

Specification
For
Serial Interface DCM-390

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DENON Brand Company

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1 Serial communication interface

1.1 Physical interface

- a) DCM280 has pin Dsub female connector for serial interface.
- b) Table 1 indicates pin assignment of connector signals.

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

Table 1. Pin Assignment

- c) Figure 1 indicates diagram of RS232C and RS422A.

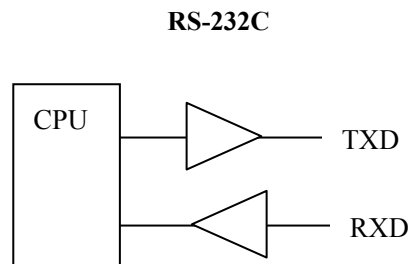


Figure 1. Serial Driver/Receiver

1.2 Transfer format of serial data

- Interface	RS-232C
- 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)

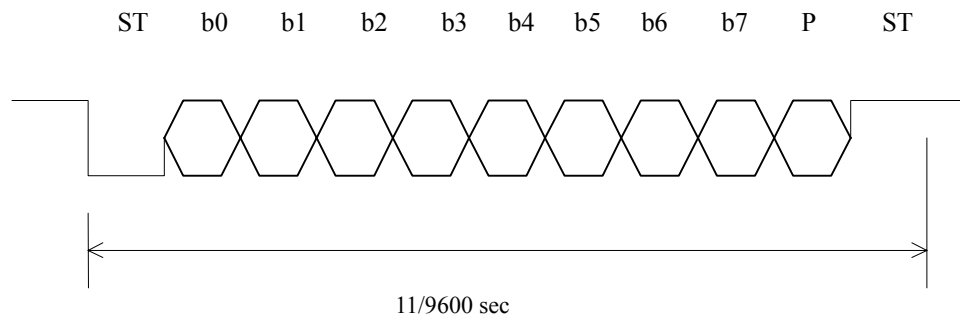


Figure 2. Command Data Array

2 Command format and answer format

The DCM380X 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 DCM380X 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) Number of parameters is defined for each command.

ETX (End of Text) 0x03

BCC (Block Check Character) $CC + PC0 + PC1 + PC2 + \dots + PCn + ETX = XY$ (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> <CC> <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) Number of parameters is defined for each command.

ETX (End of TeXt) 0x03

BCC (Block Check Character) $CC + PC0 + PC1 + PC2 + \dots + PCn + ETX = XY$ (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.

2.1 Protocol for data transmission and reception

This unit is based on half-duplex communication. The unit shall therefore transmit commands and receive answers according to the following procedure.

Basic procedure

- 1) The host shall select commands for this unit and transmit them to this unit. Command interval time is MIN 40 μ sec.
- 2) Having issued a command, the host shall receive an answer from this unit, and then issue the next command.
- 3) The host shall analyze the RC, AC, and PC as answers given and decide whether the command has been normally executed.
- 4) The host shall give an answer to a command that gives operational instructions, then issue a status request command, and decide whether this unit has finished operating with regard to the command that gives operational instructions.
- 5) The time from the start of command transmission to the end of command transmission should be max 40 msec.
- 6) The time from the completion of command transmission to the start of answerback is MAX.5sec.
- 7) This unit cannot receive any commands for about 5 seconds after the power switch is turned on.

