Specification

for

Serial Interface DN-C635

Denon, Ltd.

Histories

Rev.	Date	Name	Description
1.0	Jan.,28,'03	J.Watanabe	

Contents

1 Serial communication interface

1.1 Physical interface

a) DN-C635 has pin Dsub female connector for serial interface.

b) Table 1 indicates pin assignment of connector signals. RS-232C and RS-422A can be selected with software switch on DN-C635.

	RS-232C		RS-422A	
Terminal #	Signal	I/O	Signal	I/O
1	NC	-	NC	-
2	TxD	O	TxD-	O
3	RxD	I	RxD	I
4	NC	-	NC	-
5	S.GROUND	-	S.GROUND	-
6	NC	-	NC	-
7	NC	-	TXD	O
8	NC	-	RXD-	I
9	NC	-	NC	-

Table 1. Pin Assignment

c) Figure 1 indicates diagram of RS232C and RS422A.

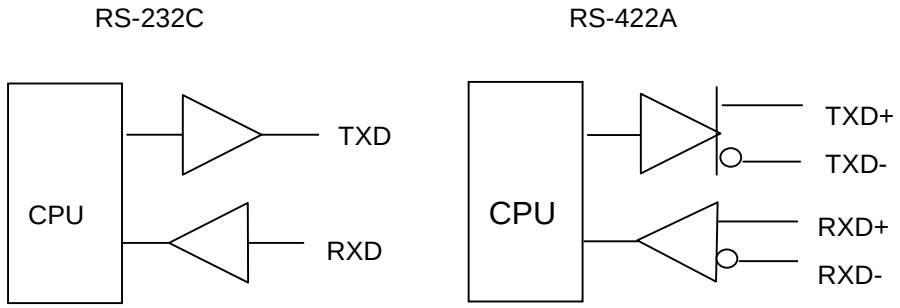

Figure 1. Serial Driver/Receiver

1.2 Transfer format of serial data

- Interface	RS-232C RS-422A selectable
- Communication system	Half-duplex communication
- Data transfer mode	Start stop synchronization
- Transfer rate	9,600bps
- Start bit (ST)	1 bit
- Data bit (b0-b7)	8 bits
- Parity (P)	Even number
- Stop bit (SP)	1 bit
- Transfer data	ASCII code
- Control characters	STX (0x02)
	ETX (0x03)
	NAK (15h)
	ACK (06h)

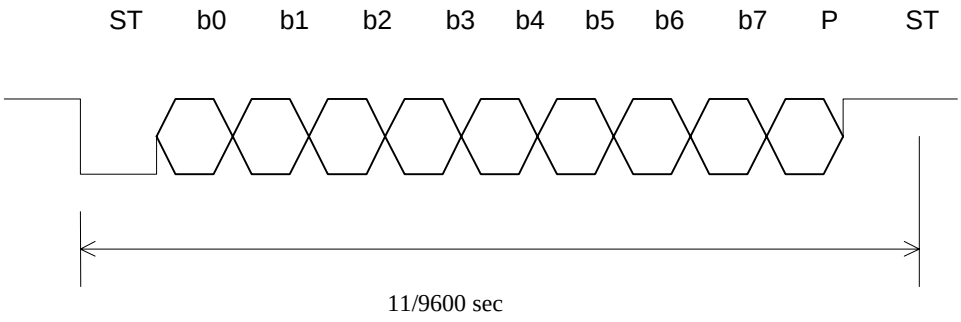

Figure 2. Command Data Array

2 Command format and answer format

The DN-C635 uses commands each of which consists of a data row (some commands no need PC) composed of command codes (CC) and parameter codes (PC). The host shall be designed to send block check characters (BCC) following ETX, with the data row enclosed in STX (text start: 0x02) and ETX (text termination: 0x03). The DN-C635 shall complete command receive with correct BCC codes.

Here are the formats.

Commands <STX> <CC> <PC0> <PC1> <PC2> <……..> <PCn> <ETX> <BCCH><BCCL>

STX (Start of TeXt)	0x02
CC (Command Code)	Command code
PC (Parameter Code)	Numbers of parameters are defined for each command.
ETX (End of TeXt)	0x03
BCC (Block Check Character)	CC + PC0 + PC1 + PC2 + + PCn + ETX = XY (hex)
	Each of X and Y is 4 bit long, X, Y=0,1,2,3,4,5,6,7,8,9,A, B, C, D, E, F

BCCH is an ASCII code converted from X (higher 4 bits of sum) and BCCL is converted from Y (lower 4 bit of sum).

BCCH and BCCL are ASCII coded data.

Answers<STX> <RC> <AC> <PC0> <PC1> <PC2> <> <PCn> <ETX><BCCH><BCCL>

STX (Start of TeXt)	0x02
RC (Reply Code)	Reply code (=Command code)
AC (Answer Code)	Answer code
PC (Parameter Code)	Numbers of parameters are defined for each command.
ETX (End of TeXt)	0x03
BCC (Block Check Character)	RC+AC + PC0 + PC1 + PC2 + + PCn + ETX = XY (hex)
	Each of X and Y is 4 bit long, X, Y=0,1,2,3,4,5,6,7,8,9,A, B, C, D, E, F

BCCH is an ASCII code converted from X (higher 4 bits of sum) and BCCL is converted from Y (lower 4 bit of sum).

