DENON SYSTEM control protocol

Application model : DNP720AE(SE)

Application terminal: ~~RS-232C/~~ **Ethernet**

Rev 8.0.0

Connector specification

~~I. RS-232C~~

~~Connector type: DB-9pin female type, slave straight connection (DCE type)~~

~~(1pin : GND , 2pin : TxD , 3pin : RxD , 5pin : Common(GND) , 4,6,7,8,9pin : NC)~~

~~Communication format:~~

~~Synchronous system   : Tone step synchronization~~

~~Communication system   : A half duplex~~

~~Communication speed   : 9600bps~~

~~Character length   : 8 bits~~

~~Parity control   : None~~

~~Start bit   : 1 bit~~

~~Stop bit   : 1 bit~~

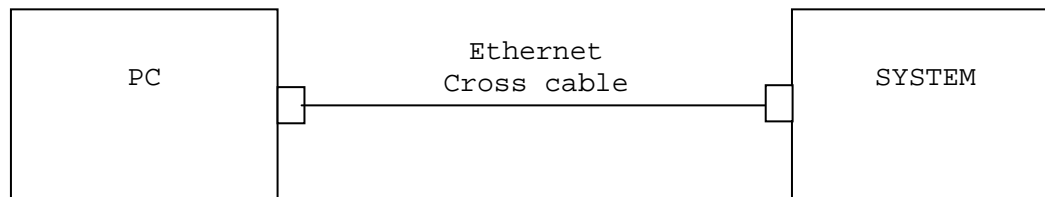~~Communication procedure   : Non procedural~~

~~Communication data length   : 135 bytes (maximum)~~

Version	Date	Contents	Page
1.0.3	7.September'11	誤記修正	
1.0.2	7.March.'11	DGO ON,DGO OFF コマンド無効 PARAMETER list に Preset 関連を追加	
1.0.1	3.March.'11	NSP1 MEM,NSP2 MEM,NSP3 MEM,NSP コマンド追加	
1.0.0	25.Feb.'11	Original	

※1 ﾍﾟｰｼﾞ の「Rev」、及び「Ver」は固定の為、修正しない事！！

Ⅱ. Ethernet

Connector type   :   RJ-45(10BASE-T/100BASE-TX)

Example ①

```
┌──────────────┐                              ┌──────────────┐
│              │          Ethernet            │              │
│     PC       ├┐      Cross cable         ┌──┤    SYSTEM     │
│              │└──────────────────────────┘  │              │
│              │                              │              │
└──────────────┘                              └──────────────┘
```

Example ②

```
                              ┌──────────┐
                              │   HUB    │
                              └─┬──────┬─┘
┌──────────────┐               │      │        ┌──────────────┐
│              │               │      │        │              │
│     PC       ├┐              │      │     ┌──┤    SYSTEM     │
│              │└──────────────┘      └─────┘  │              │
│              │   Ethernet            Ethernet│              │
└──────────────┘   Straight            Straight└──────────────┘
                     cable               cable
```
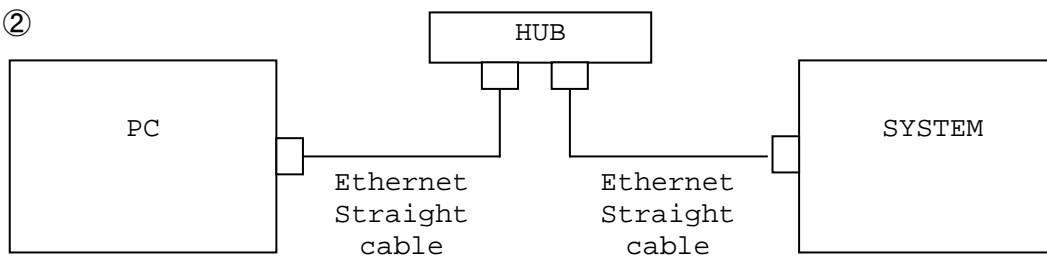
Communication format :
       Communication system   : A half duplex
       Communication speed   : 10Mbps/100Mbps
       Communication port   : TCP port 23 (telnet)
       Communication data length   : 135bytes (maximum)

NETWORK SETUP of DNP720AE(SE)

>Procedure of Network Setup mode.
(1)Press **MENU** button, then Menu appears on OLED-display.
(2)Select "Network Setting > Network Connecting" .
(3)Set parameters described below.
  <DHCP>   "ON"---Use this setting when DHCP server is on the local network.
                 "OFF"---Use this setting when DHCP server is not on the local network.
  <IP Address>   When <DHCP> sets "OFF", please set IP address.
                When <DHCP> sets "ON", you can confirm the IP address that is set by server.
  <Subnet Mask> When <DHCP> sets "OFF", please set Subnet Mask.
                When <DHCP> sets "ON", you can confirm the Subnet Mask that is set by server.
  <Gateway>   Set the address of Gateway when Gateway is on the local network.
                Do not set this parameter when Gateway is not on the local network.
  <Primary DNS> Do not set this parameter.
  <Second DNS>   Do not set this parameter.
  <Proxy>   Set this parameter "OFF".