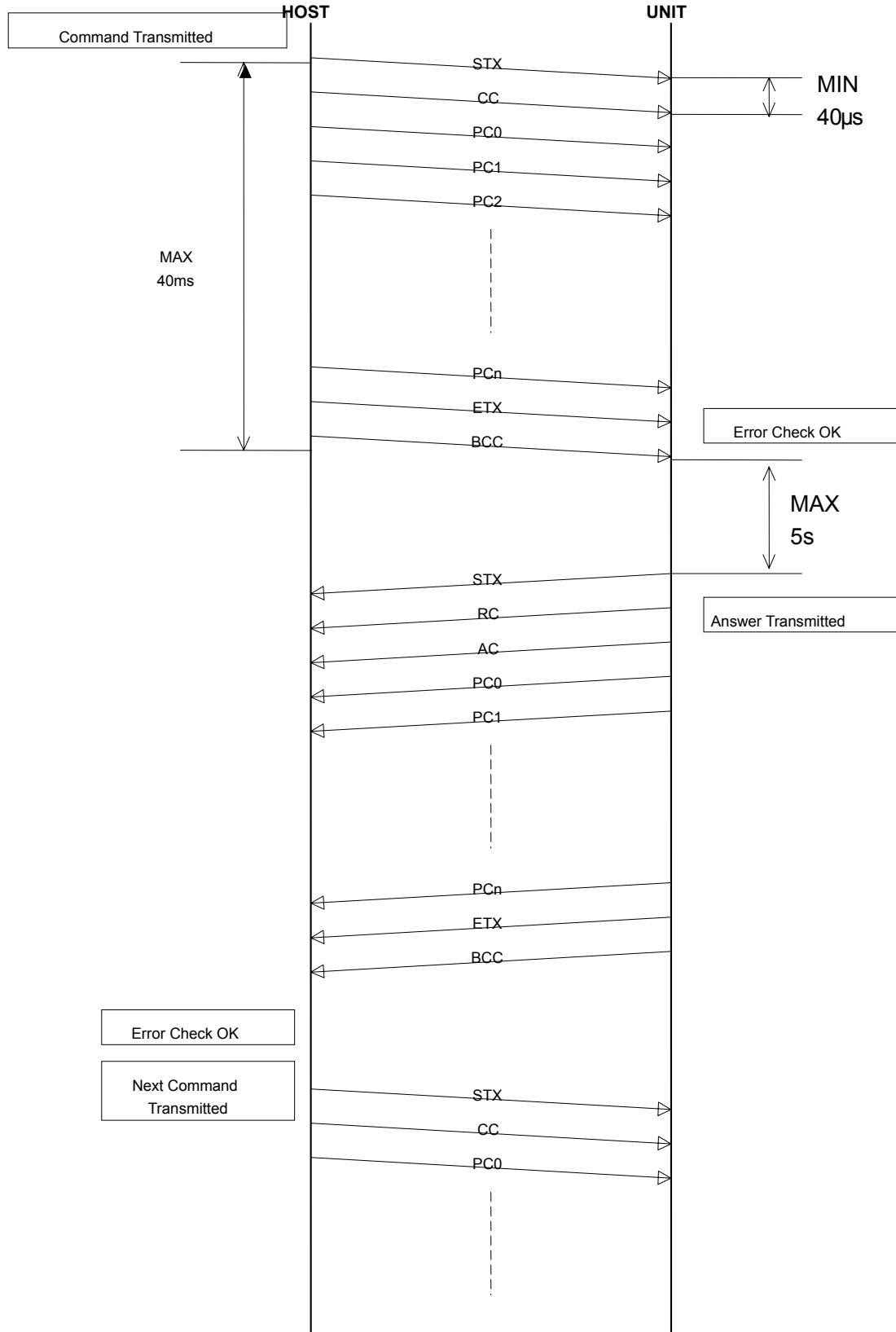
Communication errors

- 1) Having received a command, which results in a communication error (overrun, framing, or parity error), this unit shall give NAK (15h). (MAX 80ms from the start of command transmission)
- 2) If the host has received NAK from this unit, it shall retransmit the command that it has transmitted immediately beforehand.
- 3) Having received an answer, which results in a communication error (overrun, framing, or parity error), the host shall respond with NAK.
- 4) If it has received NAK from the host, this unit shall retransmit the answer it has transmitted immediately beforehand. (MAX 40ms)
- 5) When there is no answer from the unit within 6s, the host shall retransmit the command.

