DENON PROFESSIONAL

# DN-700AVP / DN-700AV

## Command Protocol Guide

## Serial (RS-232) and Network

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Contents

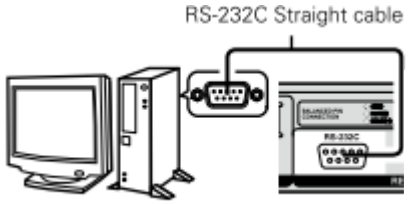
# 1. General

The Serial Remote control function is used by connecting the host machine such as PC to the device (our product). The host can control the device by sending the Control command, and the host can sense the current device status by sending the Status Request command. Two types of the connectivity, RS-232C and IP (Ethernet) is selectable. In addition, in this document, the controlled equipment is called the “Device” (our product) and the controlling equipment is called the “Host (PC etc.)”.

## 1-1. RS-232C Control

The host can control the device by connecting the RS-232C straight cable to the D-sub 9 pins connector on the device surface as shown in the following diagram.

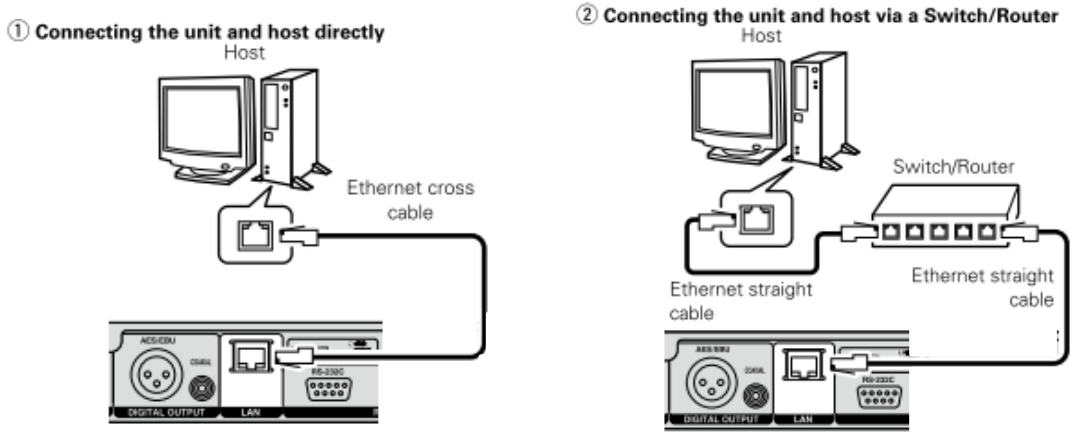
Figure 1-1 RS-232C Connection



## 1-2. IP Control (Ethernet)

The host can control the device by connecting the Ethernet cable to the RJ-45 connector on the device surface as shown in the following diagram. (10BASE-T / 100BASE-TX)

Figure 1-2 IP Control Connection




【Three main features】

1. A device is controlled by a host.
2. A device sends status of the device to host by receiving the status request command from the host
3. Automatic ally a device sends status notification to the host to notify of the device status change

## 2. Specification

### 2-1. RS-232C Control

- Transmission type : Asynchronous / Full duplex
- Connector type : 9 pin D-sub female connector (Straight cable)
- Transfer rate : 9,600 bps
- Clock accuracy : < +/- 2.0%
- Data length : 8 bits
- Parity : None
- Start bit : 1 bit
- Stop bit : 1 bit
- Flow Control : None
- Maximum data length : 600 Bytes (Start character to End character is included.)

**Figure2-1 Pin arrangement**

| Pin Number | Signal Name |
|---|---|
| 1 | GND |
| 6 | NC |
| 2 | TxD |
| 7 | RTS* |
| 3 | RxD |
| 8 | NC |
| 4 | NC |
| 9 | NC |
| 5 | S. GND |

*5V/500mA power supply can be used for RTS.

## 2-2. IP Control (Ethernet)

- Transmission type : Full duplex
- Transfer speed : 10 Mbps / 100 Mbps
- TCP port No. : 9030
- Maximum data length : 600 Bytes (Start character to End character is included.)

# 3. Communication Protocol

## 3-1. Packet Structure

A packet must be started with the Start Character '@' and terminated with the End Character '\r' (0x0D).