  <Network Option: Network Standby Mode>.
  (1)Press MENU button, then Menu appears on OLED-display.
  (2)Select "Other Network > Network Standby".
  (3)Set parameters described below.
         "**ON**"---Use this setting when using the DNP720AE(SE) Connected in a network.
          "**OFF**"--- Use this setting when not using the DNP720AE(SE) connected in a network.
                This setting is reducing the power consumption in the standby mode.

Protocol specification
The following three data forms are defined.

      COMMAND   :   The message sent to a system from a controller(Touch Panel etc.)
                        A command to a system is given from a controller.

      EVENT   :   The message sent to a controller (Touch Panel etc.) from a system
                        The result is sent, when a system is operated directly and a state changes.
                        *The form of **EVENT** presupposes that it is the same as that of **COMMAND**.
                        Refer to the following table for the contents of **COMMAND and **EVENT**.

      RESPONSE :   The message sent to a controller (Touch Panel etc.) from a system
                        if the 'request command' (**COMMAND**+**?**+CR(0x0D)) has came from a controller.
                        The **RESPONSE** should be sent <u>within 200ms</u> of receiving the **COMMAND**.
                        *The form of **RESPONSE** presupposes that it is the same as that of **EVENT**.

Basic specification: The command by ASCII CODE, parameter expression
     *ASCII CODE which can be used is from 0x20 to 0x7F: the alphabet and the number of 0-9, and space (0x20), some signs,

                                         AND carriage return (0x0D) --- It is used only as a pause sign.

Command structure: COMMAND + PARAMETER + CR (0x0D)
     COMMAND: ASCII CODE of 2 characters
              Ex.   SI   : Select Input source
                     ~~MU : Mute Setting~~
                     ~~MV : Master Volume setting~~
                     PW :   system PoWer setting
     PARAMETER : ASCII CODE (up to 25 characters)
            ex.   TUNER : function name

                       ~~SUPER STADIUM : surround mode name~~
                *Special Parameter--- ? : for request command

The example of a command   * <CR> is the meaning of 0x0D.

SITUNER<CR> : Select Input source TUNER

~~MUON<CR>   : Mute Set to On~~

~~MVUP<CR>   : Master Volume UP~~

PWON<CR> : system PoWer ON

PWSTANDBY<CR> : system PoWer STANDBY

SI?<CR> : Request command for now playing input source >> Return ***RESPONSE*** 'SI***<CR>'

Others

A) *COMMAND* is receivable also during transmission of *EVENT*.

B) The *RESPONSE* should be sent as opposed to the request command by all the commands with which an *EVENT* exists , not need to the another request commands(ex. SV command).

C) The *PARAMETER* (with *COMMAND* and *RESPONSE*, *EVENT*) of minimum level of MASTER VOLUME defines "99".

D) If the MASTER VOLUME & CHANNEL VOLUME set with 0.5dB step, the *PARAMETER* (with *COMMAND* and *RESPONSE*, *EVENT*) defines three ASCII characters as bellows.

    Ex.   MASTER VOLUME =   +1.0dB :   MV81<CR>
                    +0.5dB :   MV805<CR>
                     0dB :   MV80<CR>
                    -0.5dB :   MV795<CR>
                    -1.0dB :   MV79<CR>
                       |
                   -79.5dB :   MV005<CR>
                   -80.0dB :   MV00<CR>
                 -80.5dB :   **MV995<CR>**
                      --- :   MV99<CR>
    * At the **.0dB step, only uses two ASCII characters as *PARAMETER*, same as usual.

K) 1 seconds later, please transmit the next *COMMAND* after transmitting a power on *COMMAND* (PWON) .