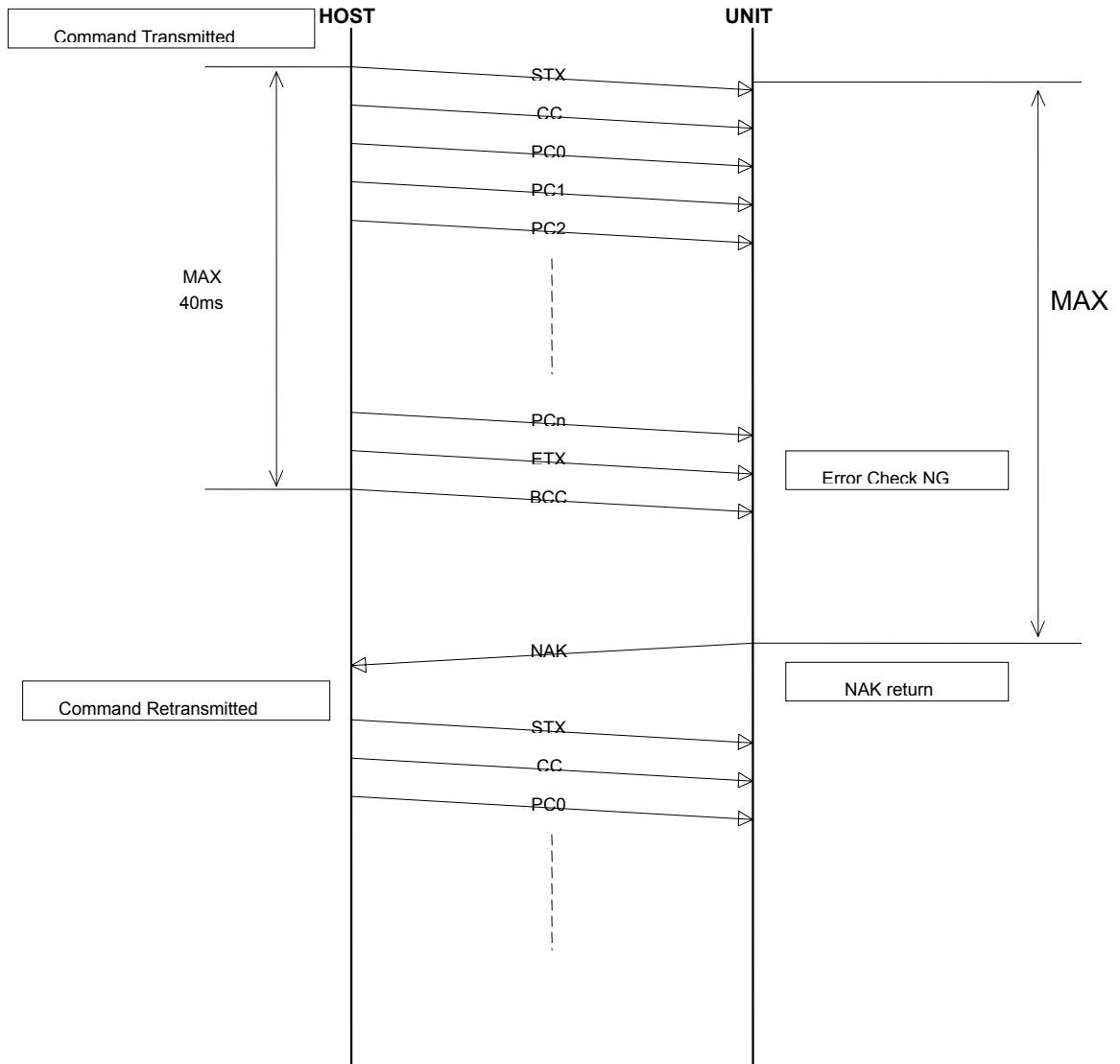
2.2 Command / Answer sequence

Shown below are the command sequence and the answer sequence of this unit.

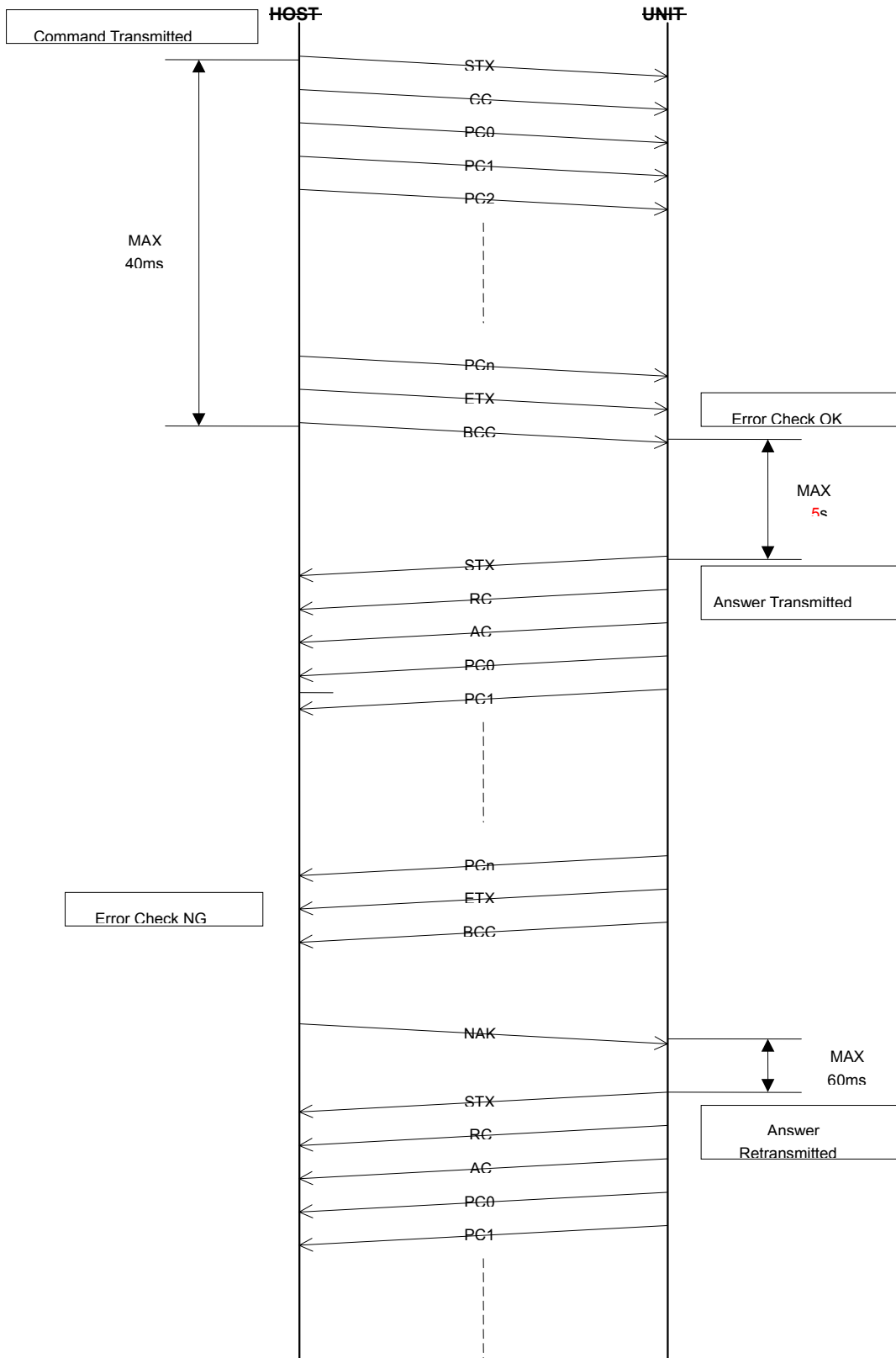
- 1) When a command is normally received by [unit] and an answer is normally received by [host] with an answer parameter