BCCH and BCCL are ASCII coded data.

For BCC;

1) Add from command through STX.
2) Take two lowest digits in BCC sum. (“tens” & “ones” place)
3) Convert tens & ones place numbers in to hex.

Examples: BCC=337 → BCCH=33, BCCL=37 (discard hundredths place 3)
BCC=107 → BCCH=30, BCCL=37 (discard hundredths place 1)
BCC= 45 → BCCH=34, BCCL=35 (convert directly)
BCC= AC → BCCH=41, BCCL=43 (convert directly)

2.1 Protocol for data transmission and reception

This device's serial protocol is based on half-duplex communication. Therefore the host shall transmit commands and receive answers according to the following procedure.

Basic procedure

1) The host selects a prefer command and transmit codes to device. The host shall not send each byte within 40µsec because the device cannot receive within 40µsec after previous byte.
2) The host shall wait device's answer before transmit next command. Reading RC, AC and PC bytes, the host can get acknowledge whether the device received previous command correctly or not.
3) When transmit the command which causes some functions, the host shall get device's status that the device becomes ready. The Read Status command is used for this purpose.
4) The host shall complete the transmission of one command within 40 msec.
5) The device shall return answer within 5 seconds.
6) The device cannot receive any command within 2 second after power turned on.

Communication errors

1) In case of communication error such as overrun, framing, or parity error occurred, the device returns NAK (15h) code within 80msec from the start of command transmission. When received NAK (0x15) code, the host shall transmit previous command again immediately.
2) If the host detects communication error while receiving the answer, the host shall send NAK (0x15) code within 80msec from beginning of receipt. The device sends same answer again after received NAK code within 80msec.
3) The host shall send previous command when there is no answer from device.

2.2 Command / Answer sequence

Figure 3 is examples of command and answer sequence for DN-T645/625.