**Figure 3-1Packet Structure**


There are three kinds of packet, "COMMAND", "REQUEST", and "ANSWER /NOTIFICATION/ERROR".

## 3-2. ACK (Acknowledge) and NACK (Not Acknowledge)

The device sends ACK or NACK to a host according to the following table.

### 3-2-1. ACK [ Acknowledgement]:

It is an affirmative reply sent to a host from a device. When data transfer completes properly, a device notify of that to a host.

### 3-2-2. NACK [Negative Acknowledgement]:

It is a negative reply sent to a host from a device. When data transfer does not complete properly, a device notify of that to a host.

**Table 3-1 ACK and NACK**

| Name | Value (HEX) | Transmission Requirement |
|---|---|---|
| ACK | 0x06 | The device acknowledged that the command was received normally from the host. |
| NACK | 0x15 | · The device received the End Character '\r'(0x0D) before receiving the Start Character '@(0x40)'.<br>· The device does not receive ID'0(0x30)' just after Start Character'@(0x40)'<br>· The device receives an unknown character just after Start Character '@ (0x40)' and ID'0 (0x30)'<br>· The device receives an unknown command just after Start Character '@ (0x40)' and ID'0 (0x30)'.<br>· Parameter is out of range.<br>· The size of data is abnormal.<br>· 5msec passed before the device receives the next code necessary to complete the command. |

## 3-3. Communication Rules

### 3-3-1. Initiative of Communication

In the communication between a host and a device, the host must have the initiative. However, the Status Information notification automatically from the device is an exception.

When the device receives a command from the host, the device returns the following.

- When receiving the command which doesn't require a status information — ACK
- When receiving the command which requires a status information — ACK + Status information (ANSWER)
- For the communication failure or an unknown commands etc.(Refer to Table 3-2): — NACK

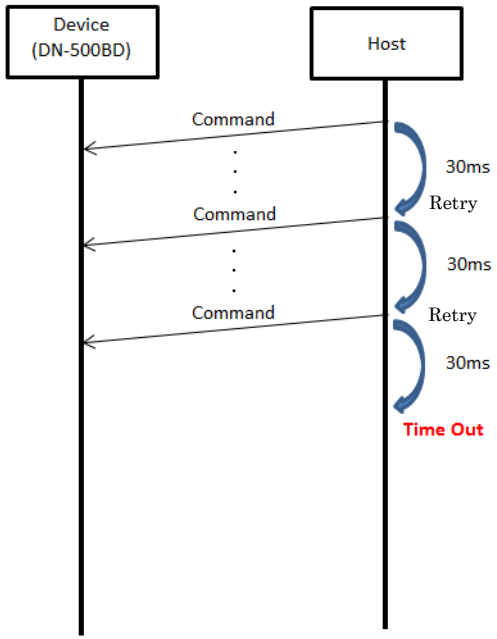
### 3-3-2. Communication Sequence

The host must not send any new command after the previous command before the host receives ACK or NACK, or the timeout (see "3-3-3 Timeout") has expired.

### 3-3-3. Timeout

After a host sends a message to a device, the host waits for a reply from the device for 30ms(IP Control)/300ms(RS-232C). When the host does not receive a reply over 30ms(IP Control)/300ms(RS-232C) from the device, the host sends the same message to the device. However, when the host does not receive a reply from the device after sending the same message 3 times (that means Tim Out), the host sends End character '\r' (0x0D) to the device. After that, the host should execute the recovery process such as retry.

Figure 3-3 Time Out




### 3-3-4. ACK

Refer to " 3-2-1 ACK [Acknowledgement)".