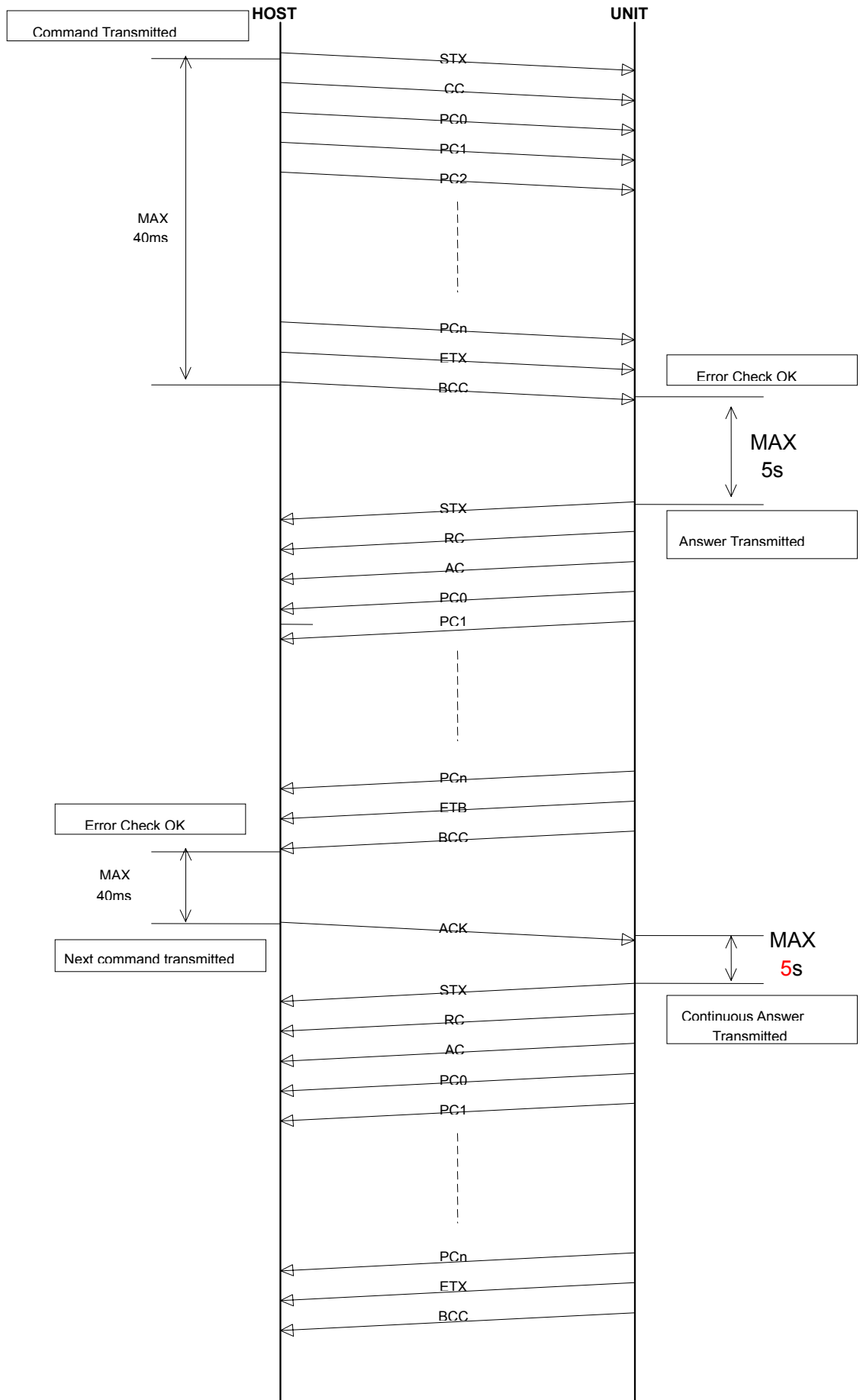
2) When a command is abnormally received (with or without an answer parameter)



3) When a command with an answer parameter is normally received by [unit] and an answer is abnormally received by [host].



