

RS-232C CONTROL


PLASMA DISPLAY MONITOR: PDP-502MX

Serial commands and protocol

This manual provides precautions and information for installation, preparation, and handling of the plasma display and its dedicated mounting hardware.

Before installation and preparatory work, choose a safe and appropriate site after thorough consideration of construction, materials used, strength, and surroundings. If adequate safeguards are not in place, immediately halt the installation process and discontinue marketing activities.

CAUTION

 Exclamation marks placed within triangles are intended to alert users to the presence of important safety information. Be sure to read instructions indicated by this symbol.

ABOUT MOUNTING/INSTALLATION

- This product is sold under the assumption that installation will be performed by experienced, qualified experts. Refer all mounting and installation work to qualified personnel, or consult the nearest PIONEER dealer for assistance.
- We accept no responsibility for accident or loss resulting from failure to select an appropriate installation site, or for those occurring during assembly, installation, mounting, or operation of this product, or resulting from modifications made to this product, or from natural disasters.

PRECAUTIONS:

- We accept no responsibility for losses resulting from the use of parts other than those supplied by us.
- We guarantee the performance of our products only when they are assembled and adjusted as described in this manual.
- The specifications and external designs shown in this manual are subject to change without notice.

Pioneer

RS-232C Adjustment Mode

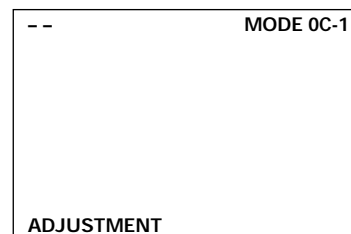
5.5 RS-232C Adjustment Mode

Through the unit's RS-232C terminal. You can use a PC to make various adjustments and settings.

5.5.1 About the RS-232C adjustment mode

- 1) When carrying out adjustments in the RS-232C adjustment mode
 - This data is written in the same memory area allocated for integrator mode (refer to 5.4.5 and 5.4.6, "Memory Area Tables").

- 2) Screens displayed in the RS-232C Adjustment Mode
 - The display will appear much like the illustration to the right. The ID number of the set of adjustments will be indicated in the upper left corner of the screen, where "--" is shown in the illustration. A display such as "0C-1" in the upper right of the screen is for factory adjustments.



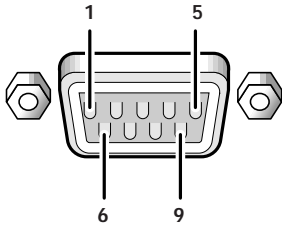
CAUTION

- (1) Always enter ID before using RS-232C adjustment mode. In addition, include the ID of the set to be targeted for control/adjustment in the RS-232C command that you transmit. Refer to section 5.5.2, "Interface".
- (2) The adjustments are stored in last memory using <AJN>. When you have finished making the adjustments, make sure that you execute <AJN>. When changing the type of signal that will be the target of the adjustments (e.g. when changing from NTSC to PAL or changing the PC refresh rate), make sure that you execute <AJN> before switching over the type of signal and then once again execute <AJY>.
- (3) Some RS-232C commands can be used in normal operating mode. Refer to section 5.5.4, "List of RS-232C commands".
- (4) With the exception of the following cases, the adjustment data and set items from RS-232C adjustment mode are all stored in last memory. A precondition for this however is that all of the conditions in "5.1.5 Last memory" have been satisfied. Cases where the adjustment data and set items are not stored in last memory. For the following commands in normal operating mode:
 - <IN 1-4> (input switching)
 - <MMN. X. Y. Z> (mirror mode switching)
 - <AMY. N> (muting)
 - <AJY> (transition to RS-232C adjustment mode)
 - <HPS> + <UPn> or <DWn> (n: 0 to 9) (movement of the picture in order to prevent it from becoming burnt onto the screen)
For more details please refer to "5.8 Regarding the problem of images becoming burnt onto the screen"
 - <VPS> + <UPn> or <DWn> (n: 0-9)For the following command in RS-232C adjustment mode
 - <DOF> + (OSD display OFF)Please take due care.
- (5) About <DIN>/<DIY> (OSD displays disabled/enabled)
Whether in <DIN> or <DIY> state, the following are shown:
 - Menu display
 - Warning just before the Power Save feature comes on
 - Warning of high internal temperature (" THERMAL WARNING! PLEASE SHUT DOWN")
 - Display announcing KEY LOCK is set; also display announcing the setting of KEY LOCK/UNLOCK
- (6) RS-232C adjustment mode is automatically canceled when the STANDBY/ON, MENU, or KEY LOCK/UNLOCK (main unit operating panel only) are pushed.

