Thank you for choosing our presentation switcher.

To ensure the best performance of this product, please read this User’s Guide and Command Guide fully and carefully before using your switcher and keep this manual beside the product.

IDK Corporation
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- PJLink is a trademark in Japan, the United States, and other countries/regions.
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- All other company and product names mentioned in this manual are either registered trademarks or trademarks of their respective owners. In this manual, the “®” or “™” marks may not be specified.
Before reading this manual

- All rights reserved.
- Some of the contents in this users guide such as appearance diagrams, menu operations, communication commands, and so on may differ depending on the version.
- This User’s guide is subject to change without notice. You can download the latest version from IDK’s website at: http://www.idk.co.jp/en/index.html

The reference manual for the MSD consists of the following two volumes:

- User’s Guide (this document):
  Contains installation, connection, configuration, and operating information for the MSD.

- Command Guide: Please download the command guide from the website above.
  Provides explanations and procedures for external control using serial and LAN communications.

FCC STATEMENT
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference and the user will be required to correct that interference at their own expense.

CE MARKING
This equipment complies with the essential requirements of the relevant European health, safety and environmental protection legislation.

WEEE MARKING
Waste Electrical and Electronic Equipment (WEEE), Directive 2002/96/EC (This directive is only valid in the EU.).
This equipment complies with the WEEE Directive (2002/96/EC) marking requirement.
The left marking indicates that you must not discard this electrical/electronic equipment in domestic household waste.
Safety instructions

Read and understand all safety and operating instructions before using this device. Follow all instructions and cautions as detailed in this document.

<table>
<thead>
<tr>
<th>Enforcement Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>! Warning</td>
<td>Indicates the presence of a hazard that may result in death or serious personal injury if the warning is ignored or the equipment is handled incorrectly.</td>
</tr>
<tr>
<td>! Caution</td>
<td>Indicates the presence of a hazard that may cause minor personal injury or property damage if the caution is ignored or the equipment is handled incorrectly.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Caution]</td>
<td>This symbol is indicated to alert the user. (Warning and caution)</td>
<td>![Electrical Hazard]</td>
</tr>
<tr>
<td>![Prohibition]</td>
<td>This symbol is intended to prohibit the user from actions.</td>
<td>![Do not disassemble]</td>
</tr>
<tr>
<td>![Instruction]</td>
<td>This symbol is intended to instruct the user.</td>
<td>![Unplug]</td>
</tr>
<tr>
<td>Warning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| **Do not place the product in any unstable place.**  
Install the product to a horizontal and stable place. Otherwise, it may fall/turn over and lead to injury. |
| **Do not place the product in any environment with vibration.**  
Otherwise, it may move/fall and lead to injury. |
| **Keep out any foreign objects.**  
In order to avoid fire or electric shock, do not allow foreign objects, such as metal and paper, to enter the product from the vent holes. |
| **For power cable/plug:**  
- Do not scratch, heat, or modify, including extending them.  
- Do not pull, put heavy stuff on them, or pinch them.  
- Do not bend, twist, or tie them together forcefully.  
If they are used in those states continuously, it may cause fire or electric shock. If power cables/plugs become damaged, contact IDK. |
| **Do not repair, modify or disassemble.**  
Since the product includes high-voltage part, those actions may cause fire or electric shock. For internal inspections or repairs, contact IDK. |
| **In the event of lighting or thunder, do not touch the main unit or cables such as power cable and LAN cable.**  
Contact may cause electric shock |
| **For installation:**  
The product is intended to be installed by skilled technicians. For installation, please contact a system integrator or IDK. Otherwise, it may cause fire, electric shock, injury, or property damage. |
| **Set the power plug in a convenient place to unplug easily.**  
You can easily unplug in case of any extraordinary failure or abnormal situation, and it also helps for unplugging when you do not use it for a long period. |
| **Plug the power plug into appropriate outlet completely.**  
If the plug is plugged incompletely, it may overheat which causes electrical shock or fire. Do not use damaged plug or loosened outlet. |
| **Clean the power plug regularly.**  
If the plug is covered in dust, it may cause fire due to reduced insulating power. |
| **Unplug immediately if the product smokes, makes unusual noise, or smells.**  
If you continue to use the product under those situations, it may cause electric shock or fire. After confirming that the product stops smoking, contact IDK. |
| **Unplug immediately if you drop the product or if the cabinet is damaged.**  
If you continue to use the product under those situations, it may cause electrical shock or fire. For maintenance and repair, contact IDK. |
| **Unplug immediately if water or other objects are directed inside.**  
If you continue to use it under those situations, it may cause electrical shock or fire. For maintenance and repair, contact IDK. |
| **For connection** |
| **Instruction**  
Difference in ground potential among the product and external devices may cause electric shock or damage of the device. When using cables to connect devices, including connection of long-distance transmission, unplug the power cables of all related devices.  
After connecting signal/control cables of each device, plug in the power cables of each device. |
### Caution

| Prohibition | Do not place the product in any place where it will be subjected to high temperatures.  
|     | If the product is subjected to direct sunlight or high temperatures, it may cause fire. |
|   | Do not place the product in humid, oil smoke, or dusty place.  
|   | If the product is placed near humidifiers or dusty area, it may cause fire or electric shock. |
|   | Do not block the vent holes.  
|   | If ventilation slots are blocked, it may cause fire or failure due to internal heat. |
|   | Do not put heavy items on the product.  
|   | It may fall/turn over and lead to injury. |
|   | Do not exceed ratings of outlet and wiring devices.  
|   | If several plugs are put in an outlet, it may cause fire and electric shock. |
|   | Use only the provided AC adapter and power cable.  
|   | If non-compliant adapter or power cables is used, it may cause fire or electrical shock. Use the provided AC power connection cable. If you want to use your product in other countries that use different AC power cables, contact IDK. |
| No wet hands | Do not plug or unplug with wet hands.  
|     | It may cause electrical shock. |
| Instruction | Use and store the product within the specified temperature/humidity range.  
|     | If the product is used outside the range continuously, it may cause fire or electric shock. |
|   | Turn off devices when they are connected to another device.  
|   | It may cause fire or electric shock. |
| Unplug | Unplug the power plug if you do not use the product for a long period.  
|     | In case of defect, it may cause fire. |
|   | Unplug the power plug before cleaning.  
|   | It may cause electric shock. |

### For installation

**For rack mount devices:**

| Instruction | Mount the product to the rack meeting EIA standards, and maintain spaces above and below for air cooling. For your safety, attach an L-shape bracket in addition to the mount bracket kit for the front panel in order to balance the weight. |

**For devices with rubber feet:**

| Instruction | Never insert only the screws into the holes after removing the rubber feet. It may lead to damage when the screws contact electrical circuit or parts inside of the product. To put the rubber feet back on, use only provided rubber feet and screws. |

### Altitude:

| Instruction | Do not place the product at elevations of 2,000 meters (6562 feet) or higher above sea level. Failure to do so may shorten the life of the internal parts and result in malfunctions. |
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1 Included Items

Make sure all items below are included in the package.
If any items are missing or damaged, please contact us.

・One (1) presentation switcher (main unit)
・One (1) RS-232C cable (1.8 meters; approximately 5.91 feet)
・One (1) power cable (1.8 meters; approximately 5.91 feet)
・Two (2) rack mounting brackets
・Cable clamps
  Six (6) for MSD-5401 and MSD-5401SL
  Seven (7) for MSD-5402 and MSD-5402SL
  Eight (8) for MSD-5403
  Nine (9) for MSD-5404

You can download the latest version of the User’s Guide from IDK’s website at:
2 Product Outline

The MSD is a Presentation Switcher having a built-in scan converter with 9-inputs and 1 to 4-outputs.

For video input, the MSD has five digital and four analog inputs, and the series can input the following signals: HDMI, DVI, composite video, S-video, analog RGB, analog YPbPr signals. The MSD converts input video signals up to QWXGA or 1080p and outputs them as HDMI or DVI signals.

For audio input, the series has five digital and nine analog inputs, and the series can output selected audio signals as digital audio (HDMI signals) and analog audio. You can set audio level of each input and output separately. The MSD also has the Lip Sync function to correct gaps between video and audio signals.

The MSD series includes RS-232C (2 ports), LAN, and parallel contacts as communication ports for external control, which enables you to set or edit settings remotely. You can also control external devices connected to the MSD through RS-232C, LAN, Tally output and CEC by registering external control commands. For external control commands, the wait function is available to switch the contact after cooling-down time of power control of projectors and other devices passes.

You can execute external control commands using front panel keys, RS-232C, LAN, and parallel connectors, and you can also execute them when operating the input switching keys and turning on the MSD.

*1 Digital I/O supports HDMI signals and DVI signals.
*2 Digital input audio: Can be converted into embedded or analog audio.
*3 Analog video input supports composite, S-Video, analog RGB and analog YPbPr signals.

[Figure 2.1] I/O diagram of Video/Audio signals
3 Features

■ For video
  • HDMI and DVI signals: HDCP (High-bandwidth Digital Content Protection system) is supported.
  • All input video signals including sources with HDCP can be switched speedily and free from sudden screen disturbance.\(^1\)
  • Various video formats such as NTSC, PAL, VGA to QWXGA and SDTV/HDTV (D1 to D5)
  • Anti-snow\(^2\)
    • Analog video signals can be converted into digital video signals and can be output as HDMI or DVI signals.
  • Scan converter that converts sources up to QWXGA or 1080p and outputs them as HDMI or DVI signals
  • Aspect ratio control
  • Cable compensation circuits for digital input and output

■ For audio
  • Analog audio can be output as HDMI signals (embedded output) and can be separated from embedded audio of HDMI signals (analog output).
  • Multi-channel linear PCM can be down-mixed to 2-channel linear PCM.

■ For control
  • Adjust function for display conditions, such as position, size, brightness, contrast, and so on
  • Projectors can be turned off using front panel keys.
  • Meets the PJLink (class1) standard protocol for projector control regulated by JBMIA (Japan Business Machine and Information System Industries Association).
  • Power control of display devices using CEC.\(^3\)

■ Others
  • Connection Reset\(^4\)
  • EDID emulation for all inputs

\(^1\) For models MSD-5401 to MSD-5404, seamless switching is available, which displays a black frame or black background between two images.
  For MSD-5401SL and MSD-5402SL, truly seamless switching is available with transition effect of cut, dissolve, and wipe.
\(^2\) The anti-snow function automatically fixes snowy noise that is a specific symptom of HDCP-compliant signals and mainly occurs at start-up. This feature does not work when snowy noise has already been occurred during startup or when it occurs due to bad condition of the transmission line.
\(^3\) The display device needs to support CEC to enable this function. Some display devices cannot be controlled by CEC.
\(^4\) For digital systems, some problems, such as an HDCP authentication error, can be recovered by physically disconnecting and reconnecting the digital cables. However, the Connection Reset function will fix these problems automatically without the need to physically plug and unplug the cables, by creating the same condition as if the cable were physically disconnected and reconnected. This function works only for the MSD’s output.
4 Application Diagrams

[Figure 4.1] Sample configuration
5 Panels

5.1 Front Panel

![Front panel diagram]

[Figure 5.1] Front panel

<table>
<thead>
<tr>
<th>#</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power supply switch (POWER)</td>
<td>Turns on/off the MSD.</td>
</tr>
<tr>
<td>2</td>
<td>DISPLAY POWER keys (DISPLAY POWER 1 to 4)</td>
<td>Turns on/off connected display devices.</td>
</tr>
<tr>
<td>3</td>
<td>SWITCHING MODE key</td>
<td>Selects a switching mode (V&amp;A, VIDEO, AUDIO) if an input is selected.</td>
</tr>
<tr>
<td>4</td>
<td>Input channel selection keys (IN1 to IN9, OFF)</td>
<td>Selects video and audio outputs.</td>
</tr>
<tr>
<td>5</td>
<td>Control command execution/ Cross point loading keys (COMMAND A to E)</td>
<td>Executes registered commands A to E and loads the registered cross point settings.</td>
</tr>
<tr>
<td>6</td>
<td>Operation mode selection key</td>
<td>COMMAND: Executes the registered control command.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PRESET LOAD: Loads the registered cross point. Key lock is enabled/ disabled by pressing this key for 2 seconds or longer.</td>
</tr>
<tr>
<td>7</td>
<td>VFD screen</td>
<td>Displays menus and settings.</td>
</tr>
<tr>
<td>8</td>
<td>MENU/SET key</td>
<td>Displays menus and edits/controls settings.</td>
</tr>
<tr>
<td>9</td>
<td>ESC key</td>
<td>Finishes the current menu setting.</td>
</tr>
<tr>
<td>10</td>
<td>Arrow keys (▲, ▼, ◄, ►)</td>
<td>Switches menu, moves cursor, and changes set values.</td>
</tr>
</tbody>
</table>
### 5.2 Rear Panel

![Rear panel diagram](image)

#### [Figure 5.1] Rear panel

<table>
<thead>
<tr>
<th>#</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>HDMI input connectors (HDMI/DVI IN1 to IN5)</td>
<td>DVI signals can be input using an HDMI-DVI conversion cable.</td>
</tr>
<tr>
<td>2</td>
<td>Analog video input connectors (ANALOG RGB/YPbPr/VIDEO IN6 to IN9)</td>
<td>The following analog video signal formats can be input: Composite video (NTSC/PAL), S-video (NTSC/PAL), analog RGB (such as PCs) and YPbPr (SDTV/HDTV).</td>
</tr>
<tr>
<td>3</td>
<td>Audio input connectors (AUDIO IN1 to IN9)</td>
<td>Input connectors for stereo audio signals. Cannot be used with embedded audio signals of HDMI input connector.</td>
</tr>
<tr>
<td>4</td>
<td>HDMI output connectors (HDMI/DVI OUT1 to OUT4)</td>
<td>When a DVI display device is connected, DVI signals are output automatically. Built-in cable EQ circuit enables 5 m/16.4 ft. or longer cables to be connected.</td>
</tr>
<tr>
<td>5</td>
<td>Audio output connectors (AUDIO OUT1 to OUT4)</td>
<td>Output connectors for stereo audio signals.</td>
</tr>
<tr>
<td>6</td>
<td>LAN port (LAN)</td>
<td>For external control by communication commands or web browsers.</td>
</tr>
<tr>
<td>7</td>
<td>RS-232C ports (RS-232C CH1, CH2)</td>
<td>For external control by communication commands using serial connector.</td>
</tr>
<tr>
<td>8</td>
<td>PARALLEL input port (PARALLEL)</td>
<td>For external control by contacts.</td>
</tr>
<tr>
<td>9</td>
<td>Tally output port (TALLY)</td>
<td>For external control by contacts.</td>
</tr>
<tr>
<td>10</td>
<td>Maintenance port (UPDATE)</td>
<td>Not used. Keep this port free.</td>
</tr>
<tr>
<td>11</td>
<td>AC power connector (AC 100-240 V)</td>
<td>For the provided power cable.</td>
</tr>
<tr>
<td>12</td>
<td>Frame ground (FG)</td>
<td>For indoor ground terminal.</td>
</tr>
</tbody>
</table>

The HDMI I/O connectors support HDCP (High-bandwidth Digital Content Protection), which is a copy protection technique developed by Intel. If DVDs or other contents with copyright protection are played, both source devices (such as DVD players connected to input connectors) and display devices (connected to output connectors) are required to be HDCP compliant.
6 Installation

Since the MSD has various types of I/O connectors, make sure that shapes of the cables and connectors match when connecting cables. If you try to connect them forcibly to an unmatched cable and connector, they might be damaged. If turning on the MSD in that situation, the MSD and display devices may be damaged. Be sure to plug cables completely and install them without any stress on the cables.

6.1 Connecting Digital Input/Output Devices

For digital I/O, the HDMI output connectors are employed. These connectors can be connected not only to HDMI devices but also to DVI devices using HDMI-DVI conversion cables.

[Figure 6.1] Connecting digital devices

For digital I/O, the MSD has the cable equalizing circuit to correct distorted signals when a long cable is connected. The amount of equalization for the input side is set automatically, but set the amount for the output side using the following menu settings: "8.7.1 Output equalizer".

**Table 6.1** Maximum extension distance

<table>
<thead>
<tr>
<th>Type</th>
<th>Maximum extension distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital input</td>
<td>Up to 10 to 30 meters; approximately 98.43 feet *</td>
</tr>
<tr>
<td>Digital output</td>
<td>Up to 10 to 50 meters; approximately 164.04 feet *</td>
</tr>
</tbody>
</table>

* Extension distance depends on the connected I/O devices. The range mentioned above is the maximum extension range acquired when IDK’s AWG24 cable is used and signals of 1080p 60 Hz, 24 bit/ pixel (8bit/component) is input or output. For some I/O combinations, and if you use cables of other manufacturer, video may be disturbed or may not be output even if signals are within the range mentioned above.
For input and output of HDMI, use HDMI Type A (male) cables.

The HDMI cable does not have lock mechanism, but the provided cable clamp prevents the cable from falling off.

[Figure 6.2] Cable clamp
6.2 Analog Video Input Connectors

For analog video input, the D-Sub 15 pin connector enables not only analog RGB signals (such as PC) to be input, but also supports analog YPbPr (SDTV/HDTV), composite video (NTSC/PAL), and S-video (NTSC/PAL) signal inputs using a conversion cable.

![D-Sub15 pin connector](image)

**[Figure 6.3] D-Sub15 pin connector**

**[Table 6.2] Pin assignments**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Analog RGB</th>
<th>Analog YPbPr</th>
<th>Composite video</th>
<th>S-video</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Red</td>
<td>Pr/Cr</td>
<td>N.C.</td>
<td>N.C.</td>
</tr>
<tr>
<td>2</td>
<td>Green/G on Sync</td>
<td>Y</td>
<td>VIDEO</td>
<td>Y</td>
</tr>
<tr>
<td>3</td>
<td>Blue</td>
<td>Pb/Cb</td>
<td>N.C.</td>
<td>C</td>
</tr>
<tr>
<td>4</td>
<td>N.C.</td>
<td>N.C.</td>
<td>N.C.</td>
<td>N.C.</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
<td>N.C.</td>
<td>N.C.</td>
<td>N.C.</td>
</tr>
<tr>
<td>6</td>
<td>GND</td>
<td>GND</td>
<td>N.C.</td>
<td>N.C.</td>
</tr>
<tr>
<td>7</td>
<td>GND</td>
<td>GND</td>
<td>GND</td>
<td>GND</td>
</tr>
<tr>
<td>8</td>
<td>GND</td>
<td>GND</td>
<td>N.C.</td>
<td>GND</td>
</tr>
<tr>
<td>9</td>
<td>N.C.</td>
<td>N.C.</td>
<td>N.C.</td>
<td>n.C.</td>
</tr>
<tr>
<td>10</td>
<td>GND</td>
<td>N.C.</td>
<td>N.C.</td>
<td>N.C.</td>
</tr>
<tr>
<td>11</td>
<td>N.C.</td>
<td>N.C.</td>
<td>N.C.</td>
<td>N.C.</td>
</tr>
<tr>
<td>12</td>
<td>DDC data</td>
<td>N.C.</td>
<td>N.C.</td>
<td>N.C.</td>
</tr>
<tr>
<td>13</td>
<td>HD/CS</td>
<td>N.C.</td>
<td>N.C.</td>
<td>N.C.</td>
</tr>
<tr>
<td>14</td>
<td>VD</td>
<td>N.C.</td>
<td>N.C.</td>
<td>N.C.</td>
</tr>
<tr>
<td>15</td>
<td>DDC clock</td>
<td>N.C.</td>
<td>N.C.</td>
<td>N.C.</td>
</tr>
</tbody>
</table>

N.C.: No Connection

The type of input video signals is recognized automatically, but if video is not output correctly, select the signal type manually using the menu shown in section “8.5.4 Signal type of analog input”.
6.3 Serial Port

External control via RS-232C is available. The MSD controls external devices externally by serial communication with RS-232C connector. Connect control devices such as PCs and the MSD with a serial communication cable, and then control the MSD and acquire status using commands. For character notations of commands and configuring communication of serial terminal, see sections “9 ASCII codes” and “8.10 Serial (COM) Port Settings”, respectively.

<table>
<thead>
<tr>
<th>Spec of serial communication</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Compliance standard</td>
<td>RS-232C</td>
</tr>
<tr>
<td>Baud rate</td>
<td>4800, 9600, 19200, 38400 [bps]</td>
</tr>
<tr>
<td>Data bits</td>
<td>8, 7 [bit]</td>
</tr>
<tr>
<td>Parity check</td>
<td>None, even, odd</td>
</tr>
<tr>
<td>Stop bit</td>
<td>1, 2 [bit]</td>
</tr>
<tr>
<td>X parameter</td>
<td>Invalid</td>
</tr>
<tr>
<td>Flow control</td>
<td>None</td>
</tr>
<tr>
<td>Delimiter</td>
<td>CR LF (Carriage return and line feed, 0D and 0A in hex)</td>
</tr>
<tr>
<td>Communication pattern</td>
<td>Full duplex</td>
</tr>
</tbody>
</table>

![Figure 6.4] RS-232C connectors and cables
6.4 LAN Port

External control via LAN is available. Use a serial communication cable to connect control devices such as PCs and the MSD, and then control the MSD and get its status using commands. For character notation of commands, refer to the “9 ASCII codes”. For control using commands, use ports 6000 to 6999, 1100, and 23. Connection will be disconnected if no communication for 30 seconds or longer after connection. For setting of LAN, see section “8.11 LAN Settings”.

<table>
<thead>
<tr>
<th>Table 6.4</th>
<th>Spec of LAN communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical layer</td>
<td>10Base-T (IEEE802.3i)/100Base-TX (IEEE802.3u)</td>
</tr>
<tr>
<td>Network layer</td>
<td>ARP, IP, ICMP</td>
</tr>
<tr>
<td>Transport layer</td>
<td>Port used for command control: 23, 1100, 6000 to 6999</td>
</tr>
<tr>
<td></td>
<td>Port used for WEB browser control (HTTP): 80, 5000 to 5999</td>
</tr>
<tr>
<td>Application layer</td>
<td>HTTP, TELNET</td>
</tr>
</tbody>
</table>

The MSD supports Auto MDI/MDI-X, which distinguishes and switches straight/cross cables automatically.

![LAN connector diagram](image)
6.4.1 The number of TCP-IP connections

The MSD can connect up to eight connections (8 ports) simultaneously. If the MSD is controlled from nine or more PCs, they may not be connected to the MSD.
For nine or more connections, use your software to establish and close TCP-IP connections for each sending and receiving communication commands. By doing so, connections are occupied and released in the MSD side so that logically eight or more connections (eight or more ports) can be connected.

<table>
<thead>
<tr>
<th>Your PC software</th>
<th>MSD-5404</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCP-IP connection</td>
<td>→</td>
</tr>
<tr>
<td></td>
<td>(1 port is occupied → 7 ports free)</td>
</tr>
<tr>
<td>Sending command</td>
<td>→</td>
</tr>
<tr>
<td>(@xxx)</td>
<td></td>
</tr>
<tr>
<td>TCP-IP close</td>
<td>←</td>
</tr>
<tr>
<td></td>
<td>Sending reply command (@xxx)</td>
</tr>
<tr>
<td></td>
<td>(1 port is released → 8 ports are free)</td>
</tr>
</tbody>
</table>

[Figure 6.6] Increasing connections

Note:
If any command is not sent from the PC side to the MSD for 30 seconds, the MSD disconnects the connection to avoid the limitation problem on the number of connections. As a result, the connection needs to be established again from the PC side after the current connection of the PC is disconnected. (Since the number of ports in the MDS-54 series is eight, if the PC is turned off while it is connected, ports are occupied permanently. To prevent this, the connection is disconnected if no communication command is sent from the PC side.)
7 Basic Operations

7.1 Selecting Input Channels

To select channels for outputting video or audio:

<table>
<thead>
<tr>
<th>Procedure</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong></td>
<td>Select the desired mode by the SWITCHING MODE key. Every time you press the key, the mode changes sequentially as follows:</td>
</tr>
<tr>
<td></td>
<td>V&amp;A (video &amp; audio simultaneously; set by default)</td>
</tr>
<tr>
<td></td>
<td>VIDEO (only video)</td>
</tr>
<tr>
<td></td>
<td>AUDIO (only audio)</td>
</tr>
<tr>
<td></td>
<td>The LED of the selected mode illuminates.</td>
</tr>
</tbody>
</table>

![Switching Mode Selection Key](image)

[Figure 7.1] SWITCHING MODE selection key

| **2** | Press the desired input channel selection key (IN1 to IN9, OFF) to set a channel to output video or audio. The LEDs of the selected video/audio inputs illuminate. |

Command control: Switching video and audio channel simultaneously: @SSW/@GSW
Switching video channel: @SSV/@GSV
Switching audio channel: @SSA/@GSA
7.2 VFD screen/Menu Operation Keys

Use the following keys to set menu options:

MENU/SET key: Displays menus and sets values
“ESC” key: Escapes from the menu
▲/▼ Keys: Switches menus and sets values
◄► keys: Moves the cursor and selects the item to be set
VFD screen: Displays menus and settings
See “8.1 Menu List” if necessary.

If no operation is applied for 30 seconds, the brightness of VFD screen is automatically set to 25% level. To keep the brightness at 100% level at all times, change the Command AUTO LOOK in section “8.18.3 Automatic key lock for control command keys”.

If you need a front panel cover (optional extra) to prevent erroneous operations, please contact us.
7.3 Turning ON/OFF Display Devices

Use the “DISPLAY POWER” keys to turn on/off the connected display devices.

Since no values are registered at the factory, in order to use the front panel DISPLAY POWER keys, the settings for those keys must be first registered into system memory (“8.12.3 Command link”). If you press the keys accidentally, the display device may be turned off. This can be avoided by pressing and holding the DISPLAY POWER keys for the registered number of seconds set in “8.18.4 DISPLAY POWER key pressing time”.

When a command for turning on or off is sent to the display device and the reply command for normal transmission is received from the display device, the LED of the key turns orange (Power ON) or is turned off (power OFF). However, if the reply command is not checked, the actual power status of the display device and LED of DISPLAY POWER key sometimes do not match.

Command control: Setting for display device power switch @SDS /@GDS
7.4 Executing Control Commands

You can register up to nine control commands in MSD (COMMANDs A to I), but you can execute only five commands (COMMANDs A to E) with control front panel command execution keys. To execute COMMANDs F to I, perform “8.12.4 Command execution” or use RS-232C, LAN, or parallel input. For COMMANDs A to I, nothing is registered by the factory default, so those keys will not work until their commands are registered in “8.12.3 Command link”.

Command control: Controlling command execution: @EXC

To execute commands associated with Control Command execution keys (COMMANDs A to E):

<table>
<thead>
<tr>
<th>Procedure</th>
<th>[Figure 7.4] Keys for command execution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Select the desired command from the Control command execution keys.</td>
</tr>
<tr>
<td>2</td>
<td>Execute the registered command from the control command keys.</td>
</tr>
</tbody>
</table>
7.5 Loading Cross Point

You can register up to nine cross points in the MSD, but the MSD can only load cross points 1 to 5 by cross point load keys. To load cross points 6 to 9, use menu settings in the “Load cross point” section (“8.13.1 Loading cross point”) or use RS-232C, LAN, or parallel inputs.

Since nothing is registered by factory default, cross point is not valid until they are registered. To load them, register cross points in advance.

Command control:
- Loading V&A input selection setting from cross point memory: @RCM
- Loading video input selection setting from cross point memory: @RCV
- Loading audio input selection setting from cross point memory: @RCA

To load cross point settings:

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Select &quot;PRESET LOAD&quot; using the Operation Mode selection key.</td>
</tr>
<tr>
<td>2</td>
<td>Press the cross point command keys to load the cross point settings. Commands A to E correspond to cross points 1 to 5.</td>
</tr>
</tbody>
</table>

![Figure 7.5] Loading cross points

7.6 Locking/Unlocking Front keys

To lock the front panel keys, press and hold the Operation Mode selection key for 2 seconds or longer until hearing the buzzer sound. To release the key lock, do the same operation again. When the setting is changed, the status will be displayed for 1 second.

<table>
<thead>
<tr>
<th>Lock Status</th>
<th>Release Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locked</td>
<td>Unlocked</td>
</tr>
</tbody>
</table>

Command control: Setting and releasing key lock: @SLS/@GLS
7.7 WEB Browser Control by

The MSD-54 connected through LAN can be controlled from a WEB browser such as Microsoft Internet Explorer.
To open the operation window, open a WEB browser in the PC through the same LAN network and enter the MSD’s IP address into the address bar. For LAN settings, see “8.11 LAN Settings”.

**Note:**
We tested the MSD using Microsoft Internet Explorer 6.0, 7.0 and 8.0 for Windows. The MSD may possibly operate incorrectly on other versions and/or browsers.

If the port number of the browser control port is set to 80 (normal setting):
Use the following format: http://192.168.1.199
If the port number of the browser control port is set to a number other than 80 (5000 to 5999):
(Example: No. 5000)
Use the following format: http://192.168.1.199:5000

![WEB browser control window](http://192.168.1.199/main.html)

[Figure 7.6] WEB browser control window
<table>
<thead>
<tr>
<th>Number</th>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SWITCHING MODE</td>
<td>Sets and displays channel switching mode. Does not affect switching mode of the front panel and parallel input. V&amp;A (switching video &amp; audio simultaneously), VIDEO (switching only video), AUDIO (switching only audio)</td>
</tr>
<tr>
<td>2</td>
<td>Input channel selection (IN1 to IN9, OFF)</td>
<td>Selects video and audio output. Orange: Video &amp; Audio; Green: only video; Red: only audio</td>
</tr>
<tr>
<td>3</td>
<td>DISPLAY POWER</td>
<td>Turns on/off connected display devices. No command is registered by factory default. To control display's power, register the command to this switch in “8.12.3 Command link”.</td>
</tr>
<tr>
<td>4</td>
<td>Cross point</td>
<td>Loads registered cross point.</td>
</tr>
<tr>
<td>5</td>
<td>Audio output level</td>
<td>Displays the current audio output level.</td>
</tr>
<tr>
<td>6</td>
<td>Audio output level: UP, DOWN</td>
<td>Turns up/down the volume 1 [dB] per click.</td>
</tr>
<tr>
<td>7</td>
<td>Audio output level: MUTE</td>
<td>Turns on and off the mute function. Red: MUTE ON; Black: MUTE OFF</td>
</tr>
<tr>
<td>8</td>
<td>COMMAND EXECUTE</td>
<td>Executes control commands assigned to COMMAND A to I. No command is registered by factory as default. To execute control commands, register them to COMMAND A to I in advance by following instructions in section “8.12.3 Command link”. Buttons in which control command is registered are displayed in green. However, as each command (A to I) has two planes (PLANE A and B), two commands are executed alternately if two different commands are registered to plane A and B. If PLANE B is executed, the button is displayed in green (PLANE A will be executed at the next click); if PLANE A is executed, the button displayed in orange (PLANE B will be executed at the next click).</td>
</tr>
<tr>
<td>9</td>
<td>NAME EDIT</td>
<td>Edits names of “CROSS POINT”, “AUDIO VOLUME,” and “COMMAND EXECUTE”. Click this button, to open the window of [Figure 7.7].</td>
</tr>
<tr>
<td>10</td>
<td>RELOAD</td>
<td>Acquires the latest information of the MSD. (It can also be updated automatically by setting “AUTO RELOAD TIMER”, 11, below.)</td>
</tr>
<tr>
<td>11</td>
<td>AUTO RELOAD TIMER</td>
<td>Sets time interval to receive the latest information periodically and to refresh WEB browser window. You can set the interval from 10 to 65535 seconds by 1 second. If you do not use this function, set the interval to 0 second (default).</td>
</tr>
<tr>
<td>Number</td>
<td>Item</td>
<td>Description</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1</td>
<td>Input channel name</td>
<td>Enter the desired input names which will be displayed in “CROSS POINT” on [Figure 7.6]. IN1 to 9 are set by factory default.</td>
</tr>
<tr>
<td>2</td>
<td>Output name</td>
<td>Enter the desired output names which will be displayed in “CROSS POINT” and “AUDIO VOLUME” on [Figure 6.7.a] Web browser control window. OUT1 to 4 are set by default.</td>
</tr>
<tr>
<td>3</td>
<td>Control command name</td>
<td>Enter the desired input names which will be displayed in “COMMAND EXECUTE” on [Figure 7.6]. “A” to “I” are set by default.</td>
</tr>
<tr>
<td>4</td>
<td>SEND</td>
<td>Saves the names entered above (1 to 3).</td>
</tr>
<tr>
<td>5</td>
<td>RELOAD</td>
<td>Restores to the current settings. Use this button to enter the names again.</td>
</tr>
<tr>
<td>6</td>
<td>END</td>
<td>Finishes editing names. Click this button to open [Figure 7.7].</td>
</tr>
</tbody>
</table>

For 1 to 3 above, only the first 10 one-byte characters are valid even if you enter 11 or more characters. (You can use two-byte characters, but they are counted as two characters.)
7.8 Remote Control Program

IDK provides control software for creating/editing control commands, assigning functions of parallel/tally and other settings which may take time to set them from the menu. The software allows you to set those settings easily on the GUI window of Microsoft Windows.

You can control all MSD menus using the program that can be downloaded by free from our web page at: http://www.idk.co.jp/en/index.html

7.9 Factory Reset

You can restore settings of “7.1 Selecting Input Channels”, “7.6 Locking/Unlocking Front keys”, and “8 Settings” to the factory default by turning on the MSD while pressing the ESC key. Hold the ESC key until you hear long-tone buzzer sound. The sound stops when the initialization is completed, and the MSD starts its normal operation.

