



AV/C Disc Media Type Specification – CD-DA

Version 1.0

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Abstract: This specification defines the specification for CD-DA structures which are used by AV/C Disc Subunit Model and Command set.

Keywords: Audio, Video, 1394, Digital, Interface, CD, CD-DA

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1. Preface

1.1 Purpose and Scope

This document defines the CD-DA media type specification for AV/C Disc subunit. This document is used in conjunction with the *AV/C Disc General Specification, version 1.0*.

1.2 Overview

This document describes the descriptors of the CD-DA in detail, the CD-DA specific rule for command and the profiles.

2. References

2.1 Related Specifications

- [1] IEC-61866, Audiovisual systems – Interactive text transmission system (ITTS)
- [2] KS C 5601-1989, Standard Codes of Korean Characters for Information Interchange
- [3] GB2312-80, Codes of Chinese Graphic Characters for Information Interchange, Primary Set
- [4] AV/C Digital Interface Command Set General Specification, version 3.0 and Enhancements to the AV/C General Specification 3.0, version 1.0
- [5] AV/C Disc Subunit General Specification, version 1.0

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<http://www.iec.ch/cs1oi-e.htm>

The Institute of Electrical and Electronics Engineers, Inc. (IEEE)
The IEEE can be contacted via their WWW home page:
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Bureau of Standard, Industrial Advancement Administration, Korea

China Association for Standardization (Beijing)

3. Change History

There are no change notes for version 1.0 of the document.

4. Definitions and abbreviations

4.1 Conformance glossary

Several keywords are used to differentiate between different levels of requirements and optionality, as follows:

- expected:** A keyword used to describe the behavior of the hardware or software in the design models assumed by this specification. Other hardware and software design models may also be implemented.
- may:** A keyword that indicates flexibility of choice with no implied preference.
- shall:** A keyword indicating a mandatory requirement. Designers are required to implement all such mandatory requirements to ensure interoperability with other products conforming to this specification.
- should:** A keyword indicating flexibility of choice with a strongly preferred alternative. Equivalent to the phrase “is recommended.”

4.2 Technical glossary

- Frame:** Frames per second = 75 for CD-DA.
- CD:** Compact Disc.
- CD-DA:** Compact Disc Digital Audio format.
- CD-text:** CD-text is an extended specification of CD. It contains the additional text information.

5. Disc Subunit Identifier Descriptor

5.1 Size of list ID, object ID and object position

The size value of list ID, object ID, and object position shall be as follows.

Table 5-1 The size value

field name	value
Size_of_list_ID	02 ₁₆
Size_of_object_ID	00 ₁₆
Size_of_object_position	02 ₁₆

Note: "size_of_object_ID = 0" indicates that object ID is not used in all object lists within the subunit that specified in this version of the document. A controller should note that if the subunit supports object list which uses object_ID in the future, a value other than 0 will be set to size_of_object_ID.

5.2 Type dependent information

The *type_dependent_information* field contains information that is specific to each type of medium supported by the subunit.

Address Offset	msb						lsb
CD-DA type_dependent_information							
00 ₁₆	CD-DA_version						
01 ₁₆	supports_CD-text	reserved					

Figure 5-1 CD-DA type_dependent_information

The *CD-DA_version* field indicates the version number of CD-DA specification that this disc subunit conforms to. The upper 4bits shows major version number, and lower 4bits shows minor version number.

Table 5-2 CD-DA_version field

CD-DA_version	Meaning
10 ₁₆	Version 1.0 of the CD-DA specification
all others	Reserved for future specification

The *supports_CD-text* bit specifies whether this subunit has the ability to access CD-text data with such specially formatted CD media. If the bit is set to 1, then the subunit has this ability.

6. Disc Subunit Status Descriptor

6.1 Number of bytes for operating mode

The primary_fields of operating mode info block shall be 3bytes. FF₁₆ pad bytes if necessary.