5.5.2 Interface

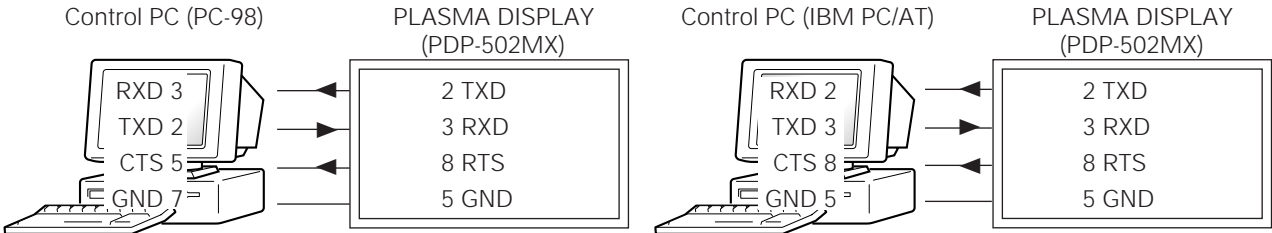
- 1) Connector
D-sub 9 pins
- 2) Pin Assignment

Pin No.	Signal
1	NC (not connected)
2	TXD (Transmit Data)
3	RXD (Receive Data)
4	NC (not connected)
5	GND
6	NC (not connected)
7	NC (not connected)
8	RTS (Return To Send)
9	NC (not connected)



- 3) Baud Rate
4800 bps (standard)
(switch-able to 1200, 2400, 9600, 19200 bps)
(NOTE) Set the baud rate to match that of the computer presently in use. Moreover, in the case that the RS-232C cable is very long, we recommend that you make the baud rate lower.
- 4) Data Format
Start: 1-bit
Data: 8-bit
Parity: 0 (no parity)
Stop: 1-bit

5) Connection



* D-sub 9-pin/D-sub 25-pin conversion tables are now available on the market.

6) Protocol

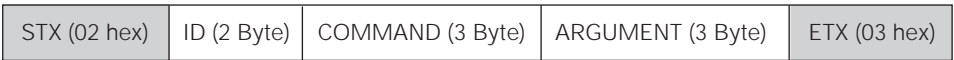
From computer to plasma display
(1) When transmitting commands individually



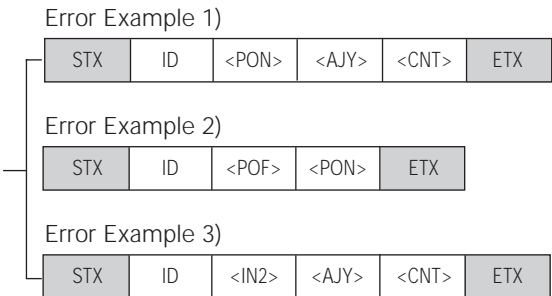
(2) When transmitting commands in batches (up to max. 3 commands) (NOTE)



(3) When transmitting direct numeric commands



- (NOTE)
- Transmit <PON> and <POF> commands one by one. (Allow an interval of three or more seconds between commands.)
 - Transmit an input switching command (IN 1-4) and <AJY> command, allowing sufficient time between them.
 - Allow an interval of approximately three or more seconds between input switching commands (IN 1-4).