3) When a command with an answer parameter is normally received by [unit] and an answer is normally received with ETB [host].



2.3 List of command codes

Following table is command code list.

3Xh:Command related to the acquisition of player information (such as status and name)

4Xh~5Xh:Operation instruction command to the player

No.	Command	Code(ASCII)	Operation
1	Reset	0x20('SP')	Reset the device.
2	Request PLAY Status	0x30('0')	Request CD player status.
3	Request CPU Version	0x31('1')	Request the CPU revision code.
4	Request Error Code	0x32('2')	Request the error code.
5	Request Disc Status	0x33('3')	Disk number information is obtained.
6	Request Program Table	0x34('4')	Request Program Num Table.
7	Request CD TOC	0x35('5')	Request CD's TOC data
8	Request TEXT Data	0x36('6')	Request CD/MP3/WMA-Text data
9	Play	0x40('@')	Start playback or recording.
10	Stop	0x41('A')	Stop playback or recording.
11	Pause	0x42('B')	Playback Pause.
12	Skip	0x43('C')	Skip to the other track.
13	Search	0x44('D')	Search with audible.
14	Open/Close	0x45('E')	Disc tray Open/Close
15	Program / Direct	0x46('F')	Select Program or Direct mode.
16	Track Num Entry	0x47('G')	Select the music track (search or program).
17	Random	0x48('H')	Random play back
18	A-B	0x49('I')	Assignment A and B point.
19	Time	0x4A('J')	
20	Repeat	0x4B('K')	Repeat 1track/1disc/all disc.
21	Disc Select	0x4C('L')	Disc search.
22	Disc Skip	0x4D('M')	Skip to another Disc.
23	Power ON	0x4E('N')	Power ON from the Stand-by status
24	Power OFF	0x4F('O')	Power OFF

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 exist.
5	None time requested	0x33('3')	Requested time does not exist.
6	Condition Error	0x34('4')	Condition error occurs.
7	None Disc requested	0x35('5')	Requested disc does not exist.

Table 3. Answer code list

2.5 Status List

Following table is a list of answer code types.

3Xh:Status of the entire system

4Xh:Status of each action

No.	Status	Code (ASCII)	Description
1	Ready	0x30 ('0')	Device is ready to receive a command.
2	Not Ready	0x31 ('1')	Device is not ready to be operated.
3	Disc Loading	0x32 ('2')	Under disc loading.
4	Disc Loading Complete	0x33 ('3')	Disc Loading complete.
5	Tray Opening	0x34 ('4')	Disc tray open.
6	Tray Closing	0x35 ('5')	Disc tray close.
7	Carousel rotating	0x36 ('6')	Carousel in drawer rotating
8	Play	0x41 ('A')	Playing.
9	Stop	0x42 ('B')	Under stop.
10	Pause	0x43 ('C')	Pausing CD.
11	No Disc	0x44 ('D')	There is no CD in the device.
12	CD Error	0x45 ('E')	CD Error.
13	Search	0x46 ('F')	Fast play, forward or reverse direction.
14	Disc Read Error	0x47 ('G')	Disc Read Error.
15	Stand-by	0x48('H')	Stand-by

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 REQUEST 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)							

Table7. 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	Disc No. code (Table 9)							
5	Disc type code (Table 10)							
6	Audio format code (Table 11)							
7	Status code (Table 4)							
8	Play mode code (Table 12)							
9	Folder number (100 digits)							
10	Folder number (10 digits)							
11	Folder number (1 digits)							
12	Track number (100 digits)							
13	Track number (10 digits)							
14	Track number (1 digits)							
15	Reserve (0x00)							
16	Reserve (0x00)							
17	Elapsed / Remain time (minutes, 100 digits)							
18	Elapsed / Remain time (minutes, 10 digits)							
19	Elapsed / Remain time (minutes, 1 digits)							
20	Elapsed / Remain time (second, 10 digits)							
21	Elapsed / Remain time (second, 1 digits)							
22	ETX (0x03)							
23	BCCH (high-level)							
24	BCCL (low-level)							

Table 8. Request CD Status answer

Code	Disc Number
0x31('1')	Disc1
0x32('2')	Disc2
0x33('3')	Disc3
0x34('4')	Disc4
0x35('5')	Disc5

Table 9. Disc No.code

Code	Disc Type
0x31('1')	Reserved
0x32('2')	Reserved
0x33('3')	Reserved
0x34('4')	CD-DA
0x35('5')	CD-ROM
0x36('6')	Reserved
0x37('7')	Unknown

Table 10. Disc type code

Code	Audio Format
0x31('1')	Reserved
0x32('2')	Reserved
0x33('3')	MP3
0x34('4')	LPCM
0x35('5')	Reserved
0x36('6')	WMA