6.2 Position Indicator Info Block

6.2.1 Absolute HMSF Count (02₁₆)

The following equation represents the relation between the hours:minutes:seconds:frames fields of the absolute HMSF count and the "AMIN:ASEC:AFRAME" within the sub code Q channel of the CD-DA.

hours:minutes:seconds:frames of Absolute HMSF Count =
(0:AMIN:ASEC:AFRAME)

The hours field of Absolute HMSF Count is fixed 0. The minutes field is allowed to exceed 60.

6.2.2 Relative segment HMSF Count (08₁₆)

The following equation represents the relation between the segment number of the Relative Segment Count and the "INDEX" within the sub code Q channel of the CD-DA.

segment number of Relative Segment Count = INDEX

The following equation represents the relation between the object_position_number of the relative HMSF count, the track_number_offset of the Track Number Offset Info Block and the "TRACK NUMBER" of the CD-DA.

object_position_number = (TRACK NUMBER) - (track_number_offset) - 1

The following equations represent the relation between the hours:minutes:seconds:frames of the relative HMSF count and the "MIN:SEC:FRAME" within the sub code Q channel of the CD-DA.

When INDEX is 0,

hours:minutes:seconds:frames of Relative HMSF count = - (0:MIN:SEC:FRAME)

When INDEX is other than 0,

hours:minutes:seconds:frames of Relative HMSF count = (0:MIN:SEC:FRAME)

The hours field of Relative HMSF Count is fixed 0. The minutes field is allowed to exceed 60.