RS-232C Adjustment Mode

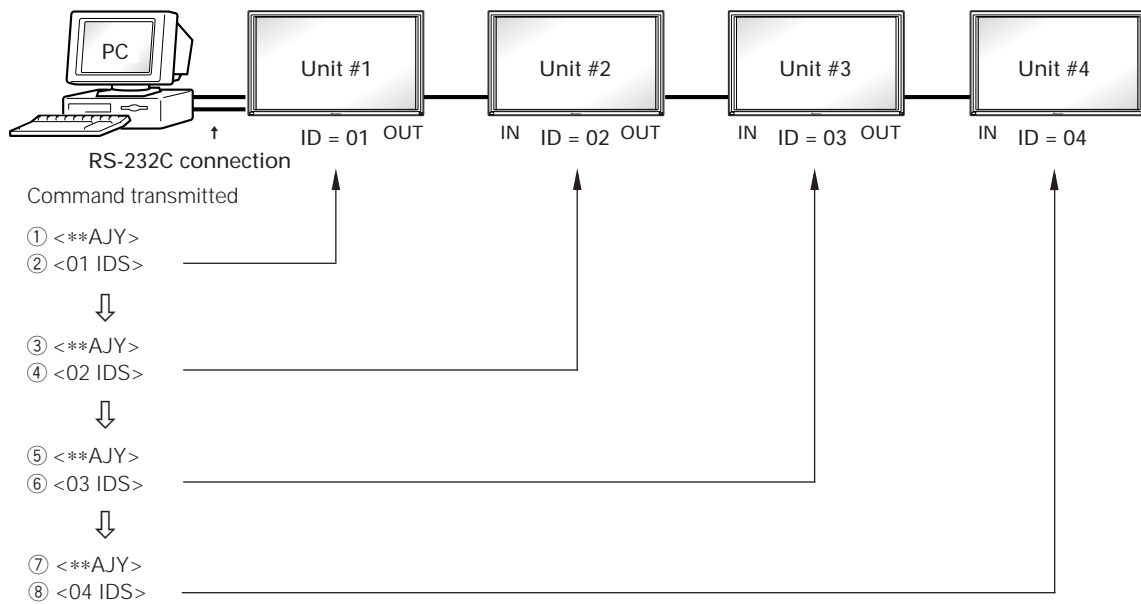
5.5.3 ID assignment

When a connection is made, this feature assigns an ID. ID assignment is performed in the PC.

Commands: <IDC> (ID CLEAR) Clears assigned IDs.
<IDS> (ID SET) Assigns IDs
IDS is only effective when an ID has not been assigned.
It is assigned from a unit close to the PC.

Example: 4 units (At first, the ID is assigned at the PC.)

First of all, following the example in the diagram below, carry out the RS-232C connection and the combination connection (see "5.6 Combination connection").



If you send commands in this order, you can assign an ID to each set.

A unit to which an ID has been assigned can only receive commands which have that ID attached. Attach ID to the beginning of commands before transmitting them.

Characters that may be used for ID are 0 to 9 and A to F (there is no uppercase/lowercase differentiation).

Asterisks (*) are used as follows:

- <***IDC> : Clear assigned ID of all units.
- <*1AJY> : Units with 1 as the second digit in their ID will go into adjustment mode.
- <2*IN1> : Units with 2 as their first digit will use INPUT 1.

Cautionary notes regarding ID assignment

Units connected to other units from which IDs were cleared will become inoperable by RS-232C.

After making settings as in the diagram above, if you carry out <***AJY> and <***IDC> then the IDs will be cleared for all of the Units #1~#4, and it will become such that you can only control the set connected directly to the PC (Unit #1). By carrying out <***AJY> <01 IDS>, the second unit from the computer would become operable. By setting ID likewise thereafter, the setting of subsequent units will become operable.

5.5.4 List of RS-232C commands

How to read this table

- Normal validity : Shows availability in the normal operating mode.
Commands shown as valid are so whether or not preceded by an <AJY> command.
- Direct validity : Shows commands that, if transmitted followed by numerical values, can or cannot directly set the corresponding items to those values sent out.
- Up/Down validity : Shows commands that, if transmitted followed by UPn/DWn (n standing for any numbers from 0 to 9), can or cannot increase or decrease the corresponding current adjustments by those numbers.

(NOTE) With regard to the propriety of last memory, please refer to "5.5.1 About the RS-232C adjustment mode".