Note:

Once you restore the settings to the factory default, you cannot put them back to the previous (user) settings.

[Table 7.1] Factory default (1/5)

<table>
<thead>
<tr>
<th>Function</th>
<th>Factory default</th>
<th>Set for each l/O/bmp*</th>
</tr>
</thead>
<tbody>
<tr>
<td>INPUT CHANNEL</td>
<td>Channel selection: INPUT OFF SWITCHING MODE: V&amp;A</td>
<td>1</td>
</tr>
<tr>
<td>RESOLUTION</td>
<td>AUTO(Set automatically from EDID)</td>
<td>1</td>
</tr>
<tr>
<td>MONITOR ASPECT</td>
<td>RESOLUTION (Aspect ratio of output resolution)</td>
<td>1</td>
</tr>
<tr>
<td>INPUT ASPECT</td>
<td>AUTO-1</td>
<td>2</td>
</tr>
<tr>
<td>ASPECT PROCESS</td>
<td>LETTER BOX or SIDE PANEL</td>
<td>2</td>
</tr>
<tr>
<td>INPUT OVER SCAN</td>
<td>NTSC/PAL/SDTV: 105% HDTV/VESA(PC): 100%</td>
<td>2</td>
</tr>
<tr>
<td>INPUT POSITION</td>
<td>Horizontal/Vertical: 0</td>
<td>2</td>
</tr>
<tr>
<td>INPUT SIZE</td>
<td>Horizontal/Vertical: The number of pixels of output resolution</td>
<td>2</td>
</tr>
<tr>
<td>INPUT MASKING</td>
<td>Left/Top: 0 Right/Bottom: The number of pixels of output resolution (without masking)</td>
<td>2</td>
</tr>
<tr>
<td>OUTPUT POSITION</td>
<td>Horizontal/Vertical: 0</td>
<td>1</td>
</tr>
<tr>
<td>OUTPUT SIZE</td>
<td>Horizontal/Vertical: The number of pixels of output resolution</td>
<td>1</td>
</tr>
<tr>
<td>OUTPUT MASKING</td>
<td>Left/Top: 0 Right/Bottom: The number of pixels of output resolution (without masking)</td>
<td>1</td>
</tr>
<tr>
<td>BACKGROUND COLOR</td>
<td>R/G/B: 0 (black)</td>
<td>1</td>
</tr>
<tr>
<td>TEST PATTERN</td>
<td>Pattern output: OFF Scroll: OFF</td>
<td>1</td>
</tr>
<tr>
<td>INPUT BRIGHTNESS</td>
<td>100%</td>
<td>2</td>
</tr>
<tr>
<td>INPUT CONTRAST</td>
<td>R/G/B: 100%</td>
<td>2</td>
</tr>
<tr>
<td>INPUT HUE</td>
<td>0°</td>
<td>2</td>
</tr>
<tr>
<td>INPUT SATURATION</td>
<td>100%</td>
<td>2</td>
</tr>
<tr>
<td>SETUP LEVEL</td>
<td>0.0%</td>
<td>2</td>
</tr>
<tr>
<td>OUTPUT BRIGHTNESS</td>
<td>100%</td>
<td>1</td>
</tr>
<tr>
<td>OUTPUT CONTRAST</td>
<td>R/G/B: 100%</td>
<td>1</td>
</tr>
</tbody>
</table>
### [Table 7.2] Factory default (2/5)

<table>
<thead>
<tr>
<th>Function</th>
<th>Factory default</th>
<th>Set for each I/O/bmp*</th>
</tr>
</thead>
<tbody>
<tr>
<td>INPUT VIDEO DETECT</td>
<td>10000 ms. (10 seconds)</td>
<td>3</td>
</tr>
<tr>
<td>HDCP INPUT ENABLE</td>
<td>ENABLE</td>
<td>3</td>
</tr>
<tr>
<td>INPUT EQUALIZER</td>
<td>ON</td>
<td>3</td>
</tr>
<tr>
<td>ANALOG INPUT TYPE</td>
<td>AUTO</td>
<td>2</td>
</tr>
<tr>
<td>INPUT OFF CHECK</td>
<td>ON</td>
<td>3</td>
</tr>
<tr>
<td>H TOTAL DOTS</td>
<td>0 (when signals are detected, it is set automatically)</td>
<td>2</td>
</tr>
<tr>
<td>H START</td>
<td>0 (when signals are detected, it is set automatically)</td>
<td>2</td>
</tr>
<tr>
<td>H DISPLAY</td>
<td>0 (when signals are detected, it is set automatically)</td>
<td>2</td>
</tr>
<tr>
<td>V START</td>
<td>0 (when signals are detected, it is set automatically)</td>
<td>2</td>
</tr>
<tr>
<td>V DISPLAY</td>
<td>0 (when signals are detected, it is set automatically)</td>
<td>2</td>
</tr>
<tr>
<td>AUTO START POS</td>
<td>ON</td>
<td>2</td>
</tr>
<tr>
<td>UNKNOWN TIMING</td>
<td>ON</td>
<td>-</td>
</tr>
<tr>
<td>Device data registered by user</td>
<td>All 99 data is not registered</td>
<td>2</td>
</tr>
<tr>
<td>TRACKING</td>
<td>0 (when signals are input, it is set automatically)</td>
<td>2</td>
</tr>
<tr>
<td>OUTPUT EQUALIZER</td>
<td>OFF</td>
<td>1</td>
</tr>
<tr>
<td>OUTPUT MODE</td>
<td>HDMI YCbCr4:4:4 MODE (outputs with the most suitable mode depending on the connected display device)</td>
<td>1</td>
</tr>
<tr>
<td>SYNC OUTPUT</td>
<td>ON</td>
<td>1</td>
</tr>
<tr>
<td>VIDEO OUTPUT</td>
<td>BLUE</td>
<td>1</td>
</tr>
<tr>
<td>VIDEO SWITCHING</td>
<td>MSD-5401/5402/5403/5404: FREEZE—FADE OUT-IN MSD-5401SL/5402SL: DISSOLVE</td>
<td>1</td>
</tr>
<tr>
<td>SWITCHING SPEED</td>
<td>350 ms.</td>
<td>1</td>
</tr>
<tr>
<td>WIPE COLOR</td>
<td>R/G/B: 0(black)</td>
<td>1</td>
</tr>
<tr>
<td>HDCP OUTPUT MODE</td>
<td>ALWAYS</td>
<td>1</td>
</tr>
<tr>
<td>HDCP ERROR RETRY</td>
<td>ETERNITY (Retrying continuously until HDCP authentication succeeds)</td>
<td>1</td>
</tr>
<tr>
<td>DEEP COLOR OUTPUT</td>
<td>24-BIT COLOR</td>
<td>1</td>
</tr>
<tr>
<td>CEC CONNECTION</td>
<td>NOT CONNECTED</td>
<td>1</td>
</tr>
</tbody>
</table>
### Table 7.3 Factory default (3/5)

<table>
<thead>
<tr>
<th>Function</th>
<th>Factory default</th>
<th>Set for each I/O/bmp *</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUTPUT LEVEL</td>
<td>±0 dB</td>
<td>1</td>
</tr>
<tr>
<td>OUTPUT MUTE</td>
<td>OFF</td>
<td>1</td>
</tr>
<tr>
<td>AUDIO INPUT SELECT</td>
<td>AUTO (For HDMI signals, digital audio is effective; for other signals, analog audio is effective)</td>
<td>3</td>
</tr>
<tr>
<td>INPUT OFFSET</td>
<td>±0 dB</td>
<td>2</td>
</tr>
<tr>
<td>OUTPUT LIP SYNC</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>INPUT LIP SYNC</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>SAMPLING FREQUENCY</td>
<td>AUTO (Set automatically from EDID)</td>
<td>1</td>
</tr>
<tr>
<td>OUTPUT CONNECTOR</td>
<td>ANALOG &amp; DIGITAL</td>
<td>1</td>
</tr>
<tr>
<td>MULTI AUDIO</td>
<td>DOWN MIX</td>
<td>1</td>
</tr>
<tr>
<td>TEST TONE</td>
<td>Test tone : OFF</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Speaker : ALL</td>
<td></td>
</tr>
<tr>
<td>EDID DATA</td>
<td>INTERNAL EDID</td>
<td>3</td>
</tr>
<tr>
<td>PC RESOLUTION</td>
<td>For IN 1 to IN 5: 1080p (1920x1080)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>For IN 6 to IN 9: UXGA (1600x1200)</td>
<td></td>
</tr>
<tr>
<td>AV RESOLUTION</td>
<td>AUTO</td>
<td>3</td>
</tr>
<tr>
<td>DEEP COLOR INPUT</td>
<td>24-BIT COLOR</td>
<td>3</td>
</tr>
<tr>
<td>AUDIO FORMAT</td>
<td>Linear PCM 48 kHz</td>
<td>3</td>
</tr>
<tr>
<td>SPEAKER</td>
<td>2 ch (Front Left/Front Right)</td>
<td>3</td>
</tr>
<tr>
<td>MONITOR EDID COPY</td>
<td>All 8 data is not registered.</td>
<td>-</td>
</tr>
<tr>
<td>PARAMETERS</td>
<td>Baud rate: 9600 bps</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Data length: 8 bit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Parity: None</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stop bit: 1 bit</td>
<td></td>
</tr>
<tr>
<td>FUNCTION</td>
<td>RECEIVER</td>
<td>-</td>
</tr>
<tr>
<td>IP ADDRESS</td>
<td>192.168.1.199</td>
<td>-</td>
</tr>
<tr>
<td>SUBNET MASK</td>
<td>255.255.255.0</td>
<td>-</td>
</tr>
<tr>
<td>GATEWAY ADDRESS</td>
<td>192.168.1.200</td>
<td>-</td>
</tr>
<tr>
<td>FUNCTION</td>
<td>RECEIVER</td>
<td>-</td>
</tr>
<tr>
<td>PORT NUMBER</td>
<td>Connection 1 to 3: 1100</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Connection 4 to 6: 23</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Connection 7 to 8: 80</td>
<td>-</td>
</tr>
<tr>
<td>Function</td>
<td>Factory default</td>
<td>Set for each I/O/bmp*</td>
</tr>
<tr>
<td>--------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>COMMAND EDIT</td>
<td>All 32 commands are not registered.</td>
<td>-</td>
</tr>
<tr>
<td>RECV COMMAND EDIT</td>
<td>All 32 commands are not registered.</td>
<td>-</td>
</tr>
<tr>
<td>COMMAND LINK</td>
<td>All 98 commands are not registered.</td>
<td>-</td>
</tr>
<tr>
<td>INVALID TIME</td>
<td>0 ms.</td>
<td>-</td>
</tr>
<tr>
<td>COMMAND TALLY</td>
<td>Lights if control command is registered.</td>
<td>-</td>
</tr>
<tr>
<td>FLASH TIME</td>
<td>For control command execution key: OFF (does not blink)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>For display device power switch: EXECUTION (blinks while control command is executed)</td>
<td>-</td>
</tr>
<tr>
<td>CROSS POINT MEMORY</td>
<td>All nine are not controlled channel.</td>
<td>-</td>
</tr>
<tr>
<td>PRESET MEMORY</td>
<td>All eight are not registered.</td>
<td>-</td>
</tr>
<tr>
<td>STARTUP</td>
<td>LAST CHANNEL</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>(Starts up with settings, which are set at the time of turns off the MSD last time.)</td>
<td>-</td>
</tr>
<tr>
<td>FUNCTION ASSIGN</td>
<td>See [Table 8.23] to [Table 8.26]</td>
<td>-</td>
</tr>
<tr>
<td>AUDIO VOLUME</td>
<td>PUSH SWITCH</td>
<td>-</td>
</tr>
<tr>
<td>ROTARY ENCODER</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>LOCK SETTING</td>
<td>OFF</td>
<td>-</td>
</tr>
<tr>
<td>SWITCHING MODE</td>
<td>V&amp;A</td>
<td>-</td>
</tr>
<tr>
<td>CHANNEL TOGGLE</td>
<td>OFF</td>
<td>-</td>
</tr>
<tr>
<td>CHATTERING FILTER</td>
<td>Push switch: 30 ms.</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Rotary encoder: 0 ms.</td>
<td>-</td>
</tr>
<tr>
<td>BUZZER</td>
<td>OFF</td>
<td>-</td>
</tr>
<tr>
<td>AUTO SETUP</td>
<td>ENABLE</td>
<td>-</td>
</tr>
<tr>
<td>Function</td>
<td>Factory default</td>
<td>Set for each I/O/bmp*</td>
</tr>
<tr>
<td>---------------------------</td>
<td>------------------------------------------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>FUNCTION ASSIGN</td>
<td>See [Table 8.29] to [Table 8.32].</td>
<td>-</td>
</tr>
<tr>
<td>BITMAP OUTPUT</td>
<td>OFF</td>
<td>1</td>
</tr>
<tr>
<td>BACKGROUND COLOR</td>
<td>R/G/B: 255 (white)</td>
<td>4</td>
</tr>
<tr>
<td>ASPECT</td>
<td>AUTO</td>
<td>4</td>
</tr>
<tr>
<td>POSITION</td>
<td>CENTER</td>
<td>4</td>
</tr>
<tr>
<td>CHANNEL ASSIGN</td>
<td>NONE (Not assigned)</td>
<td>1</td>
</tr>
<tr>
<td>POWER ON BITMAP</td>
<td>OFF</td>
<td>1</td>
</tr>
<tr>
<td>DIVIDE MEMORY</td>
<td>Divide: None</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Memory size: Assigns 128 blocks to 1 bitmap</td>
<td>-</td>
</tr>
<tr>
<td>DISPLAY POWER</td>
<td>OFF</td>
<td>1</td>
</tr>
<tr>
<td>COMMAND KEY</td>
<td>AUTO (Starts up with settings which were set on the MSD before the last power down.)</td>
<td>-</td>
</tr>
<tr>
<td>KEY LOCK</td>
<td>AUTO (Starts up with settings which were set on the MSD before the last power down)</td>
<td>-</td>
</tr>
<tr>
<td>COMMAND Tally</td>
<td>OFF</td>
<td>-</td>
</tr>
<tr>
<td>KEY LOCK MODE</td>
<td>Disabled</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>For all keys</td>
<td>-</td>
</tr>
<tr>
<td>BUZZER</td>
<td>ON</td>
<td>-</td>
</tr>
<tr>
<td>COMMAND AUTO LOCK</td>
<td>ON</td>
<td>-</td>
</tr>
<tr>
<td>POWER SWITCH ON</td>
<td>0ms (0 second)</td>
<td>-</td>
</tr>
<tr>
<td>INPUT CHANNEL LINK</td>
<td>VIDEO/AUDIO: OFF</td>
<td>-</td>
</tr>
<tr>
<td>TOP DISPLAY</td>
<td>NORMAL</td>
<td>-</td>
</tr>
</tbody>
</table>

### 7.10 Startup Time

The MSD can receive communication commands about 3 seconds after it is turned on. It can output video and audio and can be operated from the front panel about 12 seconds after it is turned on. However, if “POWER ON BITMAP” (”8.16.7 Bitmap”) is set to ON, it may take longer.
### 8 Settings

#### 8.1 Menu List

<table>
<thead>
<tr>
<th>Menu Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output resolutions</td>
<td></td>
</tr>
<tr>
<td>Aspect ratio control of output video</td>
<td></td>
</tr>
<tr>
<td>Aspect ratio control of input video</td>
<td></td>
</tr>
<tr>
<td>Aspect ratio</td>
<td></td>
</tr>
<tr>
<td>Overscan</td>
<td></td>
</tr>
<tr>
<td>Input position</td>
<td></td>
</tr>
<tr>
<td>Input size</td>
<td></td>
</tr>
<tr>
<td>Input masking</td>
<td></td>
</tr>
<tr>
<td>Input automatic sizing</td>
<td></td>
</tr>
<tr>
<td>Output position</td>
<td></td>
</tr>
<tr>
<td>Output size</td>
<td></td>
</tr>
<tr>
<td>Output masking</td>
<td></td>
</tr>
<tr>
<td>Output automatic sizing</td>
<td></td>
</tr>
<tr>
<td>Background color</td>
<td></td>
</tr>
<tr>
<td>Test pattern</td>
<td></td>
</tr>
</tbody>
</table>

[Figure 8.1] Menu list (1/9)
Input brightness
Input contrast
Hue
Saturation
Black level
Input default color
Output brightness
Output contrast
Output default color
No-signal input monitoring
HDCP input enabled/disabled
Input equalizer
Signal type of analog input
Automatic detection of input video interruption

[Figure 8.2] Menu list (2/9)
<table>
<thead>
<tr>
<th>Function Select</th>
<th>INPUT TIMING</th>
<th>[FUNCTION SELECT]</th>
</tr>
</thead>
<tbody>
<tr>
<td>H TOTAL DOTS</td>
<td>134 DOT</td>
<td></td>
</tr>
<tr>
<td>H START</td>
<td>29 DOT</td>
<td></td>
</tr>
<tr>
<td>H DISPLAY</td>
<td>102 DOT</td>
<td></td>
</tr>
<tr>
<td>V START</td>
<td>3 LINE</td>
<td></td>
</tr>
<tr>
<td>V DISPLAY</td>
<td>76 LINE</td>
<td></td>
</tr>
<tr>
<td>AUTO SETUP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AUTO SETUP ON</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AUTO START POS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNKNOWN TIMING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AUTO SETUP ON</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOAD</td>
<td>No. 1</td>
<td></td>
</tr>
<tr>
<td>SAVE</td>
<td>No. 1</td>
<td></td>
</tr>
<tr>
<td>TRACKING</td>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>

The total number of horizontal dots
Horizontal start position
Horizontal display period
Vertical start position
Vertical display period
Analog input automatic measurement
Automatic measurement of start position
Automatic setting of input timing
Loading device data
Registering device data
Tracking

[Figure 8.3] Menu list (3/9)
Output equalizer

Output mode

Synchronous signal output with no input video

Output video with no input video

Window transition effect

Effect duration

Wipe color

HDCP output mode

The number of HDCP retries

Deep Color

CEC

HDCP re-authentication

[Figure 8.4] Menu list (4/9)
Output level
Output mute
Input selection
Input level
Output lip sync
Input lip sync
Sampling frequency of analog audio input
Output connector
Multi-channel audio output
Test tone
EDID setting
PC resolutions
Input resolution for AV devices
Deep Color
Audio format
Speaker configuration
EDID Copy

[Figure 8.5] Menu list (5/9)
Communication setting

Operation mode

IP address

Subnet mask

Gateway address

Operation mode

TCP port number

Displaying MAC address

Control commands

Reply commands

Command link

Command execution

Invalid time

Initializing registered commands and associations

Command execution key: Lighting

Flash time (Command keys and DISPLAY POWER keys)
<table>
<thead>
<tr>
<th>Menu List (7/9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loading cross point</td>
</tr>
<tr>
<td>Saving cross point</td>
</tr>
<tr>
<td>Editing cross point</td>
</tr>
<tr>
<td>Loading all settings</td>
</tr>
<tr>
<td>Saving all settings</td>
</tr>
<tr>
<td>Startup setting</td>
</tr>
<tr>
<td>Assigning functions</td>
</tr>
<tr>
<td>Audio level</td>
</tr>
<tr>
<td>The number of clicks (Rotary encoder)</td>
</tr>
<tr>
<td>Enable/Disable</td>
</tr>
<tr>
<td>Switching mode</td>
</tr>
<tr>
<td>Toggle</td>
</tr>
<tr>
<td>Chattering reduction</td>
</tr>
<tr>
<td>Buzzer</td>
</tr>
<tr>
<td>Analog input measurement</td>
</tr>
<tr>
<td>Function initialization</td>
</tr>
</tbody>
</table>

* It will be not displayed if the setting is not saved.

[Figure 8.7]
Assigning functions
Function initialization
Bitmap output
Background color
Aspect ratio
Position
Input bitmap channel assignment
Bitmap
Dividing memory
Input image capture
DISPLAY POWER keys
Control command keys
Key lock
Tally outputs

[Figure 8.8] Menu list (8/9)
### Menu List (9/9)

<table>
<thead>
<tr>
<th>Setting key lock</th>
<th>Key buzzer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automatic key lock for control command keys</td>
<td></td>
</tr>
<tr>
<td>DISPLAY POWER key pressing time</td>
<td></td>
</tr>
<tr>
<td>Input channel automatic linking</td>
<td></td>
</tr>
<tr>
<td>Top VFD screen</td>
<td></td>
</tr>
<tr>
<td>Input signal status</td>
<td></td>
</tr>
<tr>
<td>Display device status</td>
<td></td>
</tr>
<tr>
<td>EDID of display device</td>
<td></td>
</tr>
<tr>
<td>Version information</td>
<td></td>
</tr>
</tbody>
</table>

Some menus can be set separately as follows, and those setting units are shown on the top right of each section in this manual.

- **For each output**
  - You can set the menu for each output separately.

- **For each input port/input signal**
  - You can set the menu for each input and input signals separately.
  - (For details, see “8.2 Input Signal Automatic Detection”)

- **For each input**
  - You can set the menu for each input separately.

- **For each output/bitmap**
  - You can set the menu for each output and bitmap separately.
8.2 Input Signal Automatic Detection

The MSD continuously monitors input signals. If input signals that have been input before, they are output with the same size and quality of view used previously. If input signals are not matched with any signal settings that have been input before, only settings of input timing is initialized and other settings are not changed. Adjust the size and quality of view as necessary.

![Figure 8.10] How signals are recognized

The MSD saves data of 50 input devices for each channel, and the data is used to check whether the input signals have been input before or not. To save the data of the 51st device, the oldest data that have not been input recently will be deleted, instead.

<table>
<thead>
<tr>
<th>IN1</th>
<th>IN2</th>
<th>IN3</th>
<th>IN4</th>
<th>IN5</th>
<th>IN6</th>
<th>IN7</th>
<th>IN8</th>
<th>IN9</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 1080i</td>
<td>1080i</td>
<td>UXGA</td>
<td>UXGA</td>
<td>WXGA</td>
<td>NTSC</td>
<td>NTSC</td>
<td>WXGA</td>
<td>UXGA</td>
</tr>
<tr>
<td>2 720p</td>
<td>480i</td>
<td>WXGA</td>
<td>VGA</td>
<td>SXGA</td>
<td>VGAt</td>
<td>XGA</td>
<td>WXGA</td>
<td>720p</td>
</tr>
<tr>
<td>3 480i</td>
<td>SXGA</td>
<td>XGA</td>
<td>UXGA</td>
<td>UXGA</td>
<td>UXGA</td>
<td>UXGA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 XGA</td>
<td>SXGA</td>
<td>XGA</td>
<td>UXGA</td>
<td>UXGA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 SXGA</td>
<td>UXGA</td>
<td>UXGA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 UXGA</td>
<td>UXGA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>49 VGA</td>
<td>UXGA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50 1080p</td>
<td>UXGA</td>
<td>UXGA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

When new signals are input, the oldest data will be overwritten.

![Figure 8.11] Memory table per channel

The data of the following settings are stored for each input signal.

- 8.3 Setting position, size, and Masking
- 8.3.3 Aspect ratio control of input video
- 8.3.4 Aspect ratio restoration
- 8.3.5 Overscan
- 8.3.6 Input position
- 8.3.7 Input size
- 8.3.8 Input masking
- 8.4 Video correction
- 8.4.1 Input brightness
- 8.4.2 Input contrast
- 8.4.3 Hue
- 8.4.4 Saturation
- 8.4.5 Black level
- 8.5 Input Setting
- 8.5.4 Signal type of analog input
- 8.6 Input Timing Settings
- 8.6.1 The total number of horizontal dots
- 8.6.2 Horizontal start position
- 8.6.3 Horizontal display period
- 8.6.4 Vertical start position
- 8.6.5 Vertical display period
- 8.6.7 Automatic measurement of start position
- 8.6.11 Tracking
- 8.8 Audio Setting*
- 8.8.4 Input level
- 8.8.6 Input lip sync

* Only if digital audio input is selected, settings of Input level and lip sync will be saved.
8.3 Setting Position, Size, and Masking

Position, size, and masking can be set for each input and output. Normally, set them for each input. If edges are cut off due to enlarged display in the display device side or if enlarging output video for all inputs at once, set them for the output side.

[Normally, set the position, size, and masking for each input in the input side.]

[Set the position, size, and masking in the output side if edges are cut off due to enlarged display in the display device side.]

[You can enlarge video for each input and output side separately.]

[Figure 8.12] Setting position, size, and masking of I/O
If video is input to a wide TV or the like, the video is automatically enlarged and displayed, and sometimes edges are cut off. In this case, change the display size (such as “Full display”, “Wide display”). If the problem is still not resolved, set “8.3.10 Output position” and “8.3.11 Output size”.

To set output position and size:

<table>
<thead>
<tr>
<th>Steps</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Select “OUTPUT FRAME” in “8.3.15 Test pattern”.</td>
</tr>
<tr>
<td>2</td>
<td>Set the display position by following “8.3.10 Output position” to match the upper left of the display device and test pattern.</td>
</tr>
<tr>
<td>3</td>
<td>Reduce the test pattern by following “8.3.11 Output size” to match the lower right of the display device and the test pattern.</td>
</tr>
<tr>
<td>4</td>
<td>Set the test pattern to “OFF”.</td>
</tr>
</tbody>
</table>

![Diagram showing setting position, size, and masking of output side]

[Figure 8.13] Setting position, size, and masking of output side
8.3.1 Output resolutions [RESOLUTION]

If you select “AUTO”, the optimum resolution is automatically applied.*
If you want to select a resolution other than “AUTO”, select the same resolution as the display device so that the video is displayed more clearly.
If you change the output resolution, relative display position and size of the output video are not changed.

* If you select “AUTO”, the MSD finds the optimal resolution from EDID (see section "8.9 EDID" for details) of the display device and displays the current resolution in brackets on the VFD screen. If the MSD cannot load EDID from the display device, it outputs the video with the resolution used the last time and displays a “*” after the current output resolution. Available output resolutions of the MSD are as follows and they can only be selected manually. If the resolution of the display device is not found, the closest resolution is used and a “*” is displayed after the resolution as well.

[With the optimum resolution] [EDID cannot be load or without identical optimum resolution]

- AUTO  [Default]
- VGA@60 (640x480)
- SVGA@60 (800x600)
- XGA@60 (1024x768)
- WXGA@60 (1280x768)
- WXGA@60 (1280x800)
- Quad-VGA@60 (1280x1024)
- SXGA@60 (1280x1024)
- WXGA@60 (1360x768)
- WXGA@60 (1366x768)
- SXGA+@60 (1400x1050)

Numbers following “@” are vertical synchronous frequency. For outputting high definition, 50Hz/59.94Hz/60Hz can be selected.
480i/480p/576i/576p/720p/1080i/1080p are the timings of CEA-861E standard. Others are timings meeting VESA DMT standard or VESA CVT standard. VESAHD@60, WUXGA@60, and QWXGA@60: Reduced Blanking

**Note 1:**
If connecting an IDK’s distribution amplifier between the MSD and display device and set the resolution to “AUTO”, set the EDID of the distribution amplifier to “EXTERNAL” which enables the MSD to load the EDID from the display device.

**Note 2:**
For the model MSD-5402SL only: Resolutions cannot be set for each output. OUT1 and OUT2 are output always with the same resolution.
1. To set output resolution using menu:

   MSD-5404
   ↓ SET key
   [FUNCTION SELECT] OUTPUT TIMING ▲▼keys: Select “OUTPUT TIMING”.
   ↓ SET key
   [OUTPUT TIMING] RESOLUTION ▲▼keys: Select “RESOLUTION”.
   ↓ SET key
   [RESOLUTION] AUTO (1080p 59.94) ▲▼keys: Select the desired resolution.
   ◄► keys: Select the desired output (OUT1 to OUT4).
   ↓ ESC key: Returns to the previous screen

2. To set output resolutions using commands:
   @SOT Set output resolution
   @GOT Get output resolution
   @GTD Get actual output resolution
8.3.2 Aspect ratio control of output video [MONITOR ASPECT]

This setting will be used to restore the aspect ratio to the normal ratio in "8.3.3 Aspect ratio control of input video".

- RESOLUTION [Default] - 5:3
- 4:3 - 16:9
- 5:4 - 16:10

If you select "RESOLUTION", the MSD finds that a display device whose aspect ratio is the same as that is selected in "8.3.1 Output resolutions" is connected.

<table>
<thead>
<tr>
<th>Output resolution</th>
<th>Aspect ratio</th>
<th>Output resolution</th>
<th>Aspect ratio</th>
<th>Output resolution</th>
<th>Aspect ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>VGA(640×480)</td>
<td>4:3</td>
<td>WXGA(1360×768)</td>
<td>16:9</td>
<td>VESAHD(1920×1080)</td>
<td>16:9</td>
</tr>
<tr>
<td>SVGA(800×600)</td>
<td>4:3</td>
<td>WXGA(1366×768)</td>
<td>16:9</td>
<td>WUXGA(1920×1200)</td>
<td>16:10</td>
</tr>
<tr>
<td>XGA(1024×768)</td>
<td>4:3</td>
<td>SXGA+(1400×1050)</td>
<td>4:3</td>
<td>QWXGA(2048×1152)</td>
<td>16:9</td>
</tr>
<tr>
<td>WXGA(1280×768)</td>
<td>5:3</td>
<td>WXGA+(1440×900)</td>
<td>16:10</td>
<td>480i,p(720×480)</td>
<td>4:3</td>
</tr>
<tr>
<td>WXGA(1280×800)</td>
<td>16:10</td>
<td>WXGA++(1600×900)</td>
<td>16:9</td>
<td>576i,p(720×576)</td>
<td>4:3</td>
</tr>
<tr>
<td>Quad-VGA(1280×960)</td>
<td>4:3</td>
<td>UXGA(1600×1200)</td>
<td>4:3</td>
<td>720p(1280×720)</td>
<td>16:9</td>
</tr>
<tr>
<td>SXGA(1280×1024)</td>
<td>5:4</td>
<td>WSXGA+(1680×1050)</td>
<td>16:10</td>
<td>1080i,p(1920×1080)</td>
<td>16:9</td>
</tr>
</tbody>
</table>

If aspect ratio of the target display device and the ratio set in "8.3.1 Output resolutions" differ, you can select an aspect ratio of the display device from “4:3”, “5:4”, “5:3”, “16:9”, and “16:10”.

1. To select aspect ratio of the display device to be connected using menu:

   MSD-5404
   ▼ SET key
   [FUNCTION SELECT] OUTPUT TIMING ▼
   ▲▼ keys: Select “OUTPUT TIMING”.
   ▼ SET key
   [OUTPUT TIMING] MONITOR ASPECT ▼
   ▲▼ keys: Select “MONITOR ASPECT”.
   ▼ SET key
   [MONITOR ASPECT] RESOLUTION ▼
   ▲▼ keys: Select the desired monitor aspect.
   (RESOLUTION, 4:3, 5:4, 5:3, 16:9, 16:10)
   ◄► keys: Select the desired output (OUT1 to OUT4).
   ▼ ESC key: Returns to the previous screen.

2. To select aspect ratio of the display device to be connected using commands:
   @SUM: Set display aspect ratio
   @GUM: Get display aspect ratio
8.3.3 Aspect ratio control of input video [INPUT ASPECT]

If you select “AUTO-1” or “AUTO-2”, the aspect ratio will be restored automatically to the original ratio according to the settings of “8.3.2 Aspect ratio control of output video” and “8.3.4 Aspect ratio”.

“AUTO-1” and “AUTO-2” work differently only when letter box signals are input. “AUTO-1” processes them as video signals of 16:9 or 14:9 while “AUTO-2” sets them as 4:3. Normally, no problem occurs if you set the aspect ratio to “AUTO-1”, but some DVD players and other devices display subtitles or setup menus on the area that does not have letter box signal video, which may not be displayed within the screen. In such case, set the aspect to “AUTO-2” to display the whole video.