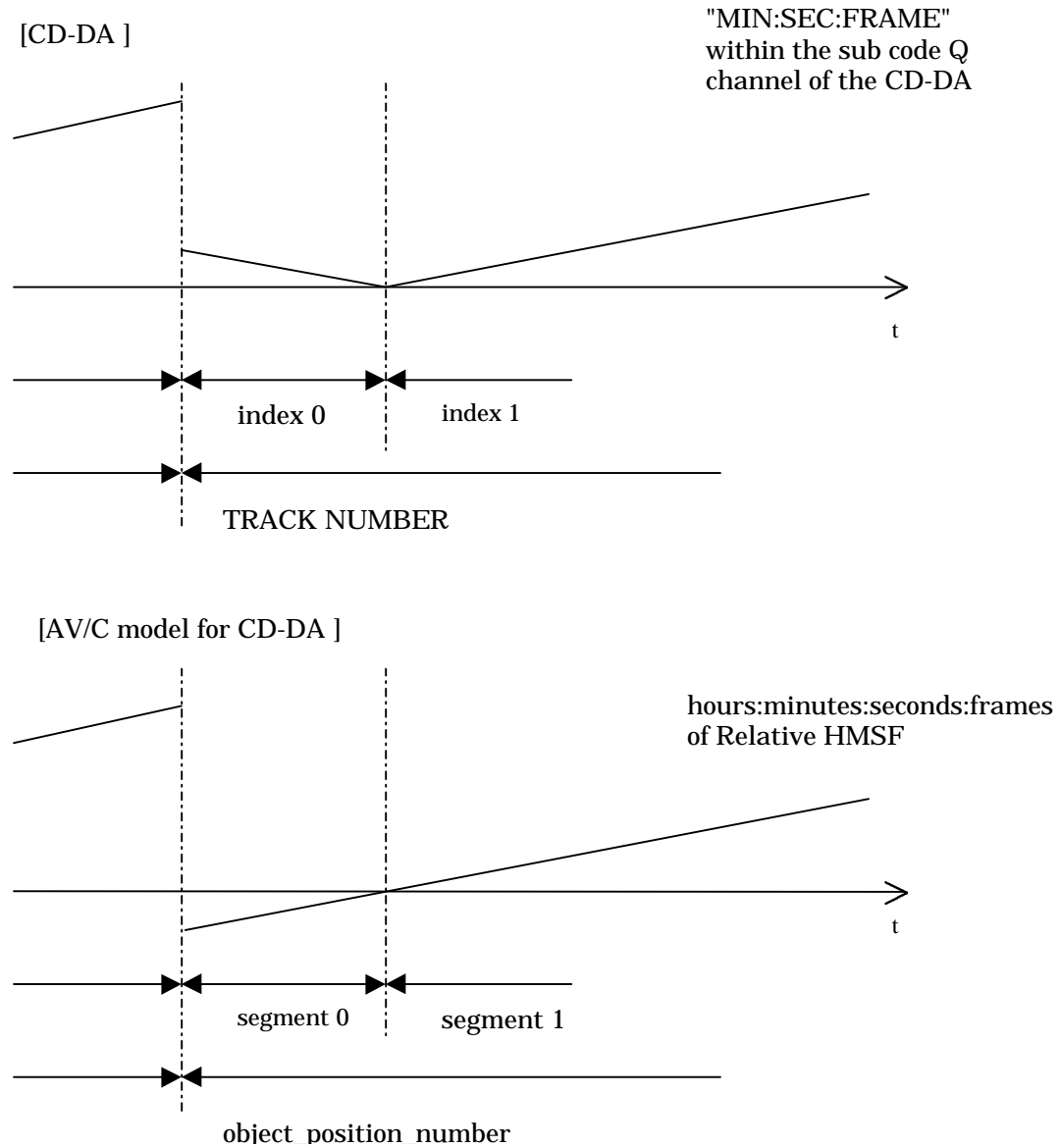


Figure 6-1 Relative Segment HMSF count

7. Object Entry

7.1 Object and List

The object name and the list which contains the object are shown. Refer to the profile section for object and list implementation.

Table 7-1 The object name and the list which contains the object

Object Name	List which contains the Object
Audio Track Object	Contents List
Child Directory Object	All Lists
Performance Object	Performance List
Text Database Object	Text Database List

7.2 Audio Track Object entry_specific_information

The structure of the entry_specific_information in Audio Track Object is shown.

Audio Track Object entry_specific_information	
Address Offset	Contents
00 00 ₁₆	non_info_block_fields_length
00 01 ₁₆	
00 02 ₁₆	disc_subunit_object_attributes
:	audio_recording_parameters_info_block
:	
:	
:	size_indicator_info_block
:	
:	name_info_block
:	
:	other info blocks
:	
:	

Figure 7-1 Audio Track Object entry_specific_information

The audio_recording_parameters_info_block, and the size_indicator_info_block are mandatory and shall be described in this order.

The value of each field on the audio_recording_parameters_info_block is shown:

Table 7-2 The audio_recording_parameters_info_block field

Parameter	value
audio_recording_sample_rate	01 ₁₆ (44.1kHz)
audio_recording_sample_size	10 ₁₆ (16 bit)
audio_compression_mode	00 ₁₆ (no compression)
audio_recording_channel_mode	00 ₁₆ (stereo)

The value of the size_indicator in the size_indicator_info_block shall be 00₁₆ (HH_M_S_F).

The following equation represents the relation of the size_indicator_info_block which indicates the size of track [n] and “START POINT” of each track described in TOC of the CD-DA.

$$\text{size_indicator_info_block of track}[n] = (\text{START POINT } [n+1]) - (\text{START POINT } [n])$$

The name_info_block is mandatory for the subunit that supports CD-text.
The name_info_block is optional for the subunit that does not support CD-text.

The name_data_reference_type in the name_info_block shall be 01₁₆(Referenced) and descriptor type shall be 20₁₆ (object entry descriptor - specified by object position).
The actual name_data is stored in Text Database Object.

7.3 Child Directory Object entry_specific_information

The structure of the entry_specific_information in Child Directory Object is shown.

Child Directory Object entry_specific_information	
Address Offset	Contents
00 00 ₁₆	Non_info_block_fields_length
00 01 ₁₆	
00 02 ₁₆	Disc_subunit_object_attributes

Figure 7-2 Child Directory Object entry_specific_information

7.4 Performance Object entry_specific_information

The structure of the entry_specific_information in Performance Object is shown.