O or ● : Yes × : No

(NOTE) ● = Not put into last memory

	Command Name	Full Name	Normal Validity	Direct Validity	Up/Down Validity	Function
A	ABN	ABL NO	×	×	×	Sets ABL to OFF.
	ABY	ABL YES	×	×	×	Sets ABL to ON.
	AJN	ADJUST NO	×	×	×	Terminates RS-232C adjustment mode.
	AJY	ADJUST YES	●	×	×	Initiates RS-232C adjustment mode.
	AMN	AUDIO MUTE NO	●	×	×	Turns audio mute OFF.
	AMY	AUDIO MUTE YES	●	×	×	Turns audio mute ON.
B	BBY	VIDEO RGB YES	×	×	×	Sets INPUT to VIDEO: RGB.
	BRT	BRIGHTNESS	×	O	O	Adjusts BRIGHTNESS.
	BHI	BLUE HIGH	×	O	O	Adjusts BLUE HIGH-LIGHT.
	BLW	BLUE LOW	×	O	O	Adjusts BLUE LOW-LIGHT.
	BSL	BLUE SIDE MASK LEVEL	×	O	O	Adjusts BLUE SIDE MASK LEVEL.
	BR1	BAUD RATE 1	×	×	×	Sets RS-232C baud rate to 1200 bps.
	BR2	BAUD RATE 2	×	×	×	Sets RS-232C baud rate to 2400 bps.
	BR3	BAUD RATE 3	×	×	×	Sets RS-232C baud rate to 4800 bps.
	BR4	BAUD RATE 4	×	×	×	Sets RS-232C baud rate to 9600 bps.
BR5	BAUD RATE 5	×	×	×	Sets RS-232C baud rate to 19200bps.	
C	CFR	CLOCK FREQUENCY	×	O	O	Adjusts clock frequency.
	CL1	CLAMP MODE 1	×	×	×	Sets Clamp Position Setting Mode to 1.
	CL2	CLAMP MODE 2	×	×	×	Sets Clamp Position Setting Mode to 2.
	CM1	COLOR MODE 1	O	×	×	Sets White Balance Adjustment Data to Mode 1.
	CM2	COLOR MODE 2	O	×	×	Sets White Balance Adjustment Data to Mode 2 (retake).
	CNT	CONTRAST	×	O	O	Adjusts CONTRAST.
	COL	COLOR	×	O	O	Adjusts COLOR.
	CP1	VIDEO COMPONENT-1 YES	×	×	×	Sets INPUT to VIDEO: COMPONENT 1.
	CP2	VIDEO COMPONENT-2 YES	×	×	×	Sets INPUT to VIDEO: COMPONENT 2.
CPH	CLOCK PHASE	×	O	O	Adjusts clock phase.	
D	DIN	OSD DISPLAY NO	×	×	×	Disables OSD displays.
	DIY	OSD DISPLAY YES	×	×	×	Enables OSD displays.
	DOF	DISPLAY OFF	×	×	×	Turns OSD display OFF.
	DSP	INPUT SIGNAL DISPLAY	×	-	-	Displays the current input signal information
	DW0	DOWN 10	×	×	×	Decreases adjustment values by 10.
	DWn	DOWN n	×	-	-	Decreases adjustment values by n.
DWF	DOWN FULL	×	-	-	Decreases adjustment values to minimum.	
F	FCA	FAN CONTROL AUTO	×	×	×	Makes control of fan's rotation automatic.
	FCM	FAN CONTROL MAX	×	×	×	Makes control of fan's rotation FIXED (MAX).
	FMB	FULL MASK BLUE	×	×	×	Turns full mask blue ON
	FMG	FULL MASK GREEN	×	×	×	Turns full mask green ON
	FMN	FULL MASK NO	×	×	×	Turns full mask OFF
	FMR	FULL MASK RED	×	×	×	Turns full mask red ON
	FMY	FULL MASK YES	×	×	×	Turns full mask white ON
	FRP	FRESH POSITION	×	×	×	Centers the SCREEN adjustment data
	FRW	FRESH WHITE BALANCE	×	×	×	Sets picture quality and white balance adjustment data to median values.
G	GHI	GREEN HIGH	×	O	O	Adjusts GREEN HIGH-LIGHT.
	GLW	GREEN LOW	×	O	O	Adjusts GREEN LOW-LIGHT.
	GPS	GET POSITION DATA	×	×	×	Sends out position adjustment data in TxD.
	GSL	GREEN SIDE MASK LEVEL	×	O	O	Adjusts GREEN SIDE MASK LEVEL.
	GST	GET STATUS	×	×	×	Sends out various adjustment data in TxD.
	GS2	GET STATUS 2	×	×	×	Sends out various settings status data. in TxD.
	GWB	GET W/B DATA	×	×	×	Sends out picture quality and white balance adjustment data in TxD.