<table>
<thead>
<tr>
<th>Input signal</th>
<th>Aspect ratio of connected display device*</th>
</tr>
</thead>
<tbody>
<tr>
<td>4:3 video signal</td>
<td>BC: top&amp;bottom</td>
</tr>
<tr>
<td>5:4 video signal</td>
<td>BC: top&amp;bottom</td>
</tr>
<tr>
<td>5:3 video signal</td>
<td>BC: top&amp;bottom</td>
</tr>
<tr>
<td>16:9 video signal</td>
<td>BC: top&amp;bottom</td>
</tr>
<tr>
<td>16:10 video signal</td>
<td>BC: top&amp;bottom</td>
</tr>
<tr>
<td>14:9 video signal</td>
<td>BC: top&amp;bottom</td>
</tr>
</tbody>
</table>

*The aspect ratio selected for the display device will be the base. BC=Background color (Default: black)

[Figure 8.14] Aspect ratio control-1(1/2)
### Aspect Ratio of Destination Display Device*

<table>
<thead>
<tr>
<th>Input signal</th>
<th>4:3</th>
<th>5:4</th>
<th>5:3</th>
<th>16:9</th>
<th>16:10</th>
</tr>
</thead>
<tbody>
<tr>
<td>16:9 letter box AUTO-1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cut: top&amp;bottom BC: top&amp;bottom</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AUTO-2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BC: top&amp;bottom</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14:9 letter box AUTO-1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cut: top&amp;bottom BC: right&amp;left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AUTO-2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BC: right&amp;left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*The aspect ratio selected for the display device will be the base.*

![Figure 8.15] Aspect ratio control-1(2/2)

### Aspect Ratio of Destination Display Device*

<table>
<thead>
<tr>
<th>Input signal</th>
<th>4:3</th>
<th>5:4</th>
<th>5:3</th>
<th>16:9</th>
<th>16:10</th>
</tr>
</thead>
<tbody>
<tr>
<td>4:3 video signal</td>
<td>Cut:right&amp;left</td>
<td>Cut:top&amp;bottom</td>
<td>Cut:top&amp;bottom</td>
<td>Cut:top&amp;bottom</td>
<td></td>
</tr>
<tr>
<td>5:3 video signal</td>
<td>Cut:right&amp;left</td>
<td>Cut:right&amp;left</td>
<td>Cut:top&amp;bottom</td>
<td>Cut:right&amp;left</td>
<td></td>
</tr>
<tr>
<td>16:9 video signal</td>
<td>Cut:right&amp;left</td>
<td>Cut:right&amp;left</td>
<td>Cut:right&amp;left</td>
<td>Cut:right&amp;left</td>
<td></td>
</tr>
</tbody>
</table>

*The aspect ratio selected for the display device will be the base.*

![Figure 8.16] Aspect ratio control-2(1/2)
Aspect ratios of analog composite video signals (NTSC/PAL), S-Video signals (NTSC/PAL), and analog YPbPr signals (SDTV/HDTV) are restored based on ID-1 signals and WSS signals, while aspect ratio of HDMI signals is restored based on packets called InfoFrame. ID-1 and WSS signals include recognition signals of aspect ratio in order to switch the aspect ratio automatically. InfoFrame contains the same kind of the identification data of aspect ratio.

Even with “AUTO-1” or “AUTO-2”, the aspect ratio is not restored if recognition signals with valid aspect ratio is not input. (If any of analog composite video signals (NTSC/PAL), S-Video signals (NTSC/PAL), analog YPbPr signals (SDTV), or HDMI signals (SDTV) is input, the MSD performs in the same way as when the input aspect ratio is 4:3; if analog YPbPr signals (HDTV) and HDMI signals (HDTV) are input, it performs as when the input aspect ratio is 16:9.)

If no recognition signals with valid aspect ratio is input or if you use the fixed aspect ratio, you can select “4:3”, “16:9”, “14:9”, “16:9 LETTER BOX”, “14:9 LETTER BOX”, “4:3 SIDE PANEL”, or “14:9 SIDE PANEL”.

Settings of “4:3”, “16:9”, “14:9”, “16:9 LETTER BOX”, “14:9 LETTER BOX”, “4:3 SIDE PANEL” and “14:9 SIDE PANEL” are as follows:

<table>
<thead>
<tr>
<th>Input signal</th>
<th>Aspect ratio of destination display device*</th>
</tr>
</thead>
<tbody>
<tr>
<td>16:10 video signal</td>
<td><img src="image1.png" alt="Diagram" /></td>
</tr>
<tr>
<td>14:9 video signal</td>
<td><img src="image2.png" alt="Diagram" /></td>
</tr>
<tr>
<td>16:9 letter box signal</td>
<td><img src="image3.png" alt="Diagram" /></td>
</tr>
<tr>
<td>14:9 letter box signal</td>
<td><img src="image4.png" alt="Diagram" /></td>
</tr>
</tbody>
</table>

*The aspect ratio selected for the display device will be the base.

[Figure 8.17] Aspect ratio control-2(2/2)
PANEL” are valid only if TV signals are input. If PC signals are input and even if you select “AUTO-1”, “AUTO-2”, “4:3”, “16:9”, “16:9 letter box”, “14:9 letter box”, “4:3 side panel”, or “14:9 side panel”, the aspect ratio will be selected automatically based on the aspect ratio of the input signals.

If you select “FULL”, video is displayed on the full screen at all times regardless of input video signals, settings of “8.3.2 Aspect ratio control of output video” and “8.3.4 Aspect ratio”.

<table>
<thead>
<tr>
<th>Input signal</th>
<th>Aspect ratio of destination display device</th>
</tr>
</thead>
<tbody>
<tr>
<td>4:3</td>
<td>Vertically long</td>
</tr>
<tr>
<td>4:3</td>
<td>Horizontally long</td>
</tr>
<tr>
<td>4:3</td>
<td>Horizontally long</td>
</tr>
<tr>
<td>4:3</td>
<td>Horizontally long</td>
</tr>
<tr>
<td>5:4</td>
<td>Horizontally long</td>
</tr>
<tr>
<td>5:4</td>
<td>Horizontally long</td>
</tr>
<tr>
<td>5:4</td>
<td>Horizontally long</td>
</tr>
<tr>
<td>5:4</td>
<td>Horizontally long</td>
</tr>
<tr>
<td>5:3</td>
<td>Vertically long</td>
</tr>
<tr>
<td>5:3</td>
<td>Vertically long</td>
</tr>
<tr>
<td>5:3</td>
<td>Vertically long</td>
</tr>
<tr>
<td>5:3</td>
<td>Vertically long</td>
</tr>
<tr>
<td>16:9</td>
<td>Vertically long</td>
</tr>
<tr>
<td>16:9</td>
<td>Vertically long</td>
</tr>
<tr>
<td>16:9</td>
<td>Vertically long</td>
</tr>
<tr>
<td>16:9</td>
<td>Vertically long</td>
</tr>
<tr>
<td>16:10</td>
<td>Vertically long</td>
</tr>
<tr>
<td>16:10</td>
<td>Vertically long</td>
</tr>
<tr>
<td>16:10</td>
<td>Horizontally long</td>
</tr>
<tr>
<td>16:10</td>
<td>Horizontally long</td>
</tr>
<tr>
<td>16:10</td>
<td>Horizontally long</td>
</tr>
<tr>
<td>16:10</td>
<td>Horizontally long</td>
</tr>
<tr>
<td>14:9</td>
<td>Vertically long</td>
</tr>
<tr>
<td>14:9</td>
<td>Vertically long</td>
</tr>
<tr>
<td>14:9</td>
<td>Vertically long</td>
</tr>
<tr>
<td>14:9</td>
<td>Vertically long</td>
</tr>
<tr>
<td>16:9 letter box</td>
<td>Vertically long</td>
</tr>
<tr>
<td>16:9 letter box</td>
<td>Horizontally long</td>
</tr>
<tr>
<td>16:9 letter box</td>
<td>Horizontally long</td>
</tr>
<tr>
<td>16:9 letter box</td>
<td>Horizontally long</td>
</tr>
<tr>
<td>16:9 letter box</td>
<td>Horizontally long</td>
</tr>
</tbody>
</table>

*The aspect ratio selected for the display device will be the base.

**Figure 8.18** Full screen display

**Note:**

If you select “THROUGH”, the input video is displayed with pixel ratio of 1:1 regardless of settings of “8.3.2 Aspect ratio control of output video” and “8.3.4 Aspect ratio”.
1. To set the aspect ratio control using menu:

<table>
<thead>
<tr>
<th>MSD-5404</th>
<th>Top</th>
</tr>
</thead>
<tbody>
<tr>
<td>↓ SET key</td>
<td></td>
</tr>
<tr>
<td>[FUNCTION SELECT] OUTPUT TIMING ✢</td>
<td>▲▼keys: Select “OUTPUT TIMING”.</td>
</tr>
<tr>
<td>↓ SET key</td>
<td></td>
</tr>
<tr>
<td>[OUTPUT TIMING] INPUT ASPECT ✢</td>
<td>▲▼keys: Select “INPUT ASPECT”.</td>
</tr>
<tr>
<td>↓ SET key</td>
<td></td>
</tr>
<tr>
<td>[IN1 ASPECT] AUTO-1 ✢</td>
<td>▲▼keys: Select the desired aspect ratio.</td>
</tr>
<tr>
<td>↓ ESC key: Returns to the previous screen.</td>
<td></td>
</tr>
</tbody>
</table>

2. To set the aspect ratio control using commands:
  - @SAP: Set aspect ratio
  - @GAP: Get aspect ratio
8.3.4 Aspect ratio control [ASPECT PROCESS]

You can select a processing of aspect ratio control.

- Letter box/Side panel: L-BOX/S-PANEL [Default]
- Side cut/Top bottom cut: S-CUT/TB-CUT

“L-BOX/S-PANEL”: The input video is displayed in the center, and the background color set in "8.3.14 Background color" is displayed on the blank areas (top/bottom and right/left).

“S-CUT/TB-CUT”: Part of the top/bottom or right/left is cut off, and the background color is not displayed. Also if you select “S-CUT/TB-CUT”, part of the input video is not displayed.

<table>
<thead>
<tr>
<th>Input signal</th>
<th>Output signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>16:9 input video is output to a 4:3 display device.</td>
<td>Letter box / Side cut</td>
</tr>
<tr>
<td>4:3 input video is output to a 16:9 display device.</td>
<td>Side panel / Top/bottom cut</td>
</tr>
</tbody>
</table>

[Figure 8.19] Restoring aspect ratio

1. To set processing for restoring aspect ratio using menu:

```
MSD-5404

↑ SET key

[FUNCTION SELECT] OUTPUT TIMING

↓ SET key

[OUTPUT TIMING] ASPECT PROCESS

↓ SET key

[IN1 PROCESS] L-BOX/S-PANEL

↑↓ keys: Select “OUTPUT TIMING”.

↑↓ keys: Select “ASPECT PROCESS”.

↑↓ keys: Select “L-BOX/S-PANEL” or “S-CUT/TB-CUT”.

◄► keys: Select the desired input (IN1 to IN9).

↓ ESC key: Returns to the previous screen.
```

2. To set processing for restoring aspect ratio using commands:

@SAR: Set aspect ratio restoration
@GAR: Get aspect ratio restoration
8.3.5 Overscan [INPUT OVER SCAN]

- The enlargement rate: 100% to 115%
  [Default values]:
  105% for NTSC/PAL/SDTV
  100% for HDTV/VESA: On the full screen

The effective display areas of NTSC/PAL/SDTV are narrowed slightly during edit. If they are displayed without any change, areas without videos (usually black bars) are displayed on edges. To avoid this problem, input videos are enlarged slightly, called Overscan.

HDTV and VESA are displayed on the full effective display area. (Some HDTV signals include areas which display black bars on the edges depending on sources.)

1. To set the overscan using menu:

   1. To set the overscan using menu:

      MSD-5404

      ↓ SET key

      [FUNCTION SELECT]
      OUTPUT TIMING  ▲▼ keys: Select “OUTPUT TIMING”

      ↓ SET key

      [OUTPUT TIMING]
      INPUT OVER SCAN  ▲▼ keys: Select “INPUT OVER SCAN”

      ↓ SET key

      [IN1 OVER SCAN]
      105%  ▲▼ keys: Select the desired overscan rate (100% to 115%).
      ▲▼ keys: Select the desired input (IN1 to IN9).

      ↓ ESC key: Returns to the previous screen.

2. To set the overscan using commands:

   @SOV: Set overscan
   @GOV: Get overscan
8.3.6 Input position [INPUT POSITION]

You can set the display position of the input video using this menu or for each output by following “8.3.10 Output position”. Normally, set the position, size, and masking of each input in settings of each input. If edges are cut off due to enlarged display in the display device or if you want to change positions of output videos for all channels at once, set the position for each output.

- Horizontal position: Changed in a unit of pixel  [Default]: 0
- Vertical position: Changed in a unit of line  [Default]: 0

Note:
If the resolutions of each output are not the same, the resolution of OUT1 will be the standard.

The setting range depends on “8.3.1 Output resolutions” and “8.3.7 Input size”, and the minimum settable values of the top, bottom, right and left are the values to disappear from the screen.
If the display position exceeds the settable range by changing display size, the display position will be set to the maximum value automatically.
Default is 0, and the video is displayed starting from the upper left of the display device.

1. To set the input video position (pixel position) using menu:

   MSD-5404
   ▼ SET key
   [FUNCTION SELECT] OUTPUT TIMING ▼
   ▼ SET key
   [OUTPUT TIMING] INPUT POSITION ▼
   ▼ SET key
   [INPUT POSITION] H:  V:  0 ▼
   ▼ keys: Select the horizontal position of IN1.

   [Figure 8.20] Input position
2. To set the input video position (pixel position) using commands:
   @SNP: Set input position
   @GNP: Get input position
8.3.7 Input size [INPUT SIZE]

You can set the display size of input video using the number of pixels. The video size is scaled based on the upper left of the input video set in “8.3.6 Input position”. You can set the size for each input by using this menu or for each output by following “8.3.11 Output size”. Normally, set the position, size, and masking of each input separately by using the settings of each input. If edges are cut off due to enlarged display in the display device or if you want to enlarge output video of all channels at once, set the position for each output.

- Horizontal size: Scaled in a unit of pixel  [Default]: Horizontal output resolution
- Vertical size: Scaled in a unit of line  [Default]: Vertical output resolution

Note:
If the resolutions of each output are not the same, the resolution of OUT1 will be the standard.

[Figure 8.21] Input size

The set range and default value depend on settings of “8.3.1 Output resolutions”, and the range is quarter to quadruple of the output resolution. Default is the same as the resolution setting, and the video is displayed on the full screen of the display device.

1. To set the input size (the number of pixels) using menu:

```
MSD-5404
↓ SET key
[FUNCTION SELECT] OUTPUT TIMING ▼
↓ SET key
[OUTPUT TIMING] INPUT SIZE ▼
↓ SET key
[IN1 SIZE] H: 1920/1920
  LINK: ON  V: 1080/1080
↓ ◄►keys
```

▲▼ keys: Select “OUTPUT TIMING”.
▲▼ keys: Select “INPUT SIZE”.
▲▼ keys: Set “LINK” to “OFF” or “ON” for H and V.¹
**8.3.8 Input masking [INPUT MASKING]**

You can hide any unnecessary area (top/bottom and right/left) by setting the masking of the input video. You can set the masking amount for each input by using this menu or for each output by following "**8.3.12 Output masking**". Normally, set the masking of each input in settings of each input. If you want to limit the display area on the output screen, set the masking for each output.

- Left side masking: Masked in a unit of pixel  [Default]: 0
- Right side masking: Masked in a unit of pixel  [Default]: Horizontal input size
- Top side masking: Masked in a unit of line  [Default]: 0
- Bottom side masking: Masked in a unit of line  [Default]: Vertical input size

(0, 0)

![Input masking diagram](image)

**[Figure 8.22] Input masking**

The range of set values depends on settings of "**8.3.6 Input position**", "**8.3.7 Input size**" and masking. If you change the display position or display size, the display range before changing is kept and settings of masking are automatically changed. Default value (no masking) of the left/top sides is 0 while that of the right/bottom sides is the input size setting.
1. To set the input masking (the number of pixels) using menu:

```
<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSD-5404</td>
<td>Top</td>
</tr>
<tr>
<td>↓ SET key</td>
<td></td>
</tr>
<tr>
<td>[FUNCTION SELECT]</td>
<td>OUTPUT TIMING</td>
</tr>
</tbody>
</table>
| OUTPUT TIMING     | ▲▼ keys: Select “OUTPUT TIMING”.
| ↓ SET key         |                              |
| [OUTPUT TIMING]   | INPUT MASKING                |
| INPUT MASKING     | ▲▼ keys: Select “INPUT MASKING”.
| ↓ SET key         |                              |
| [IN1 MASKING] L:  | ▲▼ keys: Set the left side masking of IN1. |
| R:1920 T: 0 B:1080|                              |
| ↓◄► keys          |                              |
| [IN1 MASKING] L:  | ▲▼ keys: Set the right side masking of IN1. |
| R:1920 T: 0 B:1080|                              |
| ↓◄► keys          |                              |
| [IN1 MASKING] L:  | ▲▼ keys: Set the top side masking of IN1. |
| R:1920 T: 0 B:1080|                              |
| ↓◄► keys          |                              |
| [IN1 MASKING] L:  | ▲▼ keys: Set the bottom side masking of IN1. |
| R:1920 T: 0 B:1080|                              |
| ↓◄► keys          |                              |
|                  | ESC key: Returns to the previous screen. |
```

2. To set the input masking (the number of pixels) using commands:

@SNM: Set input masking
@GNM: Get input masking
8.3.9 Input automatic sizing [INPUT AUTO SIZING]  

You can adjust input signals optimally (displaying input video on the full display device), and as a result the following settings will be initialized automatically: "8.3.3 Aspect ratio control of input video", "8.3.5 Overscan", "8.3.6 Input position", "8.3.7 Input size", and "8.3.8 Input masking". It may not work if aspect ratios of the input signal and display device do not match or depending on some settings.

1. To set the input automatic sizing using menu:

```
1. To set the input automatic sizing using menu:

   MSD-5404  Top
   ↓ SET key
   [FUNCTION SELECT] OUTPUT TIMING  ▲▼ keys: Select “OUTPUT TIMING”.
   ↓ SET key
   [OUTPUT TIMING] INPUT AUTO SIZING  ▲▼ keys: Select “INPUT AUTO SIZING”.
   ↓ SET key  ↑ ESC key: Returns to the previous screen without changing settings.
   [IN1 AUTO SIZING] SURE? = NO  ▲▼ keys: Select “YES” or “NO”.
   ↓ To apply the setting: Select “YES” and press the “SET” key.
   To return to the menu without any change: Select “NO” and press the “SET” key.
```

2. To set the input automatic sizing using commands:

```
@IAS: Input automatic sizing
```
8.3.10 Output position [OUTPUT POSITION]

You can set the display position of the output video by the pixel position of on the output screen.
You can set the position for each input channel in "8.3.6 Input position", in this menu you can set the position for each output. Normally, set the position, size, and masking of each input in settings of each input. If edges are cut off due to enlargement display in the display device or if you want to move output video for all channels at a time, set the position for each output.

- Horizontal position: Changed in a unit of pixel  [Default]: 0
- Vertical position: Changed in a unit of line  [Default]: 0

The setting range depends on settings of "8.3.1 Output resolution" and "8.3.11 Output size". Values can be set unless video disappears from the top, bottom and right, left of the screen. If the display position exceeds the settable range by changing display size, the display position will be set to the maximum value automatically. Default is 0, and the video is displayed from the upper left of the display device.

1. To set the output position on the output screen (pixel position) using menu:

   ```
   MSD-5404
   ↓ SET key
   [FUNCTION SELECT] OUTPUT TIMING  
   ↓ SET key
   [OUTPUT TIMING] OUTPUT POSITION 
   ↓ SET key
   [OUT1 POSITION]  
   H:   V:   0  
   ▲▼keys: Select "OUTPUT TIMING".
   ▲▼keys: Select "OUTPUT POSITION".
   ▲▼keys: Set horizontal position of OUT1.
   ▲▼keys: Set vertical position of OUT1.
   ↓ ESC key: Returns to the previous screen.
   
2. To set the output position on the output screen (pixel position) using commands:

   @SOP: Set output position
   @GOP: Get output position
8.3.11 Output size [OUTPUT SIZE]

Output video size is scalable in reference to the upper left of video set in “8.3.10 Output position”. You can set the size for each output by using this menu or for each input by using “8.3.7 Input size”. Normally, set position, size, and masking for each input in the settings of each input. If edges are cut off due to enlargement display in the display device or if you want to enlarge output video of all channels at a time, set the position for each output.

- Horizontal size: Scaled in a unit of pixel  [Default]: Horizontal output resolution
- Vertical size: Scaled in a unit of line  [Default]: Vertical output resolution

![Figure 8.24] Output size

The setting range and default vary depending on settings of “8.3.1 Output resolutions”, and the range is quarter to quadruple of output resolution. Default is the same as the resolution setting, and the video is displayed on the full screen of the display device.

1. To set the output size (the number of pixels) using menu:

```
MSD-5404
↓ SET key
[FUNCTION SELECT] OUTPUT TIMING ▼
↓ SET key
[OUTPUT TIMING] OUTPUT SIZE ▼
↓ SET key
[OUT1SIZ]H:1920/1920 LINK:ON V:1080/1080
↓ keys
[OUT1SIZ]H:1920/1920 LINK:ON V:1080/1080
↓ keys
↓ ESC key: Returns to the previous screen.
```

*1 The scan rate of OUT1 is set to “ON” or “OFF” for H and V.

*2 Numbers following “/” mean horizontal output resolution.

Numbers following “/” mean vertical output resolution.
1 If you set “LINK” to ON, only horizontal size can be set. If you set the horizontal size, the current aspect ratio is kept and vertical size is also set. If either horizontal or vertical size reaches the limit, you cannot set the larger values.

2 Only if you set “LINK” to “OFF”, you can set the vertical size.

2. To set the output size (the number of pixels) using commands:
   @SOS: Set output size
   @GOS: Get output size
8.3.12 Output masking [OUTPUT MASKING]

You can hide unnecessary part (top/bottom and right/left) by setting masking.

You can set masking for each input by following the “8.3.8 Input masking” menu or for each output using this menu. Normally, set masking of each input in the settings of each input. If you want to limit the display area on the output screen, set the masking for each output.

- Left side masking: Masked in a unit of pixel  [Default]: 0
- Right side masking: Masked in a unit of pixel  [Default]: Horizontal output resolution
- Top side masking: Masked in a unit of line  [Default]: 0
- Bottom side masking: Masked in a unit of line  [Default]: Vertical output resolution

![Diagram of output masking]

[Figure 8.25] Output masking

The range of set values depends on settings of “8.3.1 Output resolutions”, “8.3.10 Output position”, “8.3.11 Output size” and masking. If you change the output resolution, position or size, the display range before that change is kept and the settings of masking are automatically changed. Default values (no masking) of the left and top sides are 0 while that of the right and bottom sides are the input size.
1. To set the output masking (the number of pixels) using menu:

```
MSD-5404
Top
↓ SET key
[FUNCTION SELECT]
OUT PUT TIMING
↓ SET key
[OUTPUT TIMING]
OUT PUT MASKING
↓ SET key
[OUT1 MASKING]: 0
R:1920 T: 0 B:1080
↓ ◄► keys
[OUT1 MASKING]: 0
R:1920 T: 0 B:1080
↓ ◄► keys
[OUT1 MASKING]: 0
R:1920 T: 0 B:1080
↓ ◄► keys
[OUT1 MASKING]: 0
R:1920 T: 0 B:1080
↓ ESC key: Returns to the previous screen.
```

2. To set the output masking (the number of pixels) using commands:

@SOM: Set output masking
@GOM: Get output masking
8.3.13 Output automatic sizing [OUTPUT AUTO SIZING]

This function adjusts output signals optimally to display video on the full screen, and as a result, the following settings will be initialized automatically: “8.3.10 Output position”, “8.3.11 Output size”, and “8.3.12 Output masking”. It may not work depending on some settings.

1. To set the output automatic sizing using menu:

```
MSD-5404
         ↑
      ↓ SET key
[FUNCTION SELECT] OUTPUT TIMING ▼
       ▲▼ keys: Select “OUTPUT TIMING”.
      ↓ SET key
[OUTPUT TIMING] OUTPUT AUTO SIZING ▼
       ▲▼ keys: Select “OUTPUT AUTO SIZING”.
      ↓ SET key ↑ ESC key: Returns to the previous screen without changing settings.
[INI AUTO SIZING] SURE? = NO ◀▶
       ▲▼ keys: Select “YES” or “NO”.
       ▲▼ keys: Select the desired output (OUT1 to OUT9).
      ↓ To apply the setting: Select “YES” and press the “SET” key.
To return to the menu without any change: Select “NO” and press the “SET” key.
```

2. To set the output automatic sizing using commands:

@OAS: Input automatic sizing
8.3.14 Background color [BACKGROUND COLOR]

You can select a color from an approximately 16.7-million combinations of Red, Green, and Blue.

- Background color: Red, Green, and Blue: 0 to 255  [Default]: all colors: 0

1. Set the background color using menu:

   MSD-5404
   Top
   ↓ SET key
   [FUNCTION SELECT] OUTPUT TIMING ▲▼ keys: Select “OUTPUT TIMING”.
   ↓ SET key
   [OUTPUT TIMING] BACKGROUND COLOR ▲▼ keys: Select “BACKGROUND COLOR”.
   ↓ SET key
   [OUT1 COLOR]LINK:ON R:100 G:100 B:100 ▲▼ keys: Set “LINK” to “ON” or “OFF”.
   ↓ ◄►keys
   ▲▼ keys: Set the background color Red for OUT1 (0 to 255).
   ↓ ◄►keys
   ▲▼ keys: Set the background color Green for OUT1 (0 to 255).
   ↓ ◄►keys
   ▲▼ keys: Set the background color Blue for OUT1 (0 to 255).
   ↓ ESC key: Returns to the previous screen.

   *1 If you set “LINK” to “ON”, you can set only Red (R). Settings of Green (G) and Blue (B) are also changed associated with the settings of the Red (R). For example, if you increase Red (R) +2, Green (G) and Blue (B) are also increased (+2).

   *2 Only if you set “LINK” to “OFF”, you can set the background colors Green and Blue.

2. Set the background color using commands:

@SBC: Set background color
@GBC: Get background color
8.3.15 Test pattern [TEST PATTERN]

You can scroll at a speed of 3 to 30 pixels/a frame by using "COLOR BAR", "GRAY SCALE", "LAMP", and "ZEBRA".

- OFF [Default]
- V-COLOR BAR • 100% WHITE RASTER • OUTPUT FRAME
- H-COLOR BAR • 50% WHITE RASTER • VERTICAL STRIPE
- V-GRAY SCALE • RED RASTER • HORIZONTAL STRIPE
- H-GRAY SCALE • GREEN RASTER • VERTICAL ZEBRA
- VERTICAL LAMP • BLUE RASTER • HORIZONT ZEBRA
- HORIZONTAL LAMP • CROSS HATCH

![Test Patterns Diagram]

[Figure 8.26] Test patterns

- Scroll: OFF [Default]
  3 pixel per frame to 30 pixel per frame (by 3 pixels per frame)

Notes:
- For test patterns other than “OUTPUT FRAME”: Video is output on the full screen at the resolution set in “8.3.1 Output resolutions”, and the display position and size will be invalid.
- For “OUTPUT FRAME”: Use this pattern if edges are cut off due to enlargement display on the display device, and settings of “8.3.10 Output position” and “8.3.11 Output size” will be applied.
- While a test pattern is displayed, all settings of “8.4 Video Correction” will be invalid.
1. To set the test pattern using menu:

To set the test pattern using menu:

<table>
<thead>
<tr>
<th>MSD-5404</th>
<th>Top</th>
</tr>
</thead>
<tbody>
<tr>
<td>↓ SET key</td>
<td></td>
</tr>
</tbody>
</table>
| [FUNCTION SELECT] | OUTPUT TIMING ▼\▲ keys: Select “OUTPUT TIMING”.
| [OUTPUT TIMING] | TEST PATTERN ▼\▲ keys: Select “TEST PATTERN”.
| ↓ SET key |
| [OUT1 PATTERN] | OFF ▼\▲ keys: Select the desired test pattern for OUT1.
| ↓ ◄► keys |
| [OUT1 SCROLL] | OFF ▼\▲ keys: Select the desired scroll speed for OUT1.*
| ↓ ◄► keys |
| ↓ ESC key: Returns to the previous screen. |

* You can select SCROLL only if selecting “V-COLOR BAR”, “H-COLOR BAR”, “V-GRAY SCALE”, “H-GRAY SCALE”, “VERTICAL LAMP”, “HORIZONTAL LAMP”, “VERTICAL ZEBRA”, or “HORIZONTAL ZEBRA”.

2. To set the test pattern using commands:

@STP: Set test pattern
@GTP: Get test pattern
8.4 Video Correction

You can set output video quality.
Items that are set for each input: Correct deviation in color and others.
Items that are set for each output: Correct brightness according to the connected display device and others.

![Diagram of video correction settings]

**8.4.1 Input brightness [INPUT BRIGHTNESS]**

- **Brightness**: 80% to 120%  [Default]: 100%
  If you increase the value, the whole level will be increased as well; if you reduce the value, the whole level will be reduced.

1. **To set the input brightness using menu:**

   MSD-5404 Top
   ▼ SET key
   [FUNCTION SELECT]  ▲▼ keys: Select “IMAGE EFFECT”.
   ↓ SET key
   [IMAGE EFFECT]  ▲▼ keys: Select “INPUT BRIGHTNESS”.
   ↓ SET key
   [IN1 BRIGHTNESS]  ◀► keys: Set the brightness (80% to 120%).
   ◀► keys: Select the desired input (IN1 to IN9).
   ↓ ESC key: Returns to the previous screen.

2. **To set the input brightness using commands:**

   @SBR: Set input brightness
   @GBR: Get input brightness
8.4.2  Input contrast [INPUT CONTRAST]

You can set the contrast (Red, green, blue can be set separately) for input contrast.

- Contrast Red: 0% to 200%  [Default]: 100%
- Contrast Green: 0% to 200%  [Default]: 100%
- Contrast Blue: 0% to 200%  [Default]: 100%
  If you increase the value, the amplitude will be increased as well; if you reduce the value, the amplitude will be reduced.

1. To set the input contrast using menu:

```
MSD-5404 Top

[FUNCTION SELECT] IMAGE EFFECT ▼ ▲ keys: Select “IMAGE EFFECT”.

[IMAGE EFFECT] INPUT CONTRAST ▼ ▲ keys: Select “INPUT CONTRAST”.

[IN1 CONT] LINK:ON R:100 G:100 B:100 ▼ ▲ keys: Set “LINK” to “ON” or “OFF”. *1

[IN1 CONT] LINK:ON R:100 G:100 B:100 ▼ ▲ keys: Set the contrast of Red for IN1 (0% to 200%).