### 3-3-5. NACK

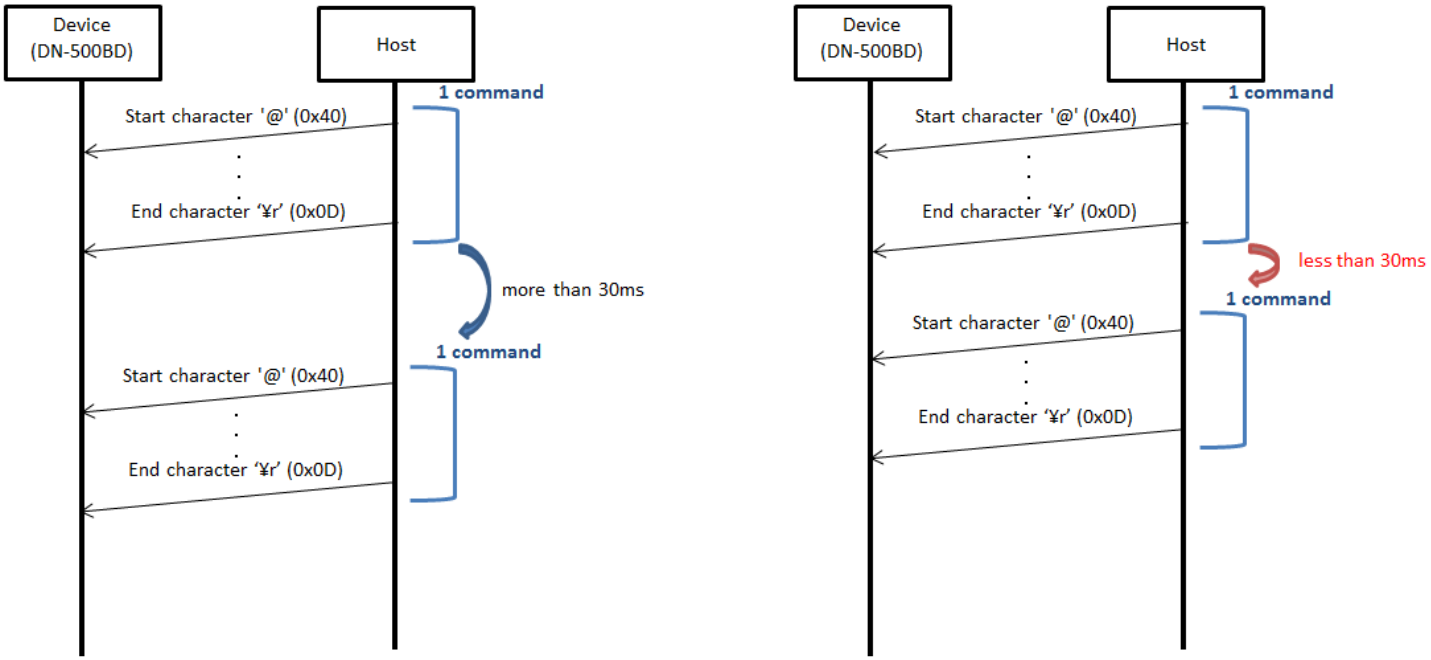
The device returns a NACK immediately after detecting a failure in the communication with the host (see ("3-2-2 NACK [Negative Acknowledgement)"). If the host receives a NACK, it must stop sending the current remaining command immediately and execute the recovery process such as retry.

### 3-3-6. Command Interval time

・Interval time between Characters from a host must be less than 5ms. The device sends NACK when 5msec passed before the device receives the next character code.

・Interval time between Commands is more than 30ms.

**Figure 3-4 Interval time between each command**




In case of less than 30ms as interval time between commands,

1) Executing the subsequent command is not guaranteed.

2) When there are buffer spaces of a device for a command, the device will execute the command.

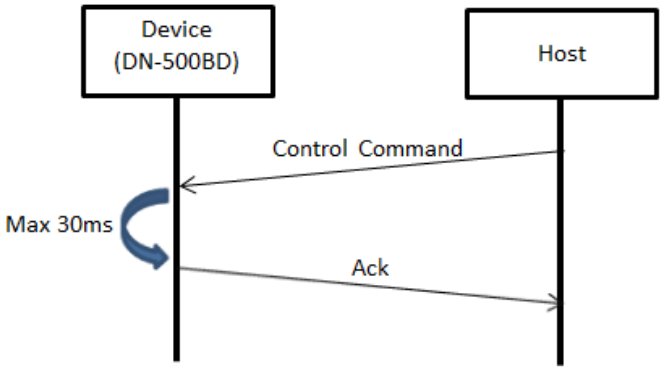
3) When there is no buffer space of a device for a command, the device does not execute the command, and will send Busy (@0BDERBUSY) to the host instead.