RS-232C Adjustment Mode

	Command Name	Full Name	Normal Validity	Direct Validity	Up/Down Validity	Function
H	HCN	HIGH CONTRAST NO	×	×	×	Turns the HIGH CONTRAST setting OFF
	HCY	HIGH CONTRAST YES	×	×	×	Turns the HIGH CONTRAST setting ON
	HMD	HOUR METER DISPLAY	×	×	×	Lets hour meter appear.
	HPS	HORIZONTAL POSITION	●	○	○	Adjusts horizontal position.
	HSI	HORIZONTAL SIZE	×	○	○	Adjusts horizontal size.
I	IDC	ID CLEAR	×	×	×	Clears ID.
	IDS	ID SET	×	×	×	Sets ID.
	IN1	INPUT1	●	×	×	Selects INPUT 1 (RCA or BNC).
	IN2	INPUT2	●	×	×	Selects INPUT 2 (S-terminal or Y/C).
	IN3	INPUT3	●	×	×	Selects INPUT 3 (BNC x 5).
	IN4	INPUT4	●	×	×	Selects INPUT 4 (mini D-sub 15).
K	KLN	KEY LOCK NO	×	×	×	Enables controls on display/remote.
	KLY	KEY LOCK YES	×	×	×	Disables controls on display/remote.
M	MMN	MIRROR MODE NO	●	×	×	Resets mirror mode setting. (normal use)
	MMX	MIRROR MODE X	●	×	×	Sets mirror mode to X (left/right reverse).
	MMY	MIRROR MODE Y	●	×	×	Sets mirror mode to Y (up/down reverse).
	MMZ	MIRROR MODE XY	●	×	×	Sets mirror mode to X/Y (up/down & left/right reverse).
N	NT4	TV SYSTEM 4.43 NTSC	×	×	×	Sets COLOR SYSTEM to 4.43 NTSC.
	NTS	TV SYSTEM NTSC	×	×	×	Sets COLOR SYSTEM to NTSC.
P	PAL	TV SYSTEM PAL	×	×	×	Sets COLOR SYSTEM to PAL.
	PCY	PC RGB YES	×	×	×	Sets INPUT to PC: RGB.
	POF	POWER OFF	○	×	×	Turns off power.
	PON	POWER ON	○	×	×	Turns on power.
	PLN	BRIGHT ENHANCE OFF	×	×	×	Turns off central screen brightness correction.
	PLY	BRIGHT ENHANCE ON	×	×	×	Turns on central screen brightness control.
	PSN	POWER SAVE OFF	×	×	×	Sets power save off.
	PS1	POWER SAVE MODE 1	×	×	×	Sets power save to Mode 1.
	PS2	POWER SAVE MODE 2	×	×	×	Sets power save to Mode 2.
R	RHI	RED HIGH	×	○	○	Adjusts RED HIGH-LIGHT.
	RLW	RED LOW	×	○	○	Adjusts RED LOW-LIGHT.
	RSL	RED SIDE MASK LEVEL	×	○	○	Adjusts RED SIDE MASK LEVEL.
S	SCM	TV SYSTEM SECAM	×	×	×	Sets COLOR SYSTEM to SECAM.
	SHP	H. SHARPNESS	×	○	○	Adjusts H. SHARPNESS.
	SHV	V. SHARPNESS	×	○	○	Adjusts V. SHARPNESS.
	SM0	SCREEN MODE 0	○	×	×	Sets screen size to original.
	SM1	SCREEN MODE 1	○	×	×	Sets screen size to 4:43 Normal.
	SM2	SCREEN MODE 2	○	×	×	Sets screen size to full.
	SM3	SCREEN MODE 3	○	×	×	Sets screen size to Zoom.
	SM4	SCREEN MODE 4	○	×	×	Sets screen size to Cinema Wide.
	SM5	SCREEN MODE 5	○	×	×	Sets screen size to Natural Wide.
	STD	STD.WHITE BALANCE DATA	×	×	×	Resets picture quality and white balance adjustment data to defaults.
	SV1	SUB VOLUME INPUT1	×	○	○	Adjusts SUB VOLUME of INPUT 1.
	SV2	SUB VOLUME INPUT2	×	○	○	Adjusts SUB VOLUME of INPUT 2.
	SV3	SUB VOLUME INPUT3	×	○	○	Adjusts SUB VOLUME of INPUT 3.
SV4	SUB VOLUME INPUT4	×	○	○	Adjusts SUB VOLUME of INPUT 4.	
T	TNT	TINT	×	○	○	Adjusts TINT.
	TVA	TV SYSTEM AUTO	×	×	×	Sets COLOR SYSTEM to AUTO.
U	UP0	UP10	×	–	–	Increase adjustment values by 10.
	UPn	UP n	×	–	–	Increases adjustment values by 10.
	UPF	UP FULL	×	–	–	Increases adjustment values to maximum.
V	VOL	VOLUME	×	○	○	Adjusts volume.
	VPS	VERTICAL POSITION	●	○	○	Adjusts vertical position.
	VSI	VERTICAL SIZE	×	○	○	Adjusts vertical size.
Y	YCM	3D Y/C MOTION	×	×	×	Sets motion mode to MOTION.
	YCS	3D Y/C STILL	×	×	×	Sets motion mode to STILL.

(NOTE) Make sure that you use the SUB VOLUME adjustment commands <SV1~4> only after switching to the required input using the appropriate input switching command <IN1~4>.

5.5.5 About the GET commands

What are GET commands?

- These are commands used to transmit adjustment data and other information in TXD to PCs from a microcomputer inside the plasma display.
- This information is transmitted in ASCII code.

(NOTE) Command names are given inside < >.

1) <GPS> (GET POSITION DATA) – SCREEN parameters are issued in the following formats.