[IN1 CONT] LINK:OFF R:100 G:100 B:100 ▼ ▲ keys: Set the contrast of Green for IN1 (0% to 200%). *2

[IN1 CONT] LINK:OFF R:100 G:100 B:100 ▼ ▲ keys: Set the contrast of Blue for IN1 (0% to 200%). *2

ESC key: Returns to the previous screen.
```

*1 If you set “LINK” to “ON”, you can set only Red (R). Settings of Green (G) and Blue (B) are also changed associated with the settings of the Red (R). For example, if you increase Red (R) +2, Green (G) and Blue (B) are also increased (+2). If one of these three colors reaches the limiting value, it cannot be changed any further.

*2 Only if you set “LINK” to “OFF”, you can set the contrasts of Green and Blue.

2. To set the input contrast using commands:

@SCO: Set input contrast
@GCO: Get input contrast
8.4.3 Hue [INPUT HUE]

You can set the hue of input video:

- HUE: 0° to 359°  [Default]: 0°

1. To setting the hue using menu:

   MSD-5404

   ▼ SET key

   [FUNCTION SELECT]  IMAGE EFFECT  ▲▼keys: Select “IMAGE EFFECT”.
   ▼ SET keys

   [IMAGE EFFECT]  INPUT HUE  ▲▼keys: Select “INPUT HUE”.
   ▼ SET key

   [IN1 HUE]  ►◄  ▲▼keys: Set the hue (0° to 359°).
   ►◄ keys: Select the desired input (IN1 to IN9)
   ▼ ESC keys: Returns to the previous screen.

2. To set the hue using commands:

   @SHU: Set hue
   @GHU: Get hue
8.4.4 Saturation [INPUT SATURATION]

You can set the saturation of input video:

- Saturation: 0% to 200%  [Default]: 100%
  If you reduce the value, the color becomes weaker and goes to monochrome. (0%: full monochrome) If you increase the value, the color becomes more vivid.

1. To set the saturation using menu:

   MSD-5404 Top
   ↓ SET key
   [FUNCTION SELECT]
   IMAGE EFFECT ▲▼ keys: Select “IMAGE EFFECT”.
   ↓ SET key
   [IMAGE EFFECT]
   INPUT SATURATION ▲▼ keys: Select “INPUT SATURATION”.
   ↓ SET key
   [IN1 SATURATION] 100% ▲▼ keys: Set the saturation (0% to 200%). ▲▼ keys: Select the desired input (IN1 to IN9).
   ↓ ESC key: Returns to the previous screen.

2. To set the saturation using commands:

   @SST: Set saturation
   @GST: Get saturation
8.4.5 Black level [INPUT SETUP LEVEL]

You can set the black level of the input video:

- Setup level: -10.0% to +10.0% by 0.5% step  [Default]: ±0.0%
  If black level of output video is low (light black), set the level toward the minus direction.
  If black level is high (dark black), set the level toward the plus direction.
  Even if you change the black level, the white level is not changed.

1. To set the setup level using menu:

   1. MSD-5404
   2. Top
   3. SET key
   4. [FUNCTION SELECT]
      IMAGE EFFECT
      ▲▼ keys: Select “IMAGE EFFECT”.
   5. SET key
   6. [IMAGE EFFECT]
      INPUT SETUP LEVEL
      ▲▼ keys: Select “INPUT SETUP LEVEL”.
   7. SET key
   8. [IN1 SETUP LEVEL]
      0.0%
      ▲▼ keys: Set the black level (-10.0% to +10.0%).
      ▲▼ keys: Select the desired input (IN1 to IN9).
   9. ESC key: Returns to the previous screen.

2. To set the setup level using commands:

   @SSU: Set black level
   @GSU: Get black level
8.4.6 Input default color [IN DEFAULT COLOR]

You can initialize settings of the following menus: “8.4.1 Input brightness”, “8.4.2 Input contrast”, “8.4.3 Hue”, “8.4.4 Saturation”, and “8.4.5 Black level”.

1. To initialize the settings of input default color using menu:

```
MSD-5404 Top
↓ SET key
[FUNCTION SELECT] IMAGE EFFECT ▲▼ keys: Select “IMAGE EFFECT”.
↓ SET key
[IMAGE EFFECT] IN DEFAULT COLOR ▲▼ keys: Select “IN DEFAULT COLOR”.
↓ SET key ↑ ESC key: Returns to menu without changing settings
[IN1 DEFAULT COLOR] SURE? = NO ▲▼ keys: Select “YES” or “NO”.
▲▼ keys: Select the desired input (IN1 to IN9).
↓ To apply the setting: Select “YES” and press the “SET” key.
To return to the menu without any change: Select “NO” and press the “SET” key.
```

2. To initialize the settings of input default color using commands:

@IDC: Input default color
8.4.7 Output brightness [OUTPUT BRIGHTNESS]

You can set the output brightness.
- Brightness: 80% to 120%  [Default]: 100%
  If you increase the value, the whole level will be increased as well; if you reduce the value, the whole level will be reduced.

1. To set the output brightness using menu:

   1. [FUNCTION SELECT]
      IMAGE EFFECT
      ▲▼ keys: Select “IMAGE EFFECT”.
   2. [IMAGE EFFECT]
      OUTPUT BRIGHTNESS
      ▲▼ keys: Select “OUTPUT BRIGHTNESS”.
   3. [OUT1 BRIGHTNESS]
      100%
      ▲▼ keys: Set the output brightness (80% to 120%).
      ▲▼ keys: Select the desired output (OUT1 to OUT4).
   4. ESC key: Returns to the previous screen.

2. To set the output brightness using commands:

   @SOB: Set output brightness
   @GOB: Get output brightness
8.4.8 Output contrast [OUTPUT CONTRAST]

You can set contrasts of Red, Green, and Blue separately.

- Contrast (Red): 0% to 200%  [Default]: 100%
- Contrast (Green): 0% to 200%  [Default]: 100%
- Contrast (Blue): 0% to 200%  [Default]: 100%

If you reduce the set value, the amplitude decreases and if you increase the value, the amplitude increases.

1. To set the output contrast using menu:

   MSD-5404
   ↓ SET key
   [FUNCTION SELECT] IMAGE EFFECT  ▲▼keys: Select “IMAGE EFFECT”.
   ↓ SET key
   [IMAGE EFFECT] OUTPUT CONTRAST  ▲▼keys: Select “OUTPUT CONTRAST”.
   ↓ SET key
   [OUT1 CONT] LINK: ON  R:100 G:100 B:100  ▲▼keys: Set “LINK” to “ON” or “OFF”. *1
   ↓◄► keys
   [OUT1 CONT] LINK: ON  R:10% G:100 B:100  ▲▼keys: Set the contrast of Red for OUT1 (0% to 200%).
   ↓◄► keys
   [OUT1 CONT] LINK: OFF  R:100 G:100 B:100  ▲▼keys: Set the contrast of Green for OUT1 (0% to 200%).  *2
   ↓◄► keys
   [OUT1 CONT] LINK: OFF  R:100 G:100 B:10%  ▲▼keys: Set the contrast of Blue for OUT1 (0% to 200%).  *2
   ↓◄► keys

   ▼ESC key: Returns to the previous screen.

*1 If you set “LINK” to “ON”, you can set only Red (R). Settings of Green (G) and Blue (B) are also changed associated with the settings of the Red (R). For example, if you increase Red (R) +2, Green (G) and Blue (B) are also increased (+2). If one of these three colors reaches the limiting value, it cannot be changed any further.

*2 Only if you set “LINK” to “OFF”, you can set the contrasts of Green and Blue.

2. To set the output contrast using commands:

   @SOC: Set output contrast
   @GOC: Get output contrast
8.4.9 Output default color [OUT DEFAULT COLOR]

You can initialize the settings of “8.4.7 Output brightness” and “8.4.8 Output contrast”.

1. To initialize the settings of output default color using menu:

   MSD-5404
   ↓ SET key
   [FUNCTION SELECT] IMAGE EFFECT  ▲▼ keys: Select “IMAGE EFFECT”.
   ↓ SET key
   [IMAGE EFFECT] OUT DEFAULT COLOR  ▲▼ keys: Select “OUT DEFAULT COLOR”.
   ↓ SET key  ↑ ESC key: Return to previous screen without changing settings.
   [OUT DEFAULT COLOR] SURE? = NO  ▲▼ keys: Select “YES” or “NO”.
   ▲▼ keys: Select the desired output (OUT1 to OUT4).
   ↓ To apply the setting: Select “YES” and press the “SET” key.
   To return to the menu without any change: Select “NO” and press the “SET” key.

2. To initialize the settings of output default color using commands:

   @ODC: Output default color
8.5 Input Settings

8.5.1 No-signal input monitoring [INPUT VIDEO DETECT]

If you change the settings of EDID or turn off/on the MSD while HDMI or DVI devices (hereafter referred to as “source devices”) that are connected to the MSD are turned on, only a few source devices stop outputting signals. In this case, the MSD repeatedly requests the source devices to output signal data. Use this menu to set the monitoring time which is from when a source device stops outputting signals to when the MSD requests the source device to output video signals.

- Monitoring time: OFF, 2000ms (2 seconds) to 15000 ms (15 seconds) by 100 ms.
  [Default]: 10000 ms (10 seconds)

![Figure 8.28] Monitoring absence of input

**Note 1:**
If the MSD requests a PC to output video signals, the PC resets the output of video signals. If the set value is too short, the PC may not output video because it keeps resetting repeatedly.

![Figure 8.29] Repeating reset

**Note 2:**
If you use this input monitoring function and the power-saving function of the PC’s monitor simultaneously, the PC may output video again only after the time set in this menu passes following that the monitor power save function works. If you enable the monitor power save function, set this menu to “OFF”.

**Note 3:**
If this function works with the Dual monitor function simultaneously, the PC may determine there is no monitor connection and it may reset the Dual monitor function. In this case, set this menu to “OFF”.

1. To set the No-signal input monitoring time using menu:

   MSD-5404  Top
   ↓ SET key
   [FUNCTION SELECT] INPUT SETTING  ▲▼ keys: Select “INPUT SETTING”.
   ↓ SET key
2. To set the No-signal input monitoring time using commands:
   @SDT: Set no-signal-input monitoring
   @GDT: Get no-signal-input monitoring
8.5.2 HDCP input enabled/disabled [HDCP INPUT ENABLE]

Some source devices check whether the connected device supports HDCP and then determine whether they encrypt HDCP signals or not. Since the MSD is HDCP compliant, if it is connected to a display device that is not HDCP compliant, the display device may not display video.

With this menu, you can set whether the MSD encrypts HDCP to the source device. “ENABLE” is set by default, but if you want to connect the MSD to a display device that is not HDCP compliant, select “DISABLE” to disable the encryption of HDCP output from the source device.

- To disable HDCP encryption: DISABLE
- To enable HDCP encryption: ENABLE [Default]

![Diagram](image)

[Figure 8.30] Enabling/disabling HDCP input

**Note:**
If you select “DISABLE” and connect a Blu-ray disc player or the like to the MSD, all video signals may not be output. This is because Blu-ray disc players do not allow connection with any device that is not HDCP compliant. In such a case, select “ENABLE” and connect an HDCP-compliant display device. Even if you select “DISABLE” and video can be output, protected contents (movie, music video, and the like) still cannot be played.

**1. To enable/disable the HDCP input using menu:**

```
Top

[FUNCTION SELECT] [INPUT SETTING] ↓ SET key

▲▼ keys: Select “INPUT SETTING”.

[INPUT SETTING] HDCP INPUT ENABLE ↓ SET key

▲▼ keys: Select “HDCP INPUT ENABLE”.

[IN1 HDCP INPUT] ENABLE ↓ SET key

▲▼ keys: select “DISABLE” or “ENABLE”.

◄► keys: Select the desired input (IN1 to IN5).

ESC key: Returns to the previous screen.
```
2. To enable/disable the HDCP input using commands:
   @SHE: Set HDCP input enabled/disabled
   @GHE: Get HDCP input enabled/disabled
8.5.3 Input equalizer [INPUT EQUALIZER]

HDMI input connector has an equalizer circuit to correct attenuated signals caused when a long cable is connected. If you set this menu to “ON”, signals are corrected automatically according to the amount of the attenuation. However, if you connect a cable booster or the like for input of the MSD, compensatory functions may sometimes conflict and signals cannot be corrected appropriately. In such a case, set this menu to “OFF”.

- Enable input equalizer: ON [Default]
- Disable input equalizer: OFF

1. To enable/Disable the input equalizer using menu:

   MSD-5404
   
   Top
   
   ↓ SET key
   
   [FUNCTION SELECT] INPUT SETTING ▲▼ keys: Select “INPUT SETTING”.
   
   ↓ SET key
   
   [INPUT SETTING] INPUT EQUALIZER ▲▼ keys: Select “INPUT EQUALIZER”.
   
   ↓ SET key
   
   [IN1 EQUALIZE] ON ▲▼ keys: Select “ON” or “OFF”.
   
   ◄► keys: Select the desired input (IN1 to IN5).
   
   ↓ ESC key: Returns to the previous screen.

2. To enable/disable the input equalizer using commands:

   @SIQ: Set input equalizer
   
   @GIQ: Get input equalizer
8.5.4 Signal type of analog input [ANALOG INPUT TYPE]

You can set the signal type that is input from an analog input connector:

- AUTO [Default]
- RGB
- YPbPr
- VIDEO AUTO
- VIDEO (for composite video)
- Y/C (for S-video)

If you select “AUTO”, the type of input signals is detected automatically. In cases where the detection fails and video is not output correctly, set the input type manually. With “AUTO”, the automatic detection of S-Video may fail. If both composite video and S-Video are input at the same time, select “VIDEO AUTO”; if only S-Video is input, select “Y/C”.

**Note:**
For video of a monochrome camera or VHS tape with a bad recording condition or the like, automatic detection may fail. In these cases, select “VIDEO AUTO”, “VIDEO” or “Y/C”.

1. To set the signal type of analog input using menu:

   MSD-5404
   Top
   ↓ SET key
   [FUNCTION SELECT] INPUT SETTING  ▲▼ keys: Select “INPUT SETTING”.
   ↓ SET key
   [INPUT SETTING] ANALOG INPUT TYPE  ▲▼ keys: Select “ANALOG INPUT TYPE”.
   ↓ SET key
   [IN6 ANALOG TYPE] AUTO  ▲▼ keys: Select the desired signal type.
   ( AUTO, RGB, YPbPr, VIDEO AUTO, VIDEO, Y/C )
   ◄► keys: Select the desired input (IN6 to IN9).
   ↓ ESC key: Returns to the previous screen.

2. To set the signal type of analog input using commands:
   @SAI: Set analog input type
   @GAI: Get analog input type
8.5.5 Automatic detection of input video interruption [INPUT OFF CHECK]

The MSD can stop outputting video immediately after input video signals are disconnected for a moment. Use this function to reduce distorted output video occurred at the time of switching if an external switcher is connected for input of the MSD. The processing of this function is the same as that of switching input. (Settings of the following menus are applied automatically: “8.7.5 Window transition effect”, “8.7.6”, and “8.7.7 Wipe color”.)

\[
\begin{align*}
\cdot & \text{ Not detect automatically: OFF} \\
\cdot & \text{ Detect automatically: ON } \quad \text{[Default]}
\end{align*}
\]

Note 1:
If you select “ON” and input video (VHS tapes or the like) that has a bad record condition, outputting video will be ON/OFF repeatedly due to distorted synchronous idles. In this case, set this menu to “OFF”.

Note 2:
Even if you set this item to “ON”, distorted video cannot be corrected completely when input video signals are lost. Especially if you set “8.7.5 Window transition effect” to an option other than “CUT”, noises or black bars may be output at the time of fading out or wiping out.

1. To enable/disable the automatic detection using menu:

   MSD-5404  \begin{tabular}{|c|c|}
   \hline
   Top \\
   \hline
   \end{tabular}  \\
   \downarrow \text{SET key}  \\
   \begin{tabular}{|c|c|}
   \hline
   [FUNCTION SELECT] \\
   \multicolumn{1}{|c|}{\begin{tabular}{c} INPUT SETTING \end{tabular}} \\
   \hline
   \end{tabular}  \\
   \uparrow \downarrow \text{keys: Select “INPUT SETTING”}.  \\
   \downarrow \text{SET key}  \\
   \begin{tabular}{|c|c|}
   \hline
   [INPUT SETTING] \\
   \multicolumn{1}{|c|}{\begin{tabular}{c} INPUT OFF CHECK \end{tabular}} \\
   \hline
   \end{tabular}  \\
   \uparrow \downarrow \text{keys: Select “INPUT OFF CHECK”}.  \\
   \downarrow \text{SET key}  \\
   \begin{tabular}{|c|c|}
   \hline
   [IN1 OFF CHECK] \\
   \multicolumn{1}{|c|}{\begin{tabular}{c} ON \end{tabular}} \\
   \hline
   \end{tabular}  \\
   \uparrow \downarrow \text{keys: Select “ON” or “OFF”}.  \\
   \leftarrow \rightarrow \text{keys: Select the desired input (IN1 to IN9).}  \\
   \downarrow \text{ESC key: Returns to the previous screen.}

2. To enable/disable the automatic detection using commands:

   @SID: Set automatic detection of input video interruption  
   @GID: Get automatic detection of input video interruption
8.6 Input Timing Settings

The MSD continuously monitors input signals. When signals input from analog input (IN6 to IN9) changes, the MSD loads the optimal table from the built-in tables and converts the signals. However, if signals which are not registered in the MSD tables are input or if part of the output video is cut off by using the standard table registered in the MSD, set the input timing manually. You can check if the input signals are registered in the MSD in “8.18.7 Input signal status”. Normally, it is set automatically by the operations in “8.6.6 Analog input automatic measurement”, but if the automatic setup fails, you can set it manually.

For digital inputs, IN1 to IN5, you do not need to set the input timing, but if part of the video is cut off, adjust the input timing finely.
8.6.1 The total number of horizontal dots [H TOTAL DOTS]

You can set the total number of horizontal dots of analog RGB/analog YPbPr input video videos.

- The total number of horizontal dots: 400 to 4125 (Within sampling clock 13M Hz to 162M Hz)  
  [Default]: Depends on input signals

![Diagram](image)

[Figure 8.31] Total number of horizontal dots

1. To set the total number of horizontal dots using menu:

```
MSD-5404
Top
↓ SET key
[FUNCTION SELECT]    ▲▼keys: Select “INPUT TIMING”.
  INPUT TIMING
↓ SET key
  [INPUT TIMING]    ▲▼keys: Select “H TOTAL DOTS”.
  H TOTAL DOTS
↓ SET key
  [IN6 H TOTAL DOTS]    ▲▼keys: Set the total number of horizontal dots.
  1344DOT
↓ ESC key: Returns to the previous screen.
```

Note:
You can set the total number of horizontal dots only if analog RGB or analog YPbPr signals are input. You can only display the set value for input analog video signals or digital input signals, and you cannot change the setting. If no signal is input, you cannot set the function and the message is displayed.

```
[IN6 H TOTAL DOTS]
NOT AVAILABLE NOW ↔
```

A: Settable only if analog RGB/analog YPbPr signals are input.
If analog video signals are input, only the set value is displayed and you cannot set the total number of horizontal dots.
B: Only the set value is displayed. You cannot set the total number of horizontal dots.

2. To set the total number of horizontal dots using commands:
   @SHT: Set the total number of horizontal dots
   @GHT: Get the total number of horizontal dots

91
8.6.2  Horizontal start position [H START]

- Starting position of horizontal reading:
  64 to 2900 (Must be equal or less than [The total number of horizontal dots - Horizontal display period])
  [Default]: Depends on input signals

The settable range depends on settings of "8.6.1 The total number of horizontal dots" and "8.6.3 Horizontal display period". If the set value is [Total number of horizontal dots > Horizontal display period > Horizontal start position] and the set value of the horizontal start position exceeds the limit value by changing the total number of horizontal dots or horizontal display period, set the horizontal start position to the limit value automatically.

1. To set the horizontal start position using menu:

   MSD-5404  Top
   ↓ SET key
   [FUNCTION SELECT]  ▲▼ keys: Select “INPUT TIMING”.
   INPUT TIMING  ↓ SET key
   [INPUT TIMING]  ▲▼ keys: Select “H START”.
   ↓ SET key
   [IN6 H START]  ▲▼ keys: Set the horizontal start position.
   296DOT  ◄► keys: Select the desired input (IN1 to IN9).
   ↓ ESC key: Returns to the previous screen.

   Note:
   You can set the horizontal start position only if there is an input signal. If no signal is input, you cannot set the position, and the message shown right is displayed.

2. To set the horizontal start position using commands:

   @SHS: Set horizontal start position
   @GHS: Get horizontal start position
8.6.3  Horizontal display period [H DISPLAY]

- Horizontal display period: 64 to 2900 (Equal or less than [The total number of horizontal dots - 64])
  [Default]: Depends on input signals

[Figure 8.33] Horizontal display period

The settable range depends on setting of “8.6.1 The total number of horizontal dots”. If the set value is [Total number of horizontal dots > Horizontal displaying period] and the setting of horizontal display period exceeds the limit value by changing the total number of horizontal dots, the horizontal display period is set to the limit value of the set range automatically.

1. To set the horizontal display period using menu:

   MSD-5404
   ----
   Top
   ▼ SET key
   [FUNCTION SELECT] INPUT TIMING ▼
   ▼ SET key
   [INPUT TIMING] H DISPLAY ▼
   ▼ SET key
   [IN6 H DISPLAY] 1024 DOT ◄►
   ▼ ESC key: Returns to the previous screen.

   Note:
   You can set the horizontal display period only if there is an input signal. If no signal is input, you cannot set the period, and the message shown right is displayed.

2. To set the horizontal display period using commands:

   @SHD: Set horizontal display period
   @GHD: Get horizontal display period
### 8.6.4 Vertical start position [V START]

- Vertical start position: 10 to 2048 (Equal or less than [Total vertical lines - vertical display period])
  
  [Default]: Depends on input signals

![Diagram showing vertical start position](image)

**[Figure 8.34] Vertical start position**

The settable range depends on the total number of lines of input signals (the MSD counts automatically) and "8.6.5 Vertical display period". If the set value is [Total number of vertical lines > Vertical displayed period > Vertical start position] and the set value of vertical start position exceeds the limit value by changing the vertical display period, the vertical start position is set to the limit value automatically.

1. **To set the vertical start position using menu:**

   MSD-5404

   ↓ SET key

   [FUNCTION SELECT]
   INPUT TIMING

   ▲▼ keys: Select “INPUT TIMING”.

   ↓ SET key

   [INPUT TIMING]
   V START

   ▲▼ keys: Select “V START”.

   ↓ SET key

   [IN6 V START]
   35 LINE

   ▲▼ keys: Set the vertical start position.

   ◄► keys: Select the desired input (IN1 to IN9).

   ↓ ESC key: Returns to the previous screen.

**Note:**

You can set the vertical start position only if there is an input signal. If no signal is input, you cannot set the position, and the message shown right is displayed.

2. **To set the vertical start position using commands:**

   @SVS: Set vertical start position

   @GVS: Get vertical start position
8.6.5 Vertical display period [V DISPLAY]

- Vertical display period: 10 to 2048 (Equal or less than [The total number of vertical lines – 10])
  [Default]: Depends on input signals

[Figure 8.35] Vertical display period

1. To set the vertical display period using menu:

   MSD-5404 Top
   ↓ SET key
   [FUNCTION SELECT] INPUT TIMING ▼ ▲▼ keys: Select “INPUT TIMING”.
   ↓ SET key
   [INPUT TIMING] V DISPLAY ▼ ▲▼ keys: Select “V DISPLAY”.
   ↓ SET key
   [IN6 V DISPLAY] 768 LINE ▼ ▲▼ keys: Select the desired input (IN1 to IN9).
   ↓ ESC key: Returns to the previous screen.

Note:
You can set the vertical display period only if there is an input signal. If no signal is input, you cannot set the period, and the message shown right is displayed.

2. To set the vertical display period using commands:

   @SVD: Set vertical display period
   @GVD: Get vertical display period
8.6.6 Analog input automatic measurement [AUTO SETUP]

Analog RGB/ analog YPbPr video inputs are measured, and the following menus are set automatically: “8.6.1 The total number of horizontal dots”, “8.6.2 Horizontal start position”, “8.6.3 Horizontal display period”, “8.6.4 Vertical start position”, “8.6.5 Vertical display period”, and “8.6.11 Tracking”.

**Note:**
In order to enable this menu, the input video must have 25% or more brightness and its edges (all sides) need to be in contact with the circumscribed rectangle in the effective display area.

If you input very black or extremely dark video, the measurement fails and a message, “MEASUREMENT ERROR”, is displayed.

1. To set the automatic measurement using menu:

   MSD-5404
   ↓ SET key
   [FUNCTION SELECT] INPUT TIMING  ▲▼ keys: Select “INPUT TIMING”.
   ↓ SET key
   [INPUT TIMING] AUTO SETUP  ▲▼ keys: Select “AUTO SETUP”.
   ↓ SET key  ↓ ESC key: Cancels measurement and returns to the previous screen.
   [IN6 AUTO SETUP]  ▲▼ keys: Select the desired measuring mode.¹
   PUSH SET: NORMAL MODE  ◄► keys: Select the desired input (IN1 to IN9).
   SET keys: Executes the measurement and sets the input timing.
   ↓ SET key: Executes measurement
   [IN6 AUTO SETUP]  Displays the measurement result for 1 second and then returns to the NORMAL END previous screen automatically.
   ↓  
   [IN6 AUTO SETUP]  ◄► Normal END  PUSH SET: NORMAL MODE  ↓ ESC key: Returns to the previous screen.

   ¹ Normally, select “NORMAL MODE” (Automatic measurement of start position and display period). If edges of video are not displayed correctly, use this mode to set the start position and display period automatically.
If the total number of horizontal dots is not correct, the aspect ratio is not matched even though automatic measurement is set to perform with the “NORMAL MODE”. In this case, select "NEXT ASPECT" (Auto measurement taking into account aspect ratio) for the measurement function. Each time you press the “SET” key, input timing is set based on several aspect ratios of the input signals. If the aspect ratio of the input signal is known, you can directly specify the aspect ratio to correctly perform the automatic measurement.

If input signal is not registered in the MSD, use this function.

You can execute the automatic measurement not only from this menu but also by pressing an input selection key (one of IN6 to IN9 keys) for 2 seconds or longer. By pressing an input selection key for 2 seconds, the auto measurement mode with “NORMAL MODE” will be enabled. After that, pressing the same key for 3 seconds or longer, the auto measurement mode with “NEXT ASPECT” will be enabled. (This auto measurement mode can be enabled also by pressing the input key for 5 seconds or longer continuously.)

Once you perform the function, from the next time, it can be performed simply by pressing the key without pressing it for several seconds. This mode can be canceled 5 seconds after the last auto measurement is executed. If you execute the automatic measurement with this mode, the input selection keys blink until the measurement finishes.

You can execute the automatic measurement also from input selection keys of parallel input.
You can execute automatic measurement by pressing the input channel selection key for 2 seconds.

![Figure 8.39] Automatic measurement using input keys

**Note:**
The automatic measurement is available only if analog RGB or analog YPbPr signals are input. If analog video signals are input, no signal is input, or video input is set to a channel other than IN6 to IN9, you cannot execute the measurement and the message shown right is displayed.

<table>
<thead>
<tr>
<th>IN 1</th>
<th>IN 2</th>
<th>IN 3</th>
<th>IN 4</th>
<th>IN 5</th>
<th>IN 6</th>
<th>IN 7</th>
<th>IN 8</th>
<th>IN 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
</tbody>
</table>

A: Settable only if analog RGB/analog YPbPr signals are input.
N/A: Cannot be executed.

Since the automatic measurement is executed in the output side, the target input has to be first selected for any of the output. If it is not selected for an output, the measurement cannot be executed.

2. **To set the automatic measurement using commands:**
   - @AIS: Automatic input measurement
   - @AIT: Automatic input measurement including aspect
8.6.7 Automatic measurement of start position [AUTO START POS]

General PCs output video signals meeting the VESA standard, but some PCs output cut-off (a few dots from the VESA standard) signals. In such a case, if the video is output using the video format table in the MSD, the left edge may not be displayed or black line may be output. If you set this menu “ON”, the MSD monitors continuously the upper left of the signals input from (IN6 to IN9) and it automatically matches the upper left of the input video and the upper left of the screen (Settings of “8.6.2 Horizontal start position”, “8.6.4 Vertical start position”, and “8.6.11 Tracking” are set automatically).

- Not measuring all inputs from the input automatically: ALL OFF
- Not measuring the current input signals automatically: OFF
- Measuring the current input signals automatically: ON [Default]

**Note 1:**
For motion images, some content may not be displayed on the full screen, and the display position may be moved every time the setting of the automatic measurement is applied. In such a case, set this menu to “OFF”. As “OFF” and “ON” are saved for each input resolution, it can be set according to the input video. If you do not want to perform this function for all resolution, select “ALL OFF”.

**Note 2:**
Only the start position is set by automatic measurement of this menu. If “8.6.1 The total number of horizontal dots”, “8.6.3 Horizontal display period”, and “8.6.5 Vertical display period” do not match, the lower right may be cut off or blackout may be output. In this case, adjust the whole screen by following “8.6.6 Analog input automatic measurement”. As the set value must not exceed “8.6.2 Horizontal start position” and “8.6.4 Vertical start position”, some input videos are displayed with blackout at the left or top side.

**Note 3:**
Automatic setting of start position is enabled only if the brightness is over 25% or more and video is displayed on the almost full screen. At least, the position is not set automatically if the video is extremely dark or displayed on the center in a small size.

**Note 4:**
Even if you set this menu to “ON”, the manual setting will be applied and the automatic measurement is not executed if you set any of the following menus: “8.6.1 The total number of horizontal dots”, “8.6.2 Horizontal start position”, “8.6.3 Horizontal display period”, “8.6.4 Vertical start position”, and “8.6.5 Vertical display period”. Even if you set “8.6.11 Tracking”, the manual setting is applied, and tracing is not set automatically when the automatic measurement is executed.

When you execute “8.6.6 Analog input automatic measurement”, settings of this menu will be valid again.
1. To set the automatic measurement of start position using menu:

```
Top

1. MSD-5404

  ↓ SET key

  [FUNCTION SELECT]
  INPUT TIMING  ▼

  ▲▼ keys: Select “INPUT TIMING”.

  ↓ SET key

  [INPUT TIMING]
  AUTO START POS ▼

  ▲▼ keys: Select “AUTO START POS”.

  ↓ SET key

  [IN6 AUTO START]
  ▼ON ▲▼

  ▲▼ keys: Select the desired mode (ALL OFF, OFF, ON).
  ◄► keys: Select the desired input (IN6 to IN9).