Performance Object entry_specific_information	
Address Offset	Contents
00 00 ₁₆	non_info_block_fields_length
00 01 ₁₆	
00 02 ₁₆	disc_subunit_object_attributes
:	
:	descriptor_reference_info_block
:	
:	
:	presentation_start_time_info_block
:	
:	
:	presentation_end_time_info_block
:	
:	
:	content_entry_point_info_block
:	
:	
:	content_exit_point_info_block
:	
:	
:	other info blocks
:	
:	

Figure 7-3 Performance Object entry_specific_information

The descriptor_reference_info_block is mandatory and the descriptor type shall be 20₁₆ (object entry descriptor – specified by object position).

The presentation_start_time, the presentation_end_time, the content_entry_point and the content_exit_point info blocks are optional.

The order of the information blocks shall be as above.

7.5 Text Database Object entry_specific_information

The structure of the entry_specific_information in Text Database Object is shown.

Text Database Object entry_specific_information	
Address Offset	Contents
00 00 ₁₆	non_info_block_fields_length
00 01 ₁₆	
00 02 ₁₆	disc_subunit_object_attributes
:	
:	text_database_content_attributes_info_block
:	
:	
:	character_code_info_block
:	
:	
:	raw_text_info_block
:	
:	
:	other info blocks
:	
:	

Figure 7-4 Text Database Object entry_specific_information

The text_database_content_attributes_info_block, the character_code_info_block, and the raw_text_info_block are mandatory, and shall be described in this order.

8. Object List

8.1 List ID assignment

The list ID allocation for each list is shown. Refer to the profile section for object and list implementation.

Table 8-1 List ID assignment

list type		contents		list ID	
Contents list	Root			1000 ₁₆	
	Child	Audio		1001 ₁₆	
		reserved		1002 ₁₆ -11FF ₁₆	
Performance list	Root			1400 ₁₆	
	main	Reserved		1401 ₁₆ -1403 ₁₆	
		User defined main performance list		1404 ₁₆ -14FF ₁₆	
Text Database list	Root			1800 ₁₆	
	Child	Disc Title		1801 ₁₆	
		Track Title	ITTS (Latin-based alphanumeric character set)		1802 ₁₆
			ASCII		1803 ₁₆
			MS-JIS (Japanese)		1804 ₁₆
			Reserved		1805 ₁₆ -180F ₁₆
			Reserved		1810 ₁₆ -187F ₁₆
		other text database list		1880 ₁₆ -18FF ₁₆	
Reserved			1200 ₁₆ -13FF ₁₆ 1500 ₁₆ -17FF ₁₆ 1900 ₁₆ -3FFF ₁₆		

8.2 Contents List

8.2.1 List Structure

The whole structure of the Contents List is shown:

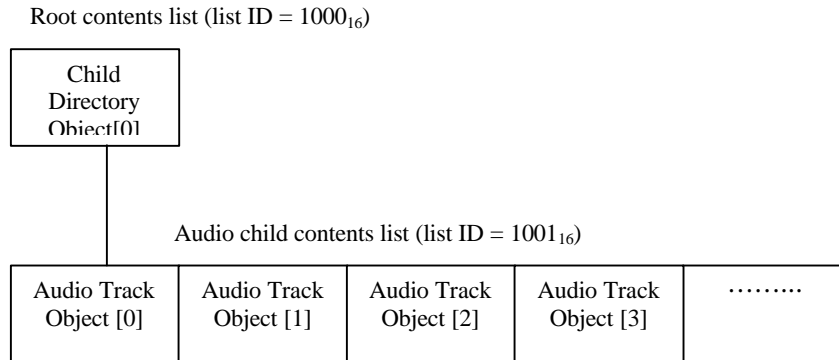


Figure 8-1 The whole structure of the Contents List

8.2.1.1 Root Contents List list_specific_information

The structure of the list_specific_information in Root Contents List is shown.