STX (02 hex)	H.POSITION (3 Byte)	V.POSITION (3 Byte)	H.SIZE (3 Byte)...(NOTE)	V.SIZE (3 Byte)...(NOTE)	CLK FREQ. (3 Byte)...(NOTE)	CLK PHASE (3 Byte)...(NOTE)	ETX (03 hex)
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- (NOTE)
- If the present input signal is a video input signal, the adjustment data of CLK FREQ. and CLK PHASE will be output as dummy data.
 - If the present input signal is a PC input signal, the adjustment data of H.SIZE and V.SIZE will be output as dummy data.
 - If the present input signal is "1280 x 1024/60 Hz", the SCREEN adjustment data of present display screen size will be output.

2) <GWB> (GET W/B DATA) – PICTURE and WHITE BALANCE parameters are issued in the following formats:

STX (02 hex)	CONTRAST (3 Byte)	BRIGHT (3 Byte)	RED HIGH (3 Byte)	GREEN HIGH (3 Byte)	
	BLUE HIGH (3 Byte)	RED LOW (3 Byte)	GREEN LOW (3 Byte)	BLUE LOW (3 Byte)	
	COLOR (3 Byte)...(NOTE)	TINT (3 Byte)...(NOTE)	H. SHARP (3 Byte)...(NOTE)	V. SHARP (3 Byte)...(NOTE)	
	DUMMY DATA (3 Byte)	DUMMY DATA (3 Byte)	DUMMY DATA (3 Byte)	DUMMY DATA (3 Byte)	ETX (03 hex)

- (NOTE) If the present input is PC input, the adjustment data of COLOR, TINT, H. SHARP, and V. SHARP will be output as dummy data.

RS-232C Adjustment Mode

3) <GST> (GET STATUS) – The status of various settings is transmitted in the following formats:

STX (02 hex)	PC SOFTWARE VERSION (5 Byte)	INPUT FUNCTION (3 Byte)	COLOR MODE (3 Byte)	SCREEN SIZE (3 Byte)	POWER SAVE (3 Byte) ①	
	DUMMY DATA (3 Byte)	COLOR SYSTEM (3 Byte) ②	3D Y/C (3 Byte) ③	HIGH CONTRAST (3 Byte)	INPUT SETTING (3 Byte) ④	
	CLAMP (3 Byte) ④	ABL (3 Byte) ④	DUMMY DATA (3 Byte)	KEY LOCK (3 Byte)	OSD DISPLAY (3 Byte) ①	
	MIRROR MODE (3 Byte)	CENTRAL SCREEN BRIGHTNESS (3 Byte) ①	FAN CONTROL FORMAT (3 Byte)	EASY TEMPERATURE MEASUREMENT (3 Byte)	ACCUMULATED ON TIME (5 Byte)	ETX (03 hex)

(NOTE) • Items not related to the ongoing INPUT functions/INPUT signals will output dummy data.

- ① Depending on the present signal input (video or PC signal) the output content will switch.
 - ② Dummy data will be output unless in INPUT 1 or 2.
 - ③ Dummy data will be output unless in INPUT 1.
 - ④ Dummy data will be output unless in INPUT 3 or 4.
- For more information concerning output, refer to section 5.5.4, "List of RS-232C Commands".

4) GS2 (GET STATUS 2) - Outputs the state of the various settings in the format shown below.

STX (02 hex)	SUB VOLUME INPUT 1 (3 Byte)	SUB VOLUME INPUT 2 (3 Byte)	SUB VOLUME INPUT 3 (3 Byte)	SUB VOLUME INPUT 4 (3 Byte)	R SIDE MASK (3 Byte)	
	G SIDE MASK (3 Byte)	B SIDE MASK (3 Byte)	DUMMY DATA (3 Byte)	DUMMY DATA (3 Byte)	DUMMY DATA (3 Byte)	ETX (03 hex)