  ↓ ESC key: Returns to the previous screen.
```

2. To set the automatic measurement of start position using commands:

@SIS: Set automatic measurement of start position
@GIS: Get automatic measurement of start position
8.6.8 Automatic setting of input timing [UNKNOWN TIMING]

The MSD continuously monitors input signals. When signals input from analog input (IN6 to IN9) changes, it loads the optimal table from the built-in tables and converts the signals. However, if unregistered signals are input, the input timing must be set. By setting this menu to “ON”, “8.6.6 Analog input automatic measurement” is executed and the input timing is set automatically if signals that cannot be detected by the MSD are input for the first time.

- The automatic measurement is not executed when unregistered signals are input: AUTO SETUP OFF
- The automatic measurement is executed when unregistered signals are input: AUTO SETUP ON [Default]

Note 1:
If automatic measurement finds inconsistency of aspect ratio, please perform “8.6.6 Analog input automatic measurement” manually or set the input timing in the following menus: “8.6.1 The total number of horizontal dots”, “8.6.2 Horizontal start position”, “8.6.3 Horizontal display period”, “8.6.4 Vertical start position”, or “8.6.5 Vertical display period”.

Note 2:
Only if a video having 25% or more brightness and whose edges (all sides) are in contact with the circumscribed rectangle in the effective display area is input, the automatic measurement is valid. If the input video does not meet these requirements, the measurement may fail or the video may be output on the correct position. In such a case, set this menu to “OFF”.

![Image showing examples of input videos]

[Figure 8.40] Examples of input videos

1. To set the input timing using menu:

   MSD-5404
   ▾ SET key
   [FUNCTION SELECT] INPUT TIMING ▾
   ▾ SET key
   [INPUT TIMING] UNKNOWN TIMING ▾
   ▾ SET key

   ▾▼ keys: Select “INPUT TIMING”.

   ▾▼ keys: Select “UNKNOWN TIMING”.

101
2. To set the input timing using commands:
   @SSM: Set automatic setting of input timing
   @GSM: Get automatic setting of input timing
8.6.9 Loading device data [LOAD]

For digital input (IN1 to IN5): Settings of input timing will be initialized to settings that are detected automatically by MSD. Use this menu to restore the input timing settings that are set manually to the original timing.

For analog input (IN6 to IN9): Registered device data will be loaded. Use this menu in the following cases:
- Several device data with the same frequency of synchronous signal and different input timings is registered
- You want to set the input timing again.

1. To load the device data using menu:

   | MSD-5404 |
   | Top |

   ▼ SET key

   **[FUNCTION SELECT]**
   **INPUT TIMING** ▲▼ keys: Select “INPUT TIMING”.

   ▼ SET key

   **[INPUT TIMING]**
   **LOAD** ▲▼ keys: Select “LOAD”.

   ▼ SET key  ‾ ESC key: Returns to the previous screen without loading the setting.

   **[IN1 LOAD]**
   1920x1080 ▶► keys: Select the desired input (IN1 to IN9).

   **[IN6 LOAD]**
   No. 1 ▶► keys: Select the desired table number.*

   ◄► keys: Select the desired input (IN1 to IN9).

   ▼ SET key: Loads settings

   **[PRESET TABLE 1]**
   NOW LOADING... Displays the message for 1 second before automatically returning to the previous screen.

   ▼

   **[INPUT TIMING]**
   **LOAD**

* Only table numbers that can be loaded are displayed. If only numbers (1 to 99) are displayed, those numbers show the device data registered in “8.6.10 Registering device data”, and the registered name is displayed on the right. “P+Number” shows pre-registered device data, and the resolution is displayed on the right.
**Note:**
This function is available only if there is an input signal. For analog input, the function can be executed only if device data corresponding to the input signal is registered.

I: Can be executed only if there is an input signal
D: Can be executed only if device data corresponding to the input signal is registered.

2. To load the device data using commands:
   @RTT: Load device data
8.6.10 Registering device data [SAVE]

You can register the set input timings of analog input as the device data. From the next time, the convert operation will be performed with the registered timings when the same signal is input from a different channel.

**Note:**
Do not turn off the MSD while “NOW SAVING...” is displayed in the MSD's VFD screen; otherwise, the set data may be lost.

1. To register the device data using menu:

   MSD-5404
   ▼▼ SET key
   [FUNCTION SELECT]
   INPUT TIMING ▼▼
   ▼▼ SET key
   [INPUT TIMING]
   SAVE ▼▼
   ▼▼ SET key ▲ ESC key: Returns to the previous screen without saving settings.
   [IN6 SAVE] ▲▼ keys: Select “INPUT TIMING”.
   ▲▼ keys: Select “SAVE”.
   ▼▼ keys: Select the desired table number (1 to 99).
   ▲▼ keys: Moves the cursor to the device data name.
   [IN6 SAVE] ▲▼ keys: Set the device data name (20 to 7D of “9 ASCII codes”).
   ▲▼ keys: Moves the cursor to the next character.
   Select the desired input (IN6 to IN9).
   ▼▼ SET key: Displays the confirmation screen before saving settings ▲ ESC key
   [TIMING TABLE 1]
   SAVE? ▼▼
   ▼▼ key: Select “YES” or “NO”.
   ▼▼ To apply the setting: Select “YES” and press the “SET” key.
   To return to the menu without any change: Select “NO” and press the “SET” key.
   [TIMING TABLE 1]
   NOW SAVING...
   [INPUT TIMING]
   SAVE

   **Note:**
   Device data can be registered only if analog RGB or analog YPbPr signals are input. You cannot register data and the message shown right is displayed in the followings cases: analog video signals are input, no signal is input, or video input is set to a channel other than IN6 to IN9.

   ![IN 1 ▼...
   N/A ▼...
   N/A ▼...
   N/A ▼...
   A ▼...
   A ▼...
   A ▼...
   A ▼...
   A ▼...

   A: Can be registered only if analog RGB/analog YPbPr signals are input.
   N/A: Cannot be registered.

2. To registering the device data using commands:
   @STT: Register device data
8.6.11 Tracking [TRACKING]

You can set the tracking for analog RGB/ analog YPbPr input video.

- Tracking: 0 to 63  [Default]: 0

This function can be performed only if the total number of input horizontal dots and the value set in "8.6.1 The total number of horizontal dots" are the same.

1. To set the tracking using menu:

   MSD-5404
   Top
   ↓ SET key
   [FUNCTION SELECT] INPUT TIMING ▲▼ keys: Select “INPUT TIMING”.
   ↓ SET key
   [INPUT TIMING] TRACKING ▲▼ keys: Select “TRACKING”.
   ↓ SET key
   [IN6 TRACKING] ▲▼ keys: Set the tracking (0 to 63).
   ◄► keys: Select the desired input (IN6 to IN9).
   ↓ ESC key: Returns to the previous screen.

Note:
Tracking works only if analog RGB or analog YPbPr signals are input. It is disabled and the message shown right is displayed in the followings cases: Analog video signals are input, no signal is input, or video input is set to a channel other than IN6 to IN9.

<table>
<thead>
<tr>
<th>IN1</th>
<th>IN2</th>
<th>IN3</th>
<th>IN4</th>
<th>IN5</th>
<th>IN6</th>
<th>IN7</th>
<th>IN8</th>
<th>IN9</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
</tbody>
</table>

A: Can be set only if analog RGB/analog YPbPr signal is input.
N/A: Cannot be set.

2. To set the tracking using commands:
@STK Set tracking
@GTK Get tracking
8.7 Output Settings

8.7.1 Output equalizer [OUTPUT EQUALIZER]

HDMI input connector has an equalizer circuit to correct attenuated signals caused when a long cable is connected. Set the output equalizer according to the cable length.

- No correction: OFF [Default]
- Modest correction: LOW
- Middle correction: MIDDLE
- Significant correction: HIGH

[Table 8.2] Output equalizer

<table>
<thead>
<tr>
<th>Cable length</th>
<th>Shorter than 32.8 ft./10 m</th>
<th>32.8 ft./10 m or longer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting</td>
<td>“OFF” to “MIDDLE”</td>
<td>“LOW” to “HIGH”</td>
</tr>
</tbody>
</table>

If you use other manufacturers’ cable, use this table only as a reference.
If a display device that is in a significantly bad condition is connected, the video may be distorted.

[Table 8.3] Amount of corrections

<table>
<thead>
<tr>
<th>Setting of output equalizer</th>
<th>Amount of corrections</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>0.0 dB</td>
</tr>
<tr>
<td>LOW</td>
<td>1.5 dB</td>
</tr>
<tr>
<td>MIDDLE</td>
<td>3.5 dB</td>
</tr>
<tr>
<td>HIGH</td>
<td>6.0 dB</td>
</tr>
</tbody>
</table>

1. To set the output equalizer using menu:

   MSD-5404
   Top
   ↓ SET key
   [FUNCTION SELECT] OUTPUT SETTING ▲▼ keys: Select “OUTPUT SETTING”.
   ↓ SET key
   [OUTPUT SETTING] OUTPUT EQUALIZER ▲▼ keys: Select “OUTPUT EQUALIZER”.
   ↓ SET key
   [OUT1 EQUALIZER] OFF ▲▼ keys: Select the desired output equalizer mode (OFF, LOW, MIDDLE, or HIGH).
   ◄► keys: Select the desired output (OUT1 to OUT4).
   ↓ ESC key: Returns to the previous screen.

2. To set the output equalizer using commands:

   @SEQ: Set output equalizer
   @GEQ: Get output equalizer
8.7.2 Output mode [OUTPUT MODE]

You can select the output mode of HDMI output connectors manually. Set the mode to “HDMI YCbCr4:4:4 MODE” to output video with the optimal mode automatically even if a display device that does not support HDMI component signals or DVI signals is connected. If you want to output video with HDMI RGB signals or DVI signals forcibly, set the desired mode.

"HDMI YCbCr4:4:4 MODE" > "HDMI YCbCr4:2:2 MODE" > "HDMI RGB MODE" > "DVI MODE"

[DVI MODE] [HDMI YCbCr4:2:2 MODE]
[HDMI RGB MODE] [HDMI YCbCr4:4:4 MODE] [Default]

Notes:
- "DVI MODE": digital audio is not output.
- "YCbCr MODE": used only for TV output resolutions (480i, 576i, 720p, 1080i, 1080p)
- "HDMI RGB MODE" and "DVI MODE": used for PC resolutions.

[Table 8.4] Output mode priority

<table>
<thead>
<tr>
<th>Output mode</th>
<th>DVI</th>
<th>HDMI RGB</th>
<th>HDMI YCbCr4:2:2</th>
<th>HDMI YCbCr4:4:4</th>
</tr>
</thead>
<tbody>
<tr>
<td>DVI MODE</td>
<td>1st</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>HDMI RGB MODE</td>
<td>2nd</td>
<td>1st</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>HDMI YCbCr4:2:2 MODE</td>
<td>3rd</td>
<td>2nd</td>
<td>1st</td>
<td>-</td>
</tr>
<tr>
<td>HDMI YCbCr4:4:4 MODE</td>
<td>4th</td>
<td>3th</td>
<td>2nd</td>
<td>1st</td>
</tr>
</tbody>
</table>

1. To set the output mode using menu:

1. To set the output mode using commands:

   @SDM: Set output mode
   @GDM: Get output mode
8.7.3 Synchronous signal output with no input video [SYNC OUTPUT]

You can set whether synchronous signals are output when no video signal is input from the selected input, or when "OFF" is selected for the input:

- Not output: OFF
- Output: ON: You can prevent the display device from being switched to the standby mode. [Default]

1. To enable/disable the synchronous output using menu:

   1. MSD-5404  
   2. Press SET key  
   3. [FUNCTION SELECT]  
   4. OUTPUT SETTING  
   5. ▲▼ keys: Select “OUTPUT SETTING”.  
   6. Press SET key  
   7. [OUTPUT SETTING]  
   8. SYNC OUTPUT  
   9. ▲▼ keys: Select “SYNC OUTPUT”.  
  10. Press SET key  
  11. [OUT1 SYNC OUTPUT]  
  12. ▲▼ keys: Select “OFF” or “ON”.  
  13. ►◄ keys: Select the desired output (OUT1 to OUT4).  
  14. Press ESC key: Returns to the previous screen.

2. To enable/disable the synchronous output using commands:
   - @SUY: Set synchronous signal output with no input video
   - @GUY: Get synchronous signal output with no input video
8.7.4 Output video with no input video [VIDEO OUTPUT]

You can set the color of the video to be output when no video signal is input from the selected input.*

- Black screen: BLACK
- Blue screen: BLUE [Default]
- Background color screen: BACKGROUND COLOR

* If you set “8.7.3 Synchronous signal output with no input video” to “OFF”, no synchronous signal is output, and no video is output to the display device.

1. To set the video when no video is input using menu:

   MSD-5404 Top
   ▼ SET key
   [FUNCTION SELECT] OUTPUT SETTING ▲▼ keys: Select “OUTPUT SETTING”.
   ▼ SET key
   [OUTPUT SETTING] VIDEO OUTPUT ▲▼ keys: Select “VIDEO OUTPUT”.
   ▼ SET key
   [OUT1 VIDEO OUTPUT] BLUE ▲▼ keys: Select the desired output screen (BLACK, BLUE, or BACKGROUND COLOR).
   ◄► keys: Select the desired output (OUT1 to OUT4).
   ▼ ESC key: Returns to the previous screen.

2. To set the video when no video is input using commands:

   @SBO: Set output video with no input video
   @GBO: Get output video with no input video
8.7.5 Window transition effect [VIDEO SWITCHING]

You can select a window transition effect for when the video input is switched. Switching speed of effect other than “CUT” can be set in “8.7.6”.

[For MSD-5401/MSD-5402/MSD-5403/MSD-5404]
“CUT”: A black frame is displayed and the video input is switched instantly (approximately five frames).
“FADE OUT-IN”: The current video fades out slowly and then a black frame is displayed. After that, the next video is displayed slowly.
“FREEZE->FADE OUT-IN”: The current video fades out slowly after a freeze.
“WIPE”: The color selected in “8.7.7 Wipe color” is wiped in and the video is displayed. After wipe-out, the next video is displayed. You can select a wiping direction from four directions.

However, if you switch the channel from a channel without input video signals or switch it to a channel without input video signals, “FADE OUT-IN” and WIPE OUT/IN cannot be performed regardless of the setting of this menu. You can set the switching speed of “FADE OUT-IN” and WIPE OUT/IN by following “8.7.6”.

- CUT
- FADE OUT-IN
- FREEZE->FADE OUT-IN [Default]
- LEFT->RIGHT WIPE
- RIGHT->LEFT WIPE
- TOP->BOTTOM WIPE
- BOTTOM->TOP WIPE

[For MSD-5401SL/MSD-5402SL]
“CUT”: The video input is switched instantly.
“DISSOLVE”: The current video is cross-fades and switched to the next video.
“FREEZE->DISSOLVE”: The current video is cross-faded after freeze.
“WIPE”: Video is wiped. You can select a wiping direction from four directions. If it is switched from or to a channel without input video signals, the color selected in “8.7.7 Wipe color” is wiped in and the current video disappears. After it is wiped out, the next video is displayed.

- CUT
- DISSOLVE
- FREEZE->DISSOLVE [Default]
- LEFT->RIGHT WIPE
- RIGHT->LEFT WIPE
- TOP->BOTTOM WIPE
- BOTTOM->TOP WIPE

Note:
The setting of this menu is valid not only when the input is switched, but also when “8.5.5 Automatic detection of input video interruption” is set to “ON”.

For each output
1. To set the window transition effect using menu:

   MSD-5404
   
   ▼ SET key
   [FUNCTION SELECT]
   OUTPUT SETTING ▼
   ▲▼ keys: Select “OUTPUT SETTING”.
   
   ▼ SET key
   [OUTPUT SETTING]
   VIDEO SWITCHING ▼
   ▲▼ keys: Select “VIDEO SWITCHING”.
   
   ▼ SET key
   [OUT1 SWITCHING] ◄ ►
   FREEZE+FADE OUT-IN ◄ ►
   ▲▼ keys: Set the desired effect.
   ◄ ► keys: Select the desired output (OUT1 to OUT4).
   
   ▼ ESC key: Returns to the previous screen.

2. To set the window transition effect using commands:

   @SFF: Set video switching effect
   @GFF: Get video switching effect
You can set the amount of time the MSD takes to complete a transition effect for “FADE OUT-IN”, “DISSOLVE”, or “WIPE OUT/IN” when input channel is switched. These options are not available when “8.7.5 Window transition effect” is set to “CUT”.

- 100 ms. (0.1 seconds) to 2000 ms. (2.0 seconds) by 10 ms.  [Default]: 350 ms. (0.35 seconds)

Note:
Setting of this menu is applied not only when input is switched but also when “8.5.5 Automatic detection of input video interruption” is set to “ON”.

Since “FADE OUT-IN”, “DISSOLVE”, and WIPE IN/OUT are performed after synchronization to vertical synchronous signals of the output, the actual speed may be a few milliseconds slower or faster than the set time. For example, if the output resolution is 1080p@60, the set switching speed of video inputs is 420 ms., and “FADE OUT-IN”, “DISSOLVE”, or WIPE IN/OUT is performed at 0.42 (second) × 60 (frame/second) ÷ 25 frames, the actual speed becomes 25 (frames) ÷ 60 (frame/second) ÷ 0.4166 seconds ÷ approximately 416.6 ms.
1. To set the effect duration using menu:

   MSD-5404 Top
   ↓ SET key
   [FUNCTION SELECT]
   OUTPUT SETTING ▼
   ▲▼ keys: Select "OUTPUT SETTING".

   ↑ SET key
   [OUTPUT SETTING]
   SWITCHING SPEED ▼
   ▲▼ keys: Select "SWITCHING SPEED".

   ↓ SET key
   [OUT1 FADE SPEED]
   35 ms ▶
   ▲▼ keys: Set the switching speed (100 ms. to 2000 ms.).
   ◄► keys: Select the desired output (OUT1 to OUT4).

   ↓ ESC key: Returns to the previous screen.

2. To set the effect duration using commands:

   @SFT: Set video switching speed
   @GFT: Get video switching speed
8.7.7 Wipe color [WIPE COLOR]

You can set the wipe color while switching video input. Valid only if you set "8.7.5 Window transition effect" to "WIPE".

- Wipe color Red: 0 to 255  [Default]: 0
- Wipe color Green: 0 to 255  [Default]: 0
- Wipe color Blue: 0 to 255  [Default]: 0

1. To set the wipe color using menu:

```
1. To set the wipe color using menu:

   MSD-5404  Top
   ↓ SET key
   [FUNCTION SELECT]  OUTPUT SETTING  ▲▼ keys: Select “OUTPUT SETTING”.
   ↓ SET key
   [OUTPUT SETTING]  WIPE COLOR  ▲▼ keys: Select “WIPE COLOR”.
   ↓ SET key
   [OUT1 WIPE] LINK: ON
   R:  0  G:  0  B:  0  ▲▼ keys: Set “LINK” to “OFF” or “ON”.
   ↓ ◄► keys
   [OUT1 WIPE] LINK: ON
   R:  0  G:  0  B:  0  ▲▼ keys: Set the wipe color Red for OUT1 (0 to 255).
   ↓ ◄► keys
   [OUT1 WIPE] LINK: OFF
   R:  0  G:  0  B:  0  ▲▼ keys: Set the wipe color Green for OUT1 (0 to 255).
   ↓ ◄► keys
   [OUT1 WIPE] LINK: OFF
   R:  0  G:  0  B:  0  ▲▼ keys: Set the wipe color Blue for OUT1 (0 to 255).
   ↓ ESC key: Returns to the previous screen.
```

*1 If you set “LINK” to “ON”, you can set only Red (R). Settings of Green (G) and Blue (B) will also be changed according to the settings of the Red (R). For example, if you increase Red (R) +2, Green (G) and Blue (B) will also be increased at that level (+2).

*2 If you set “LINK” to “OFF”, you can set each of the wipe colors individually, Red, Green and Blue.

2. To set the wipe color using commands:

   @SWC: Set wipe color
   @GWC: Get wipe color
8.7.8 HDCP output mode [HDCP OUTPUT MODE]

You can set the HDCP output for when a display device that supports HDCP is connected.

“ALWAYS”: HDCP is output at all times regardless of status of input signals.

“HDCP INPUT ONLY”: HDCP is output only if the input signal has HDCP. However, some display devices may not output video and audio temporarily due to failure of the HDCP authentication when HDCP is switched from OFF to ON.

“DISABLE”: only video and audio without HDCP are output, because HDCP is not authorized.

When a display device without HDCP is connected, only video and audio without HDCP are output regardless of the setting of this menu.

\[
\begin{align*}
\cdot & \text{HDCP is output only if input signals are with HDCP: HDCP INPUT ONLY} \\
\cdot & \text{HDCP is output at all times: ALWAYS [Default]} \\
\cdot & \text{HDCP is not authorized: DISABLE}
\end{align*}
\]

**Note:**
Normally, select “ALWAYS”. If you connect a distribution amplifier supporting HDCP for output of the MSD and a display device without HDCP is connected from the output of the distribution amplifier, signals without HDCP are not output to the display device. In such a case, select “HDCP INPUT ONLY”.

1. To set the HDCP output mode using menu:

   1. MSD-5404 ▼ Top
   2. ▼ SET key [FUNCTION SELECT]
   3. ▲▼ keys: Select “OUTPUT SETTING”.
   4. ▼ SET key [OUTPUT SETTING]
   5. ▲▼ keys: Select “HDCP OUTPUT MODE”.
   6. ▼ SET key [OUT1 HDCP MODE]
   7. ▲▼ keys: Select the desired HDCP output mode (HDCP INPUT ONLY, ALWAYS, or DISABLE).
   8. ◄► keys: Select the desired output (OUT1 to OUT4).
   9. ▼ ESC key: Returns to the previous screen.

2. To set the HDCP output mode using commands:
   - @SEN: Set HDCP output mode
   - @GEN: Get HDCP output mode
8.7.9 The number of HDCP retries [HDCP ERROR RETRY]  

If a display device with HDCP is connected and you set “8.7.8 HDCP output mode” to “HDCP INPUT ONLY” or “ALWAYS”, HDCP is authorized regardless of the status of input signals. Normally, set “HDCP ERROR RETRY” to “ETERNITY” to retry the authentication automatically after the first authentication fails. However, if you do not input signals protected by HDCP, you can set the number of retries arbitrarily. (If retry is not succeeded even after the MSD retries for the set number of retry times, video and audio with HDCP are not output.)

- Retry until succeeded: ETERNITY  [Default]
- Not retry: 0
- Retry for the set number of retry times: 1 to 100

1. To set the number of HDCP retries using menu:

```
MSD-5404

Top

[FUNCTION SELECT]  OUTPUT SETTING

↓ SET key

[OUTPUT SETTING]  HDCP ERROR RETRY

↓ SET key

[OUT1 HDCP RETRY]  ETERNITY

▲▼ keys: Select “OUTPUT SETTING”.

▲▼ keys: Select “HDCP ERROR RETRY”.

▲▼ keys: Set the number of HDCP retries for when HDCP authentication failed.

◄► keys: Select the desired output (OUT1 to OUT4).

Displays the message for 1 second before automatically returning to the previous screen.

[HDCP ERROR RETRY]  NOW UPDATE...

[OUTPUT SETTING]  HDCP ERROR RETRY
```

Note:
If you do not press the “SET” key, the number of retries is not changed. Make sure to press the “SET” key.

2. To set the number of HDCP retries using commands:

@SHR: Set the number of HDCP retries
@GHR: Get the number of HDCP retries
8.7.10 Deep Color [DEEP COLOR OUTPUT]

“30-BIT COLOR”: signals are output with “30-BIT COLOR” only if a display device supporting Deep Color is connected. If a display device that does not support Deep Color is connected, signals are output with “24-BIT COLOR” automatically. However, since the transmission clock of “30-BIT COLOR” is faster than that of “24-BIT COLOR”, noise may occur if a bad-quality cable or long cable is connected. In those cases, the noise may be removed by selecting “24-BIT COLOR”.

- 24-BIT COLOR [Default]
- 30-BIT COLOR

1. To set the Deep Color of HDMI outputs using menu:

   MSD-5404

   ↓ SET key

   ▲▼ keys: Select “OUTPUT SETTING”.

   [FUNCTION SELECT] OUTPUT SETTING  
   ▲▼ keys: Select “DEEP COLOR OUTPUT”.

   ↓ SET key

   [OUTPUT SETTING] DEEP COLOR OUTPUT  
   ▲▼ keys: Select the desired color depth (24-BIT COLOR or 30-BIT COLOR).

   ◄► keys: Select the desired output (OUT1 to OUT4).

   ↓ ESC key: Returns to the previous screen.

2. To set the Deep Color of HDMI outputs using commands:
   @SDC: Set Deep Color
   @GDC: Get Deep Color
8.7.11 CEC (Consumer Electronics Control) [CEC CONNECTION]

You can select the channel for connecting CEC when a CEC-supported device is connected to HDMI input and output connectors.

- NOT CONNECTED [Default]
- SELECTED CHANNEL
- IN1
- IN2
- IN3
- IN4
- IN5

Note 1:
Using CEC may cause the following negative effects. If you do not use CEC, set this menu to “NOT CONNECTED.”

If the status of the display devices connected to the HDMI output connector changes (such as being turned OFF → ON) or if the CEC connection changes, the EDID may also need to be changed (the MSD changes it automatically) in order to update the address of the connected device. When the EDID is changed, the source device stops outputting video temporarily. Note the following points to not make the EDID change at the time of operation.

- The MSD refers to the address of display device at the time of CEC connection. However, if display device is turned off or if the display device has multiple HDMI input connectors and a connector to which the MSD is connected is not selected, the MDS sometimes cannot load the address. (Address may be loaded depending on display devices.) Since the MSD saves the address of the last-used display device, EDID is not normally changed even if the display device status changes. However, when a display device is connected for its first time, EDID may possibly be changed. Therefore, before operation, connect a display device under the same CEC connection status to make the MSD recognize the address of the display device.
- If you select “SELECTED CHANNEL”, the CEC connection changes when you switch inputs. If you connect display devices to each output having an address that is different from the MSD settings, the EDID is changed when CEC connections are changed. If you select “SELECTED CHANNEL”, make sure to connect display devices having the same addresses.
- If a display device has multiple HDMI input connectors, each connector has the specific address that is different from each other. If connecting display devices of the same model to each MSD output, connect them to the same input connector of the display device. If you connect devices such as a repeater between the output of the MSD and a display device, the addresses may not be matched. In this case, set this menu to an option other than “SELECTED CHANNEL”. The addresses of the display devices connected to each output connector are displayed on the upper right.

Note 2:
CEC connection is a one-on-one basis; it cannot connect multiple inputs and outputs. If you set multiple outputs to connect to the same input, only a smaller output number is connected preferentially and other outputs are not connected. For example, if you set both OUT1 and OUT2 to IN2, OUT1 is connected to IN2, while OUT 2 is not connected.
Note 3:
To use CEC, enable HDMI link control of the connected device (such as digital TV, Blu-ray disc recorder, and so on). The MSD is counted as a CEC device, and several CEC devices including the MSD may be displayed on the CEC operation window. In this case, select the device you want to operate. (For settings and operation of your device, refer to the manual of the device.)

1. To set the CEC using menu:

   MSD-5404

   ▼ SET key

   [FUNCTION SELECT] OUTPUT SETTING ▼
   ▲▼ keys: Select “OUTPUT SETTING”.

   ▼ SET key

   [OUTPUT SETTING] CEC CONNECTION ▼
   ▲▼ keys: Select “CEC CONNECTION”.

   ▼ SET key

   [OUT1 CEC] NOT CONNECTED ◀▶
   ▲▼ keys: Select the desired CEC connection.
   ◀▶ keys: Select the desired output (OUT1 to OUT4).

   ▼ SET key: Applies settings.

   [CEC CONNECTION] NOW UPDATE...
   Displays the message for 1 second before automatically returning to the previous screen.

   ▼

   [OUTPUT SETTING] CEC CONNECTION ▼

Note:
If you do not press the “SET” key, the CEC is not changed. Make sure to press the “SET” key.

2. To set the CEC using commands:

   @SCE: Set CEC
   @GCE: Get CEC
If a display device supporting HDCP is connected, HDCP is authorized automatically. You can re-authorize HDCP manually using this menu. (Connection Reset is performed automatically, but it can be performed manually using this menu.)

1. To perform the HDCP re-authentication using menu:

```
1. To perform the HDCP re-authentication using menu:

   MSD-5404
     Top
   ↓ SET key
   [FUNCTION SELECT] OUTPUT SETTING ↓ ▲▼ keys: Select “OUTPUT SETTING”.
   ↓ SET key
   [OUTPUT SETTING] HDCP AUTHORIZATION ↓ ▲▼ keys: Select “HDCP AUTHENTICATION”.
   ↓ SET key
   [OUT1 AUTHORIZATION] SURE? = NO ◄► keys: Select “YES” or “NO”.
   ◄► keys: Select the desired output (OUT1 to OUT4).
   ‾ To execute re-authentication: Select “YES” and press the “SET” key.
   ‾ To return to the menu without execution: Select “NO” and press the “SET” key.
   [OUT1 AUTHORIZATION] NOW UPDATE... ◄► The message is displayed for one second and then previous screen is displayed automatically.
   ↓
   [OUTPUT SETTING] HDCP AUTHORIZATION ↓
```

2. To perform the HDCP re-authentication using commands:

@HAU: Re-authorize HDCP
8.8 Audio Settings

HDMI digital audio supports the following formats. For audio output of devices connected to the HDMI input connectors (such as DVD players), set a format supported by both the MSD and display device connected to HDMI output connector (such as display devices and AV amplifier). However, as factory default, only “2 channel linear PCM” can be input. If you want to use “Multi channel linear PCM” or bit stream signals (compressed audio), set “8.9.5 Audio format” and “8.9.6 Speaker configuration”.

<table>
<thead>
<tr>
<th>Audio format</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 channel linear PCM</td>
<td>2ch, 32 kHz to 192 kHz, 16/20/24bit</td>
</tr>
<tr>
<td>Multi channel linear PCM</td>
<td>8ch, 32 to 192kHz, 16/20/24bit</td>
</tr>
<tr>
<td>AC-3, Dolby Digital, DTS</td>
<td>Bit stream</td>
</tr>
<tr>
<td>Dolby Digital+, DTS-HD, Dolby TrueHD</td>
<td>Bit stream</td>
</tr>
<tr>
<td>AAC</td>
<td>Bit stream</td>
</tr>
</tbody>
</table>

If Multi channel linear PCM signals are input to digital audio, two channels set in “8.8.9 Multi-channel audio output” or down-mixed audio is output to analog audio and display devices that do not support multi linear PCM.

[Table 8.5] Supported formats of HDMI digital audio

[Figure 8.42] I/O of multi-channel signals
If bit stream signals (compressed audio) such as Dolby Digital are input to HDMI digital audio, these input audio signals are output to digital audio as they are. They are not output to analog audio, and audio volume cannot be adjusted.

![Diagram showing input and output of bit stream signals](image)

**[Figure 8.43] Inputting/Outputting bit stream signals**

### 8.8.1 Output level [OUTPUT LEVEL]

You can set the audio output level using audio output volume.

- Audio output level: -60 dB to +10 dB  [Default]: ±0 dB

**Note:** If you change the output level while “8.8.2 Output mute” is set to "ON", mute is canceled.

If you set “8.18.6 Top VFD screen” to “AUDIO VOLUME”, you can set the audio output level on the top screen.

1. **To set the audio output level using menu:**

   MSD-5404
   
   Top
   
   ▼ SET key
   
   [FUNCTION SELECT] AUDIO ▼ keys: Select “AUDIO”.
   
   ▼ SET key
   
   [AUDIO] OUTPUT LEVEL ▼ keys: Select “OUTPUT LEVEL”.
   
   ▼ SET key
   
   [OUT1 AUDIO VOLUME] dB ▼ ▲ keys: Set the audio output level (-60 to +10).
   
   ◄► keys: Select the desired output (OUT1 to OUT4).
   
   ▼ ESC key: Returns to the previous screen.

2. **To set the audio output level using commands:**

   @SSL: Set audio output level
   
   @GSL: Get audio output level
   
   @SOL: Set relative value of audio output level
   
   @GOL: Get limit status of audio output level
8.8.2 Output mute [OUTPUT MUTE]

- Mute off: OFF [Default]
- Mute on: ON

If you set “8.18.6 Top VFD screen” to “AUDIO VOLUME,” you can set this menu on the top screen.

1. To set the audio output mute using menu:

```
MSD-5404
↓ SET key
[FUNCTION SELECT] AUDIO ▲▼ keys: Select “AUDIO”.
↓ SET key
[AUDIO] OUTPUT MUTE ▲▼ keys: Select “OUTPUT MUTE”.
↓ SET key
[OUT1 MUTE] OFF ▲▼ keys: Select “OFF” or “ON”.
◄► keys: Select the desired output (OUT1 to OUT4).
↓ ESC key: Returns to the previous screen.
```

2. To set the audio output mute using commands:

@SAM: Set output mute
@GAM: Get output mute
8.8.3 Input selection [AUDIO INPUT SELECT]

If you select “AUTO,” digital audio is output automatically when HDMI signals with audio signals are input; analog audio is output in other cases.

- AUTO [Default]
- ANALOG
- DIGITAL

* If you select “AUTO” while both digital and analog audio signals are input, the digital audio is output. While no HDMI signals are input (for example, during a standby period until the source device starts or output resolution of the output device is changed), the analog audio is output. If you do not want to output analog audio in these conditions, set the audio input manually.

1. To select the digital or analog audio input using menu:

   MSD-5404
   ▼ SET key
   [FUNCTION SELECT] AUDIO ▲▼ keys: Select “AUDIO”.
   ▼ SET key
   [AUDIO] AUDIO INPUT SELECT ▲▼ keys: Select “AUDIO INPUT SELECT”.
   ▼ SET key
   [IN1 AUDIO SELECT] AUTO(DIGITAL) ▲▼ keys: Select the desired audio input (AUTO, ANALOG, DIGITAL).
   ◄► keys: Select the desired input (IN1 to IN5).
   ▼ ESC key: Returns to the previous screen.

2. To select the digital or analog audio input using commands:

   @SAS: Select audio input
   @GAS: Get audio input
   @GSD: Get actual audio input
8.8.4 Input level [INPUT OFFSET]

You can correct the gap in audio input levels of each input signal, because audio input level can be set for each input connector.

- Audio input level: -60 dB to ±0 dB  [Default]: ±0 dB

1. To set the audio input level using menu:

   1. To set the audio input level using menu:

      MSD-5404  
      ▼ SET key
      [FUNCTION SELECT] AUDIO ▲▼ keys: Select “AUDIO”.
      ▼ SET key
      [AUDIO] INPUT OFFSET ▲▼ keys: Select “INPUT OFFSET”.
      ▼ SET key
      [IN1 AUDIO OFFSET] X dB ▲▼ keys: Set the audio input level (-60 to ±0).
      ◄► keys: Select the desired input (IN1 to IN9).
      ▼ ESC key: Returns to the previous screen.

2. To set the audio input level using commands:

   @SSO: Set audio input level
   @GSO: Get audio input level
   @SIL: Set relative value of audio input level
   @GIL: Get limit status of audio input level
8.8.5  Output lip sync [OUTPUT LIP SYNC]

Since video signals and audio signals are processed on different circuit, time lag between the lip movement and audio is developed. The time lag can be corrected by the lip sync correction function.

With this menu, you can set the lip synch value to delay the audio in order to match it with the video. The MSD can delay audio signals by one frame.

You can set this function for each output using this menu and for each input by following "8.8.6 Input lip sync". Normally, set it for each output to delay audio depending on the video delay amount of the display device. In case the video source itself contains the gap between the video and audio, or video is delayed by connecting a frame synchronizer for input, set lip sync for each input.

- Lip sync: 0 to 8 frames  [Default]: 0 frame

Note:

Up to eight frames using lip-sync can be set for each output and input, but if the total number of frames for output plus input exceeds eight frames, the maximum number of delayed frames is limited to eight frames. If sampling frequency of the audio signals (sampling frequency of input signals or digital input; the set value of "8.8.7 Sampling frequency of analog audio input" for analog input) is 88.2 kHz or more, the amount of delay is also limited. For example, if sampling frequency is 192 kHz, only two frames are delayed even though lip-sync is set to three frames or more.

<table>
<thead>
<tr>
<th>Sampling frequency</th>
<th>32 kHz</th>
<th>44.1 kHz</th>
<th>48 kHz</th>
<th>88.2 kHz</th>
<th>96 kHz</th>
<th>192 kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. delay</td>
<td>8 frames</td>
<td>8 frames</td>
<td>8 frames</td>
<td>5 frames</td>
<td>5 frames</td>
<td>2 frames</td>
</tr>
</tbody>
</table>

* If vertical synchronous frequency of "8.3.1 Output resolutions" is 50 Hz (576i@50, 576p@50, 720p@50, 1080i@50, 1080p@50), the maximum delay is four frames.

1. To set the lip synch value to delay the audio using menu:

   MSD-5404  
   ↓ SET key
   [FUNCTION SELECT] AUDIO  
   ▲▼ keys: Select "AUDIO".  
   ↓ SET key
   [AUDIO] OUTPUT LIP SYNC  
   ▲▼ keys: Select "OUTPUT LIP SYNC".  
   ↓ SET key
   [OUTPUT LIP SYNC] FRAME  
   ▲▼ keys: Set the output lip-sync (0 to 8 frames).  
   ◄► keys: Select the desired output (OUT1 to OUT4).  
   ↓ ESC key: Returns to the previous screen.

2. To set the lip synch value to delay the audio using commands:

@SLO: Set output lip sync
@GLO: Get output lip sync
8.8.6 Input lip sync [INPUT LIP SYNC]

Normally, audio is delayed depending on the video delay amount of the display device in "8.8.5 Output lip sync". If the video source itself includes the gap between video and audio or if video is delayed by connecting a frame synchronizer for the input, set the lip-sync frames individually for each input.

- Lip sync: 0 to 8 frames  [Default]: 0 frame

1. To set the input lip sync using menu:

[FUNCTION SELECT]  AUDIO

[FUNCTION SELECT]  INPUT LIP SYNC

[FUNCTION SELECT]  IN1 LIP SYNC

![DIAGRAM]

- ▲▼ keys: Select “AUDIO”.
- ▲▼ keys: Select “INPUT LIP SYNC”.
- ▲▼ keys: Set the input lip sync (0 to 8 frames).
- ◄► keys: Select the desired input (IN1 to IN9).

ESC key: Returns to the previous screen.

2. To set the input lip sync using commands:

@SLY: Set input lip sync

@GLY: Get input lip sync
8.8.7 Sampling frequency of analog audio input [SAMPLING FREQUENCY]

You can set the sampling frequency for when analog audio input signals (audio input is IN1 to IN5 and you set “8.8.3 Input selection” to “ANALOG”, or audio input is IN6 to IN9) are output to digital audio. If you set it to “AUTO”, the maximum sampling frequency supported by the connected display device is output.*

* If you select “AUTO”, the MSD determines the sampling frequency based on the EDID (see “8.9 EDID” for details) of the display device and displays the output frequency in parentheses of the VFD screen.

If the MSD cannot load the EDID from the display device, it outputs signals with the last-used sampling frequency, and displays an “*” following the sampling frequency that is actually output.

<table>
<thead>
<tr>
<th>[OUT1 FREQUENCY]</th>
<th>AUTO (48kHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>[EDID can be loaded]</td>
<td>[EDID cannot be loaded]</td>
</tr>
</tbody>
</table>

- AUTO [Default] 32 kHz 44.1 kHz
- 48 kHz 96 kHz 192 kHz

1. To set the sampling frequency for the selected analog audio input using menu:

   MSD-5404
   Top
   ↓ SET key
   [FUNCTION SELECT] AUDIO ▲▼ keys: Select “AUDIO”.
   ↓ SET key
   [AUDIO] SAMPLING FREQUENCY ▲▼ keys: Select “SAMPLING FREQUENCY”.
   ↓ SET key
   [OUT1 FREQUENCY] AUTO (48kHz) ▲▼ keys: Set the sampling frequency.
   ●► keys: Select the desired output (OUT1 to OUT4).
   ↓ ESC key: Returns to the previous screen.

2. To set the sampling frequency for the selected analog audio input using commands:
   @SSF: Set sampling frequency of analog audio input
   @GSF: Get sampling frequency of analog audio input
   @GFD: Get actual sampling frequency of analog audio input
8.8.8 Output connector [OUTPUT CONNECTOR]

You can select audio output.

- Only analog audio output connector: ANALOG
- Only HDMI output connector: DIGITAL
- Both analog audio output and HDMI output connectors: ANALOG&DIGITAL [Default]

Note:
If you set "8.7.2 Output mode" to “DVI MODE”, no audio is output to any HDMI output connector regardless of the setting of this menu.

1. To set the audio output connector using menu:

   MSD-5404 Top
   ↓ SET key

   [FUNCTION SELECT] AUDIO ▲▼ keys: Select "AUDIO".
   ↓ SET key

   [AUDIO] OUTPUT CONNECTOR ▲▼ keys: Select “OUTPUT CONNECTOR”.
   ↓ SET key

   [OUT1 AUDIO OUTPUT] ANALOG&DIGITAL ▲▼ keys: Select the desired audio output (ANALOG, DIGITAL, or ANALOG&DIGITAL).
   ◄► keys: Select the desired output (OUT1 to OUT4).
   ↓ ESC key: Returns to the previous screen.

2. To set the audio output connector using commands:

   @SDO: Set audio output connector
   @GDO: Get audio output connector
8.8.9 Multi-channel audio output [MULTI AUDIO]

You can set audio to be output to a display device that does not support multi-channel linear PCM or analog audio for when multi-channel linear PCM audio is input from an HDMI input connector.

If you select “DOWN MIX”, the MSD will down-mix the multi-channel audio and then output the down-mixed audio.

- CH1/CH2 STEREO  - CH7/CH8 STEREO  - CH5/CH6 MONO
- CH3/CH4 STEREO  - CH1/CH2 MONO  - CH7/CH8 MONO
- CH5/CH6 STEREO  - CH3/CH4 MONO  - DOWN MIX  [Default]

1. To set the multi-channel audio output using menu:

   MSD-5404
   ▼ SET key
   [FUNCTION SELECT] AUDIO
   ▲▼ keys: Select “AUDIO”.
   ▼ SET key
   [AUDIO] MULTI AUDIO
   ▲▼ keys: Select “MULTI AUDIO”.
   ▼ SET key
   [OUT1 MULTI AUDIO] DOWN MIX
   ▲▼ keys: Select the desired multi-channel audio output.
   ◄► keys: Select output (OUT1 to OUT4)
   ▼ ESC key: Returns to the previous screen.

2. To set the multi-channel audio output using commands:
   @SMD: Set multi-channel audio output
   @GMD: Get multi-channel audio output
8.8.10 Test tones [TEST TONE]

Since test tone can be output only to specific speakers, you can check the position of the speakers.

- Test tones:
  - OFF [Default]
  - 1 kHz
  - 400 Hz

- Speakers’ position:
  - ALL [Default] ・FRONT LEFT ・REAR LEFT
  - FRONT L/R ・FRONT RIGHT ・REAR RIGHT
  - REAR L/R ・LOW FREQUENCY EFFECT ・REAR LEFT CENTER
  - REAR L/R CENTER ・FRONT CENTER ・REAR RIGHT CENTER

**Note:**
For “LOW FREQUENCY EFFECT”, only test tone of 30 Hz is output.

---

**Figure 8.44** Speaker configuration

1. To set the test tone using menu:

```
MSD-5404
↓ SET key
[FUNCTION SELECT] AUDIO ▲▼: Select “AUDIO”.
↓ SET key
[AUDIO] TEST TONE ▲▼: Select “TEST TONE”.
↓ SET key
[OUT1 TEST TONE] OFF ▲▼: Select the desired test tone of OUT1.
↓ ◄► keys
[OUT1 SPEAKER] ALL ▲▼: Select the desired speaker of OUT1.
↓ ESC key: Returns to the previous screen.
```
* Only if you set the test tone to “1 kHz” or “400 Hz”, you can set a speaker.

2. To set the test tone using commands:
   @SAT: Set test tone
   @GAT: Get test tone
8.9 EDID (Extended Display Identification Data)

You can select the EDID from either the built-in data or the data loaded from the connected display device. The MSD can load EDID that conforms to VESA DDC2B/EDID standard ver. 1.0 to 1.3. Data loaded from a display device connected can only be used for digital input (IN1 to IN5). Only built-in EDID can be used for analog inputs (IN6 to IN9).

*Note:*
For PCs, since EDID is acquired when the PC is turned on, turn on the PC while the MSD and display device are turned on. When turning off the system, first turn off the PC and then turn off the MSD and display device. If you change the settings of EDID during operation, the MSD may not be recognized correctly. Set EDID while source devices are turned off as much as possible.

### 8.9.1 EDID setting [EDID DATA]

You can set the EDID to be sent to the connected source device. If you select “INTERNAL EDID”, the EDID that is set in the following menus is sent: “8.9.2 PC resolutions”, “8.9.3”, “8.9.4 Deep Color”, “8.9.5 Audio format,” and “8.9.6 Speaker configuration”.

- Built-in data: INTERNAL EDID [Default]
- Data of display device connected to HDMI output connector: OUTn MONITOR*1
- Data copied from display device: COPY DATA 1 to 8*2

*1 "n": Output number (1 to 4)
*2 EDID must be loaded from the display device set in "8.9.7 EDID Copy" beforehand.

1. To set the EDID using menu:

```
MSD-5404
↓ SET key
[FUNCTION SELECT] EDID
↑↓ keys: Select “EDID”.
↓ SET key
[EDID] EDID DATA
↑↓ keys: Select “EDID DATA”.
↓ SET key
[IN1 EDID] INTERNAL EDID
↑↓ keys: Select the EDID.
↓ SET key: Applies settings.
[EDID DATA] NOW UPDATE...
The message is displayed for one second and then previous screen is displayed automatically.
↓
[EDID] EDID DATA
```

*Note:*
If you do not press the “SET” key, the EDID is not changed. Make sure to press the “SET” key.

For each input
The error message below is displayed for a second when the VFD screen moves from the sub menu to the setup menu in the following cases:

- “OUTn MONITOR” is set for any input channel, and
- no display device is connected, or
- loading EDID fails.

If EDID cannot be updated pressing the “SET” key, the same message is displayed for a second as well.

If the error message is displayed, check the connection of the display device. If EDID can be loaded, EDID will be updated automatically.

2. To set the EDID using commands:

@SED: Set EDID
@GED: Get EDID
8.9.2  PC resolutions [PC RESOLUTION]

You can set the resolution to be output from source devices.

For digital inputs (IN1 to IN5), this menu is valid only if you select “INTERNAL EDID” for "8.9.1 EDID setting". Normally, set the resolution when connecting DVI devices such as PCs or analog RGB devices. However, if you connect AV devices such as Blu-ray disc player using HDMI, the setting of this menu is valid in order to limit the output resolution.

- SVGA (800x600)
- XGA (1024x768)
- SXGA (1280x1024)
- WXGA (1360x768)
- WXGA+ (1440x900)
- WXGA++ (1600x900)
- SXGA+ (1400x1050)
- WSXGA+ (1680x1050)
- WSXGA+ (1680x1050)

[Default]: For inputs 1(IN1) to 5 (IN5): 1080p (1920x1080)
For inputs 6(IN6) to 9 (IN9): UXGA (1600x1200)

Timing of 720p, 1080i, and 1080p is the same as that of HD signals meeting the CEA-861D standard. For other resolutions, timings meet the VESA DMT or VESA CVT standards. 1920x1200 and 2048x1152 are Reduced Blanking.

Set the maximum available resolution for EDID, but the lower resolutions are also supported. Select the resolution responding to the resolution that is output from the connected PC.

---

**Table 8.6** Supported resolution

<table>
<thead>
<tr>
<th>Supported resolution</th>
<th>640 x 480</th>
<th>800 x 600</th>
<th>1024 x 768</th>
<th>1280 x 768</th>
<th>1280 x 960</th>
<th>1280 x 1024</th>
<th>1360 x 768</th>
<th>1366 x 768</th>
<th>1366 x 1050</th>
<th>1440 x 900</th>
<th>1440 x 1050</th>
<th>1600 x 900</th>
<th>1600 x 1024</th>
<th>1680 x 1050</th>
<th>1920 x 1080</th>
<th>1920 x 1080p</th>
<th>1920 x 1200</th>
<th>2048 x 1152</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Resolution settings</td>
<td>800x600</td>
<td>1024x768</td>
<td>1280x720[D4]</td>
<td>1280x800</td>
<td>1280x960</td>
<td>1280x1024</td>
<td>1360x768</td>
<td>1366x768</td>
<td>1400x1050</td>
<td>1440x900</td>
<td>1600x900</td>
<td>1600x1024</td>
<td>1680x1050</td>
<td>1920x1080</td>
<td>1920x1080p</td>
<td>1920x1200</td>
<td>2048x1152</td>
<td></td>
</tr>
</tbody>
</table>

---

Y: Supported  N: Not supported
1. To set the PC resolution using menu:

   MSD-5404

   Top

   ↓ SET key

   [FUNCTION SELECT]
   EDID ▲▼keys: Select “EDID”.

   ↓ SET key

   [EDID]
   PC RESOLUTION ▲▼keys: Select “PC RESOLUTION”.

   ↓ SET key

   [IN1 PC FORMAT]
   1080p(1920x1080) ◀►keys: Set the resolution for the PC.

   ◀►keys: Select the desired input (IN1 to IN9).

   ↓ SET key: Applies settings.

   [PC RESOLUTION]
   NOW UPDATE...

   The message is displayed for one second and then previous screen is displayed automatically.

   ↓

   [EDID]
   PC RESOLUTION ▲▼

**Note:**
If you do not press the “SET” key, the PC resolution is not changed. Make sure to press the “SET” key.

2. To set the PC resolution using commands:

   @SVF: Set PC resolution (EDID)
   @GVF: Get PC resolution (EDID)
8.9.3 Input resolution for AV devices [AV RESOLUTION]

This menu is valid only if you select “INTERNAL EDID” for “8.9.1 EDID setting” and an AV device such as Blu-ray disc player is connected. Normally, select “AUTO” and set the resolution using the setting of “8.9.2 PC resolutions”.

- UNUSED
- 720p
- 1080p
- 480p
- 1080i
- AUTO [Default]

“UNUSED” disables the EDID for AV devices. If you select “AUTO” and the resolution output from the PC is different from the setting in Properties, the problem may be solved by selecting “UNUSED”. If you select “UNUSED”, the settings of “8.9.4 Deep Color”, “8.9.5 Audio format”, and “8.9.6 Speaker configuration” will be disabled and audio is not output because the source device outputs signal through DVI mode.

If there is a potential to connect both PCs and AV devices with different resolutions (for example, PC with WXGA (1366x768), Blu-ray disc player with 1080p), set the PC resolution in “8.9.2 PC resolutions” and select the AV resolution from 480p, 720p, 1080i, and 1080p in this menu. However, some PCs and AV devices may choose the higher resolution of the resolutions set in “8.9.2 PC resolutions” or set in this menu.

If you select “AUTO”, resolutions for AV devices are set automatically according to the settings of “8.9.2 PC resolutions”.

### [Table 8.7] Input resolutions with “AUTO”

<table>
<thead>
<tr>
<th>PC resolution</th>
<th>800 x 600</th>
<th>1024 x 768</th>
<th>1280 x 720</th>
<th>1280 x 768</th>
<th>1280 x 800</th>
<th>1280 x 960</th>
<th>1280 x 1024</th>
<th>1280 x 1050</th>
<th>1280 x 1080</th>
<th>1280 x 1200</th>
<th>1280 x 1360</th>
<th>1280 x 1400</th>
<th>1280 x 1440</th>
<th>1280 x 1600</th>
<th>1280 x 1660</th>
<th>1280 x 1680</th>
<th>1280 x 1800</th>
<th>1280 x 1920</th>
<th>2048 x 1152</th>
</tr>
</thead>
<tbody>
<tr>
<td>AV resolution</td>
<td>480p</td>
<td>720p</td>
<td>1080i</td>
<td>1080p</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. To set the HDTV resolution using menu:

- MSD-5404
- ▼ SET key
- [FUNCTION SELECT] EDID
- ▲▼ keys: Select “EDID”.
- ▼ SET key
- [EDID] AV RESOLUTION
- ▲▼ keys: Select “AV RESOLUTION”.
- ▼ SET key
- [IN1 AV FORMAT] AUTO
- ▲▼ keys: Select the desired resolution for the AV device.
- ►► keys: Select the desired input (IN1 to IN5).
- ▼ SET key: Applies settings.
- [AV RESOLUTION] NOW UPDATE...
- The message is displayed for one second and then previous screen is displayed automatically.
- ▼
- [EDID] AV RESOLUTION

**Note:**

If you do not press the “SET” key, the AV resolution is not changed. Make sure to press the “SET” key.
2. To set the HDTV resolution using commands:
   @SHF: Set HDTV resolution (EDID)
   @GHF: Get HDTV resolution (EDID)

8.9.4 Deep Color [DEEP COLOR INPUT]

This menu is valid only all conditions below are met: if you select “INTERNAL EDID” for “8.9.1 EDID setting”, you select a resolution other than “UNUSED” for “8.9.3 Input resolution for AV devices [AV RESOLUTION]”, and you connect an HDMI device such as a Blu-ray recorder.

If you select “30-BIT COLOR” in this menu setting and a display device supporting Deep Color is connected, the Deep Color is used. However, compared to “24-BIT COLOR”, “30-BIT COLOR” is transmitted using a higher clock frequency, which may cause noise if a cable with a bad quality or a long cable is connected. In such a case, the noise may be removed by setting the color to “24-BIT COLOR”.

\[
\begin{cases}
\text{• 24-BIT COLOR} & \text{[Default]} \\
\text{• 30-BIT COLOR}
\end{cases}
\]

1. To set the Deep Color using menu:

```
MSD-5404

[FUNCTION SELECT]
EDID

[FUNCTION SELECT]
EDID

[FUNCTION SELECT]
EDID

[FUNCTION SELECT]
EDID

[FUNCTION SELECT]
EDID

[FUNCTION SELECT]
EDID

[FUNCTION SELECT]
EDID
```

▲▼ keys: Select “EDID”.

▲▼ keys: Select “DEEP COLOR INPUT”.

▲▼ keys: Select the desired color depth (24-BIT COLOR or 30-BIT COLOR).

◄► keys: Select the desired input (IN1 to IN5).

↓ SET key: Applies settings.

The message is displayed for one second and then previous screen is displayed automatically.

```
[FUNCTION SELECT]
EDID

[FUNCTION SELECT]
EDID

[FUNCTION SELECT]
EDID

[FUNCTION SELECT]
EDID
```

Note:

If you do not press the “SET” key, Deep Color is not changed. Make sure to press the “SET” key.

2. To set the Deep Color using commands:
   @SDI: Set Deep Color
   @GDI: Get Deep Color
8.9.5 Audio format [AUDIO FORMAT]

You can set the audio format and maximum sampling frequency to be output from a source device. This menu is valid only all conditions below are met: if you select “INTERNAL EDID” for “8.9.1 EDID setting”, you select a resolution other than “UNUSED” for “8.9.3 Input resolution for AV devices [AV RESOLUTION]”, and you connect an HDMI device such as a Blu-ray recorder.

**[Table 8.8] Audio formats**

<table>
<thead>
<tr>
<th>Audio format</th>
<th>ON/OFF</th>
<th>Sampling frequency (kHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear PCM</td>
<td>Not settable</td>
<td>32/44.1/48/88.2/96/176.4/192 (48)</td>
</tr>
<tr>
<td>AC-3/Dolby Digital</td>
<td>Settable (OFF)</td>
<td>32/44.1/48 (48)</td>
</tr>
<tr>
<td>AAC</td>
<td>Settable (OFF)</td>
<td>32/44.1/48/88.2/96 (48)</td>
</tr>
<tr>
<td>Dolby Digital+</td>
<td>Settable (OFF)</td>
<td>32/44.1/48/96 (48)</td>
</tr>
<tr>
<td>DTS</td>
<td>Settable (OFF)</td>
<td>32/44.1/48/96/192 (96)</td>
</tr>
<tr>
<td>DTS-HD</td>
<td>Settable (OFF)</td>
<td>44.1/48/88.2/96/176.4/192 (192)</td>
</tr>
<tr>
<td>Dolby TrueHD</td>
<td>Settable (OFF)</td>
<td>44.1/48/88.2/96/176.4/192 (96)</td>
</tr>
</tbody>
</table>

Default values are enclosed in parentheses.

1. **To set the audio format using menu:**

```
MSD-5404 Top
FSET key
[FUNCTION SELECT] EDID ▲▼keys: Select “EDID”.

↓ SET key
[EDID] AUDIO FORMAT ▲▼keys: Select “AUDIO FORMAT”.

↓ SET key
[IN1 PCM] MAX FREQ:32kHz ▲▼keys: Set the maximum sampling frequency of IN1
(32 kHz, 44.1 kHz, 48 kHz, 88.2 kHz, 96 kHz, 176.4 kHz, 192 kHz).

↓ SET key
[IN1 Dolby Digital] ON ▲▼keys: Set “OFF” or “ON” for AC-3/Dolby Digital output of IN1.

↓ SET key
[IN1 Dolby Digital] MAX FREQ:32kHz ▲▼keys: Set the maximum sampling frequency of AC-3/Dolby Digital of IN1 (32 kHz, 44.1 kHz, 48 kHz).

This is displayed only if output (set in the previous screen) is set to “ON”.

Repeat the same procedure to set the audio formats of AAC, Dolby Digital+, DTS, DTS-HD, and Dolby TrueHD.

↓ SET key: Applies settings.
```

The message is displayed for one second and then previous screen is displayed automatically.

```
[EDID] AUDIO FORMAT
```

**Note:**

If you do not press the “SET” key, the audio format is not changed. Make sure to press the “SET” key.
2. To set the audio format using commands:
   @SAF: Set audio format
   @GAF: Get audio format
8.9.6 Speaker configuration [SPEAKER]

This menu is valid only if all conditions below are met: if you select “INTERNAL EDID” for “8.9.1 EDID setting”, you select a resolution other than “UNUSED” for “8.9.3 Input resolution for AV devices [AV RESOLUTION]”, and you connect an HDMI device such as a Blu-ray recorder.

- The number of speakers: 1 to 8  [Default]: 2

If you select “AUTO” for the setting mode and set the number of speakers, the speaker configuration will be set by default that is shown in the following table. To change the default configuration, set the mode to “MANUAL” and set each speaker to ON/OFF individually.

[Table 8.9] Default speaker configuration

<table>
<thead>
<tr>
<th>The number of speakers</th>
<th>FR/FL</th>
<th>LFE</th>
<th>FC</th>
<th>RL/RR</th>
<th>RC</th>
<th>FLC/ FRC</th>
<th>RLC/ RRC</th>
<th>FLW/ FRW</th>
<th>FLH/ FRH</th>
<th>TC</th>
<th>FCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>2</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>3</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>4</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>5</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>6</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>7</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>8</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
</tbody>
</table>

[Figure 8.45] Speaker configuration
1. To set the speaker configuration using menu:

```
<table>
<thead>
<tr>
<th>MSD-5404</th>
<th>Top</th>
</tr>
</thead>
<tbody>
<tr>
<td>↓ SET key</td>
<td></td>
</tr>
<tr>
<td>[FUNCTION SELECT]</td>
<td>▲▼ keys: Select “EDID”.</td>
</tr>
<tr>
<td>EDID</td>
<td></td>
</tr>
<tr>
<td>↓ SET key</td>
<td></td>
</tr>
<tr>
<td>[EDID]</td>
<td>▲▼ keys: Select “SPEAKER”.</td>
</tr>
<tr>
<td>SPEAKER</td>
<td></td>
</tr>
<tr>
<td>↓ SET key</td>
<td></td>
</tr>
<tr>
<td>[IN1 SPEAKER]</td>
<td>▲▼ keys: Select the setting mode of IN1 (AUTO, MANUAL).</td>
</tr>
<tr>
<td>MODE: AUTO  NUMBER: 2</td>
<td></td>
</tr>
<tr>
<td>↓ ▲▼ keys</td>
<td></td>
</tr>
<tr>
<td>[IN1 SPEAKER]</td>
<td>▲▼ keys: Set the number of speakers of IN1 (1 to 8).</td>
</tr>
<tr>
<td>MODE: AUTO  NUMBER:</td>
<td></td>
</tr>
<tr>
<td>└── Repeat the same procedure for other speakers. ┘</td>
<td></td>
</tr>
<tr>
<td>↓ SET key: Applies settings.</td>
<td></td>
</tr>
<tr>
<td>[SPEAKER] NOw UPDATE...</td>
<td></td>
</tr>
<tr>
<td>The message is displayed for one second and then previous screen is displayed automatically.</td>
<td></td>
</tr>
<tr>
<td>↓</td>
<td></td>
</tr>
<tr>
<td>[EDID] SPEAKER</td>
<td></td>
</tr>
<tr>
<td>* The cursor can be moved only if you select “MANUAL”. The number of speakers is displayed on the right side of the screen.</td>
<td></td>
</tr>
</tbody>
</table>
```

**Note:**
If you do not press the “SET” key, the speaker configuration is not changed. Make sure to press the “SET” key after each change.

If you set the speaker configuration manually and press the “SET” key, the number of speakers will be set automatically. If the number of speakers exceeds the available value, the following message is displayed and the settings will not be applied.

2. To set the speaker configuration using commands:

@SSP: Set speaker configuration
@GSP: Get speakers configuration
8.9.7 EDID Copy [MONITOR EDID COPY]

You can load the EDID of display devices and save it in the MSD.
To use the copied EDID, select “COPY DATA” for "8.9.1 EDID setting". After that, the copied data can be used as the same as that of the built-in data.
The copied EDID can only be used for digital input (IN1 to IN5), and not for analog inputs (IN6 to IN9).

1. To copy the EDID using menu:

   MSD-5404
   ↓ SET key
   [FUNCTION SELECT]
   EDID
   ↓ SET key
   [EDID]
   MONITOR EDID COPY
   ↓ SET key
   ↑ ESC key: Cancels the setting and returns to the previous screen.
   [MONITOR EDID COPY]
   OUT1 NO. 1 COPY DATA1
   ↓ ◄► keys
   [MONITOR EDID COPY]
   OUT1 NO. 1 COPY DATA1
   ↓ ◄► keys
   [MONITOR EDID COPY]
   OUT1 NO. 1 COPY DATA1
   ↓ SET key: Displays the confirmation screen
   ↑ ESC key
   [MONITOR EDID COPY]
   SAVE? = NO
   ↓ To save the settings: Select “YES” and press the “SET” key.
   To return to the menu without saving: Select “NO” and press the “SET” key.
   [MONITOR EDID COPY]
   EDID COPY COMPLETE
   The message is displayed for one second and then previous screen is displayed automatically.
   ↓
   [EDID]
   MONITOR EDID COPY
   ↓

If no display device is connected to the selected output, the message is displayed, and you cannot press the “SET” key.

2. To copy the EDID using command:
   @RME: Copy EDID
8.10 Serial (COM) Port Settings

8.10.1 Communication setting [PARAMETERS]

You can set up the serial communication settings for each connector:

- Baud rate: 4800, 9600, 19200, 38400 [bps]  [Default]: 9600 [bps]
- Data length: 8, 7 [bit]  [Default]: 8 [bit]
- Parity: NONE, EVEN, ODD  [Default]: NONE
- Stop bits: 1, 2[bit]  [Default]: 1[bit]

1. To set the COM port using menu:

   MSD-5404  Top
   ↓ SET key
   [FUNCTION SELECT]  
   COM PORT  ▼▼keys: Select “COM PORT”.
   ↓ SET key
   [COM PORT]  PARAMETERS  ▼▼keys: Select “PARAMETERS”.
   ↓ SET key  ↑ ESC key: Cancels the setting and returns to the previous screen.
   [CH1 PARAMETERS]  9600 8 NONE 1  ▼▼keys: Set the communication of RS-232C CH1.
   ↓◄►keys
   [CH2 PARAMETERS]  9600 8 NONE 1  ▼▼keys: Set the communication of RS-232C CH2.
   ↓ SET key: Applies settings.
   [COM PARAMETERS]  NOW UPDATE...
   The message is displayed for one second and then previous screen is displayed automatically.
   ↓
   [COM PORT]  PARAMETERS  ▼▼

Note:
If you do not press the “SET” key, the communication setting is not changed. Make sure to press the “SET” key.

2. To set the COM port using commands:
   @SCT: Set COM port communication
   @GCT: Get COM port communication
8.10.2 Operation mode [FUNCTION]

You can set the operation mode to “RECEIVER” mode in which the MSD is controlled externally or “TRANSMITTER” mode in which the MSD controls external devices.

[Table 8.10] RS-232C operation

<table>
<thead>
<tr>
<th>Mode</th>
<th>External control</th>
<th>Controlling external devices using “8.12 Control Command Settings”</th>
</tr>
</thead>
<tbody>
<tr>
<td>RECEIVER</td>
<td>Can be used</td>
<td>Cannot be used “1”</td>
</tr>
<tr>
<td>TRANSMITTER</td>
<td>Cannot be used “2”</td>
<td>Can be used</td>
</tr>
</tbody>
</table>

“1” You cannot use the serial Com ports set to “RECEIVER” mode to control external devices.
“2” You cannot use the serial Com ports set to “TRANSMITTER” mode to control the MSD externally.

1. To set the COM operation mode using menu:

1. MSD-5404
   ↓ SET key
   [FUNCTION SELECT]
   ▲▼ keys: Select “COM PORT”.
   ↓ SET key
   [COM PORT] FUNCTION
   ▲▼ keys: Select “FUNCTION”.
   ↓ SET key  
   [CH1 FUNCTION]
   ▲▼ keys: Select the desired operation mode of RS-232C CH1
   (RECEIVER or TRANSMITTER).
   ↓ ◄► keys
   [CH2 FUNCTION]
   ▲▼ keys: Select the desired operation mode of RS-232C CH2
   (RECEIVER or TRANSMITTER).
   ↓ SET key: Applies settings.
   [COM FUNCTION] NOW UPDATE...
   The message is displayed for one second and then previous screen is displayed automatically.
   ↓ [COM PORT] FUNCTION

Note:
If you do not press the “SET” key, the COM operation mode is not changed. Make sure to press the “SET” key.

2. To set the COM operation mode using commands:
   @SCF: Set COM port operation
   @GCF: Get COM port operation
8.11 LAN Settings

The MSD does not support automatic acquisition of IP address using DHCP (Dynamic Host Configuration Protocol). If you use the MSD in a network with DHCP, keep a fixed IP address. If controlling external devices connected over LAN from the MSD, keep several fixed IP addresses.

8.11.1 IP address [IP ADDRESS]

[Default]: 192.168.001.199

1. To set the IP address using menu:

```
MSD-5404
  ▼ SET key
  [FUNCTION SELECT] ▲▼ keys: Select “LAN”

  ▼ SET key
  [LAN] ▲▼ keys: Select “IP ADDRESS”

  ▼ SET key    ▲ ESC key: Cancels the setting and returns to the previous screen.
  [IP ADDRESS] ▲▼ keys: Set the IP address (0 to 255).

  ▼ SET key: Applies settings.
  [IP ADDRESS] The message is displayed for one second and then previous screen is
  NOW UPDATE... displayed automatically.

  ▼
  [LAN] ▲▼ keys: Select “IP ADDRESS”
```

**Note:**
If you do not press the “SET” key, the IP address is not changed. Make sure to press the “SET” key.

2. To set the IP address using commands:
   @SIP: Set IP address
   @GIP: Get IP address
8.11.2 Subnet mask [SUBNET MASK]

[Default]: 255.255.255.000

1. To set the subnet mask using menu:

```
MSD-5404

↓ SET key
[FUNCTION SELECT] LAN ▲▼ keys: Select “LAN”.

↓ SET key
[LAN] SUBNET MASK ▲▼ keys: Select “SUBNET MASK”.

↓ SET key ↑ ESC key: Cancels the setting and returns to the previous screen.

[SUBNET MASK] 255. 255. 255. 0 ▲▼ keys: Set the subnet mask (0.0.0.0 to 255.255.255.254).

↓ SET key: Applies settings.

[SUBNET MASK] NOW UPDATE...
The message is displayed for one second and then previous screen is displayed automatically.

↓
[LAN] SUBNET MASK ▲▼
```

**Note:**
If you do not press the “SET” key, the subnet mask is not changed. Make sure to press the “SET” key.

2. To set the subnet mask using commands:

@SSB: Set subnet mask
@GSB: Get subnet mask
8.11.3 Gateway address [GATEWAY ADDRESS]

[Default]: 192.168.001.200

1. To set the gateway address using menu:

   MSD-5404
   ▼ SET key
   [FUNCTION SELECT]
   LAN ▼
   ▼ SET key
   [LAN]
   GATEWAY ADDRESS ▼
   ▼ SET key
   [GATEWAY ADDRESS]
   192.168.1.200 ▼
   ▼ SET key: Select “LAN”.
   ▼ SET key: Select “GATEWAY ADDRESS”.
   ▼ SET key: Move the cursor.
   [GATEWAY ADDRESS]
   NOW UPDATE...
   ▼ SET key: Applies settings.
   ▼ SET key: The message is displayed for one second and then previous screen is displayed automatically.
   ▼ SET key
   [LAN]
   GATEWAY ADDRESS ▼

Note:
If you do not press the “SET” key, the gateway address is not changed. Make sure to press the “SET” key.

2. To set the gateway address using commands:

   @SGW: Set gateway address
   @GGW: Get gateway address
8.11.4 Operation mode [FUNCTION]

Set the LAN operation mode consisting of “RECEIVER” mode that controls the MSD externally and “TRANSMITTER” mode that controls external devices from the MSD.

If you select “TRANSMITTER” mode, you need to set the IP address of the device and the port number to be connected. The MSD can establish up to eight connections and the operation mode can be set separately.

[Table 8.11] Setting items of LAN operation mode

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>FUNCTION *1</td>
<td>Controlling the MSD externally or controlling external devices from MSD.</td>
<td>RECEIVER [Default]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TRANSMITTER</td>
</tr>
<tr>
<td>IP *2</td>
<td>IP address of target device</td>
<td>4 bytes between 0 to 255</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Default] 192.168.001.198</td>
</tr>
<tr>
<td>PJLink *2</td>
<td>Whether you use PJLink (class1) for projector control or not.</td>
<td>OFF : PJLink is not used.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Default] ON : PJLink is used.</td>
</tr>
<tr>
<td>PORT *2 *3</td>
<td>Port number for “TRANSMITTER” mode. (Set the port number for “RECEIVER” mode in “8.11.5 TCP port number”.)</td>
<td>1 to 65535 [Default]: 1100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Make sure the port number is correct, because reserved port number that is only for specific purpose can also be selected technically.</td>
</tr>
<tr>
<td>PASSWORD *2 *4</td>
<td>Password for authentication at PJLink protocol connection (up to 32 characters). Not necessary if you do not perform the authentication with password.</td>
<td>“9 ASCII codes”; 30 to 39, 41 to 5A, and 61 to 7A (alphanumeric character)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Final character: 20 (space)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Default]</td>
</tr>
</tbody>
</table>

*1 If selecting “RECEIVER” for operation mode, you do not need to set the item.

*2 If selecting “TRANSMITTER” for operation mode, you need to set the item.

*3 If selecting “ON” for PJLink protocol, the target port number is fixed at “4352”.

*4 If selecting “OFF” for PJLink protocol, you do not need to set the item.

*5 Connections that are set to “RECEIVER” cannot be used for controlling external devices.

*6 Connections that are set to “TRANSMITTER” cannot be used for controlling the MSD externally.

[Table 8.12] LAN operation mode

<table>
<thead>
<tr>
<th>Mode</th>
<th>External control</th>
<th>Controlling external devices using “8.12 Control Command Settings”</th>
</tr>
</thead>
<tbody>
<tr>
<td>RECEIVER mode</td>
<td>Can be used</td>
<td>Cannot be used*5</td>
</tr>
<tr>
<td>TRANSMITTER</td>
<td>Cannot be used*6</td>
<td>Can be used</td>
</tr>
</tbody>
</table>

*5 Connections that are set to “RECEIVER” cannot be used for controlling external devices.

*6 Connections that are set to “TRANSMITTER” cannot be used for controlling the MSD externally.
[All connections: "RECEIVER" mode (Default)]

Connection 1  
Connection 2  
Connection 3  
Port No.: 1100

Connection 4  
Connection 5  
Connection 6  
Port No.: 23

Connection 7  
Connection 8  
Port No.: 80

Factory default: All 8 connections are "RECEIVER" mode; the MSD can be controlled externally.

[Change connections 3 and 6 to "TRANSMITTER" mode]

Connection 1  
Connection 2  
Port No.: 1100

Connection 3  
Connection 4  
Connection 5  
Port No.: 23

Connection 6  
Connection 7  
Connection 8  
Port No.: 80

To control peripheral devices, select "TRANSMITTER" mode. 
Set the IP address and port number of the destination.

[Change connection 6 to "TRANSMIT" mode of "PJLink protocol"]

Connection 1  
Connection 2  
Connection 3  
Port No.: 1100

Connection 4  
Connection 5  
Port No.: 23

Connection 6  
Connection 7  
Connection 8  
Port No.: 80

If you use "PJLink protocol", the port number will be fixed at "4352".

[Figure 8.46] LAN operation mode
1. To set the LAN operation mode using menu:

```
MSD-5404
Top

SET key

[FUNCTION SELECT] LAN
▲▼keys: Select “LAN”.

