.

Some motherboards with on-board audio also have a SPDIF input for connecting the CD-ROM, as you can see in **Figures 3 and 4**. This connector can also be used to plug in an adaptor to put SPDIF external connectors on your PC. We'll talk about this in following pages.



Figure 5: Optical fiber Used in optical SPDIF Connections.



Figure 6: Rear of a Mini Disc deck, you can see from left to right one coaxial SPDIF input, two optical SPDIF inputs, one coaxial SPDIF output and one optical SPDIF output.

Outside the computer, the SPDIF connection can be made between other digital devices, such as professional CD players, Mini Discs, DVD players and Home Theater receivers.

The edge of the SPDIF connection lies in its immunity from electromagnetic interference (i. e., noise), as it is digital. Thus, this is the best connection type available. So, if your DVD player has SPDIF outputs and your home theater receiver has SPDIF inputs, the best way to connect them is thru SPDIF connection.

Unfortunately the vast majority of users aren't aware of this, and still use analog connection (RCA cables) when connecting digital audio equipments or while connecting these equipments to their PC. If your computer has external SPDIF connectors, you can also connect such devices to your PC digitally, avoiding the use of analog connection, which generates noise.

There are two kinds of SPDIF connections: optical (set up by optical fiber) and coaxial (set up by coaxial cable). On **Figure 5** we show the optical fiber used in optical SPDIF connections (the best connection available) and on the other pictures you can see many examples of digital audio devices that have SPDIF inputs and outputs.

The optical SPDIF connector is usually protected by a cover, that must be removed when you want to install the optical fiber. On **Figure 6** you can see that the inputs are protected by this cover, while we removed it from the optical output.



SPDIF outputs on a DVD coaxial player (Sony DVP-NS575P).



Figure 9: Optical and coaxial SPDIF inputs on a

home theater receiver (Sony STR-K750P).

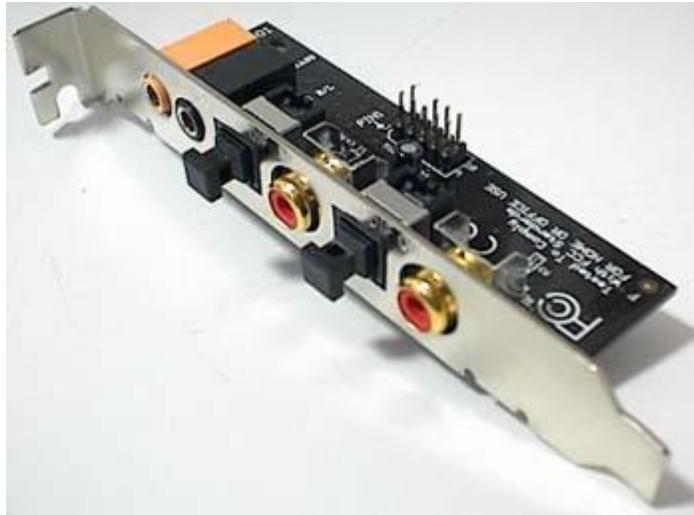


Figure 10: Sound Card SPDIF Extender

So, using the above products, we can say that the best way to connect the DVD player from **Figure 8** to the home theater receiver from **Figure 9** it thru optical SPDIF connection using an optical fiber. If you want to record some musics from your Pioneer CDJ100S (**Figure 7**) on a Mini Disc (**Figure 6**), the best connection is done thru coaxial SPDIF (since this CD player doesn't have optical SPDIF).

This same idea can be applied to PCs. For instance, if you want to record your Mini Discs to MP3 or Wav files in your computer, connect the SPDIF output from the Mini Disc deck to your PC SPDIF input. If you want to connect your PC to an external amplifier to enjoy the full experience a game can deliver you, you should connect the SPDIF output from your PC to the SPDIF input on your home theater receiver. This connection you allow you to fully enjoy the 5.1 audio (also known as 6-channel audio). We will explain this further on the

Only high-end soundcards and motherboards offer SPDIF outputs and inputs. Sound cards that provide external SPDIF connection are supplied with an adapter card, shown on **Figure 10**. Note that this card has both an optical fiber connector (square) and a coaxial cable connector (round). You can also install a similar device to enable external SPDIF connection on motherboards with the SPDIF connector shown on Figures 3 and 4.

High-end motherboards with on-board audio are usually supplied with external SPDIF connectors directly soldered to the motherboard (coaxial and/or optical) or thru the use of an adaptor like the one shown on **Figure 10**.