## 3-4. Basic Control Flow

### 3-4-1. Device Control Flow

The device sends the host an ACK (Acknowledgement) and executes that command when the device receives a Control command from the host. The list of the Control command is shown in "Control Command List".

Figure 3-5 Device Control Flow

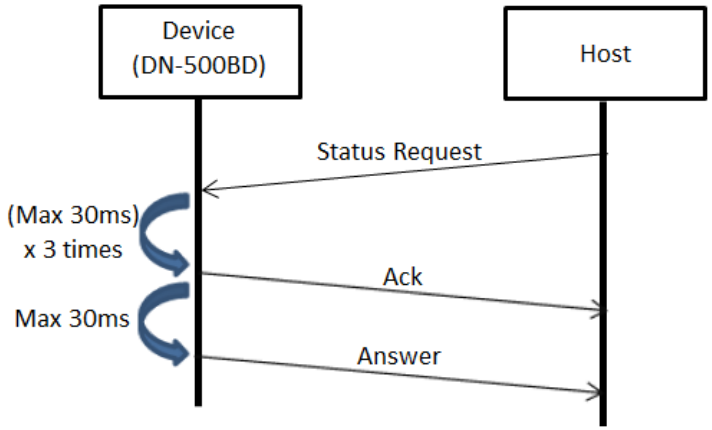



If the device receives an unknown command or an End Character '\r' (0x0D) without a Start Character '@', it causes transmission failure and the device returns a NACK (Not Acknowledgement). Refer to "3-2-2 NACK [Negative Acknowledgement)" about NACK transmission condition.

### 3-4-2. Status Request Flow

The device returns an ACK and the ANSWER requested by the host when the device receives the Status Request from the host. The list of the Status Request and the corresponding answer is shown in "Status Request List".

**Figure 3-6 Status Request Flow**



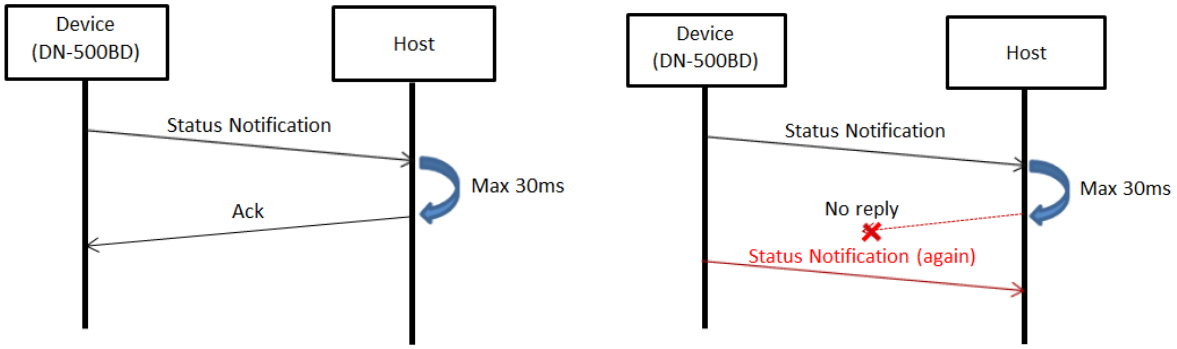

When a device receives Status Request from a host, the device sends an ACK to the host. After that, the device gets the current status, and then sends it to the host.

If the device receives an unknown command or an End Character '\r' (0x0D) without a Start Character '@', it causes transmission failure and the device returns a NACK (Not Acknowledgement). Refer to "3-2-2 NACK [Negative Acknowledgement)" about NACK transmission condition.

### 3-4-3. Status Notification Flow

A device notifies of Status Information listed in "Status Information List" whenever the status of the device is changed, such as the transport status, the current track, the storage media status, and other status.

**Figure 3-7 Status Notification Flow**




A device sends Status Notification to a host. The host replies ACK to the device. The device waits for the ACK for Max 30ms. When the device does not receive the ACK from the host, the device sends the same Status Notification to the host again. After that, the device does not send the same Status Notification even if it does not receive an ACK from the host.