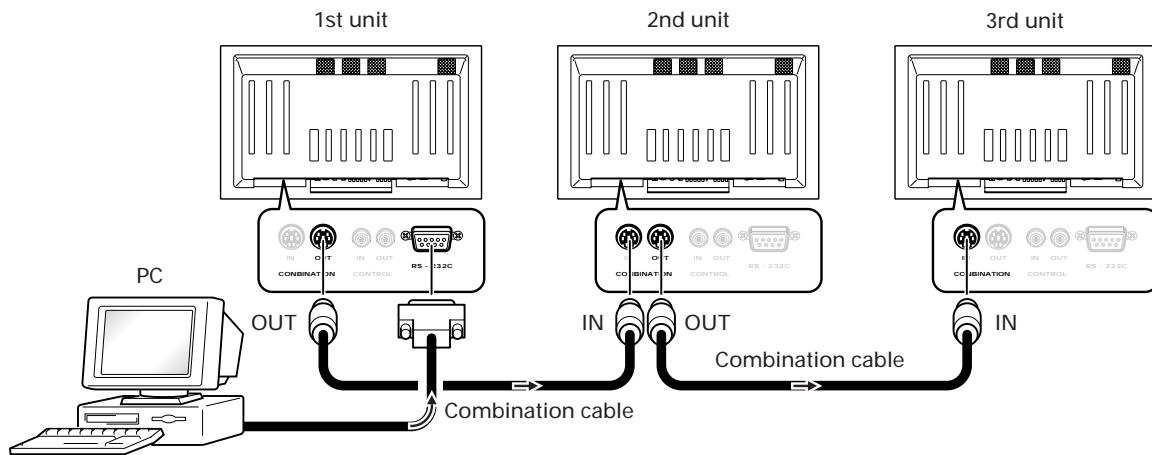
5.6 Combination Connection

This is useful for controlling/adjusting a number of sets from a single PC.

By carrying out combination connection and then assigning IDs to each of the sets, it becomes possible to control/adjust a number of sets either all at once or individually.

5.6.1 Connections

Carry out connections as shown below. You can then control/adjust the units from the PC.



NOTE

You may use either combination input or control port (RS-232C connector), but not both at once. Using both simultaneously will result in malfunction or system breakdown.
Don't connect combination inputs to other combination inputs, or combination outputs to other combination outputs. It may cause a trouble.

General purpose Mini Din 6-pin (straight) cables may be used as combination cables.

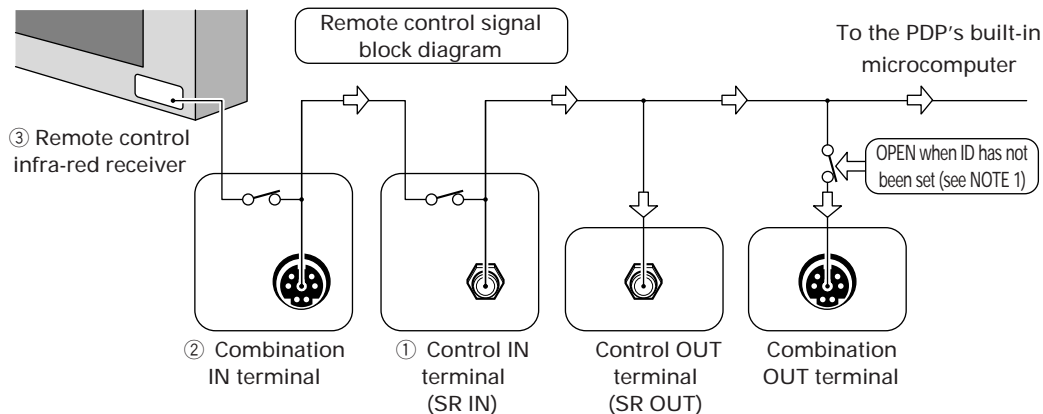
- The connections for remote control signals are as shown below.

- The order of precedence for remote control signals is as follows:

① Control IN terminal (SR IN) > ② Combination IN terminal > ③ Remote control infra-red receiver

Example: If you connect a cable to the Control IN terminal (SR IN) then the built-in Control IN terminal (SR IN) switch makes it impossible to receive remote control signals via either the remote control infra-red receiver (??) or the Combination IN terminal.

(NOTE) RS-232C signals can still be received via the Combination IN terminal.