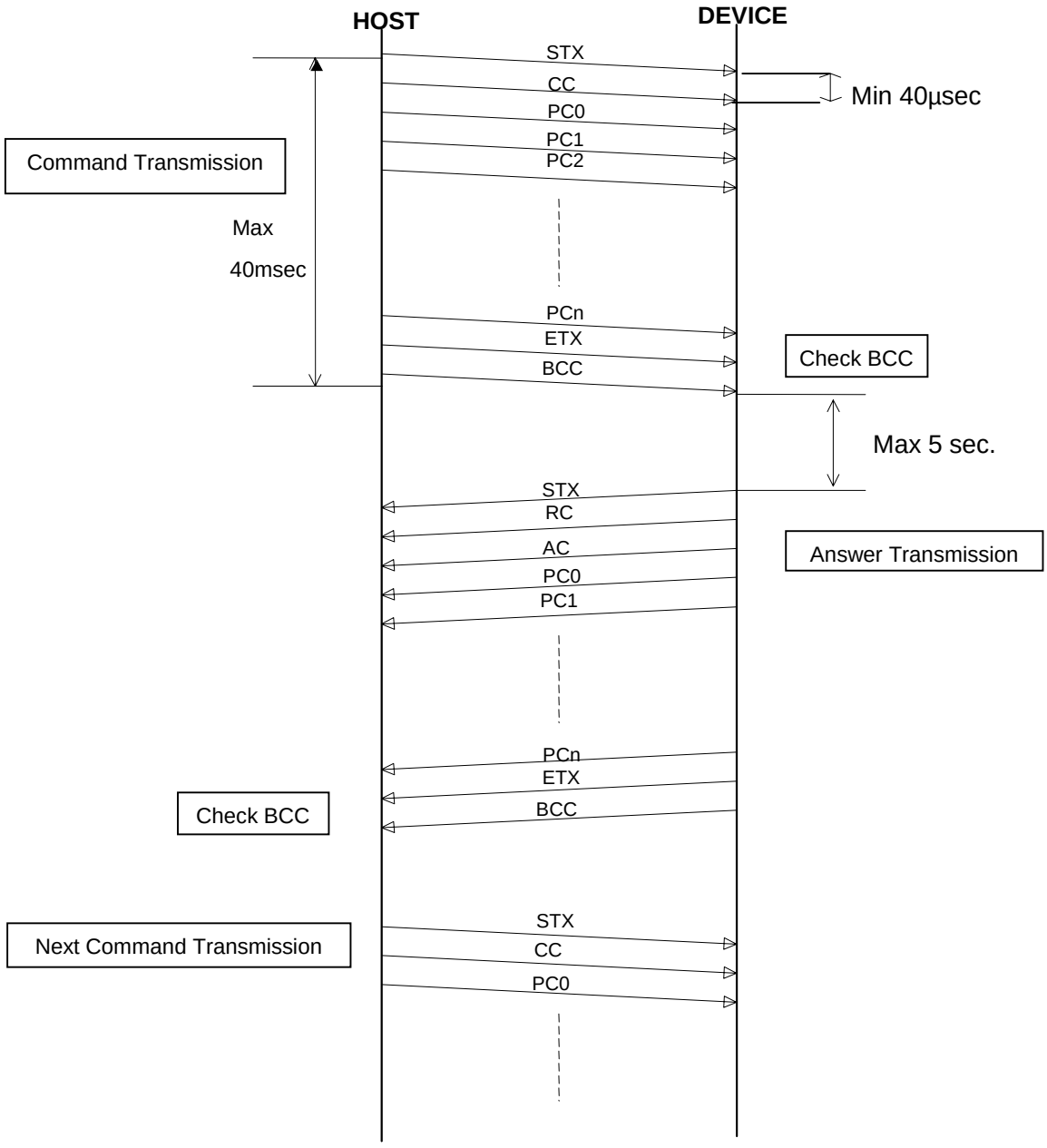

Figure 3. Command Sequence

2.3 List of command codes

No.	Command	Code (ASCII)	Destination		Operation
			System	CD	
1	Reset	0x20('SP')	X		Reset the device.
2	Sleep	0x21('!')	X		Force the device to Sleep mode.
3	Request CD PLAY Status	0x30('0')		X	Request CD player and Deck status.
4	Request Firmware Rev.	0x31('1')	X		Request the firmware revision code.
5	Request Error Code	0x32('2')	X		Request the error code.
6	Request Machine ID	0x36('6')	X		Request the machine ID.
7	Request CD TOC	0x37('7')		X	Request CD's TOC data
8	Request Text Data	0x38('8')		X	Request CD-text/MP3 text data
9	Request Display Status	0x39('9')	X		Request Display Status data
10	Request Program Table	0x3B(';')	X		Request Program Num Table.
11	Play	0x40('@')		X	Start playback or recording.
12	Stop	0x41('A')		X	Stop playback or recording.
13	Pause	0x42('B')		X	Playback Pause.
14	Skip	0x43('C')		X	Skip to the other track or music.
15	Search	0x44('D')		X	Search with audio output.
16	Open/Close	0x45('E')		X	
17	Cue	0x46('F')		X	
18	Program / Direct	0x47('G')		X	
19	Track Num Entry	0x48('H')		X	
20	A-B	0x4C('L')		X	
21	Pitch	0x4E('N')		X	
22	Pitch Set	0x4F('O')		X	
23	Time	0x50('P')		X	
24	Title	0x51('Q')		X	
25	Repeat	0x52('R')		X	
26	Play Mode	0x53('S')		X	

Table 2. Command list

2.4 List of answer codes

No.	Status	Code (ASCII)	Description
1	Command OK	0x20(SP)	Received the command correctly.
2	Invalid	0x30('0')	Received invalid command or parameter.
3	Format Error	0x31('1')	Received inappropriate format command.
4	None track requested	0x32('2')	Requested track does not exit.
5	None time requested	0x33 ('3')	Requested time does not exit.
6	Condition Error	0x35 ('5')	Condition error occurs.

Table 3. Answer code list

2.5 Status List

No.	Status	Code (ASCII)			Description
			System	CD	
1	Ready	0x30 ('0')	X	X	Device is ready to receive a command.
2	Not Ready	0x31 ('1')	X	X	Device is not ready to be operated.
3	Sleep	0x33 ('3')	X		Sleeping Device.
4	Play	0x41 ('A')		X	Playing.
5	Stop	0x42 ('B')		X	Under stop.
6	Pause	0x43 ('C')		X	Pausing CD.
7	No Media	0x44 ('D')		X	There is no CD or no tape in the device.
8	Search *	0x45 ('E')		X	Slow search playing.
9	CD Error	0x46 ('F')		X	CD Error.
10	Disc Loading	0x47 ('G')		X	Under disc loading, now reading TOC or pass table.
11	Disc Loading complete	0x48 ('H')		X	Disc loading complete. Device TOC reads finish or pass table read finish.
12	Tray Opening	0x49 ('I')		X	Disc tray now opening.
13	Tray Closing	0x4A ('J')		X	Disc tray now closing.
14	Scan Play	0x4B ('K')		X	Fast play, forward or reverse direction.
15	Pause Cue	0x4C ('L')		X	Pause with Cueing.
16	Servo on	0x4D ('M')		X	Servo on.
17	Disc Read Error	0x4E ('N')		X	Disc Read Error.

Table 4. Status list

2.6 Command specification

2.6.1 RESET command

This command resets the device. After **RESET** command the device will do some operations for reset and return Answer code. At last the device resets itself.

1) Command format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Command code('SP')							
2	Reserve(0x00)							
3	Reserve(0x00)							
4	Reserve(0x00)							
5	Reserve(0x00)							
6	ETX(0x03)							
7	BCCH(high-level)							
8	BCCL(low-level)							

Table 5. Reset command

2) Answer format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Reply code ('SP')							
2	Answer code (Table 3)							
3	ETX(0x03)							
4	BCCH(high-level)							
5	BCCL(low-level)							

Table 6. Reset answer

3) Special condition

- This device cannot receive any commands within 2 seconds after this command is sent.
- After Reset command, the host shall wait the device becomes ready status. The device returns **Not Ready** status for Request Status command before get ready.

2.6.2 SLEEP command

The **SLEEP** command forces the device to enter sleep mode. The device will stop all of operations, turns off displays and returns Answer code. To wake up, send Operation command (ex. Play, Pause, Stop…).