The Status Information is same as the answer for the Status Request listed in "Status Request List".

## 4. Command Table

*Italic* characters of command mean parameter. (Ex: Frame "@0fr*XX*¥r"" -> Parameter: *XX*)

*Note- "Track" means "Chapter" during the DVD or BD playback. "Group" means "Title" (DVD or BD playcak) and "Folder" (USB and other Playback).

### 4-1. Control Command/ Status Request Command List

| CATEGORY | CONTENTS | | STATUS REQUEST | | COMMAND | NOTES |
|---|---|---|---|---|---|---|
| POWER | POWER ON | | PW?<CR> | | PWON<CR> | |
| | STANDBY | | | | PWSTANDBY<CR> | |
| MASTER VOLUME | UP | | MV?<CR> | | MVUP<CR> | |
| | DOWN | | | | MVDOWN<CR> | |
| | 0-90 | | | | MV**<CR> | **: 0 to 900(MAX),90(MIN) |
| CHANNEL VOLUME | FRONT Lch | UP | CV?<CR> | | CVFL UP<CR> | |
| | | DOWN | | | CVFL DOWN<CR> | |
| | | Direct change to **dB | | | CVFL **<CR> | **: 40 to 60 where 40(-10dB),50(0dB),60(10dB) |
| | FRONT rch | UP | | | CVFR UP<CR> | |
| | | DOWN | | | CVFR DOWN<CR> | |
| | | Direct change to **dB | | | CVFR **<CR> | **: 40 to 60 where 40(-10dB),50(0dB),60(10dB) |
| | CENTER ch | UP | | | CVC UP<CR> | |
| | | DOWN | | | CVC DOWN<CR> | |
| | | Direct change to **dB | | | CVC **<CR> | **: 40 to 60 where 40(-10dB),50(0dB),60(10dB) |
| | SUBWOOFER ch | UP | | | CVSW UP<CR> | |
| | | DOWN | | | CVSW DOWN<CR> | |
| | | Direct change to **dB | | | CVSW **<CR> | **: 40 to 60 where 40(-10dB),50(0dB),60(10dB) |
| | SURROUND Lch | UP | | | CVSL UP<CR> | |
| | | DOWN | | | CVSL DOWN<CR> | |
| | | Direct change to **dB | | | CVSL **<CR> | **: 40 to 60 where 40(-10dB),50(0dB),60(10dB) |
| | SURROUND Rch | UP | | | CVSR UP<CR> | |
| | | DOWN | | | CVSR DOWN<CR> | |
| | | Direct change to **dB | | | CVSR **<CR> | **: 40 to 60 where 40(-10dB),50(0dB),60(10dB) |
| | SURROUND BACK Lch | UP | | | CVSBL UP<CR> | |
| | | DOWN | | | CVSBL DOWN<CR> | |
| | | Direct change to **dB | | | CVSBL **<CR> | **: 40 to 60 where 40(-10dB),50(0dB),60(10dB) |
| | SURROUND BACK Rch | UP | | | CVSBR UP<CR> | |
| | | DOWN | | | CVSBR DOWN<CR> | |
| | | Direct change to **dB | | | CVSBR **<CR> | **: 40 to 60 where 40(-10dB),50(0dB),60(10dB) |