SET key

[LAN] FUNCTION
▲▼keys: Select “FUNCTION”.

SET key

[CONNECTION1] RECIEVER
▲▼keys: Select the desired mode of CONNECTION 1.
(RECIEVER, TRANSMITTER)

SET key

[CONNECTION2] TRANSMITTER
▲▼keys: Select the desired mode of CONNECTION 2.
(RECIEVER, TRANSMITTER)

SET key

[CONNECTION2] IP: 192.168.1.198
▲▼keys: Set the IP address of CONNECTION 2 (0 to 255).

SET key

[CONNECTION2] PJLink: OFF
▲▼keys: Select “OFF” or “ON” for PJLink protocol.

SET key

[CONNECTION2] PORT: 1100
▲▼keys: Set the destination port no. of CONNECTION 2 (1 to 65535)

or

[CONNECTION2] PASSWORD
▲▼keys: Set the password of CONNECTION 2 (30 to 39, 41 to 5A, 61 to 7A from “9 ASCII codes”).

SET key: Applies settings.

The message is displayed for one second and then previous screen is displayed automatically.
```

*1 Settable only if you select “TRANSMITTER”.
*2 If setting PJLink protocol to “OFF”, set the port number of the destination. If turning it “ON”, set the password.
*3 The number of characters at the cursor position is displayed at the lower left, and the maximum number of the characters is 16. Space would be the final character, and characters before the space will be registered as the password.

Note:
If you do not press the “SET” key, the LAN operation mode is not changed. Make sure to press the “SET” key.

2. To set the LAN operation mode using commands:

@SLF: Set LAN operation mode
@GLF Get LAN operation mode
8.11.5 TCP port number [PORT NUMBER]

You can set the TCP port number to control the MSD externally.
The MSD supports up to eight connections at once. Connections are assigned either communication command control or browser control according to the set port numbers. By factory default, six connections are assigned for communication command control while two connections are for browser control. Settings of port numbers depend on the setting of "8.11.4 Operation mode" ("RECEIVER" or "TRANSMITTER"). For the "RECEIVER" mode, use this menu to set the port number; for "TRANSMITTER" mode, use "8.11.4 Operation mode".

- Port number: 23, 80, 1100, 5000 to 5999, 6000 to 6999
  [Default]: Connections 1 to 3 = 1100,
  Connections 4 to 6 = 23,
  Connections 7 to 8 = 80

Set connections for communication command control to any of 23, 1100, and 6000 to 6999. Set connections for browser control to any of 80 and 5000 to 5999.

1. To set the TCP port number using menu:

   MSD-5404
   \[\text{Top}\]
   \[\text{SET key}\]
   [FUNCTION SELECT] LAN \[\text{▲▼ keys: Select "LAN".}\]
   \[\text{SET key}\]
   [LAN] PORT NUMBER \[\text{▲▼ keys: Select "PORT NUMBER".}\]
   \[\text{SET key} \quad \text{ESC key: Cancels the setting and returns to the previous screen.}\]
   [CONNECTION1 PORT] 1100 \[\text{▲▼ keys: Set the port number of CONNECTION1 (23, 80, 1100, 5000 to 5999, 6000 to 6999).}\]
   \[\text{SET key} \quad \text{◄► keys}\]
   [CONNECTION2 PORT] 1100 \[\text{▲▼ keys: Set the port number of CONNECTION2 (23, 80, 1100, 5000 to 5999, 6000 to 6999).}\]
   \[\text{SET key: Applies settings.}\]
   [PORT NUMBER] NOW UPDATE\ldots
   \[\text{The message is displayed for one second and then previous screen is displayed automatically.}\]

   [LAN] PORT NUMBER

   \[\text{Note:}\]
   If you do not press the "SET" key, the TCP port number is not changed. Make sure to press the "SET" key.

2. To set the TCP port number using commands:

   @SLP: Set TCP port number
   @GLP: Get TCP port number
8.11.6 Displaying MAC address [MAC ADDRESS]

1. To display the MAC address using menu:

   MSD-5404  Top
   ↓ SET key
   [FUNCTION SELECT]  ▲▼keys: Select “LAN”.
   LAN
   ↓ SET key
   [LAN]  ▲▼keys: Select “MAC ADDRESS”.
   MAC ADDRESS
   ↓ SET key
   [MAC ADDRESS]
   00-08-E5-55-00-00
   The MAC address is displayed.
   ↓ ESC key: Returns to the previous screen.

2. To display the MAC address using commands:
   @GMC: Get MAC address
8.12 Control Command Settings

You can control external devices (for example, turning ON/OFF projectors) using Serial, LAN, Tally output or CEC. You can register up to 32 commands in the MSD. Associate registered commands with one of 98 operating conditions (for example, switching control command execution keys, COMMANDs A to I, and switching video/audio). When execution conditions are met, the associated commands are performed according to the set execution order. The loop back function allows you to control the commands of MSD itself.

[Figure 8.47] Sending control commands

In order to control external devices using a communication, select the correct mode as follows:
Serial: set "8.10.2 Operation mode" to "TRANSMITTER"
LAN: set "8.11.4 Operation mode" to "TRANSMITTER"
Tally output: set "8.15.1 Assigning functions" to a control command output.
When a control command is executed, the user setting for the text of "MEMO" is displayed (Example 1), and if the reply command is received, the "MEMO" text registered for the reply command is also displayed (Example 2) for one second (when the control command that is used for checking the reply command is executed).
The received data is displayed (Example 3) for two seconds (when the control command that is used for displaying the received data is executed).
However, if you configure several control commands, or if you display data received from several com ports, the display time may be shortened by one to two seconds while control commands are being successively executed. If the received data does not fit in the full screen, the displayed data is scrolled.

In order to control external devices using a communication, select the correct mode as follows:
Serial: set "8.10.2 Operation mode" to "TRANSMITTER"
LAN: set "8.11.4 Operation mode" to "TRANSMITTER"
Tally output: set "8.15.1 Assigning functions" to a control command output.
When a control command is executed, the user setting for the text of "MEMO" is displayed (Example 1), and if the reply command is received, the "MEMO" text registered for the reply command is also displayed (Example 2) for one second (when the control command that is used for checking the reply command is executed).
The received data is displayed (Example 3) for two seconds (when the control command that is used for displaying the received data is executed).
However, if you configure several control commands, or if you display data received from several com ports, the display time may be shortened by one to two seconds while control commands are being successively executed. If the received data does not fit in the full screen, the displayed data is scrolled.
Example 1: “SCREEN UP” is registered as the “MEMO”.
Example 2: “SCREEN OK” is registered as the “MEMO”.
Example 3: “PROJECTOR LAMP” is registered as the “MEMO”, and “%1LAMP=1000 1” is received.
Example 4: If the reply command to the sent command cannot be received, it causes retry over.

<table>
<thead>
<tr>
<th>Number</th>
<th>VFD screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example 1</td>
<td>SEND: SCREEN UP</td>
</tr>
<tr>
<td>Example 2</td>
<td>SEND: SCREEN UP&lt;br&gt;RECV: SCREEN OK</td>
</tr>
<tr>
<td>Example 3</td>
<td>SEND: PROJECTOR LAMP&lt;br&gt;RECV: %1LAMP=1000 1</td>
</tr>
<tr>
<td>Example 4</td>
<td>SEND: SCREEN UP&lt;br&gt;RETRY OVER ERROR</td>
</tr>
</tbody>
</table>
[Figure 8.49] Control command processing
For details of the settings below, see "8.12.1 Control commands".

*1 If you set “DELAY” to a value other than “0”, command execution is delayed according to the set value.

Control command number to be executed and remaining time before the command execution are displayed by 100 ms.

<table>
<thead>
<tr>
<th>COMMAND EXEC WAIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 1 DELAY: 10.5sec</td>
</tr>
</tbody>
</table>

*2 This depends on setting of “PORT”.

*3 The send control command data set in "8.12.1 Control commands" is sent for the number of bytes specified in “SIZE”.

*4 If you set “RECV DSPLAY” to “ASCII” or “HEX”, the received data is displayed on VFD screen in “ASCII” or “HEX”.

*5 If you set “DELIMITER” to a value other than “NONE”, the MSD waits until it receives the set delimiter.

*6 If you set “DELIMITER” to “NONE”, the MSD waits the receive data until the time set for “TIME OUT” passes. If no data is received, the MSD retries.

*7 If you set “RCV” to “NOT CHECK” for all (32) commands, the next command will be performed without checking reply commands. If you set it to “CHECK” for only one command, the reply command is compared with the received data in order of “1→2→31→32”.

*8 If received data matches “DATA” of “RECV COMMAND” registered in "8.12.2 Reply commands"", the next operation will be determined according to “PROCESS” of "8.12.2 Reply commands". If you set “PROCESS” to “RETRY”, the retry operation will be performed. If you set it to “EXEC”, the next command will be executed. If you set it to “STOP”, the next command will not be executed even if the next command is associated.

*9 If a delimiter or data matching reply command is not received even after the time set in “TIME OUT” passes, it causes timeout and retries the operation.

*10 If any reply command is not received, the send command data is resent for the number of replies set in “RETRY”. If you set “RETRY” to “0”, the command is not resent.

*11 If you set “INTERVAL” to an interval other than “0”, retry will be delayed according to the set time.

*12 If the reply command is not sent even after retry for the number of retry times set in “RETRY,” the next operation will be determined according to “ERROR”. If you set “ERROR” to “EXEC”, the next command will be executed automatically. If you set it to “STOP”, the next command will not be executed even if the command is associated. If you turn multiple communication ports “ON”, it becomes “RETRY OVER ERROR” unless reply commands from all communication ports to which commands are sent are received.

*13 The connector that is set to “OFF”, “ON,” or “TGL” for “Tally” will be controlled.

*14 If you set “PULSE” of “Tally” to a value other than “NONE”, the contact point is put back to the previous (that of before controlling contact points) status automatically after the set time passes.

*15 The connector that is set to “POWER OFF” or “POWER ON” for “HDMI CEC control” will be controlled.

*16 If no response from a device controlled with CEC, the next operation will be determined according to the setting of “8.12.1 Control commands”. If you set “ERROR” to “EXEC”, the next command will be executed, but if you set it to “STOP”, the next command is not executed even if the command is associated. If you set multiple outputs to be controlled in “HDMI CEC control” and any response from all devices controlled by CEC are not sent, it causes an error.
### 8.12.1 Control commands [COMMAND EDIT]

You can register up to 32 commands.

[Table 8.13] Setting items of control commands

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>PORT</td>
<td>Select “COM”, “Tally”, or “CEC”.</td>
<td>COM: Communication command [Default]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tally: Tally output</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CEC: HDMI CEC</td>
</tr>
<tr>
<td>DELAY</td>
<td>Set the waiting time of the control command. Use this item for devices such as projectors that require time to cool down after powering off.</td>
<td>0 ms. to 999 seconds and 999 ms. [Default]: 0 ms.</td>
</tr>
<tr>
<td>Communication port *1</td>
<td>Set the following communication ports to “OFF” (not sending communication commands) or “ON” (sending communication commands). Those ports can be set separately, and communication commands can be sent to multiple communication ports at the same time. RS1: RS-232C CH1 *6</td>
<td>OFF [Default] ON</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LAN1 to LAN8: LAN connections 1 to 8 *7</td>
</tr>
<tr>
<td>COM SIZE *1</td>
<td>Set the number of bytes to be sent starting with the first byte.</td>
<td>0 byte to 30 bytes [Default]: 0 byte</td>
</tr>
<tr>
<td>COMMAND INPUT MODE *1</td>
<td>Set the input mode of send command data. Select “ASCII” if “DATA” of “COMMAND” consists of only 0A, 0D, and 20 to 7D of “9 ASCII codes”; select “HEX” if “DATA” of “COMMAND” includes other codes.</td>
<td>ASCII [Default] HEX</td>
</tr>
<tr>
<td>Send command data *1</td>
<td>Set the command from the first byte according to the number of bytes set in “COM SIZE” (up to 30 bytes).</td>
<td>0A, 0D, 20 to 7D of “9 ASCII codes” (If inputting with ASCII codes), or 00 to FF of hex (If inputting with hex) [Default]: 20 (Space) (All numbers above are hex)</td>
</tr>
<tr>
<td>RECV DISPLAY *1</td>
<td>Set whether received data is displayed or not.</td>
<td>OFF [Default] ASCII HEX</td>
</tr>
</tbody>
</table>
### DELIMITER *(1)* *(2)*
Set the delimiter to be sent at the end of the received data.
- **NONE**: delimiter is not checked and all received data within the set timeout will be valid.
- Value other than “NONE”: delimiter is checked and data received before delimiter will be valid.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NONE</strong></td>
<td>[Default] 00 to FF (Hex)</td>
</tr>
</tbody>
</table>

### RCV CHECK *(1)* *(3)*
Set whether reply command that may be returned is checked or not.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CHECK</strong></td>
<td>[Default]</td>
</tr>
<tr>
<td><strong>NOT CHECK</strong></td>
<td></td>
</tr>
</tbody>
</table>

### TIME OUT *(1)* *(4)* *(5)*
Set the timeout time for reply command to a sent command.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ms. to 99 seconds and 999 ms.</td>
<td>[Default]: 0 ms.</td>
</tr>
</tbody>
</table>

### RETRY *(1)* *(4)* *(5)*
Set the number of retries to resend the same command again if no valid response is replied.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 99</td>
<td>[Default]: 0</td>
</tr>
</tbody>
</table>

### INTERVAL *(1)* *(4)* *(5)*
Set the retry interval to resend the command.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ms. to 99 seconds and 999 ms.</td>
<td>[Default]: 0 ms.</td>
</tr>
</tbody>
</table>

### ERROR *(1)* *(4)* *(5)*
Set whether the next command is to be executed or not if no valid response is replied, even after completing retry for the set number of retries.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STOP</strong></td>
<td>[Default] Continue</td>
</tr>
<tr>
<td><strong>EXEC</strong></td>
<td>[Default]</td>
</tr>
</tbody>
</table>

### Tally output control *(3)*
Set the control of pins 22 to 24 and 47 to 49 of Tally output.
- **TGL** (toggle operation): contact points are switched from OFF to ON or vice versa.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OFF</strong></td>
<td>[Default]</td>
</tr>
<tr>
<td><strong>ON</strong></td>
<td></td>
</tr>
</tbody>
</table>

### PULSE *(6)*
Set the waiting time before the status is put back after controlling contact points with Tally output.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NONE</strong></td>
<td>Eternal [Default] 100 ms. to 9990 ms. (by 10 ms.)</td>
</tr>
</tbody>
</table>

### HDMI CEC control *(7)*
Set the CEC control for the display devices connected to HDMI connectors of OUT1 to OUT4.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OFF</strong></td>
<td>[Default]</td>
</tr>
<tr>
<td><strong>POWER ON</strong></td>
<td></td>
</tr>
<tr>
<td><strong>POWER OFF</strong></td>
<td></td>
</tr>
</tbody>
</table>

### Process for CEC error *(9)*
Set whether the next command is executed or not if no response is replied from the display device that is controlled with CEC.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STOP</strong></td>
<td>[Default] Continue</td>
</tr>
<tr>
<td><strong>EXEC</strong></td>
<td>[Default]</td>
</tr>
</tbody>
</table>

### MEMO
Register a note up to 14 characters.
The registered note is displayed when the control command is executed.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 to 7D</td>
<td>of <strong>9 ASCII codes</strong> except for 2C (,) [Default]: All spaces</td>
</tr>
</tbody>
</table>

---

*1 If “Port” is set to “Tally” or “CEC”, you do not need to set this item.
*2 If “RECV DISPLAY” is set to “OFF”, you do not need to set this item.
*3 If “RECV DISPLAY” is set to “ASCII” or “HEX”, you do not need to set this item.
*4 If only “LOOP BACK” of communication ports is set to “ON”, you do not need to set this item.
*5 If all “RCV CHECK” is set to “NOT CHECK”, you do not need to set this item.
*6 If either “RS-1” or “RS-2” is set to “ON”, set “8.10.2 Operation mode” to “TRANSMITTER”.
*7 If any LAN connections for “LAN1” to “LAN8” are set to “ON”, set “8.11.4 Operation mode” to “TRANSMITTER”.
*8 If “PORT” is set to “COM” or “CEC”, you do not need to set this item. For Tally output pins that are set to “Not control”, set “8.15.1 Assigning functions” to “Control command output”.
*9 If “PORT” is set to “COM” or “Tally”, you do not need to set this item.
1. To edit the control command using menu:

<table>
<thead>
<tr>
<th>MSD-5404</th>
<th>Top</th>
</tr>
</thead>
<tbody>
<tr>
<td>↓ SET key</td>
<td></td>
</tr>
</tbody>
</table>

[FUNCTION SELECT] PRESET COMMAND ▲▼ keys: Select “PRESET COMMAND”.

↓ SET key

[PRESET COMMAND] COMMAND EDIT ▲▼ keys: Select “COMMAND EDIT”.

↓ SET key

[COMMAND EDIT] ▲▼ keys: Select the desired control command (CMD 1 to CMD 32). “MEMO” is displayed on the right of the command number.

↓ SET key ↑ ESC key: Cancels the setting and returns to the previous screen.

PORT: COM SIZE: 0BYTE
DELAY: 000ms ▲▼ keys: Set the desired port (COM, Tally, CEC).

↓ ◄► keys

After this step, procedures differ depending on the settings of “PORT”.

Go to steps I, II, or III depending on the PORT setting being selected.
[Step I. When setting “PORT” to “COM”]

**PORT**:
- **COM SIZE**: ▲▼ keys: Set the size of send command data (1 to 30).
- **BYTE**
- **DELAY**: 0s000ms ▲▼ keys
- ▲▼ keys: Set the delay time in seconds (0 to 999).
- **ms**
- ▲▼ keys: Set the delay time in milliseconds (0 to 999).
- **0s000ms** ▲▼ keys

**RS1**: OFF ▲▼ keys
**RS2**: OFF
**LOOP BACK**: OFF ▲▼ keys

**LAN1**: OFF ▲▼ keys
**LAN2**: OFF
**LAN3**: OFF ▲▼ keys
**LAN4**: OFF

**LAN5**: OFF ▲▼ keys
**LAN6**: OFF
**LAN7**: OFF ▲▼ keys
**LAN8**: OFF

**COMMAND INPUT MODE**: ▲▼ keys
- **ASCII** ▲▼ keys

After this step, procedures to input send command data differ depending on settings of the “COMMAND INPUT MODE”. Go to I-i or I-ii below to continue.

*¹ The command size can be set also when inputting the command data.

If you press the “SET” key for 1 second or longer on the command data input screen, the number of data up to the current cursor position will be set as the size of the command data. For example, when pressing the “SET” key for one second or longer while the following display is displayed, up to the 5th byte is set as the data size.

**DATA: INPUT**
5:

**DATA: 49 4E 50 55 54**
5: 20 20 20 20 20
[Step I-i. When setting “COMMAND INPUT MODE” to “ASCII”]
You can set 30 bytes in total on the front panel VFD screen. A (LF) and 0D (CR) are displayed as shown below, and for 20 to 7D, codes corresponding to “9 ASCII codes” are displayed. If a code other than 0A, 0D, 20 to 7D is detected, an “=” symbol is displayed.

\[
\begin{align*}
0A (LF) &= \downarrow \\
0D (CR) &= \downarrow
\end{align*}
\]

**DATA:**

\[
\begin{array}{c}
1: \\
\end{array}
\]

▲▼ keys: Set the command data; 1 to 15 bytes (upper row), 16 to 30 bytes (lower row) (0A, 0D, 20 to 7D of “9 ASCII codes”)

◄► keys: Moves the cursor to the next data.

↓◄► keys

Go to step I-iii below.

[Step I-ii. When setting “COMMAND INPUT MODE” to “HEX”]
10 bytes are displayed on a VFD screen (30 bytes in three VFD screen in total) in 00 to FF (Hex).

**DATA:**

\[
\begin{array}{c}
10: 20 20 20 20 20 \\
1: 20 20 20 20 20
\end{array}
\]

▲▼ keys: Set the command data; 1st to 5th bytes (upper row), 6th to 10th bytes (lower row) (0 to F in Hex).

◄► keys: Moves the cursor to the next number.

↓◄► keys

**DATA:**

\[
\begin{array}{c}
11: 20 20 20 20 20 \\
10: 20 20 20 20 20
\end{array}
\]

▲▼ keys: Set the command data; 11th to 15th bytes (upper row), 16th to 20th bytes (lower row) (0 to F in Hex).

◄► keys: Moves the cursor to the next number.

↓◄► keys

**DATA:**

\[
\begin{array}{c}
21: 20 20 20 20 20 \\
20: 20 20 20 20 20
\end{array}
\]

▲▼ keys: Set the command data; 21st to 25th bytes (upper row), 26th to 30th bytes (lower row) (0 to F in Hex).

◄► keys: Moves the cursor to the next number.

↓◄► keys

Go to step I-iii below

*2 The numbers at the lower left indicate the number of characters of the cursor position.

[Step I-iii. Whether to display received data or not]

**RECV DISPLAY:**

\[
\begin{array}{c}
OFF \\
ASCII
\end{array}
\]

▲▼ keys: Set whether to display the received data “RECV DISPLAY” (OFF, ASCII, HEX).

↓◄► keys

**RECV DISPLAY:**

\[
\begin{array}{c}
ASCII \\
DELIMITER: NONE
\end{array}
\]

▲▼ keys: Set whether to check delimiter (NONE, 00 to FF in hex).

↓◄► keys

If selecting “RECV DISPLAY” to “OFF”, set whether to check the reply command or not (Go to step I-iv).
If selecting “ASCII” or “HEX”, set “TIME OUT” (Go to step I-v)

*3 Displayed only if you select “ASCII” or “HEX”.
If you set “DELIMITER” to a value other than “NONE”, ASCII codes (text) will also be displayed in parentheses along with hexadecimal. ASCII codes (text) are displayed the same as in step I-i.
[Step I-iv. Reply command]

▲▼keys: Set whether to check reply command 1 (NOT CHECK, CHECK). Memo is displayed at the right of the command number.

▲▼keys: Set whether to check reply command 2. (NOT CHECK, CHECK). Memo is displayed at the right of the command number.

▲▼keys: Set whether to check reply command 32 (NOT CHECK, CHECK). Memo is displayed at the right of the command number.

Go to step I-v below to continue.
[Step I-v. Setting timeout]

<table>
<thead>
<tr>
<th>TIME OUT: 0s000ms</th>
</tr>
</thead>
<tbody>
<tr>
<td>RETRY: 0</td>
</tr>
</tbody>
</table>

▲▼keys: Set the retry timeout in seconds (0 to 99).

<table>
<thead>
<tr>
<th>TIME OUT: 0s000ms</th>
</tr>
</thead>
<tbody>
<tr>
<td>RETRY: 0</td>
</tr>
</tbody>
</table>

▲▼keys: Set the retry timeout in milliseconds (0 to 999).

<table>
<thead>
<tr>
<th>TIME OUT: 0s000ms</th>
</tr>
</thead>
<tbody>
<tr>
<td>RETRY: X</td>
</tr>
</tbody>
</table>

▲▼keys: Set the number of retries (0 to 99).

<table>
<thead>
<tr>
<th>INTERVAL: 0s000ms</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERROR: STOP</td>
</tr>
</tbody>
</table>

▲▼keys: Set the retry interval in seconds (0 to 99).

<table>
<thead>
<tr>
<th>INTERVAL: 0s000ms</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERROR: STOP</td>
</tr>
</tbody>
</table>

▲▼keys: Set the retry interval in milliseconds (0 to 999).

<table>
<thead>
<tr>
<th>INTERVAL: 0s000ms</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERROR: STOP</td>
</tr>
</tbody>
</table>

▲▼keys: Select the action for when retry over occurs (STOP, EXEC).

MEMO:
1

▲▼keys: Set the “MEMO” (20 to 7D of “9 ASCII codes” except for 2C).

▲▼keys: Moves the cursor to the next number (Up to 14 characters).

The message is displayed for one second and then previous screen is displayed automatically.

*Note:
If you do not press the “SET” key, the control command is not changed. Make sure to press the “SET” key.

[Setting loop back]

If the MSD sends a communication command back to the MSD itself using the loop back function, the MSD replies “OK” if processed normally while replying “NG” if parameter or command is incorrect. (These commands differ from reply commands to communication commands received externally; not loop-back.) Since “OK” and “NG” are registered to reply commands 31 and 32 by factory default, respectively, set CHECK” for those commands in order to check reply commands using the loop back function. However, these commands can be changed in “8.12.2 Reply commands”, so confirm that “OK” and “NG” have not been changed before using.

With this function, you can register several communication commands to one control command. (Up to 30 bytes) For example, if sending the channel switching command “@SSW,1,1CR LF” and the audio output setting command “@SSL,1,1 CR LF” successively, register “@SSW,1,1 CR LF @SSL,1,1 CR LF” (20 bytes).

Even if you send several communication commands, the number of reply commands is 1, and “OK” is replied if processed successfully while “NG” is replied if there is an error even in just one command.

*4 The numbers at the lower left indicate the number of characters of the cursor position.
[Setting PJLink]
The MSD supports PJLink (class1), which is a standard protocol to control projectors. If you set a LAN port to be connected using the PJLink protocol for the communication port (can be set in “8.11.4 Operation mode”), you can select a PJLink command when inputting send command data.

**[Table 8.14] PJLink command (class1)**

<table>
<thead>
<tr>
<th>Header</th>
<th>Standard class</th>
<th>Command</th>
<th>Separator</th>
<th>Parameter</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>% (25)</td>
<td>1 (31)</td>
<td>4-character alphabet</td>
<td>Space (20)</td>
<td>ASCII codes (text) within 128 bytes</td>
<td>CR (0D)</td>
</tr>
</tbody>
</table>

Hexadecimal values are in parentheses.

You can select PJLink command by pressing ▲▼ keys when the cursor is at the first byte of the data or right of the delimiter (CR). You can select ASCII codes (text) and change parameters by pressing these keys when the cursor is at another position.

**[Figure 8.50] Selecting PJLink commands (class1)**

The MSD supports the following PJLink commands.

**[Table 8.15] PJLink commands (class1) (ASCII codes)**

<table>
<thead>
<tr>
<th>No.</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>% 1 P O W R (SP)</td>
<td>Power off (Standby)</td>
</tr>
<tr>
<td>2</td>
<td>% 1 P O W R (SP)</td>
<td>Power on (Lamp on)</td>
</tr>
<tr>
<td>3</td>
<td>% 1 P O W R (SP)</td>
<td>Get power status</td>
</tr>
<tr>
<td>4</td>
<td>% 1 I N P T (SP)</td>
<td>Switch input to RGB</td>
</tr>
<tr>
<td>5</td>
<td>% 1 I N P T (SP)</td>
<td>Switch input to VIDEO</td>
</tr>
<tr>
<td>6</td>
<td>% 1 I N P T (SP)</td>
<td>Switch input to DIGITAL</td>
</tr>
<tr>
<td>7</td>
<td>% 1 I N P T (SP)</td>
<td>Switch input to STORAGE</td>
</tr>
<tr>
<td>8</td>
<td>% 1 I N P T (SP)</td>
<td>Switch input to NETWORK</td>
</tr>
<tr>
<td>9</td>
<td>% 1 I N P T (SP)</td>
<td>Get input selection settings</td>
</tr>
<tr>
<td>10</td>
<td>% 1 A V M T (SP)</td>
<td>Switch off video mute</td>
</tr>
<tr>
<td>11</td>
<td>% 1 A V M T (SP)</td>
<td>Switch on video mute</td>
</tr>
<tr>
<td>12</td>
<td>% 1 A V M T (SP)</td>
<td>Switch off audio mute</td>
</tr>
<tr>
<td>13</td>
<td>% 1 A V M T (SP)</td>
<td>Switch on audio mute</td>
</tr>
<tr>
<td>14</td>
<td>% 1 A V M T (SP)</td>
<td>Video+audio mute off</td>
</tr>
<tr>
<td>15</td>
<td>% 1 A V M T (SP)</td>
<td>Video+audio mute on</td>
</tr>
<tr>
<td>16</td>
<td>% 1 A V M T (SP)</td>
<td>Get mute settings</td>
</tr>
<tr>
<td>17</td>
<td>% 1 E R S T (SP)</td>
<td>Get error status</td>
</tr>
<tr>
<td>18</td>
<td>% 1 L A M P (SP)</td>
<td>Get time and status of lamp</td>
</tr>
<tr>
<td>19</td>
<td>% 1 I N S T (SP)</td>
<td>Get list of switching input</td>
</tr>
<tr>
<td>20</td>
<td>% 1 N A M E (SP)</td>
<td>Get projector name</td>
</tr>
<tr>
<td>21</td>
<td>% 1 I N F 1 (SP)</td>
<td>Get manufacture name</td>
</tr>
<tr>
<td>22</td>
<td>% 1 I N F 2 (SP)</td>
<td>Get product name</td>
</tr>
<tr>
<td>23</td>
<td>% 1 I N F O (SP)</td>
<td>Get other information (optional of manufacturer)</td>
</tr>
</tbody>
</table>

*1 You can specify the input number from 1 to 9, but types and the number of selectable input connectors...
differ depending on the connected projector. “1” is displayed by default.

Reply command structure for PJLink commands:
The first 6 bites: The sent command data without change
The 7th bite: “=”
After the 8th bite: Processing result
For example, if a command, “%1POWR 1CR”, is processed normally, the reply command, “%1POWR=OK CR” will be replied.
PJLink specifications regulate that projectors are required to reply the reply commands within 2 seconds after receiving the PJLink command. However, some projectors have different specifications. Check the manual of your projector and apply the response time indicated in the manual if there is one listed.

[Table 8.16] Reply command to PJLink command (class1)

<table>
<thead>
<tr>
<th>Header</th>
<th>Standard class</th>
<th>Command</th>
<th>Separator</th>
<th>Parameter</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>% (25)</td>
<td>1 (31)</td>
<td>4-character alphabet</td>
<td>= (3D)</td>
<td>Processing result</td>
<td>CR (0D)</td>
</tr>
</tbody>
</table>

Hex values are in parentheses.

There are five types of normal reply commands as shown in [Table 8.17]. In addition to these five commands, there are other reply commands listed in [Table 8.18] are defined for setting acquisition commands.

[Table 8.17] Reply commands to PJLink command (class1) (ASCII codes)

<table>
<thead>
<tr>
<th>No.</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>% 1 x x x x = O K CR</td>
<td>Terminated normally</td>
</tr>
<tr>
<td>2</td>
<td>% 1 x x x x = E R R 1 CR</td>
<td>Mistake in command itself (Undefined command)</td>
</tr>
<tr>
<td>3</td>
<td>% 1 x x x x = E R R 2 CR</td>
<td>Invalid parameter</td>
</tr>
<tr>
<td>4</td>
<td>% 1 x x x x = E R R 3 CR</td>
<td>Currently not acceptable</td>
</tr>
<tr>
<td>5</td>
<td>% 1 x x x x = E R R 4 CR</td>
<td>Malfunction of projector</td>
</tr>
</tbody>
</table>

xxxx: Command itself

[Table 8.18] Individual reply command of status acquisition commands (text)

<table>
<thead>
<tr>
<th>No.</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reply command to power status commands</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>% 1 P O W R = 0 CR</td>
<td>Stand by</td>
</tr>
<tr>
<td>2</td>
<td>% 1 P O W R = 1 CR</td>
<td>Power ON</td>
</tr>
<tr>
<td>3</td>
<td>% 1 P O W R = 2 CR</td>
<td>Cooling</td>
</tr>
<tr>
<td>4</td>
<td>% 1 P O W R = 3 CR</td>
<td>Warming up</td>
</tr>
<tr>
<td>Reply command to input status commands</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>% 1 I N P T = 1 ^2 CR</td>
<td>RGB selected</td>
</tr>
<tr>
<td>2</td>
<td>% 1 I N P T = 2 ^2 CR</td>
<td>VIDEO selected</td>
</tr>
<tr>
<td>3</td>
<td>% 1 I N P T = 3 ^2 CR</td>
<td>DIGITAL selected</td>
</tr>
<tr>
<td>4</td>
<td>% 1 I N P T = 4 ^2 CR</td>
<td>STORAGE selected</td>
</tr>
<tr>
<td>5</td>
<td>% 1 I N P T = 5 ^2 CR</td>
<td>NETWORK selected</td>
</tr>
<tr>
<td>Get mute settings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>% 1 A V M T = 3 0 CR</td>
<td>Video+audio Mute OFF</td>
</tr>
<tr>
<td>2</td>
<td>% 1 A V M T = 1 1 CR</td>
<td>Video Mute OFF</td>
</tr>
<tr>
<td>3</td>
<td>% 1 A V M T = 2 1 CR</td>
<td>Audio Mute ON</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>4 % 1 AVMT = 3 1 CR</code></td>
<td>Video+audio mute ON</td>
</tr>
<tr>
<td><code>1 % 1 ERS T = *3 *4 *5 *6 *7 *8 CR</code></td>
<td>Get error status</td>
</tr>
<tr>
<td><code>1 % 1 LAMP = *9 (SP) *10 CR</code></td>
<td>Get time and status of lamp</td>
</tr>
<tr>
<td><code>1 % 1 INST = *11 CR</code></td>
<td>Get list of input switching</td>
</tr>
<tr>
<td><code>1 % 1 INAME = *12 CR</code></td>
<td>Get projector name</td>
</tr>
<tr>
<td><code>1 % 1 INF1 = *13 CR</code></td>
<td>Get manufacturer name</td>
</tr>
<tr>
<td><code>1 % 1 INF2 = *13 CR</code></td>
<td>Get product name</td>
</tr>
<tr>
<td><code>1 % 1 INFO = *13 CR</code></td>
<td>Get other information (optional)</td>
</tr>
</tbody>
</table>

### Notes:
- **Input number**, which is any of “1” to “9”, but types and the numbers of selectable input connectors differ depending on connected projectors.
- **Fan error**, which is any of 0 to 2.
  - 0: Error not detected or no detect error function
  - 1: Warning
  - 2: Error
- **Lamp error**, Numbers and meanings are the same as those of the fan error status above.
- **Temperature error**, Numbers and meanings are the same as those of the fan error status above.
- **Cover open error**, Numbers and meanings are the same as those of the fan error status above.
- **Filter error**, Numbers and meanings are the same as those of the fan error status above.
- **Other errors**, Numbers and meanings are the same as those of the fan error status above.
- **Accumulated time of lamp**, which is any of 0 to 99999. (For projectors that do not count the accumulated time, the value is 0 at all times.)
- **Accumulated time and lightning state for each device are replied in sequence**. For example, if a device containing three lamps, the following command is replied:
  ```
  "%1LAMP=accumulated time 1(SP) lightning state 1(SP) accumulated time 2(SP) lightning state 2(SP) accumulated time 3(SP) lightning state 3 CR"
  ```
- **Source number**, which is input switchable. Any of 11 to 59 (Meaning is the same as that of “%INPT” command). For devices containing several inputs, several statuses separated with a (SP) are sent. For example, for a device having two inputs, “%1INST= source number1(SP)source number2CR” is sent.
- **20 to FF in hex; up to 64 characters.**
- **20 to 7F in hex; up to 32 characters.**

To check reply commands of PJLink commands, register reply commands of [Table 8.17] to [Table 8.18] by following "8.12.2 Reply commands" ("xxxx" specifies the command itself of [Table 8.15].)

---

* (SP): Space
[Step II. When setting “PORT” to “Tally”]

PORT: TALLY
DELAY: 0 s 000 ms

▲▼ keys: Set the delay time in seconds (0 to 999).

PORT: TALLY
DELAY: 0 s 000 ms

▲▼ keys: Set the delay time in milliseconds (0 to 999).

TALLY22

▲▼ keys: Select the control of Tally output pin 22 (OFF, ON, or TGL).

TALLY22 ON PULSE: NONE

▲▼ keys: Select the control of Tally output pin 22 (NONE, 100 to 9990). Displayed only if you select “ON” or “OFF” on the previous screen (setting for control).

TALLY23

▲▼ keys: Select the control of Tally output pin 23 (OFF, ON, TGL).

TALLY49

▲▼ keys: Select the control of Tally output pin 49 (OFF, ON, TGL).

MEMO: 1

▲▼ keys Set the “MEMO” (20 to 7D of “9 ASCII codes” except for 2C).

SET key: Applies settings.

[PRESET COMMAND 1]
NOW UPDATE...

The message is displayed for one second and then previous screen is displayed automatically.

[COMMAND EDIT]

Note:
If you do not press the “SET” key, the control command is not changed. Make sure to press the “SET” key.

Tally output: only pins 22 to 24 and 47 to 49 can be used for control commands using open collector method. The maximum supplied currency of internal power (pins 1 and 26) is 300 mA. Do not use external power and internal power at the same time.
The maximum load of pins 22 to 24 and 47 to 49 is DC +48 V and 1 A. (different from the maximum load of other pins)

[Figure 8.51] Examples of Tally output circuit
[Step III. When setting “PORT” to CEC]

| PORT:CEC | ▲▼keys: Set the delay time in seconds (0 to 999). |
| DELAY: 8000ms | ▼► keys |

| PORT:CEC | ▲▼keys: Set the delay time in seconds in milliseconds (0 to 999). |
| DELAY: 0s000ms | ▼► keys |

| OUT1 CEC: | ▲▼keys: Select the control of OUT1 (-, POWER OFF, POWER ON). |
| ▼► keys |

| OUT2 CEC: | ▲▼keys: Select the control of OUT2 (-, POWER OFF, POWER ON). |
| ▼► keys |

| OUT3 CEC: | ▲▼keys: Select the control of OUT3 (-, POWER OFF, POWER ON). |
| ▼► keys |

| OUT4 CEC: | ▲▼keys: Select the control of OUT4 (-, POWER OFF, POWER ON). |
| ▼► keys |

| ERROR: STOP | ▲▼keys: Select the action for when retry over occurs (STOP, EXEC). |
| ▼► keys |

| MEMO: 1 | ▲▼keys: Set the “MEMO” (20 to 7D of “9 ASCII codes” except for 2C). |
| 1: | ▼► keys: Moves the cursor to the next character (Up to 14 characters). |
| ▼ SET key: Applies settings. |

The message is displayed for one second and then previous screen is displayed automatically.

**Note:**

If you do not press the “SET” key, the control command is not changed. Make sure to press the “SET” key.

CEC can only control the power of display devices connected to the HDMI output connectors. Devices connected to HDMI input connectors (IN1 to 5) cannot be controlled, and only power control is available. This function may not work correctly in old devices and some devices supporting CEC.

2. To edit the control command using commands:

   @SEC: Set control command (Control communication command)
   @GEC: Get control command (Control communication command)
   @SEC: Set control command (Display received data)
   @GEC: Get control command (Display received data)
   @SEC: Set control command (Control Tally output)
   @GEC: Get control command (Control Tally output)
   @SEC: Set control command (Control CEC)
   @GEC: Get control command (Control CEC)
### 8.12.2 Reply commands [RECV COMMAND EDIT]

You can register up to 32 commands.

**[Table 8.19] Setting items of reply commands**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIZE</td>
<td>Set the number of bytes from the first byte to be compared.</td>
<td>0 to 30 bytes</td>
</tr>
<tr>
<td></td>
<td>[Default]: 0 byte</td>
<td></td>
</tr>
<tr>
<td>PROCESS</td>
<td>Select “STOP” (to stop the next operation), “EXEC” (to execute it), or “RETRY” (to send the command again) for when received data and reply command data match.</td>
<td>STOP</td>
</tr>
<tr>
<td></td>
<td>[Default]</td>
<td>EXEC</td>
</tr>
<tr>
<td></td>
<td>RETRY: Resend commands</td>
<td>RETRY: Resend</td>
</tr>
<tr>
<td>PJLink</td>
<td>Select whether PJLink commands are set or not for when input reply command data is input.</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td>[Default]</td>
<td>ON</td>
</tr>
<tr>
<td>COMMAND INPUT MODE</td>
<td>Select the input mode of reply command data. “ASCII”: For data consisting of only 0A, 0D, 20 to 7D (text) “HEX”: For data including other codes</td>
<td>ASCII [Default]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HEX</td>
</tr>
<tr>
<td>DATA</td>
<td>Set the command to be compared with the received data from the first byte to the byte count set in “SIZE”. If using alphabets (A to Z, a to z), make sure to distinguish capital and lower case letters. (Up to 30 bytes)</td>
<td>0A, 0D, and 20 to 7D of “9 ASCII codes” or 00 to FF (Hex) [Default]: 20 (Space) (Values described above all with hex)</td>
</tr>
<tr>
<td>MASK</td>
<td>Received data is compared with MASK DATA without “AND” of each bit and reply command data. (Use this item to determine the state using the received data bit.)</td>
<td>00 to FF (Hex)</td>
</tr>
<tr>
<td></td>
<td>[Default]: All: “FF”</td>
<td></td>
</tr>
<tr>
<td>MEMO</td>
<td>Register a note up to 14 characters.</td>
<td>20 to 7D of “9 ASCII codes” except for 2C (,) [Default]: All: Spaces</td>
</tr>
</tbody>
</table>

Those default values do not apply to reply commands 31 and 32.
Note:
If the MSD sends a communication command back to the MSD itself using the loop back function, the MSD replies “OK” if processed normally while it replies “NG” if parameter or command is incorrect. (This differs from reply commands to communication commands received externally; not loop back.) Since “OK” and “NG” are registered to reply commands 31 and 32 by factory default, respectively, do not edit or delete those commands if you use the loop back function and check reply commands.

<table>
<thead>
<tr>
<th></th>
<th>SIZE</th>
<th>PROCESS</th>
<th>DATA</th>
<th>MASK</th>
<th>MEMO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0 byte</td>
<td>EXEC</td>
<td>All 00</td>
<td>All FF</td>
<td>All space</td>
</tr>
<tr>
<td>2</td>
<td>0 byte</td>
<td>EXEC</td>
<td>All 00</td>
<td>All FF</td>
<td>All space</td>
</tr>
<tr>
<td>3</td>
<td>0 byte</td>
<td>EXEC</td>
<td>All 00</td>
<td>All FF</td>
<td>All space</td>
</tr>
<tr>
<td>4</td>
<td>0 byte</td>
<td>EXEC</td>
<td>All 00</td>
<td>All FF</td>
<td>All space</td>
</tr>
<tr>
<td>5</td>
<td>0 byte</td>
<td>EXEC</td>
<td>All 00</td>
<td>All FF</td>
<td>All space</td>
</tr>
<tr>
<td>30</td>
<td>0 byte</td>
<td>EXEC</td>
<td>All 00</td>
<td>All FF</td>
<td>All space</td>
</tr>
<tr>
<td>31</td>
<td>2 bytes</td>
<td>EXEC</td>
<td>OK</td>
<td>All FF</td>
<td>OK</td>
</tr>
<tr>
<td>32</td>
<td>2 bytes</td>
<td>STOP</td>
<td>NG</td>
<td>All FF</td>
<td>NG</td>
</tr>
</tbody>
</table>

[Figure 8.52] Defaults of reply commands

1. To edit the reply command using menu:

MSD-5404

↓ SET key

[FUNCTION SELECT]

PRESET COMMAND ▲▼keys: Select “PRESET COMMAND”.

↓ SET key

[PRESET COMMAND]

RECV COMMAND EDIT ▲▼keys: Select “RECV COMMAND EDIT”.

↓ SET key

[RECV COMMAND EDIT] ▲▼keys: Select the reply command (CMD 1 to CMD 32). Memo is displayed on the right of the command number.

↓ SET key

ESC key: Cancels the setting and returns the menu.

SIZE: 0 BYTE

□ □ keys: Set the size of reply command data (0 to 30). If not registered, “0” is displayed.

PROCESS: EXEC ▲▼keys: Select the mode for when retry over occurs (STOP, EXEC, RETRY).

↓ □ □ keys

PJLink: OFF ▲▼keys: Set whether setting PJLink commands (OFF, ON).

↓ □ □ keys

COMMAND INPUT MODE: ▲▼keys: Set “COMMAND INPUT MODE”. (ASCII, HEX)

↓ □ □ keys

Procedures to input send command data differ depending on settings of “COMMAND INPUT MODE” (Go to steps I-I or I-ii below)
[Step I-i. When setting “COMMAND INPUT MODE” to “ASCII”]
You can set the command up to 30 bytes in total on an VFD screen. 0A (LF) and 0D (CR) are displayed as follows. For 20 to 7D, the corresponding codes in *9 ASCII codes* are displayed. If a code other than 0A, 0D, 20 to 7D is detected, “=” symbol is displayed.

0A (LF) = ↓
0D (CR) = ↑

If using ASCII codes (text), the mask data will automatically be “FF”. (Setting of mask data is not displayed.)

To set the mask data to a value other than “FF”, use HEX codes.

DATA: 1: ▲▼ keys: Set the reply command data; 1 to 15 bytes (upper row), 16 to 30 bytes (lower row) (0A, 0D, 20 to 7D of *9 ASCII codes*). 1

□□ keys: Moves the cursor to the next data.

Go to settings in step I-iii below.

[Step I-ii. When setting “COMMAND INPUT MODE” of reply command to “HEX”]

5-byte reply command and mask data are displayed in an VFD screen (30 bytes in total for 6 VFD screens) in “00” to “FF” (Hex).

<table>
<thead>
<tr>
<th>DATA: 1: X0 00 00 00 00</th>
<th>▲▼ keys: Set the reply command data for 1 to 5 bytes on the upper row; mask data for 1 to 5 on the lower row. (0 to F in hex). 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>MASK: 1: FF FF FF FF FF</td>
<td>▲▼ keys: Moves the cursor to the next number.</td>
</tr>
</tbody>
</table>

↓ □□ keys

<table>
<thead>
<tr>
<th>DATA: 6: X0 00 00 00 00</th>
<th>▲▼ keys: Set the reply command data for 6 to 10 bytes on the upper row; mask data for 6 to 10 on the lower row. (0 to F in hex). 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>MASK: 6: FF FF FF FF FF</td>
<td>▲▼ keys: Moves the cursor to the next number.</td>
</tr>
</tbody>
</table>

... □□ keys: Move cursor to the next port

<table>
<thead>
<tr>
<th>DATA: 26: X0 00 00 00 00</th>
<th>▲▼ keys: Set the reply command data for 26 to 30 bytes on the upper row; mask data for 26 to 30 on the lower row. (0 to F in hex). 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>MASK: 26: FF FF FF FF FF</td>
<td>▲▼ keys: Moves the cursor to the next number.</td>
</tr>
</tbody>
</table>

Go to step I-iii below to continue.

[Step I-iii. Setting]

<table>
<thead>
<tr>
<th>MEMO: 1:</th>
<th>▲▼ keys: “MEMO” (20 to 7D of <em>9 ASCII codes</em> except for 2C)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>▲▼ keys: Moves the cursor to the next character (Up to 14 characters). 1</td>
</tr>
</tbody>
</table>

↓ SET key: Applies settings

<table>
<thead>
<tr>
<th>[RECV COMMAND 1]</th>
<th>The message is displayed for one second and then previous screen is displayed automatically.</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOW UPDATE...</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>[RECV COMMAND EDIT]</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CMD 1</td>
<td></td>
</tr>
</tbody>
</table>

1 The number on the lower left shows the number of characters at the cursor position.
2 Numbers following ”DATA” and ”MASK” shows the number of characters at the cursor position.

*Note:*

If you do not press the “SET” key, the reply command is not changed. Make sure to press the “SET” key.
The received data without mask data and “AND” of each bit is compared with the reply command data. Set “MASK” to “FF”. Since “FF” is set by factory default, you do not need to change the mask data normally. Only to determine the status using bits of the received data, change the setting.

**[If ASCII codes (text) are replied from an external device]**

Since the received data and “Reply command data” are compared without any changes, set “MASK” to “FF”. (If you set “COMMAND INPUT MODE” of reply command to “ASCII”, it is automatically set to “FF”.)

For example, if “0” of ASCII codes (“30” in hex) is replied:

<table>
<thead>
<tr>
<th>(Received data)</th>
<th>Binary</th>
<th>(MASK)</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>00110000</td>
<td>00110000</td>
<td>11111111</td>
<td>=30 matched</td>
</tr>
</tbody>
</table>