1) Command format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Command code (‘!’)							
2	Reserve(0x00)							
3	Reserve(0x00)							
4	Reserve(0x00)							
5	Reserve(0x00)							
6	ETX(0x03)							
7	BCCH(high-level)							
8	BCCL(low-level)							

Table 7. Sleep command

2) Answer format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Reply code (‘!’)							
2	Answer code (Table 3)							
3	ETX(0x03)							
4	BCCH(high-level)							
5	BCCL(low-level)							

Table 8. Sleep answer

3) Special condition

- None

2.6.3 REQUEST CD PLAY STATUS command

Using this command, the host can get CD player information. The host shall send this command repeatedly to sense the CD player's status.

1) Command format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Command code ('0')							
2	CD Time Code(Elapsed : '0', Remain : '1', Total Remain : '2')							
3	Reserve(0x00)							
4	Reserve(0x00)							
5	Reserve(0x00)							
6	ETX(0x03)							
7	BCCH(high-level)							
8	BCCL(low-level)							

Table 9. Request CD Status command

2) Answer format

byte/bit	7	6	5	4	3	2	1	0
0	STX (0x02)							
1	Reply code ('0')							
2	Answer code (Table 3)							
3	[System] System Status (Table 4)							
4	[CD] Disc type code (Table 11)							
5	[CD] Audio format code (Table 12)							
6	[CD] Status code (Table 4)							
7	[CD] Play mode code (Table 14)							
8	[CD] Folder number (100 digits)							
9	[CD] Folder number (10 digits)							
10	[CD] Folder number (1 digits)							
11	[CD] Track number (100 digits)							
12	[CD] Track number (10 digits)							
13	[CD] Track number (1 digits)							
14	Reserve(0x00)							
15	Reserve(0x00)							
16	[CD] Elapsed / Remain time (minutes, 100 digits)							
17	[CD] Elapsed / Remain time (minutes, 10 digits)							
18	[CD] Elapsed / Remain time (minutes, 1 digits)							
19	[CD] Elapsed / Remain time (second, 10 digits)							
20	[CD] Elapsed / Remain time (second, 1 digits)							
21	Reserve(0x00)							
22	Reserve(0x00)							
23	Reserve(0x00)							
24	Reserve(0x00)							
25	Reserve(0x00)							
26	Reserve(0x00)							
27	Reserve(0x00)							
28	Reserve(0x00)							
29	ETX (0x03)							
30	BCCH (high-level)							
31	BCCL (low-level)							

Table 10. Request CD Status answer

Code	Disc Type
0x31(‘1’)	Reserved
0x32(‘2’)	Reserved
0x33(‘3’)	Reserved
0x34(‘4’)	CD-DA
0x35(‘5’)	MP3
0x36(‘6’)	UNKNOWN
0x37(‘7’)	CD-Text

Table 11. Disc type code

Code	Audio Format
0x31(‘1’)	Reserved
0x32(‘2’)	Reserved
0x33(‘3’)	MPEG
0x34(‘4’)	LPCM
0x35(‘5’)	Reserved
0x36(‘6’)	UNKNOWN

Table 12. Audio format code

Code	Play mode
0x31(‘1’)	Normal
0x32(‘2’)	Program
0x33(‘3’)	Random

Table 14. Play mode

3) Special conditions

- Until read the TOC, CD-text, MP3 file name, the device will return ‘0’ with track and time data.

2.6.4 REQUEST FIRMWARE REVISION command

This command requests the microprocessor firmware revision code.

1) Command format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Command code (‘1’)							
2	Reserve(0x00)							
3	Reserve(0x00)							
4	Reserve(0x00)							
5	Reserve(0x00)							
6	ETX(0x03)							
7	BCCH(high-level)							
8	BCCL(low-level)							

Table 17. Request Firmware Revision command

2) Answer format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Reply code (‘1’)							
2	Answer code (Table 3)							
3	Firmware revision 1000 digit (ASCII)							
4	Firmware revision 100 digit (ASCII)							
5	Firmware revision 10 digit (ASCII)							
6	Firmware revision 1 digit (ASCII)							
7	ETX(0x03)							
8	BCCH(high-level)							
9	BCCL(low-level)							

Table 18. Request Firmware Revision answer

3) Special condition

- None.

2.6.5 REQUEST ERROR CODE command

With this command the host can get ERROR CODE from the device in case of something wrong.

1) Command format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Command code (‘2’)							
2	Reserve(0x00)							
3	Reserve(0x00)							
4	Reserve(0x00)							
5	Reserve(0x00)							
6	ETX(0x03)							
7	BCCH(high-level)							
8	BCCL(low-level)							

Table 19. Request Error Code command

2) Answer format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Reply code (‘2’)							
2	Answer code (Table 3)							
3	Error code (Newest a)							
4	Error code (Newest b)							
5	Error code (9^{th}-a)							
6	Error code (9^{th}-b)							
7	Error code (8^{th}-a)							
8	Error code (8^{th}-b)							
9	Error code (7^{th}-a)							
10	Error code (7^{th}-b)							
11	Error code (6^{th}-a)							
12	Error code (6^{th}-b)							
13	Error code (5^{th}-a)							
14	Error code (5^{th}-b)							
15	Error code (4^{th}-a)							
16	Error code (4^{th}-b)							
17	Error code (3^{rd}-a)							
18	Error code (3^{rd}-b)							
19	Error code (2^{nd}-a)							
20	Error code (2^{nd}-b)							
21	Error code (1^{st}-a)							
22	Error code (1^{st}-b)							
23	ETX (03h)							
24	BCCH (high-level)							
25	BCCH (low-level)							

Table 20. Request Error Code answer

3) Special condition

- If error code empty then using ‘00’.