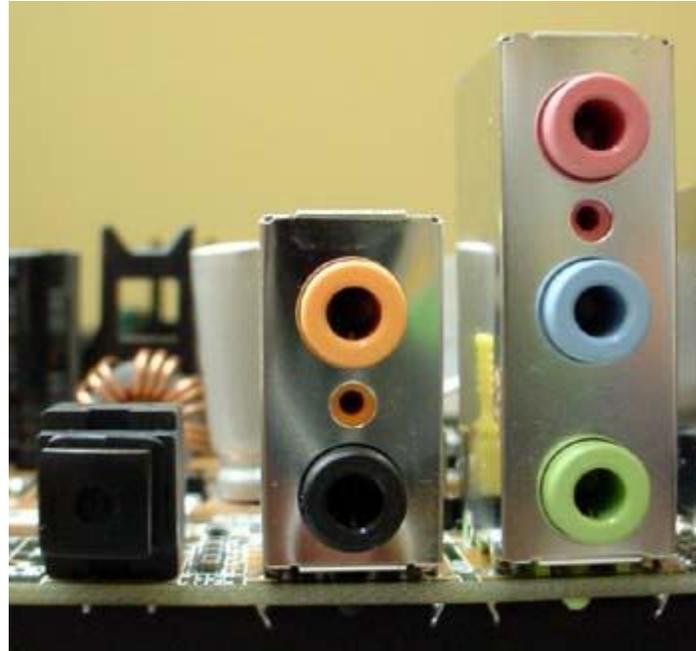


Figure 10: Detail of the Optical SPDIF Output of the ABIT IT7 Board.

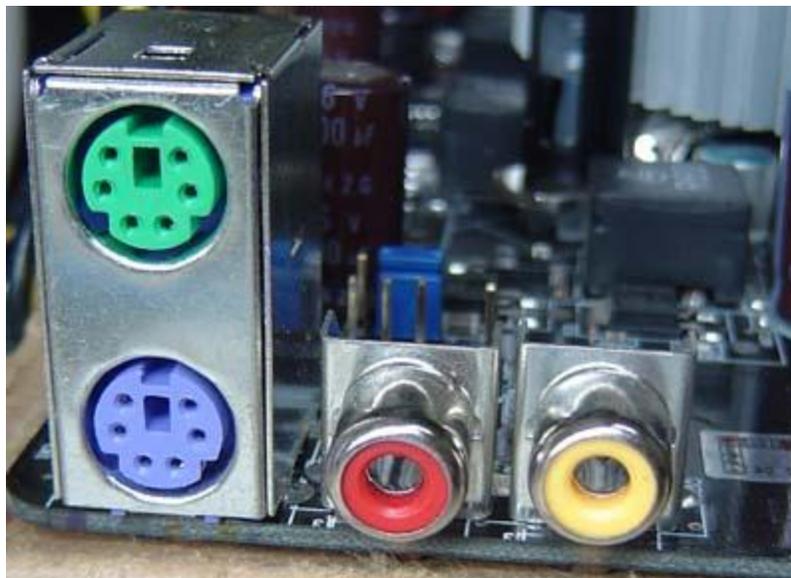


Figure 11: Detail of coaxial SPDIF input and output available on DFI LAN Party 925X-T2.

If you really care about SPDIF connection, you should pay attention when buying your high-end sound card or motherboard. Specially with motherboards, some do not offer all four possible options: optical SPDIF input, optical SPDIF output, coaxial SPDIF input and coaxial SPDIF output. Many high-end motherboards only offer outputs, not inputs (as it occurs on **Figure 10**, where we have only optical SPDIF output; we give another example on **Figure 12**, where the motherboard adaptor has only coaxial and optical SPDIF outputs, no inputs). Having only outputs is great for those users that are willing to connect their PCs to a home theater receiver and enjoy full 5.1 audio experience at the best quality, but won't allow them to record on their PC audio generated on external devices like Mini Discs using the SPDIF connection - feature that is indispensable for those that will work with digital audio.



Figure 12: SPDIF adaptor from Gigabyte K8NXP motherboard has only outputs (both optical and coaxial).

Actually, this is just a matter of the SPDIF adaptor (like the one shown on Figure 12). Usually the motherboard can have the four options, but is limited by the adaptor provided by the manufacturer. In theory, if you could get an adaptor with the four options, it would work fine.

Summary

In summary, if you are connecting an external digital audio source to a computer that includes a SPDIF connection, go for using it, and avoid using the standard analog connection. If you are an audiophile or work professionally in the audio field, getting this type of sound card or motherboard is a must. Inside your PC you can get better audio quality from your CD or DVD drive by connecting it to the sound card or motherboard thru its SPDIF connector instead of the regular "audio out."

Source: http://www.co-bw.com/DIY_SPDIF_Connection.htm