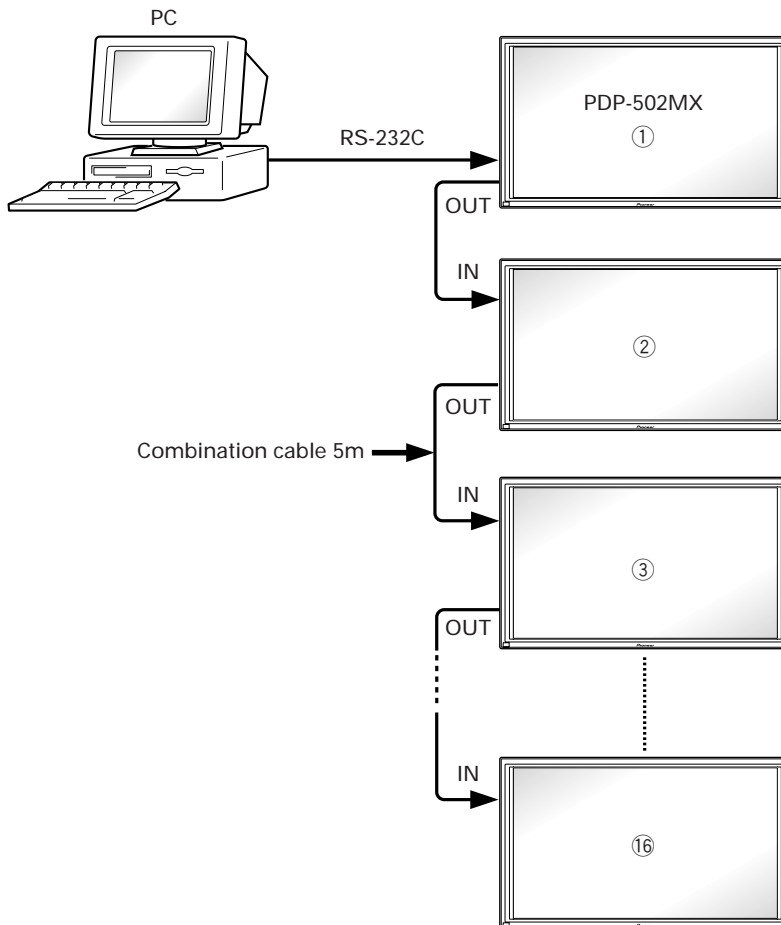
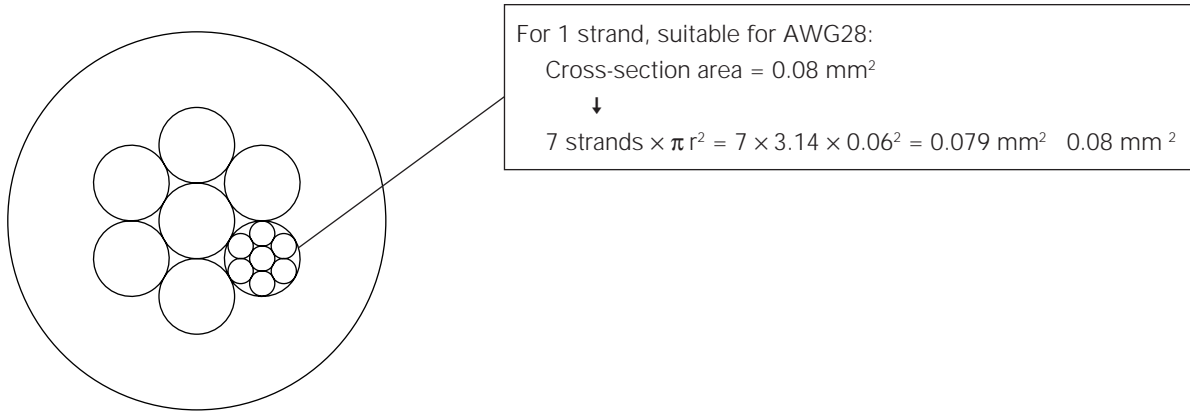
NOTE 1) In order to output remote control signals or RS-232C signals from the Combination OUT terminal, it is necessary to assign an ID. For more details see "5.5.3 ID Assignment".

NOTE 2) With the Combination IN/OUT terminals, remote control signals and RS-232C signals are inputted/outputted simultaneously. For more details see "2.3 Controls and Connectors".

Combination Connection

If the following connection conditions are observed, extension of operations to as many as 16 units is guaranteed.

- Conditions:
- ① Length of RS-232C cable connecting PC to PDP-502MX: 5 m
 - ② Combination cable length: 5 m for each
 - ③ Wire specifications for linking cable: Mini Din 6-pin straight (7 strand cable)



(NOTE) Refer to section 2.3, "Controls and Connectors" regarding the number of units that can be connected when series connection is made while using a video output terminal (INPUT 1 or 4).

5.7 KEY LOCK/UNLOCK

5.7.1 Functions

The KEY LOCK function disables the remote control unit and the main unit operation panel, preventing unauthorized persons from tampering with the unit after installation (RS-232C commands remain effective). Attempting to operate the remote control unit or the main unit operation panel will cause "KEY LOCK" to be displayed in the upper right corner of the screen. The unit is factory preset to KEY UNLOCK, meaning that the remote control unit and main unit operation panel are both enabled.

5.7.2 How to switch KEY LOCK/UNLOCK

Two settings methods are available:

- 1) With the operating panel of the main unit (A hidden button is provided for this purpose.)
Change the setting between KEY LOCK and KEY UNLOCK using the KEY LOCK/UNLOCK button hidden between the STANDBY/ON and INPUT buttons. Pressing the KEY LOCK/UNLOCK button while in menu mode or integrator mode automatically places the unit in normal operating mode and at the same time invokes the KEY LOCK status.
- 2) Using RS-232C Commands
Issue the <AJY> command to enter RS-232C adjustment mode. Then issue the <KLY> command to invoke KEY LOCK or the <KLN> command to invoke KEY UNLOCK.