2.6.6 REQUEST MACHINE ID command

This command requests the machine ID.

1) Command format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Command code (‘6’)							
2	Reserve (0x00)							
3	Reserve (0x00)							
4	Reserve (0x00)							
5	Reserve (0x00)							
6	ETX(0x03)							
7	BCCH(high-level)							
8	BCCL(low-level)							

Table 33. Request Machine ID command

2) Answer format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Reply code (‘6’)							
2	Answer code (Table 3)							
3-15	Machine ID ‘ DENON DN-C635 ‘							
16	ETX(0x03)							
17	BCCH(high-level)							
18	BCCL(low-level)							

Table 34. Request Machine ID answer

3) Special conditions

- None.

2.6.7 REQUEST CD TOC command

This command requests the device to send CD TOC data.

1) Command format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Command code (‘7’)							
2	Reserve (0x00)							
3	Track number 100 digits (Table 36)							
4	Track number 10 digits (Table 36)							
5	Track number 1 digits (Table 36)							
6	ETX(0x03)							
7	BCCH(high-level)							
8	BCCL(low-level)							

Table 35. Request CD Data command

Track number	Content	TOC data format	Remark
‘000’	Reserved	’000000’	
‘001’	Track 1	‘mmssff’	‘mm’: minute ’ss’: second, ‘ff’: frame
|	|	|	
‘099’	Track 99	Track 99	
‘0A0’	First track number	‘xx0000’	‘xx’: first track number
‘0A1’	Last track number	‘xx0000’	‘xx’: last track number
‘0A2’	total time	‘mmssff’	

Table 36. Track number, TOC data

2) Answer format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Reply code (‘7’)							
2	Answer code (Table 3)							
3	Reserve (0x00)							
4	Track number 100 digits (Table 36)							
5	Track number 10 digits (Table 36)							
6	Track number 1 digits (Table 36)							
7	TOC data 1 (Minute 10 digits)							
8	TOC data 2 (Minute 1 digits)							
9	TOC data 3 (Second 10 digits)							
10	TOC data 4 (Second 1 digits)							
11	TOC data 5 (Frame 10 digits)							
12	TOC data 6 (Frame 1 digits)							
13	ETX(0x03)							
14	BCCH(high-level)							
15	BCCL(low-level)							

Table 37. Request CD Data answer

3) Special conditions

- Track number ‘0A0’,’0A1’ and ‘0A2’ have special meaning. Refer the Table 36.

2.6.8 REQUEST TEXT DATA command

This command requests the device to send text data.

1) Command format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Command code (‘8’)							
2	Data Type (Table 39)							
3	Track number 100 digits (Table 40)							
4	Track number 10 digits (Table 40)							
5	Track number 1 digits (Table 40)							
6	ETX(0x03)							
7	BCCH(high-level)							
8	BCCL(low-level)							

Table 38. Request Text Data command

CODE	Data Type	Note
0x30 (‘0’)	CD Text (Title)	
0x31 (‘1’)	CD Text (Artist)	
0x32 (‘2’)	Reserved	
0x33 (‘3’)	Reserved	
0x34 (‘4’)	MP3 Folder Name	
0x35 (‘5’)	MP3 File Name	
0x36 (‘6’)	Reserved	
0x37 (‘7’)	ID3 Title Name	Only Play/Pause/Cue.
0x38 (‘8’)	ID3 Artist Name	Only Play/Pause/Cue.
0x39 (‘9’)	ID3 Album Name	Only Play/Pause/Cue.
0x3A (‘:’)	Reserved	

Table 39. Data Type

Track number	Content	Note
‘000’	whole Disc’s	If CD Text Disc Then whole Disc’s.
‘001’	Track 1	
:	:	
‘099’	Track 99	Maximum value in the case of the CD.
:	:	
‘999’	Track 999	

Table 40. Track number

2) Answer format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Reply code (‘8’)							
2	Answer code (Table 3)							
3	Data Type (Table 39)							
4	Track number 100 digits (Table 40)							
5	Track number 10 digits (Table 40)							
6	Track number 1 digits (Table 40)							
7-36	Text Data (30charactors)							
37	ETX(0x03)							
38	BCCH(high-level)							
39	BCCL(low-level)							

Table 41. Request Text Data answer

3) Special conditions

- None.

2.6.9 Request Display Status command

This command acquires the display condition of the display.