Table 11. Audio format code

Ode	Play mode
0x31('1')	Normal
0x32('2')	Program
0x33('3')	Normal Random
0x4('4')	Program Random

Table 12. Play mode

3) Special conditions

- Until read the TOC, MP3/MWA file name, the device will return '0' with track and time data.
- If time exceeds 999minutes 99seconds , return '-----'

2.6.3 REQUEST CPU Version command

This command requests the microprocessor CPU firmware version 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 13. 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 version 1000 digit (ASCII)							
4	Firmware version 100 digit (ASCII)							
5	Firmware version 10 digit (ASCII)							
6	Firmware version 1 digit (ASCII)							
7	ETX (0x03)							
8	BCCH (high-level)							
9	BCCL (low-level)							

Table 14. Request Firmware Revision answer

3) Special condition

- None.

2.6.4 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 15. 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	1st error code (Table 17)							
4	2nd error code (Table 17)							
5	ETX (03h)							
6	BCCH (high-level)							
7	BCCH (low-level)							

Table 16. Request Error Code answer

No.	Error code		Detail
	1st	2nd	
1	0x20	0x20	Loading error
2	0x21	0x21	Loading switch error
3	0x22	0x22	Focus servo error
4	0x23	0x23	Tracking servo error
5	0x24	0x24	Can't adjust FOCUS offset value for servo circuit
6	0x25	0x25	Can't adjust TRACKING offset value for servo circuit
7	0x26	0x26	Can't adjust FOCUS gain value for servo circuit
8	0x27	0x27	Can't adjust TRACKING gain value for servo circuit
9	0x28	0x28	Focusing failed in playing or searching or pausing
10	0x29	0x29	During spinup, data of disc does not read
11	0x2A	0x2A	During play, data of disc does not read
12	0x2B	0x2B	Cannot read within a preset time period in TOC reading.
13	0x2C	0x2C	Sub code data does not read
12	0x2D	0x2D	Command error occurs
13	0x2E	0x2E	Focusing failed in scanning

Table 17. Request Error Code answer

3) Special condition

If error code is empty, using '00'.

- Error code is the following.
- After error occurs, it receives only "OPEN /CLOSE" KEY.

2.6.5 Request Disc status

This obtains the information on the disk number reproduced now and each disk.

Byte/bit	7	6	5	4	3	2	1	0
0	STX (0x02h)							
1	Command code ('3')							
2	Reserve (0x00)							
3	Reserve (0x00)							
4	Reserve (0x00)							
5	Reserve (0x00)							
6	ETX (03h)							
7	BCCH (high-level)							
8	BCCH (low-level)							

Table 18. Request Disc status Code command

Byte/bit	7	6	5	4	3	2	1	0
0	STX (0x02h)							
1	Reply code ('3')							
2	Answer code (Table 3)							
3	Current disc number code (Table 20)							
4	Disc1 type code (Table 21)							
5	Disc2 type code (Table 21)							
6	Disc3 type code (Table 21)							
7	Disc4 type code (Table 21)							
8	Disc5 type code (Table 21)							
9	ETX (03h)							
10	BCCH (high-level)							
11	BCCH (low-level)							

Table 19. Request Disc status Code answer

Code	Disc Number
0x31('1')	Disc1
0x32('2')	Disc2
0x33('3')	Disc3
0x34('4')	Disc4
0x35('5')	Disc5

Table 20. Current disc number code

Code	Disc Type
0x31('1')	Reserved
0x32('2')	Reserved
0x33('3')	Reserved
0x34('4')	CD-DA
0x35('5')	CD-ROM
0x36('6')	Reserved
0x37('7')	Unknown
0x38('7')	No Disc

Table 21. Disc type code

2.6.6 Request Program Table command

This command acquires the 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 ('4')							
2	Program Table Num ('0' - '3') (Table 23)							
3	Reserve (0x00)							
4	Reserve (0x00)							
5	Reserve (0x00)							
6	ETX (0x03)							
7	BCCH (high-level)							
8	BCCL (low-level)							

Table 22. Call 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 - 32

Table 23. Program / Direct answer

2) Answer format

Byte/bit	7	6	5	4	3	2	1	0
0	STX (0x02)							
1	Reply code ('4')							
2	Answer code (Table 3)							
3	Program Table Num ('0' - '3') (Table 23)							
4	Program Num 1 Disc number (Table20)							
5	Program Num 1 Track number 100 digits							
6	Program Num 1 Track number 10 digits							
7	Program Num 1 Track number 1 digits							
8	Program Num 2 Disc number (Table20)							
9	Program Num 2 Track number 100 digits							
10	Program Num 2 Track number 10 digits							
11	Program Num 2 Track number 1 digits							
12	Program Num 3 Disc number (Table20)							
13	Program Num 3 Track number 100 digits							
14	Program Num 3 Track number 10 digits							
15	Program Num 3 Track number 1 digits							
16	Program Num 4 Disc number (Table20)							
17	Program Num 4 Track number 100 digits							
18	Program Num 4 Track number 10 digits							
19	Program Num 4 Track number 1 digits							
20	Program Num 5 Disc number (Table20)							
21	Program Num 5 Track number 100 digits							
22	Program Num 5 Track number 10 digits							
23	Program Num 5 Track number 1 digits							
24	Program Num 6 Disc number (Table20)							
25	Program Num 6 Track number 100 digits							

