

RECOMMENDATION ITU-R BR.1385*

**EXCHANGE OF SOUND PROGRAMMES ON RECORDABLE
COMPACT DISCS (CD-R)**

(Question ITU-R 215/10)

(1998)

The ITU Radiocommunication Assembly,

considering

- a) that the exchange of sound programmes on recordable compact discs (CD-R) is becoming common practice;
- b) that CD-R equipment is widely available and at low cost;
- c) that the compatibility with existing CD players must be guaranteed;
- d) that the alignment levels should be compatible with that of commercial CDs;
- e) that alignment tones are a very useful means for equipment set up,

recommends

1 that if CD-R discs are supplied for programme exchange, they should conform to the requirements given in Annex 1.

ANNEX 1

Exchange of sound programmes on recordable compact discs (CD-R)**1 Discs****1.1 Specification**

The CD-R must be recorded according to the "Red Book" standard IEC 60908 – 1987, Amendment 1, 1992 and Amendment 2, 1998 – "Compact disc digital audio system".

1.2 Quality of the support

Blank discs should be good quality and there must be no obvious surface defects on the blank or recorded disc. (See also section 2.1 below.)

1.3 Protection

The disc must be supplied in an undamaged "Jewel Case".

1.4 Recording level

Recordings should be made such that the Permitted Maximum Level, PML, is –3 dBFS (dB Full Scale). (See also Appendix, section 1).

* This Recommendation should be brought to the attention of the International Electrotechnical Commission (IEC).

NOTE – If the programme material is transferred from a DAT tape, recorded according to EBU Recommendation R64 – 1992 – “Exchange of sound programmes as digital audio tape recordings”, the change in level and other processing described in Appendix, section 2 will be necessary.

Other recording levels should be used by prior agreement only.

1.5 Line-up tone

It is preferable that the first track of the disc should contain an alignment tone. This should be 30 s of 1 kHz tone recorded on both channels at Alignment Level, as shown in Table 1.

The left and right channels may be differentiated by using an interrupted tone on the left channel, as specified in EBU Recommendation R49 – 1993 – “Tape alignment leader for the exchange of television programmes”.

Alignment Level should be 9 dB below PML, that is –12 dBFS, (actually 12.04 dBFS, corresponding to a ratio of 1:4).

TABLE 1

Digital codes for maximum levels and alignment levels

Maximum coding level (0 dBFS)		Audio alignment level	
Negative peaks	Positive peaks	Negative peaks	Positive peaks
8 000	7FFF	E000	1FFF

1.6 Emphasis

No pre-emphasis shall be used.

1.7 Tracks

A continuous programme should occupy a single track. If the programme is in sections, then individual sections should occupy separate, consecutively numbered, tracks.

2 Accompanying information

2.1 Labels

All CDs and cases should be clearly labelled, indicating programme details. To avoid possible damage to the disc, it must only be labelled using methods in accordance with the manufacturer's instructions.

2.2 Track information

Track numbers must be documented, along with accurate timings of the programme and sections where appropriate.

2.3 Recording report

A completed recording report should accompany all programmes.

APPENDIX

1 Recording level

In making a CD-R, the aim is to produce a disc that is level compatible with commercial CDs. Experience has shown that if the output level of a CD player is set so that 0 dBFS reads “+12” on a IEC type IIB Peak Programme Meter (PPM), then, on average, audio signals from commercial CDs will peak to “+9”. In practice, this works well, and reduces the need for manual level adjustment.

If the replay section of a CD recorder is aligned for 0 dBFS = “+9”, then by setting the record level for unity gain, the recording “headroom” of 3 dB is achieved by default. When the record signals are monitored on a PPM under carefully controlled conditions, the 3 dB margin is probably sufficient to avoid digital clipping. If true peak reading meters are used on the editor/recorder, the aim should be for occasional peaks to 0 dBFS.

2 Copying from DAT recordings

If a digital copy of a DAT recorded to EBU Recommendation R64 [2] is made on CD-R, the following processing will be necessary:

- sample rate conversion from 48 kHz to 44.1 kHz;
- 6 dB of audio gain to compensate for the 9 dB of headroom allowed on the DAT.

During the transfer, the level of the recorded programme should be carefully controlled to prevent overloading.

3 Permitted maximum and alignment levels

Permitted Maximum Level reads “+9” on an IEC Type IIB Peak Programme Meter (PPM).

Alignment Level is 9 dB below Peak Maximum Level and reads “Test” on an IEC Type IIB PPM. (See Table 2 below.)

4 Content of audio tracks

When preparing material for a CD-R using a digital editor, a lead-in of least ten CD frames should be allowed between the start of a track and the start of the audio. When using other methods of preparation, there should be at least 1/3 of a second (25 CD frames) between the start of a track and the start of the audio. Some commercial (classical) CDs have a gap of several seconds of “atmosphere”. In practice, most discs will be automatically or manually cued on replay, so a gap is preferable to a clipped start.

If Start IDs are transferred from DAT recordings to be used as track starts on a CD-R, the audio may need to be delayed in order to compensate for processing delays; most converter equipment now provides adjustable delay.

5 P-Channel codes

Some commercial CDs use “P-Channel coding” to mark the end of each track. Normally, a “flag” in the P-Channel is set “high” during the countdown period at the start of a new track. It then goes “low” when time 00:00 is reached. At this point, the INDEX display on the player goes from 0 to 1. Many commercial CD recordings do not use the P-Channel at all, nor the countdown period at the start of a track. It appears that only the very first generation of CD players rely on P-Channel information to locate the tracks. It is now given as an option in the Red Book, rather than being mandatory. No operational problems have been encountered when using discs without P-Channel information, although for consistency with commercial CDs it is recommended that the P-Channel information is inserted if the recording system allows it to be.

Some CD manufacturers now use CD-R as the source for preparing a CD glass master. In this case, they will require that the P-Channel information is present.

6 Meter readings

The following table has been compiled from information given in Recommendation ITU-R BS.645 – “Test signals and metering to be used on international sound-programme connections and the specification of the Nordic PPM scale Technical Recommendation N10 – 1993 – “Sound Control Systems and Units” (4th edition).

TABLE 2

Indications produced on various types of programme meter by sine-waves at programme and alignment levels

	PPM				Vu	
	IEC Type I	IEC Type IIa*	IEC Type IIb	Nordic		
Test signal	Germany, etc.	UK	EBU	Nordic countries	Australia, N. America, etc.	France
Permitted Maximum Level, PML	“0 dB”	“6¼”	“+9 dB”	“+9 dB”	Off scale	Off scale
Alignment Level, AL	“–9 dB”	“4”	“Test” (0 dB)	“TEST”	“0”	“2”
Measurement Level, ML	“–21 dB”	“1”	“–12 dB”	“–12 dB”	“–12”	“–10”

* This scale is in arbitrary units, NOT in dB.