1) Command format

Byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Command code (‘9’)							
2	Reserve (0x00)							
3	Reserve (0x00)							
4	Reserve (0x00)							
5	Reserve (0x00)							
6	ETX(0x03)							
7	BCCH(high-level)							
8	BCCL(low-level)							

Table 42. Request Display Status command

2) Answer format

Byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Reply code (‘9’)							
2	Answer code (Table 3)							
3	Reserve (0x00)							
4	[CD] Play / Pause Status (OFF : ‘0’, Play : ‘1’, Pause : ‘2’)							
5	[CD] Elapsed Status (OFF : ‘0’, ON : ‘1’)							
6	[CD] Remain Status (OFF : ‘0’, ON : ‘1’, T-Remain : ‘2’)							
7	[CD] File Status (OFF : ‘0’, ON : ‘1’)							
8	[CD] Folder Status (OFF : ‘0’, ON : ‘1’)							
9	[CD] Title Status (OFF : ‘0’, ON : ‘1’)							
10	[CD] MP3 Status (OFF : ‘0’, ON : ‘1’)							
11	[CD] Program Status (OFF : ‘0’, ON : ‘1’)							
12	Reserve (0x00)							
13	[CD] A-B Status (OFF : ‘0’, A-B ON : ‘1’, A-B Brink : ‘2’)							
14	[CD] Album Status (OFF : ‘0’, ON : ‘1’)							
15	[CD] Artists Status (OFF : ‘0’, ON : ‘1’)							
16	[CD] Pitch % Status (OFF : ‘0’, ON : ‘1’, Brink : ‘2’)							
17	[CD] Pitch Symbol Status (‘sp’, ‘-‘)							
18	[CD] Pitch 10 digits Status							
19	[CD] Pitch 1 digits Status							
20	[CD] Pitch 0.1 digits Status							
21	Reserve (0x00)							
22	Reserve (0x00)							
23	Reserve (0x00)							
24	Reserve (0x00)							
25	Reserve (0x00)							
26	Reserve (0x00)							
27	Reserve (0x00)							
28	Reserve (0x00)							
29	Reserve (0x00)							
30	ETX(0x03)							
31	BCCH(high-level)							
32	BCCL(low-level)							

Table 43. Request Display Status answer

3) Special conditions

2.6.10 Request Program Table command

This command acquires 10 occurrences of information that is registered to program with unit.

1) Command format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Command code (';')							
2	Program Table Num ('0' – '9') (Table 47)							
3	Reserve (0x00)							
4	Reserve (0x00)							
5	Reserve (0x00)							
6	ETX(0x03)							
7	BCCH(high-level)							
8	BCCL(low-level)							

Table 46. Request Program Table command

CODE	Program / Direct Status
0x30 ('0')	Program Num 01 – 10
0x31 ('1')	Program Num 11 – 20
0x32 ('2')	Program Num 21 – 30
0x33 ('3')	Program Num 31 – 40
0x34 ('4')	Program Num 41 – 50
0x35 ('5')	Program Num 51 – 60
0x36 ('6')	Program Num 61 – 70
0x37 ('7')	Program Num 71 – 80
0x38 ('8')	Program Num 81 – 90
0x39 ('9')	Program Num 91 – 99

Table 47. Program / Direct answer

2) Answer format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Reply code (';')							
2	Answer code (Table 3)							
3	Program Table Num ('0' – '9') (Table 47)							
4	Program Num 1 Track number 100 digits							
5	Program Num 1 Track number 10 digits							
6	Program Num 1 Track number 1 digits							
7	Program Num 2 Track number 100 digits							
8	Program Num 2 Track number 10 digits							
9	Program Num 2 Track number 1 digits							
10	Program Num 3 Track number 100 digits							
11	Program Num 3 Track number 10 digits							
12	Program Num 3 Track number 1 digits							
13	Program Num 4 Track number 100 digits							
14	Program Num 4 Track number 10 digits							
15	Program Num 4 Track number 1 digits							
16	Program Num 5 Track number 100 digits							
17	Program Num 5 Track number 10 digits							
18	Program Num 5 Track number 1 digits							
19	Program Num 6 Track number 100 digits							

20	Program Num 6 Track number 10 digits
21	Program Num 6 Track number 1 digits
22	Program Num 7 Track number 100 digits
23	Program Num 7 Track number 10 digits
24	Program Num 7 Track number 1 digits
25	Program Num 8 Track number 100 digits
26	Program Num 8 Track number 10 digits
27	Program Num 8 Track number 1 digits
28	Program Num 9 Track number 100 digits
29	Program Num 9 Track number 10 digits
30	Program Num 9 Track number 1 digits
31	Program Num 10 Track number 100 digits
32	Program Num 10 Track number 10 digits
33	Program Num 10 Track number 1 digits
34	ETX(0x03)
35	BCCH(high-level)
36	BCCL(low-level)

Table 48. Request Program Table answer

3) Special condition

If Program Num empty then ‘000’.

2.6.11 PLAY command

1) Command format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Command code (‘@’)							
2	Mechanism select (CD : ‘0’)							
3	Reserve (0x00)							
4	Reserve (0x00)							
5	Reserve (0x00)							
6	ETX(0x03)							
7	BCCH(high-level)							
8	BCCL(low-level)							

Table 49. PLAY command

2) Answer format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Reply code (‘@’)							
2	Answer code (Table 3)							
3	ETX(0x03)							
4	BCCH(high-level)							
5	BCCL(low-level)							

Table 50. PLAY answer

3) Special conditions

2.6.12 STOP command

This command stops playback.