26	Program Num 6 Track number 10 digits
27	Program Num 6 Track number 1 digits
28	Program Num 7 Disc number (Table20)
29	Program Num 7 Track number 100 digits
30	Program Num 7 Track number 10 digits
31	Program Num 7 Track number 1 digits
32	Program Num 8 Disc number (Table20)
33	Program Num 8 Track number 100 digits
34	Program Num 8 Track number 10 digits
35	Program Num 8 Track number 1 digits
36	Program Num 9 Disc number (Table20)
37	Program Num 9 Track number 100 digits
38	Program Num 9 Track number 10 digits
39	Program Num 9 Track number 1 digits
40	Program Num 10 Disc number (Table20)
41	Program Num 10 Track number 100 digits
42	Program Num 10 Track number 10 digits
43	Program Num 10 Track number 1 digits
44	ETX (0x03)
45	BCCH (high-level)
46	BCCL (low-level)

Table 24. Call answer

3) Special condition

-If Program Num empty then '000'.

2.6.7 REQUEST CD TOC command

This command requests the device to send CD TOC data **and MP3/WMA file data**.

1) Command format

Byte/bit	7	6	5	4	3	2	1	0
0	STX (0x02)							
1	Command code ('5')							
2	Reserve (0x00)							
3	Track number 100 digits (Table 26)							
4	Track number 10 digits (Table 26)							
5	Track number 1 digits (Table 26)							
6	ETX (0x03)							
7	BCCH (high-level)							
8	BCCL (low-level)							

Table 25. Request CD Data command

Track number	Content	TOC data format	Remark
'000'	Reserved	'0000000'	
'001'	Track 1	'mmmssff'	'mmm': minute 'ss': second, 'ff': frame
'512'	Track 512	Track 99 512	
'0A0'	First track number	'xxx0000'	'xxx': first track number
'0A1'	Last track number	'xxx0000'	'xxx': last track number
'0A2'	Total time	'mmmssff'	
'0A3'	Total track	'xxx0000'	'xxx': total track number
'0A4'	Total folder	'xx00000'	'xx': total folder number

Table 26. Track number, TOC data

2) Answer format

Byte/bit	7	6	5	4	3	2	1	0
0	STX (0x02)							
1	Reply code ('5')							
2	Answer code (Table 3)							
3	Reserve (0x00)							
4	Track number 100 digits (Table 26)							
5	Track number 10 digits (Table 26)							
6	Track number 1 digits (Table 26)							
7	TOC data 0 (Minute 100 digits)							
8	TOC data 1 (Minute 10 digits)							
9	TOC data 2 (Minute 1 digits)							
10	TOC data 3 (Second 10 digits)							
11	TOC data 4 (Second 1 digits)							
12	TOC data 5 (Frame 10 digits)							
13	TOC data 6 (Frame 1 digits)							
14	ETX (0x03)							
15	BCCH (high-level)							
16	BCCL (low-level)							

Table 27. Request CD Data answer

3) Special conditions

- Track number '0A0', '0A1', '0A2', '0A3' and '0A4' have special meaning. Refer the Table 26.
- If time exceeds 999minutes 99seconds , return '-----'

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 ('6')							
2	Data Type (Table 29)							
3	Track number 100 digits (Table 30)							
4	Track number 10 digits (Table 30)							
5	Track number 1 digits (Table 30)							
6	ETX (0x03)							
7	BCCH (high-level)							
8	BCCL (low-level)							

Table 28. 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/WMA Folder Name	
0x35 ('5')	MP3/WMA 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 29. 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 30. Track number

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	Data Type (Table 29)							
4	Track number 100 digits (Table 30)							
5	Track number 10 digits (Table 30)							
6	Track number 1 digits (Table 30)							
7-36	Text Data (30characters)							
37	ETX (0x03)							
38	BCCH (high-level)							
39	BCCL (low-level)							

Table 31. Request Text Data answer

3) Special conditions

- If Text Data 30Characters or more , then put in 30Characters .
- If Text Data 29Characters or less ,then put in null(0x00) after the last character.

2.6.9 PLAY command

The device starts playback. (CD)

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 32. 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 33. PLAY answer

3) Special conditions

- The answer code returns "Command OK", when mecha status data is Play.
- This command force to start playback, when mecha status is Stop, Forward, Rewind, Cue, Review or Play Mute.

2.6.8 STOP command

This command stops playback, recording, fast forward and rewind.