Root Contents List list_specific_information	
Address Offset	Contents
00 00 ₁₆	non_info_block_fields_length
00 01 ₁₆	
00 02 ₁₆	disc_subunit_list_attributes
:	media_type
:	
:	disc_recordable_information
:	
:	time_stamp_info_block (descriptor_modification_date_and_time)
:	
:	default_play_list_info_block
:	
:	AV_object_type_specific_capacity_info_block (Audio)
:	
:	track_number_offset_info_block
:	
:	name_info_block
:	
:	other info blocks
:	

Figure 8-2 Root Contents List list_specific_information

The time_stamp_info_block, the default_play_list_info_block, the AV_object_type_specific_capacity_info_block, and the track_number_offset_info_block are mandatory, and shall be described in this order.

When the descriptor is changed, the time_stamp_info_block is updated. For example, when a disc is inserted, it is updated.

The media_type shall be 0101₁₆ (CD-DA).

The value of the capacity_format_indicator field in the AV_object_type_specific_capacity_info_block shall be 00₁₆ (time).

The following equation represents the relation of the object_type_specific_total_playback_capacity field in the AV_object_type_specific_capacity_info_block and “READ OUT TIME” in TOC of the CD-DA.

$$\text{object_type_specific_total_playback_capacity} = (\text{READ OUT TIME})$$

The name_info_block is mandatory for the subunit that supports CD-text. The name_info_block is optional for the subunit that does not support CD-text.

The name_data_reference_type in the name_info_block shall be 01₁₆(Referenced) and the descriptor type shall be 20₁₆ (object by object position). The actual name data is contained in Text Database Object.

8.2.1.2 Audio child contents list

The structure of the list_specific_information in Audio Child Contents List is shown.

Audio Child Contents List list_specific_information	
Address Offset	Contents
00 00 ₁₆	non_info_block_fields_length
00 01 ₁₆	
00 02 ₁₆	disc_subunit_list_attributes
:	
:	time_stamp_info_block
:	(descriptor_modification_date_and_time)
:	
:	current_total_info_block
:	
:	other info blocks
:	

Figure 8-3 Audio Child Contents List list_specific_information

The time_stamp_info_block and the current_total_info_block are mandatory, and shall be described in this order.

8.2.2 Performance List

8.2.2.1 Total Structure

The whole structure of Performance List is shown.

Root Performance List (list ID = 1400_{16})

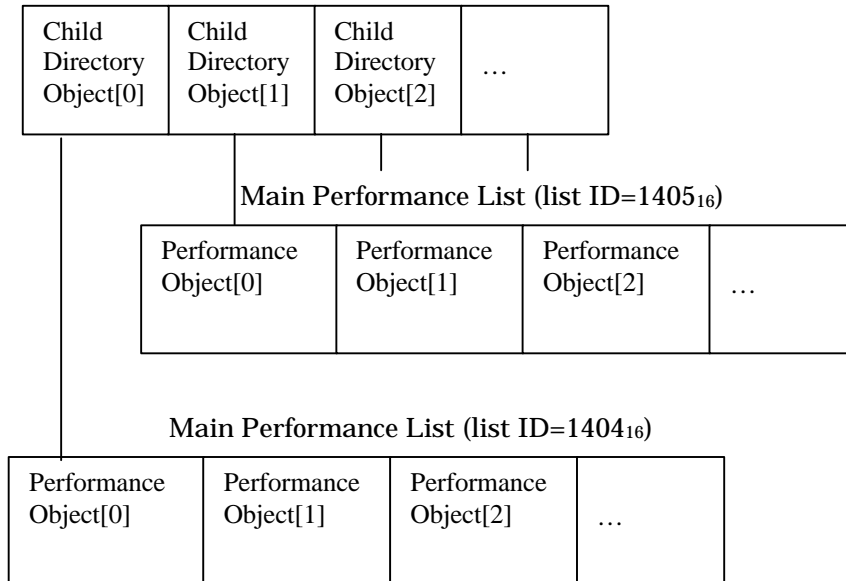


Figure 8-4 The whole structure of Performance List

The list ID of Root Performance List shall be 1400_{16} . Root Performance List contains only Child Directory Object as an object entry. That is, even if there is just one Main Performance List, Root Performance List will contains Child Directory Object.