1) Command format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Command code (‘A’)							
2	Mechanism select (CD : ‘0’)							
3	Reserve (0x00)							
4	Reserve (0x00)							
5	Reserve (0x00)							
6	ETX(0x03)							
7	BCCH(high-level)							
8	BCCL(low-level)							

Table 51. STOP command

2) Answer format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Reply code (‘A’)							
2	Answer code (Table 3)							
3	ETX(0x03)							
4	BCCH(high-level)							
5	BCCL(low-level)							

Table 52.STOP answer

3) Special conditions

2.6.13 CD PAUSE command

This command pause the CD.

1) Command format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Command code (‘B’)							
2	Reserve (0x00)							
3	Reserve (0x00)							
4	Reserve (0x00)							
5	Reserve (0x00)							
6	ETX(0x03)							
7	BCCH(high-level)							
8	BCCL(low-level)							

Table 53. CD PAUSE command

2) Answer format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Reply code (‘B’)							
2	Answer code (Table 3)							
3	ETX(0x03)							
4	BCCH(high-level)							
5	BCCL(low-level)							

Table 54. CD PAUSE answer

3) Special conditions

2.6.14 Skip command

This command does the music search of the CD.

1) Command format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Command code (‘C’)							
2	Skip code (Forward : ’+’, Reverse : ’-‘)							
3	Reserve (0x00)							
4	Reserve (0x00)							
5	Reserve (0x00)							
6	ETX(0x03)							
7	BCCH(high-level)							
8	BCCL(low-level)							

Table 55. SKIP command

2) Answer format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Reply code (‘C’)							
2	Answer code (Table 3)							
3	ETX(0x03)							
4	BCCH(high-level)							
5	BCCL(low-level)							

Table 56. SKIP answer

3) Special condition

2.6.15 SEARCH command

This command does the music search at designated speed in the CD playback.

1) Command format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Command code (‘D’)							
2	Search Speed (Table 58)							
3	Reserve (0x00)							
4	Reserve (0x00)							
5	Reserve (0x00)							
6	ETX(0x03)							
7	BCCH(high-level)							
8	BCCL(low-level)							

Table 57. SEARCH command

Code	Search Speed
0x40 (‘@’)	Normal (x1 FWD)
0x41 (‘A’)	x20 FWD
0x42 (‘B’)	x16 FWD
0x43 (‘C’)	x8 FWD
0x44 (‘D’)	x4 FWD
0x61 (‘a’)	x20 RVS
0x62 (‘b’)	x16 RVS
0x63 (‘c’)	x8 RVS
0x64 (‘d’)	x4 RVS

Table 58. Search speed

2) Answer format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Reply code (‘D‘)							
2	Answer code (Table 3)							
3	ETX(0x03)							
4	BCCH(high-level)							
5	BCCL(low-level)							

Table 59. SEARCH answer

3) Special condition

After performing this function, it returns to normal playback by performing Search Speed “Normal”.

2.6.16 Open / Close Command

This command opens and closes the loader of the CD.

1) Command format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Command code (‘E’)							
2	Open / Close Code(Close : ‘0’, Open : ‘1’)							
3	Reserve (0x00)							
4	Reserve (0x00)							
5	Reserve (0x00)							
6	ETX(0x03)							
7	BCCH(high-level)							
8	BCCL(low-level)							

Table 60. Open / Close command

2) Answer format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Reply code (‘E’)							
2	Answer code (Table 3)							
3	ETX(0x03)							
4	BCCH(high-level)							
5	BCCL(low-level)							

Table 61. Open / Close answer

3) Special condition

2.6.17 Cue command

This command transfers playback position in the queue point and Pause.

1) Command format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Command code (‘F’)							
2	Reserve (0x00)							
3	Reserve (0x00)							
4	Reserve (0x00)							
5	Reserve (0x00)							
6	ETX(0x03)							
7	BCCH(high-level)							
8	BCCL(low-level)							

Table 62. Cue command

2) Answer format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Reply code (‘F’)							
2	Answer code (Table 3)							
3	ETX(0x03)							
4	BCCH(high-level)							
5	BCCL(low-level)							

Table 63. Cue answer

3) Special condition

2.6.18 Program / Direct command

This command Selects a program mode or a direct mode.

1) Command format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Command code (‘G’)							
2	Program / Direct Code (Direct : ‘0’, Program : ‘1’, Program input : ‘2’, Program input end: ‘3’)							
3	Reserve (0x00)							
4	Reserve (0x00)							
5	Reserve (0x00)							
6	ETX(0x03)							
7	BCCH(high-level)							
8	BCCL(low-level)							

Table 64. Program / Direct command

2) Answer format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Reply code (‘G’)							
2	Answer code (Table 3)							
3	ETX(0x03)							
4	BCCH(high-level)							
5	BCCL(low-level)							

Table 65. Program / Direct answer

3) Special condition

This command receives it only when it stops.

2.6.19 Track Num Entry command

This command designates the truck that should program playback truck, in the case of program mode in the case of a direct mode.

1) Command format

Byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Command code (‘H’)							
2	Reserve (0x00)							
3	Track number 100 digits							
4	Track number 10 digits							
5	Track number 1 digits							
6	ETX(0x03)							
7	BCCH(high-level)							
8	BCCL(low-level)							

Table 66. Play Num Set command

2) Answer format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Reply code (‘H’)							
2	Answer code (Table 3)							
3	ETX(0x03)							
4	BCCH(high-level)							
5	BCCL(low-level)							

Table 67. Play Num Set answer

3) Special condition

2.6.20 A-B command

This command designates A point, B point in an A-B point designated repeating function.