## Control command code table

| CATEGORY | CONTENTS | | STATUS REQUEST | COMMAND | NOTES |
|---|---|---|---|---|---|
| CHANNEL DELAY | FRONT Lch | UP | CD?<CR> | CDFL UP<CR> | |
| | | DOWN | | CDFL DOWN<CR> | |
| | | Direct change to ** | | CDFL **<CR> | **: 0 to 100 by ASCII |
| | FRONT rch | UP | | CDFR UP<CR> | |
| | | DOWN | | CDFR DOWN<CR> | |
| | | Direct change to ** | | CDFR **<CR> | **: 0 to 100 by ASCII |
| | CENTER ch | UP | | CDC UP<CR> | |
| | | DOWN | | CDC DOWN<CR> | |
| | | Direct change to ** | | CDC **<CR> | **: 0 to 100 by ASCII |
| | SUBWOOFER ch | UP | | CDSW UP<CR> | |
| | | DOWN | | CDSW DOWN<CR> | |
| | | Direct change to ** | | CDSW **<CR> | **: 0 to 100 by ASCII |
| | SURROUND Lch | UP | | CDSL UP<CR> | |
| | | DOWN | | CDSL DOWN<CR> | |
| | | Direct change to ** | | CDSL **<CR> | **: 0 to 100 by ASCII |
| | SURROUND Rch | UP | | CDSR UP<CR> | |
| | | DOWN | | CDSR DOWN<CR> | |
| | | Direct change to ** | | CDSR **<CR> | **: 0 to 100 by ASCII |
| | SURROUND BACK Lch | UP | | CDSBL UP<CR> | |
| | | DOWN | | CDSBL DOWN<CR> | |
| | | Direct change to ** | | CDSBL **<CR> | **: 0 to 100 by ASCII |
| | SURROUND BACK Rch | UP | | CDSBR UP<CR> | |
| | | DOWN | | CDSBR DOWN<CR> | |
| | | Direct change to ** | | CDSBR **<CR> | **: 0 to 100 by ASCII |
| OUTPUT MUTE | ON | | MU?<CR> | MUON<CR> | |
| | OFF | | | MUOFF<CR> | |
| MAIN-ZONE | ON | | ZM?<CR> | ZMON<CR> | |
| | OFF | | | ZMOFF<CR> | |
| ZONE2 Control | ZONE2 mode set and select source | DVD | Z2?<CR> | Z2DVD<CR> | |
| | | DOCK | | Z2DOCK<CR> | |
| | | BD | | Z2BD<CR> | |
| | | SAT/CBL | | Z2SAT<CR> | |
| | | CD | | Z2CD<CR> | |
| | | TUNER | | Z2TUNER<CR> | |

## Control command code table

| CATEGORY | CONTENTS | STATUS REQUEST | COMMAND | NOTES |
|---|---|---|---|---|
| Select INPUT source | DVD | SI?<CR> | SIDVD<CR> | |
| | DOCK | | SIDOCK<CR> | |
| | BD | | SIBD<CR> | |
| | SAT | | SISAT<CR> | |
| | GAME1 | | SIGAME1<CR> | |
| | GAME2 | | SIGAME2<CR> | |
| | CD | | SICD<CR> | |
| | MEDIA | | SIMEDIA<CR> | |
| | BLUETOOTH | | SIBLUETOOTH<CR> | |
| | TV | | SITV<CR> | |
| | TUNER | | SITUNER<CR> | |
| Select SURROUND mode | DIRECT | MS?<CR> | MSDIRECT<CR> | |
| | STEREO | | MSSTEREO<CR> | |
| | MOVIE | | MSMOVIE<CR> | |
| | MUSIC | | MSMUSIC<CR> | |
| | GAME | | MSGAME<CR> | |
| | NEO6CINEMA | | MSNEO6CINEMA<CR> | |
| | NEO6MUSIC | | MSNEO6MUSIC<CR> | |
| | HALL | | MSHALL<CR> | |
| | ROOM | | MSROOM<CR> | |
| | STADIUM | | MSSTADIUM<CR> | |
| | THEATER | | MSTHEATER<CR> | |
| Quick Select 1-4 Mode | QUICK1 | MSQUICK?<CR> | MSQUICK1<CR> | |
| | QUICK2 | | MSQUICK2<CR> | |
| | QUICK3 | | MSQUICK3<CR> | |
| | QUICK4 | | MSQUICK4<CR> | |
| Quick Select 1-4 Mode Memory | QUICK1 MEMORY | **N/A** | MSQUICK1 MEMORY<CR> | |
| | QUICK2 MEMORY | | MSQUICK2 MEMORY<CR> | |
| | QUICK3 MEMORY | | MSQUICK3 MEMORY<CR> | |
| | QUICK4 MEMORY | | MSQUICK4 MEMORY<CR> | |