The value of the list ID of Main Performance List which referred to by the object entry (n) of Root Performance List shall be $1404_{16} + n_{16}$.

The hierarchic structure of the performance lists should not be modifiable.

Note: When the performance object does not contain entry_point, the playback starting point is the beginning point of index 0 or index 1. It is an implementation choice.

8.2.2.2 Root Performance List list_specific_information

The structure of the list_specific_information in Root Performance List is shown.

Root Performance List list_specific_information	
Address Offset	Contents
00 00 ₁₆	non_info_block_fields_length
00 01 ₁₆	
00 02 ₁₆	disc_subunit_list_attributes
:	AV_object_type
:	time_stamp_info_block
:	
:	
:	current_total_info_block
:	
:	other info blocks
:	
:	
:	

Figure 8-5 Root Performance List list_specific_information

The time_stamp_info_block and the current_total_info_block are mandatory and shall be described in this order.

AV_object_type is child directory object.

The number_of_items field in the current_total_info_block indicates the number of object of Root Performance List; that is the number of main performance list.

8.2.2.3 Main Performance List list_specific_information

The structure of the list_specific_information in Main Performance List is shown.

Main Performance List list_specific_information	
Address Offset	Contents
00 00 ₁₆	non_info_block_fields_length
00 01 ₁₆	
00 02 ₁₆	disc_subunit_list_attributes
00 03 ₁₆	AV_object_type
:	time_stamp_info_block
:	
:	
:	size_indicator_info_block
:	
:	current_total_info_block
:	
:	other info blocks
:	
:	
:	

Figure 8-6 Main Performance List list_specific_information

The time_stamp_info_block, the size_indicator_info_block, and the current_total_info_block are mandatory, and shall be described in this order.

AV_object_type shall be Audio Track Object.

The size_indicator_info_block indicates the total time of all the Performance described in this list.

The number_of_items field of the current_total_info_block indicates the number of the object included in this main performance list.

8.2.3 Text Database List

8.2.3.1 Total Structure

The whole structure of Text Database List is shown.