1) Command format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Command code (‘L’)							
2	A-B Code(A-B OFF : ‘0’, A-set : ‘1’, B-Set : ‘2’)							
3	Reserve (0x00)							
4	Reserve (0x00)							
5	Reserve (0x00)							
6	ETX(0x03)							
7	BCCH(high-level)							
8	BCCL(low-level)							

Table 75. A-B command

2) Answer format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Reply code (‘L’)							
2	Answer code							
3	ETX(0x03)							
4	BCCH(high-level)							
5	BCCL(low-level)							

Table 76. A-B answer

3) Special condition

As for this command, information condition changes by the condition of a/the main body.

1. A device ‘receives only A-Set' condition at the time of ' A-B off'.
2. A device ‘receives only B-Set' and' A-B off' condition at the time of ' A-Set'.
3. A device 'receives only A-B off' condition at the time of ' A-B Set'.

2.6.21 Pitch command

This command does pitch function On/off.

1) Command format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Command code (‘N’)							
2	Pitch code (OFF : ‘0’, ON : ‘1’)							
3	Reserve (0x00)							
4	Reserve (0x00)							
5	Reserve (0x00)							
6	ETX(0x03)							
7	BCCH(high-level)							
8	BCCL(low-level)							

Table 79. Pitch command

2) Answer format

Byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Reply code (‘N’)							
2	Answer code (table 3)							
3	ETX(0x03)							
4	BCCH(high-level)							
5	BCCL(low-level)							

Table 80. Pitch answer

3) Special condition

2.6.22 Pitch Set command

This command sets up the numerical value of pitch function.

1) Command format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Command code (‘O’)							
2	Pitch symbol (‘+’,’-‘)							
3	Pitch 10 digits							
4	Pitch 1 digits							
5	Pitch 0.1 digits							
6	ETX(0x03)							
7	BCCH(high-level)							
8	BCCL(low-level)							

Table 81. Pitch command

2) Answer format

Byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Reply code (‘O’)							
2	Answer code (table 3)							
3	ETX(0x03)							
4	BCCH(high-level)							
5	BCCL(low-level)							

Table 82. Pitch answer

3) Special condition

2.6.23 Time command

This command changes Elapse/Remain/Total Remain time display.

1) Command format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Command code (‘P’)							
2	Time Mode Code(Elapsed : ‘0’, Remain : ‘1’, Total Remain : ‘2’)							
3	Reserve (0x00)							
4	Reserve (0x00)							
5	Reserve (0x00)							
6	ETX(0x03)							
7	BCCH(high-level)							
8	BCCL(low-level)							

Table 83. Time command

2) Answer format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Reply code (‘P’)							
2	Answer code (Table 3)							
3	ETX(0x03)							
4	BCCH(high-level)							
5	BCCL(low-level)							

Table 84. Time answer

3) Special condition

2.6.24 Title command

This command changes display.

1) Command format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Command code (‘Q’)							
2	Title code(Table 86)							
3	Reserve (0x00)							
4	Reserve (0x00)							
5	Reserve (0x00)							
6	ETX(0x03)							
7	BCCH(high-level)							
8	BCCL(low-level)							

Table 85. Title command

CODE	Title Code
0x30 (‘0’)	Elapsed Time
0x31 (‘1’)	File
0x32 (‘2’)	Title
0x33 (‘3’)	Artist
0x34 (‘4’)	Album

Table 86. Title code

2) Answer format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Reply code (‘Q’)							
2	Answer code (Table 3)							
3	ETX(0x03)							
4	BCCH(high-level)							
5	BCCL(low-level)							

Table 87. Title answer

3) Special condition

2.6.25 Repeat command

This command changes repeating function.

1) Command format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Command code (‘R’)							
2	Repeat Code(OFF : ‘0’, ON : ‘1’)							
3	Reserve (0x00)							
4	Reserve (0x00)							
5	Reserve (0x00)							
6	ETX(0x03)							
7	BCCH(high-level)							
8	BCCL(low-level)							

Table 88. Repeat command

2) Answer format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Reply code (‘R’)							
2	Answer code (Table 3)							
3	ETX(0x03)							
4	BCCH(high-level)							
5	BCCL(low-level)							

Table 89. Repeat answer

3) Special condition

2.6.26 Play Mode command

This command changes playback function.

1) Command format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Command code (‘S’)							
2	Play Mode Code (Table 91)							
3	Reserve (0x00)							
4	Reserve (0x00)							
5	Reserve (0x00)							
6	ETX(0x03)							
7	BCCH(high-level)							
8	BCCL(low-level)							

Table 90. Play Mode command

CODE	Play Mode Code
0x30 (‘0’)	Single
0x31 (‘1’)	Continue

Table 91. Play Mode Code

2) Answer format

byte/bit	7	6	5	4	3	2	1	0
0	STX(0x02)							
1	Reply code (‘S’)							
2	Answer code (Table 3)							
3	ETX(0x03)							
4	BCCH(high-level)							
5	BCCL(low-level)							

Table 92. Play Mode answer

3) Special condition