COMMAND and PARAMETER list

COMMAND	*PARAMETER*	Function	example
PW	ON	POWER ON/STANDBY change	PWON<CR>
	STANDBY		PWSTANDBY<CR>
	?	Return PW Status	PW?<CR>
SI	TUNER		SITUNER<CR>
	RHAPSODY	(North America model Only)	SIRHAPSODY<CR>
	NAPSTER		SINAPSTER<CR>
	PANDORA		SIPANDORA<CR>
	LASTFM		SILASTFM<CR>
	IRADIO		SIIRADIO<CR>
	SERVER		SISERVER<CR>
	USB		SIUSB<CR>
	?	Return SI Status	SI?<CR>

~~MV *COMMAND* : "*" parameter uses two or three ASCII characters. (see page7 J) section)~~

COMMAND	*PARAMETER*	Function	example
FV	**	FAVORITE direct change to No.**	FV 25<CR>
	?	Return FAVORITE List	FV ?<CR>

~~PS *COMMAND* : "*" parameter uses two ASCII characters. (see page7 J) section)~~

※ANALOG TUNER Control

COMMAND	PARAMETER	Function	example
TF	ANUP	TUNER Frequency UP/DOWN	TFANUP<CR>
	ANDOWN		TFANDOWN<CR>
	AN****** (6 digits)	--- ****.** kHz at AM band (>050000 is AM.) 　　　****.** MHz at FM band (<050000 is FM.)	TFAN105000<CR> 　(1050.00kHz at AM)
	AN?	Return TF Status	TFAN?<CR>
TP	ANUP	TUNER PRESET CH UP/DOWN , direct change to No.**	TPANUP<CR>
	ANDOWN		TPANDOWN<CR>
	AN** (PRESET No.)		TPAN50<CR> 　(PRESET No."50")
	AN?	Return TP Status	TPAN?<CR>
	ANMEM**	TUNER PRESET MEMORY	TPANMEM05<CR>
TM	ANAM	TUNER BAND , MODE Select ---Band set to AM	TMANAM<CR>
	ANFM	---Band set to FM	TMANFM<CR>
	?	Return TM Status	TM?<CR>
	ANAUTO	---Tuning mode set to AUTO mode	TMANAUTO<CR>
	ANMANUAL	---Tuning mode set to MANUAL mode	TMANMANUAL<CR>

　　TF, TP, TM **COMMAND** : '*' parameters can NOT operate when INPUT source isn't TUNER.

※FAVORITE Control

COMMAND	PARAMETER	Function	example
MN	CUP	"Cursor Up" Control	MNCUP<CR>
	CDN	"Cursor Down" Control	MNCDN<CR>
	CLT	"Cursor Left" Control	MNCLT<CR>
	CRT	"Cursor Right" Control	MNCRT<CR>
	ENT	"Enter" Control	MNENT<CR>
	FAV ON	"FAVORITE ON"	MNFAV ON<CR>
	FAV OFF	"FAVORITE OFF"	MNFAV OFF<CR>

※Network/Rhapsody/Napster/USB/iPod Direct Extended Control

COMMAND	PARAMETER	Function	example
NS	90	"Cursor Up" Control	NS90<CR>
	91	"Cursor Down" Control	NS91<CR>
	92	"Cursor Left" Control	NS92<CR>
	93	"Cursor Right" Control	NS93<CR>
	94	"Enter (Play/Pause)" Control	NS94<CR>
	9A	"Play" Control(iRadio/mServer/USB) "Play/Pause" Control(iPod Direct)	NS9A<CR>
	9B	"Pause" Control "Play/Pause" Control(iPod Direct)	NS9B<CR>
	9C	"Stop" Control	NS9C<CR>
	9D	"Skip Plus" Control	NS9D<CR>
	9E	"Skip Minus" Control	NS9E<CR>
	9H	"Repeat One" (USB/iPod DIRECT/mServer/Rhapsody/Napster)	NS9H<CR>
	9I	"Repeat All" (USB/iPod DIRECT/mServer/Rhapsody/Napster)	NS9I<CR>
	9J	"Repeat Off" (USB/iPod DIRECT/mServer/Rhapsody/Napster)	NS9J<CR>
	9K	"Random On/Repeat ALL" (USB/mServer/Rhapsody/Napster) "Shuffle Songs" Control (iPod Direct Only)	NS9K<CR>
	9M	"Random Off" (USB/mServer/Rhapsody/Napster) "Shuffle Off" Control (iPod Direct Only)	NS9M<CR>
	9W	Toggle Switch "Browse Mode/Remote Mode" Control (iPod Direct Only)	NS9W<CR>
	P1	Net Audio Preset1 Call	NSP1<CR>
	P2	Net Audio Preset2 Call	NSP2<CR>
	P3	Net Audio Preset3 Call	NSP3<CR>
	P1 MEM	Net Audio Preset1 Memory	NSP1 MEM<CR>
	P2 MEM	Net Audio Preset2 Memory	NSP2 MEM<CR>
	P3 MEM	Net Audio Preset3 Memory	NSP3 MEM<CR>
	P	Net Audio Preset 1-3 status (UTF-8)	NSP<CR> (Return NSP1-NSP3,Refer to Page 14)
NSE		Request Onscreen Display Information List (UTF-8 CODE Character)	NSE<CR> (Return NSE0-NSE8,Refer to Page 15)
NSD	*	"Direct Character Search"(except iPod Direct)	NSD0<CR> (*:0-9,A-Z)