1) Command format

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

Table 34. 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 35. STOP answer

3) Special conditions

- The answer code returns "Command OK", when mecha status data is Stop.

2.6.9 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 36. 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 37. CD PAUSE answer

3) Special conditions

2.6.10 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 38. 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 39. SKIP answer

3) Special condition

2.6.11 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 41)							
3	Reserve (0x00)							
4	Reserve (0x00)							
5	Reserve (0x00)							
6	ETX (0x03)							
7	BCCH (high-level)							
8	BCCL (low-level)							

Table 40. SEARCH command

Code	Search Speed
0x40 ('@')	Reserved
0x41 ('A')	FWD Search
0x42 ('B')	Reserved
0x43 ('C')	Reserved
0x44 ('D')	Reserved
0x61 ('a')	RVS Search
0x62 ('b')	Reserved
0x63 ('c')	Reserved
0x64 ('d')	Reserved

Table 41. 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 42. SEARCH answer

3) Special condition

2.6.12 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 43. 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 44. Open / Close answer

3) Special condition

2.6.13 Program / Direct command

This command selects a program mode or a direct mode. (CD)

1) Command format

Byte/bit	7	6	5	4	3	2	1	0
0	STX (0x02)							
1	Command code ('F')							
2	Program / Direct Code (Direct: '0', Program: '1')							
3	Reserve (0x00)							
4	Reserve (0x00)							
5	Reserve (0x00)							
6	ETX (0x03)							
7	BCCH (high-level)							
8	BCCL (low-level)							

Table 45. Program / Direct 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 46. Program / Direct answer

3) Special condition

This command receives it only when it stops.

If you need program clear, select a direct mode.

2.6.14 Track Num Entry command

This command designates the truck that should program playback truck, in the case of program mode or 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 ('G')							
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 47. Play Num Set 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 48. Play Num Set answer

3) Special condition

2.6.15 RANDOM command

This command does random function ON/OFF. (CD)

1) Command format

Byte/bit	7	6	5	4	3	2	1	0
0	STX (0x02)							
1	Command code ('H')							
2	RANDOM 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 49. Random 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 50. Random answer

3) Special condition

2.6.16 A-B command

This command designates a point, B point in an A-B point designated repeating function. (CD)

1) Command format

Byte/bit	7	6	5	4	3	2	1	0
0	STX (0x02)							
1	Command code ('I')							
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 51. A-B command

2) Answer format

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

Table 52. 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'.

2.6.17 Time command

This command changes Elapse/Remain/Total Remain time display. (CD)

1) Command format

Byte/bit	7	6	5	4	3	2	1	0
0	STX (0x02)							
1	Command code ('J')							
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 53. Time command

2) Answer format

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

Table 54. Time answer

3) Special condition

2.6.18 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', 1track: '1', 1disc:'2', All disc:'3')							
3	Reserve (0x00)							
4	Reserve (0x00)							
5	Reserve (0x00)							
6	ETX (0x03)							
7	BCCH (high-level)							
8	BCCL (low-level)							

Table 55. 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 56. Repeat answer

3) Special condition

2.6.19 Disc Select

It changes to the selected disk.

1) Command format

Byte/bit	7	6	5	4	3	2	1	0
0	STX (0x02)							
1	Command code ('L')							
2	Disc code(Table 58)							
3	Reserve (0x00)							
4	Reserve (0x00)							
5	Reserve (0x00)							
6	ETX (0x03)							
7	BCCH (high-level)							
8	BCCH (low-level)							

Table 57. Disc Select command

Code	Select Disc
31h (1)	Disc1
32h (2)	Disc2
33h (3)	Disc3
34h (4)	Disc4
35h (5)	Disc5

Table 58. Disc code

2) Answer format

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

Table 59. Disc Select answer

3) Special condition

2.6.20 Disc skip command

It changes to the following disk (for DVD changer).

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

Table 60. Disc Select command

1) Answers returned

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

Table 61. Disc Select answer

3) Special condition

2.6. 21 Power ON command

This command releases the “Stand-by” status.

After “**Power ON**” 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 ('N')							
2	Reserve (0x00)							
3	Reserve (0x00)							
4	Reserve (0x00)							
5	Reserve (0x00)							
6	ETX (0x03)							
7	BCCH (high-level)							
8	BCCH (low-level)							

Table 61. Power ON command

2) Answers returned

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 62. Power ON answer

3) Special condition

- This command accepts only “Stand-by” status.
- This device cannot receive any commands within 2 seconds after this command is sent.
- After Power ON 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. 21 Power OFF

This command changes to the “Stand-by” status.

It turns off the display and stops servo rotation.

1) Command format

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

Table 63. Power OFF command

2) Answers returned

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 64. Power OFF answer

3) Special condition

- When “Stand-by” status, can accept “Power ON” and “Reset” command only.
- This command cannot accept “Stand-by” status.