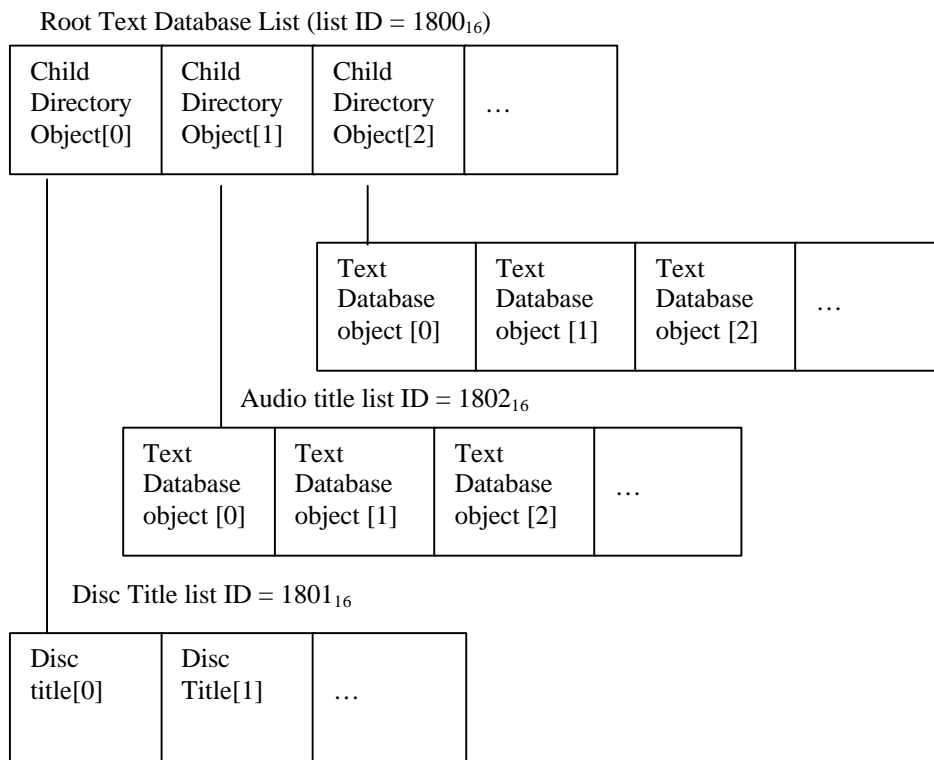


Figure 8-7 The whole structure of Text Database List

The value of the list ID in Root Text Database List shall be 1800₁₆.

The value of the list ID of Child Text Database List --- referred to by the object entry [n] of Root text database List shall be 1801₁₆ + n₁₆.

The text database object is empty when there is no text information for it.

Text Database Object of Child Text Database List of the list ID = 1801₁₆ contains the title of the Disc in the Root Contents list. (list ID = 1000₁₆)

The title of Audio Track Object[n] of the Audio contents list (list ID = 1001₁₆) is contained by the Text Database Object[n] in the Child Text Database List.

The hierarchic structure of the text database lists should not be modifiable.

8.2.3.2 Root Text Database List list_specific_information

The structure of the list_specific_information in Root Text Database List is shown.

Root Text Database List list_specific_information	
Address Offset	Contents
00 00 ₁₆	non_info_block_fields_length
00 01 ₁₆	
00 02 ₁₆	disc_subunit_list_attributes
:	
:	time_stamp_info_block
:	
:	
:	other info blocks
:	
:	

Figure 8-8 Root Text Database List list_specific_information

The time_stamp_info_block is mandatory.

8.2.3.3 Child Text Database List list_specific_information

The list_specific_information in Child Text Database List is shown.

Child Text Database List list_specific_information	
Address Offset	Contents
00 00 ₁₆	non_info_block_fields_length
00 01 ₁₆	
00 02 ₁₆	disc_subunit_list_attributes
:	
:	time_stamp_info_block
:	
:	
:	other info blocks
:	
:	

Figure 8-9 Child Text Database List list_specific_information

The time_stamp_info_block is mandatory.

9. Command

9.1 SEARCH

9.1.1 CD specific rule for track search

When the measurement _unit = track, the search point is the position of +0hour:
0minute: 0second: 0frame in the Relative HMSF Count.

10. Profile

Table 10-1 implementation_profile_ID

implementation_profile_ID	meaning
20 ₁₆	Network CD - it implements at least the follows: <ol style="list-style-type: none"> 1) Subunit identifier descriptor 2) Disc subunit status descriptor operating_mode_info_block, position_info_block, plug_configuration_info_block 3) Contents list 4) Command support PLAY(forward, forward pause), STOP, SEARCH(absolute unit, unit=track)
50 ₁₆	Program play CD - it implements at least the follows: <ol style="list-style-type: none"> 1) Subunit identifier descriptor 2) Disc subunit status descriptor operating_mode_info_block, position_info_block, plug_configuration_info_block 3) Contents list 4) Performance list 5) Command support PLAY(forward, forward pause), STOP, SEARCH(absolute unit, unit=track) CONFIGURE
60 ₁₆	Title CD - it implements at least the follows: <ol style="list-style-type: none"> 1) Subunit identifier descriptor 2) subunit status descriptor operating_mode_info_block, position_info_block plug_configuration_info_block, 3) Contents list 4) Text database list 5) Performance list 6) command support PLAY(forward, forward pause) STOP SEARCH(absolute unit, unit=track) CONFIGURE
all others	Reserved for future definitions