## Control command code table

| CATEGORY | CONTENTS | | STATUS REQUEST | COMMAND | NOTES |
|---|---|---|---|---|---|
| NET/USB/BT Control | "Cursor Up" Control | | N/A | NS90<CR> | |
| | "Cursor Down" Control | | | NS91<CR> | |
| | "Cursor Left" Control | | | NS92<CR> | |
| | "Cursor Right" Control | | | NS93<CR> | |
| | "Enter" Control | | | NS94<CR> | |
| | "Play" Control | | | NS9A<CR> | |
| | "Stop" Control | | | NS9C<CR> | |
| | "Skip Plus" Control | | | NS9D<CR> | |
| | "Skip Minus" Control | | | NS9E<CR> | |
| | Menu | | | NSMEN<CR> | |
| | Return | | | NSRTN<CR> | |
| System Control | "Cursor Up" Control | | N/A | MNCUP<CR> | |
| | "Cursor Down" Control | | | MNCDN<CR> | |
| | "Cursor Left" Control | | | MNCLT<CR> | |
| | "Cursor Right" Control | | | MNCRT<CR> | |
| | "Enter" Control | | | MNENT<CR> | |
| | OSD Menu | ON | | MNMEN ON<CR> | |
| | | OFF | | MNMEN OFF<CR> | |
| | REMOTE CONTROL LOCK ON/OFF | ON | | SYREMOTE LOCK ON<CR> | |
| | | OFF | | SYREMOTE LOCK OFF<CR> | |
| | PANEL BUTTON (Except MASTER VOL.) CONTROL LOCK ON | | | SYPANEL LOCK ON<CR> | |
| | PANEL BUTTON & MASTER VOL. CONTROL LOCK ON | | | SYPANEL+V LOCK ON<CR> | |
| | PANEL BUTTON & MASTER VOL. CONTROL LOCK OFF | | | SYPANEL LOCK OFF<CR> | |

# 5. Appendix

## 5-1. Acceptable Character

The acceptable character set is ISO/IEC 8859-1.

5-1-1. Acceptable Character Type1

• Acceptable characters are shown in **Error! Reference source not found.**. (The characters that are colored in gray are not acceptable.)

| | X0 | X1 | X2 | X3 | X4 | X5 | X6 | X7 | X8 | X9 | XA | XB | XC | XD | XE | XF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0X | | | | | | | | | | | | | | | | |
| 1X | | | | | | | | | | | | | | | | |
| 2X | *SP* | ! | “ | # | $ | % | & | ‘ | ( | ) | * | + | , | - | . | / |
| 3X | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | : | ; | < | = | > | ? |
| 4X | @ | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O |
| 5X | P | Q | R | S | T | U | V | W | X | Y | Z | [ | \ | ] | ^ | _ |
| 6X | ` | a | B | c | D | e | f | g | h | I | j | k | l | m | n | o |
| 7X | p | q | R | s | T | u | v | w | x | Y | z | { | \| | } | ~ | *DEL* |
| 8X | | | | | | | | | | | | | | | | |
| 9X | | | | | | | | | | | | | | | | |
| AX | *NBSP* | ¡ | ¢ | £ | ¤ | ¥ | ¦ | § | ¨ | © | ª | « | ¬ | - | ® | ¯ |
| BX | ° | ± | ² | ³ | ´ | µ | ¶ | · | ¸ | ¹ | º | » | ¼ | ½ | ¾ | ¿ |
| CX | À | Á | Â | Ã | Ä | Å | Æ | Ç | È | É | Ê | Ë | Ì | Í | Î | Ï |
| DX | Ð | Ñ | Ò | Ó | Ô | Õ | Ö | × | Ø | Ù | Ú | Û | Ü | Ý | Þ | ß |
| EX | à | á | â | ã | Ä | å | æ | ç | è | É | ê | ë | ì | í | î | ï |
| FX | ð | ñ | ò | ó | Ô | õ | ö | ÷ | ø | Ù | ú | û | ü | ý | þ | ÿ |

## 5-2. Folder name/File name

### 5-2-1. Absolute Folder or File name

Folder name or File name must be specified in full-path from the root folder. (Root folder is expressed in 0x2F ('/') of the top, and the separator is 0x2F ('/').)

Ex) Folder name: /NewFolder, File name: /NewFolder/NewFile.wav

### 5-2-2. Folder or File name without folder path

Folder name or File name is specified without folder path.