EVENT(or RESPONSE) and PARAMETER list

EVENT	PARAMETER	Function	example
PW	ON	POWER ON/STANDBY change	PWON<CR>
	STANDBY		PWSTANDBY<CR>
SI	TUNER	(North America model Only)	SITUNER<CR>
	RHAPSODY		SIRHAPSODY<CR>
	NAPSTER		SINAPSTER<CR>
	PANDORA		SIPANDORA<CR>
	LASTFM		SILASTFM<CR>
	IRADIO		SIIRADIO<CR>
	SERVER		SISERVER<CR>
	USB		SIUSB<CR>

EVENT	PARAMETER	Function	example
FV	** aaaa_???????	"FAVORITE NAME" Request *:FAVORITE No. a:Character Length(MAX32byte) _:Null ?: Don't Care (The character after Null should be disregarded) **aaaa_?????:35byte Fixed	FV25FM-87.50MHz<CR>

※ANALOG TUNER Control

EVENT	PARAMETER	function	example
TF	AN****** (6 digits)	TUNER Frequency change --- ****.** kHz at AM band ****.** MHz at FM band	TFAN105000<CR> (1050.00kHz at AM)
TP	AN**(PRESET No.)	TUNER PRESET change to No.**	TPANA1<CR> (PRESET No."A1")
TM		TUNER BAND , MODE change	
	ANAM	---Band set to AM	TMANAM<CR>
	ANFM	---Band set to FM	TMANFM<CR>
	ANAUTO	---Tuning mode set to AUTO mode	TMANAUTO<CR>
	ANMANUAL	---Tuning mode set to MANUAL mode	TMANMANUAL<CR>

※ Network/Rhapsody/Napster/USB/iPod Direct Extended Control

EVENT	PARAMETER	function	
NS	P*	Net Audio Preset Call No.1-3	NSP1<CR>
	P* MEM	Net Audio Preset1 Memory No.1-3	NSP1 MEM<CR>
	P	Net Audio Preset 1-3 status (UTF-8)	NSP01**********(20 digits)<CR>(Preset Name：P1) NSP02**********(20 digits)<CR>(Preset Name：P2) NSP03**********(20 digits)<CR>(Preset Name：P3)

EVENT	PARAMETER	function	
NSE		Onscreen Display Information(mServer/iRadio) is Answered By the NSE Command.	
	0	Display Line1 Information	NSE0**************_?????<CR>
	1	Display Line2 Information	NSE1※************_?????<CR>
	2	Display Line3 Information	NSE2※************_?????<CR>
	3	Display Line4 Information	NSE3※************_?????<CR>
	4	Display Line5 Information	NSE4※************_?????<CR>
	5	Display Line6 Information	NSE5※************_?????<CR>
	6	Display Line7 Information	NSE6※************_?????<CR>
	7	Display Line8 Information	NSE7**************_?????<CR>
	8	Display Line9 Information	NSE8**************_?????<CR> *:UTF-8 CODE Character(MAX95byte) _:Null ?: Don't Care (The character after 　Null should be disregarded) ※:Cursor&Playable Music 　　Information Data(1Byte) 　Bit1:Playable Music =1 　Bit2,3:Don't Care 　Bit4:CURSOR SELECT=1 　Bit5,6,7,8:Don't Care 　***********_?????:96byte Fixed
	<example>		NSE0Now Playing　USB_????<CR> NSE1※Come Away With Me_???<CR> NSE2※Norah Jones_?????????<CR> NSE3※_??????????????????<CR> NSE4※_??????????????????<CR> NSE5※00:11　　100%_???????<CR> NSE6※_??????????????????<CR> NSE7_??????????????????<CR> NSE8_???????????????????<CR>