A. Appendix New Info Block (normative)

A.1 Track Number Offset Info Block (80 12₁₆)

The *track_number_offset_info_block* specifies an offset value which controllers should add to all track numbers derived from AV object in this list. The purpose is to support the concept of "collections" of media. For example, a collection of 3 CD's may be represented as tracks 1 through 10 on the first CD, tracks 11 through 15 on the second, and tracks 16 through 25 on the third. The info block has the following format:

track_number_offset_info_block	
Address Offset	Contents
00 00 ₁₆	compound_length
00 01 ₁₆	
00 02 ₁₆	info_block_type = 80 12 ₁₆ (track_number_offset_info_block)
00 03 ₁₆	
00 04 ₁₆	primary_fields_length
00 05 ₁₆	
00 06 ₁₆	track_number_offset
:	
:	

Figure A-1 track_number_offset_info_block

The *track_number_offset* field contains the offset value. The number of byte for this field is same as the size of object position.

Note: This section is to be added to the section 11 of the next revision of AV/C Disc Subunit General Specification version 1.0.

A.2 Position Indicator Info block(00 02₁₆)

A.2.1 Relative segment HMSF Count (08₁₆)

The relative segment HMSF count type position data has the following format.

Relative segment HMSF count		
Address Offset	Contents	
00 ₁₆	object_position_number	
:		
:	segment	
:		
:	+/-	hours
:		minutes
:		seconds
:		frames

Figure A-2 Relative segment HMSF count

The position indicator info block with this type position data is used to indicate a position in the object referred by the object_position_number.

The object_position_number field specifies the position number of the object in the list. Its size, in bytes, is determined by the size_of_object_position field in the subunit identifier descriptor.

The segment_number field (two bytes) specifies the segment.

The +/- bit indicates the plus / minus sign of the following hours, minutes, seconds and frames information. If this bit is set to 1, the sign is minus. If this bit is set to 0, the sign is plus.

The hours, minutes, seconds and frames fields specify the hours, minutes, seconds and frames of the position. If the subunit is not able to support all of the fields in this structure (such as frames), then it shall specify a value of FF₁₆ for the unsupported fields.

The resolution of the frame depends on the data format of the AV stream referred by this info block.

The starting point and the way of measurement of hours, minutes, seconds and frames depend on the data format of the AV stream referred by this info block.

Note: This section is to be added to the section 6.3 of the next revision of Enhancement to the AV/C General Specification 3.0, version 1.0.

B. Appendix New Character Code (normative)

B.1 Character Code Info Block (00 08₁₆)

The *character_code_type* field specifies the character code used for the text. It can take on one of the following values:

Table B-1 *character_code_type*

character_code_type		
Value	Definition	references
03 ₁₆	ITTS	IEC61866, Audiovisual systems – Interactive text transmission system, ref[1]
04 ₁₆	Korean	KS C 5601-1989, Standard Codes of Korean Characters for Information Interchange, ref[2]
05 ₁₆	Chinese	GB2312-80, Codes of Chinese Graphic Characters for Information Interchange, Primary Set, ref[3]

The *character_code_type_specific* field provides more detail on the character code being used. The following structures are defined:

B.1.1 ITTS

The ITTS type-specific information is defined as follows:

Table B-2 ITTS *character_code_type_specific_info*

ITTS <i>character_code_type_specific_info</i>	
value	meaning
00 ₁₆	Latin-based alphanumeric character set
01 ₁₆	Extended Latin-based alphanumeric character set
02 ₁₆	Mosaic and lined graphics font set
03 ₁₆	Japanese font table 1
04 ₁₆	Japanese font table 2
all other values	reserved for future definition

The length of *character_code_type_specific_info* is 1byte.

B.1.2 Korean

There is no type-specific information defined for the Korean character code type.

B.1.3 Chinese

There is no type-specific information defined for the Chinese character code type.

Note: This section is to be added to the section 6 of the next revision of Enhancement to the AV/C General Specification 3.0, version 1.0.
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