```
DATA1: 30 00 00 00
MASK1: FF FF FF FF
```

**[If status is determined using bits of the received data]**

Set only bits that determine the Mask data to “1” and set other bits to “0”.

For example, if determining status using the second bit from the left:

<table>
<thead>
<tr>
<th>(Received data)</th>
<th>Binary</th>
<th>(MASK)</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>11111111</td>
<td>01000000</td>
<td>01000000</td>
<td>=40 matched</td>
</tr>
</tbody>
</table>

```
DATA1: 40 00 00 00 00
MASK1: 40 FF FF FF FF
```
[PJLink]
The MSD supports PJLink (class1), which is the standard protocol to control projectors. If you set “PJLink” to "ON", the PJLink command can be selected at the time of inputting the reply command data.
You can select PJLink command by pressing ▲▼ keys when the cursor is at the first byte of the data or right of the delimiter (CR). You can select ASCII codes (text) and change parameters by pressing the keys when the cursor is at another position.

![Diagram](image)

[Figure 8.53] Selecting PJLink commands (class1)

2. To edit the reply command using commands:
   @SRC: Set reply command
   @GRC: Get reply command
8.12.3 Command link [COMMAND LINK]

The MSD has 98 command execution conditions as shown below. If these execution conditions are met, control commands which are associated beforehand will be executed. One execution condition can be associated to up to 10 commands. If several commands are associated, commands are executed in order of registration. If the same command is associated several times, it is repeatedly executed.

<table>
<thead>
<tr>
<th>Execution condition</th>
<th>Function</th>
<th>Execution condition</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMANDs A to I</td>
<td>Control command execution key</td>
<td>VIDEO:OUT2-IN1</td>
<td>Selecting video input channel of OUT2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VIDEO:OUT2-IN9</td>
<td></td>
</tr>
<tr>
<td>POWER ON</td>
<td>Controlling power switch</td>
<td>VIDEO:OUT2-OFF</td>
<td></td>
</tr>
<tr>
<td>DISPLAY1 POWER ON</td>
<td>Controlling display device power of OUT1</td>
<td>AUDIO:OUT2-IN1</td>
<td>Selecting audio input channel of OUT2</td>
</tr>
<tr>
<td>DISPLAY1 POWER OFF</td>
<td></td>
<td>AUDIO:OUT2-IN9</td>
<td></td>
</tr>
<tr>
<td>DISPLAY2 POWER ON</td>
<td>Controlling display device power of OUT2</td>
<td>VIDEO:OUT3-IN1</td>
<td>Selecting video input channel of OUT3</td>
</tr>
<tr>
<td>DISPLAY2 POWER OFF</td>
<td></td>
<td>VIDEO:OUT3-IN9</td>
<td></td>
</tr>
<tr>
<td>DISPLAY3 POWER ON</td>
<td>Controlling display device power of OUT3</td>
<td>AUDIO:OUT3-IN1</td>
<td>Selecting audio input channel of OUT3</td>
</tr>
<tr>
<td>DISPLAY3 POWER OFF</td>
<td></td>
<td>AUDIO:OUT3-IN9</td>
<td></td>
</tr>
<tr>
<td>DISPLAY4 POWER ON</td>
<td>Controlling display device power of OUT4</td>
<td>VIDEO:OUT4-IN1</td>
<td>Selecting video input channel of OUT4</td>
</tr>
<tr>
<td>DISPLAY4 POWER OFF</td>
<td></td>
<td>AUDIO:OUT4-IN9</td>
<td></td>
</tr>
<tr>
<td>VIDEO:OUT1-IN1</td>
<td>Selecting video input channel of OUT1</td>
<td>AUDIO:OUT4-OFF</td>
<td></td>
</tr>
<tr>
<td>to VIDEO:OUT1-IN9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VIDEO:OUT1-OFF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AUDIO:OUT1-IN1</td>
<td>Selecting audio input channel of OUT1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>to AUDIO:OUT1-IN9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Those functions can be controlled not only by pressing the front panel keys but also using parallel input or communication commands.

For association, select control commands registered in "8.12.1 Control commands" (COMMAND 1 to 32). If you do not want to execute any commands, select “OFF”. All execution conditions are set to “OFF” by default.
For association of control command execution keys (COMMANDs A to I), each execution condition has two planes. Normally, use only “PLANE A”, but if you want to operate different operations alternately at every time execution conditions are met, turn “TOGGLE” to “ON” and associate PLANE A and PLANE B separately. You can select which command will be executed at start-up of the MSD from “AUTO”, “PLANE A”, or “PLANE B”. If you select “AUTO”, the opposite plane of the plane executed immediately before turning off the MSD will be executed. “TOGGLE” of all execution conditions is set to “OFF” by default.

When PLANE B is executed, LEDs for control command execution keys on the front panel and Tally output are illuminated (PLANE A will be executed at the next press); when PLANE A is executed, the LEDs blink (PLANE B will be executed at the next press).
1. To associate the control command using menu:

**MSD-5404**

- **Top**
- **SET key**
- **FUNCTION SELECT**
- **PRESET COMMAND**
  - ▲▼ keys: Select “PRESET COMMAND”.
- **SET key**
- **PRESET COMMAND**
- **COMMAND LINK**
  - ▲▼ keys: Select “COMMAND LINK”.
- **SET key**
- **COMMAND LINK**
- **COMMAND A**
  - ▲▼ keys: Select the execution condition (COMMAND A to AUDIO:OUT4-OFF).
- **SET key**
- **ESC key**: Cancels the setting and returns to menu.
- **COMMAND A**
- **TOGGLE: OFF**
  - ▲▼ keys: Set the toggle operation (OFF, ON).
  - Settable only if you select any of COMMAND A to 1 for the execution condition.
- **STARTUP: AUTO**
  - ▲▼ keys: Select the plane you want to execute at starting up (AUTO, A, B).
  - Settable only if you set “TOGGLE” to “ON”.
- **COMMAND A**
  - ▲▼ keys: Set the 1st command (OFF, COMMAND 1 to COMMAND 32).
  - If you set “TOGGLE” to “OFF”, this screen is for “PLANE A”.
- **COMMAND A**
  - ▲▼ keys: Set the 2nd command (OFF, COMMAND 1 to COMMAND 32).
  - If you set “TOGGLE” to “OFF”, this screen is for “PLANE A”.
- **COMMAND A**
  - ▲▼ keys: Set the 10th command (OFF, COMMAND 1 ~ COMMAND 32).
  - If you set “TOGGLE” to “OFF”, this screen is for “PLANE A”.

**[Figure 8.56] Example of toggle operation of control command execution key**
Note:
If you do not press the “SET” key, the command link is not changed. Make sure to press the “SET” key.

2. To associate the control command using commands:
   @SCC: Set command link
   @GCC: Get command link
   @STG: Set toggle operation
   @GTG: Get toggle operation
   @SUP: Set execution plane at starting up
   @GUP: Get execution plane at starting up

8.12.4 Command execution [COMMAND EXECUTION]

Although you can execute only COMMANDs A to E using the control command execution keys on the front panel, you can execute all COMMANDs A to I using this menu. You can specify command numbers and execute them without an association.

1. To execute control commands:
   MSD-5404
   ▼ SET key
   [FUNCTION SELECT]
   PRESET COMMAND ▼
   ▲▼ keys: Select “PRESET COMMAND”.
   ▼ SET key
   [PRESET COMMAND]
   COMMAND EXECUTION ▼
   ▲▼ keys: Select “COMMAND EXECUTION”.
   ▼ SET key
   [COMMAND EXECUTION]
   COMMAND A ▼
   ▲▼ keys: Select the command you want to execute
   ▼ SET key: Executes the command.

   ▼ ESC key: Returns to the previous screen.

* Only executable commands are displayed.
2. To execute control commands using command:
   @EXC: Execute control commands

8.12.5 Invalid time [INVALID TIME]

During control command execution, other operations from a port (any of front panel, parallel input, RS-232C CH1, RS-232C CH2, LAN communication command, and LAN browser) that executes control commands will be invalid. Since the execution time of some control commands is short, you can set the waiting time from starting control command execution to receiving the next command. The longer time either of control command execution time or the time set in this menu will be applied as the invalid operation time. Use this menu to prevent repeated execution caused by pressing the control command execution key twice. Only operations from ports that execute control commands will be invalid; operations from other ports can be performed. For example, if you execute a control command from the front panel, you cannot perform all operations from the front panel until the control command execution time or time set in this menu passes, but you can perform operations from the parallel input. However, even during invalid operation time, for controlling power of display devices and switching inputs, you can control display devices' power and can then switch input only for different outputs, in order to operate several outputs successively.

・Invalid time: 0 ms. to 999999 ms.  [Default]: 0 ms.

1. To set the invalid time using menu:

   1. MSD-5404
   2. Top
   3. ↑ SET key
   4. [FUNCTION SELECT]
   5. PRESET COMMAND
   6. ▲▼ keys: Select “PRESET COMMAND”.
   7. ↑ SET key
   8. [PRESET COMMAND]
   9. INVALID TIME
   10. ▲▼ keys: Select “INVALID TIME”.
   11. ↑ SET key
   12. [INVALID TIME]
   13. 0s000ms
   14. ▲▼ keys: Set the invalid time in seconds (0 to 999).
   15. ↓◄► keys
   16. [INVALID TIME]
   17. 0s000ms
   18. ▲▼ keys: Set the invalid time in milliseconds (0 to 999).
   19. ↓ ESC key: Returns to the previous screen.

2. To set the invalid time using commands:
   @SIT: Set ineffective time during control command
   @GIT: Get ineffective time during control command
8.12.6 Initializing registered commands and associations [INITIALIZE]

You can initialize the following commands and associations:
- Control commands registered in “8.12.1 Control commands”
- Reply commands registered in “8.12.2 Reply commands”
- Associations of control commands registered in “8.12.3 Command link”

Use this menu to delete or set them from the first step again.

1. To initialize commands using menu:

   MSD-5404
   ▼ SET key
   [FUNCTION SELECT] PRESET COMMAND ▼ ▲▼: Select “PRESET COMMAND”.
   ▼ SET key
   [PRESET COMMAND] INITIALIZE ▼ ▲▼: Select “INITIALIZE”.
   ▼ SET key ▲: ESC key: Cancels initializing and returns to the previous screen.
   [PRESET INITIALIZE] CMD 1 ▲▼: keys: Select the command or association you want to initialize.
   (CMD1 to CMD 32, RCV 1 to RCV 32, or Association conditions)
   For control commands (CMD x) and reply commands (RCV x), MEMO is displayed at the right side.
   ▼ SET key: Displays the confirmation screen. ▲: ESC key
   [SURE? = NO] ▲▼: keys: Select “YES” or “NO”.
   ▼ SET key: Initializes setting.
   [NOW INITIALIZATION..] Displays the message for 1 second before automatically returning to the previous screen.
## [Table 8.21] Association conditions of control commands

<table>
<thead>
<tr>
<th>Execution condition</th>
<th>Function</th>
<th>Execution condition</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMAND A–PLANE A</td>
<td>Control command execution key</td>
<td>VIDEO:OUT2-IN1</td>
<td>Selecting video input channel of OUT2</td>
</tr>
<tr>
<td>COMMAND A–PLANE B</td>
<td>to</td>
<td>VIDEO:OUT2-IN9</td>
<td>Selecting video input channel of OUT2</td>
</tr>
<tr>
<td>COMMAND I–PLANE A</td>
<td></td>
<td>VIDEO:OUT2-OFF</td>
<td></td>
</tr>
<tr>
<td>COMMAND I–PLANE B</td>
<td></td>
<td>AUDIO:OUT2-IN1</td>
<td></td>
</tr>
<tr>
<td>POWER ON</td>
<td>Controlling power switch</td>
<td>to</td>
<td></td>
</tr>
<tr>
<td>DISPLAY1 POWER ON</td>
<td>Controlling display device power of OUT1</td>
<td>AUDIO:OUT2-IN9</td>
<td></td>
</tr>
<tr>
<td>DISPLAY1 POWER OFF</td>
<td></td>
<td>AUDIO:OUT2-OFF</td>
<td></td>
</tr>
<tr>
<td>DISPLAY2 POWER ON</td>
<td>Controlling display device power of OUT2</td>
<td>VIDEO:OUT3-IN1</td>
<td>Selecting video input channel of OUT3</td>
</tr>
<tr>
<td>DISPLAY2 POWER OFF</td>
<td></td>
<td>VIDEO:OUT3-IN9</td>
<td></td>
</tr>
<tr>
<td>DISPLAY3 POWER ON</td>
<td>Controlling display device power of OUT3</td>
<td>VIDEO:OUT3-OFF</td>
<td></td>
</tr>
<tr>
<td>DISPLAY3 POWER OFF</td>
<td></td>
<td>VIDEO:OUT3-OFF</td>
<td></td>
</tr>
<tr>
<td>DISPLAY4 POWER ON</td>
<td>Controlling display device power of OUT4</td>
<td>AUDIO:OUT3-IN1</td>
<td>Selecting audio input channel of OUT3</td>
</tr>
<tr>
<td>DISPLAY4 POWER OFF</td>
<td></td>
<td>AUDIO:OUT3-OFF</td>
<td></td>
</tr>
<tr>
<td>VIDEO:OUT1-IN1</td>
<td>Selecting video input channel of OUT1</td>
<td>to</td>
<td></td>
</tr>
<tr>
<td>VIDEO:OUT1-IN9</td>
<td></td>
<td>AUDIO:OUT3-IN9</td>
<td></td>
</tr>
<tr>
<td>VIDEO:OUT1-OFF</td>
<td></td>
<td>AUDIO:OUT3-OFF</td>
<td></td>
</tr>
<tr>
<td>AUDIO:OUT1-IN1</td>
<td>Selecting audio input channel of OUT1</td>
<td>to</td>
<td></td>
</tr>
<tr>
<td>AUDIO:OUT1-IN9</td>
<td></td>
<td>VIDEO:OUT4-IN1</td>
<td></td>
</tr>
<tr>
<td>AUDIO:OUT1-OFF</td>
<td></td>
<td>VIDEO:OUT4-OFF</td>
<td></td>
</tr>
<tr>
<td>AUDIO:OUT4-IN1</td>
<td>Selecting video input channel of OUT4</td>
<td>to</td>
<td></td>
</tr>
<tr>
<td>AUDIO:OUT4-IN9</td>
<td></td>
<td>AUDIO:OUT4-OFF</td>
<td></td>
</tr>
</tbody>
</table>

2. To initialize commands using commands:
   @DEC: Initialize registered command and association
8.12.7 Command execution key: Lighting condition [COMMAND TALLY]

You can set the lighting condition of COMMANDs A to E on the front panel and COMMANDs A to I of Tally output separately.

- Lights if a control command is registered: REGISTERED [Default]
- Lights while a control command is executed: EXECUTION

There are two planes (PLANE A and B) for each execution condition of COMMANDs A to I. If you register control commands for both planes, the control commands are executed alternatively every time you press the command key as follows.

<table>
<thead>
<tr>
<th>Lighting condition</th>
<th>If you register a command only for one plane</th>
<th>If you register commands for both two planes</th>
</tr>
</thead>
<tbody>
<tr>
<td>REGISTERED</td>
<td>Lights if a control command is registered</td>
<td>Lights if PLANE A will be executed at the next press; blinks if PLANE B will be executed at the next press.</td>
</tr>
<tr>
<td>EXECUTION</td>
<td>Lights while a control command is executed</td>
<td>Lights if PLANE A will be executed at the next press; turned off if PLANE B will be executed at the next press.</td>
</tr>
</tbody>
</table>

*1 If you set “LINK” to “ON”, you can change all registered conditions at the same time.

Table 8.22] Lighting conditions of control command execution keys

1. To set the lighting condition of command keys using menu:

   MSD-5404

   \[\text{Top}\]

   ↓ SET key

   \[[\text{FUNCTION SELECT}]\]

   PRESET COMMAND  

   \[\text{▲▼ keys: Select “PRESET COMMAND”}.

   ↓ SET key

   \[[\text{PRESET COMMAND}]\]

   COMMAND TALLY

   \[\text{▲▼ keys: Select “COMMAND TALLY”}.

   ↓ SET key

   \[[\text{FRONT A}]\]

   LINK: \text{ON/REGISTERED}  

   \[\text{▲▼ keys: Select “OFF” or “ON” for “LINK”.}.

   \[\text{◄► keys} \]

   \[[\text{FRONT A}]\]

   LINK: \text{ON/REGISTERED}  

   \[\text{▲▼ keys: Select the lighting condition of COMMAND A on the front panel keys.}.

   (REGISTERED, EXECUTION)

   \[\text{◄► keys} \]

   \[[\text{FRONT B}]\]

   LINK: \text{ON/REGISTERED}  

   \[\text{▲▼ keys: Select the lighting condition of COMMAND B on the front panel keys.}.

   (REGISTERED, EXECUTION)

   \[\text{◄► keys} \]

   \[[\text{TALLY I}]\]

   LINK: \text{ON/REGISTERED}  

   \[\text{▲▼ keys: Select the lighting condition of COMMAND B on the front panel keys.}.

   (REGISTERED, EXECUTION)

   ↓ ESC key: Returns to the previous screen.

* If you set “LINK” to “ON”, you can change all registered conditions at the same time.
2. To set the lighting condition of command keys using commands:
@STL: Set command key lighting
@GTL: Get command key lighting

8.12.8 Flash time (Command keys and DISPLAY POWER keys) [FLASH TIME]

You can set the flash time (blink duration) of command execution keys and power switch of display devices during command execution:

- Blinks while a control command is being executed: EXECUTION
- Not blink: OFF
- Blinks for the specified time*: 1 to 1000 sec.

[Defaults]: For COMMANDs A to I: OFF
For DISPLAY POWER: EXECUTION

* If the command execution has not been completed even after the set time passes, it continues to blink until the execution is completed.

1. To set the flash time of command keys and display power keys using menu:

```
MSD-5404
   Top
   ▼ SET key
   [FUNCTION SELECT]
   [PRESET COMMAND] ▼ keys: Select “PRESET COMMAND”.
   ▼ SET key
   [PRESET COMMAND]
   [FLASH TIME] ▼ keys: Select “FLASH TIME”.
   ▼ SET key
   [COMMAND A] OFF ▼ keys: Set the flash time of COMMAND A
   ▲▼ keys: Set the flash time of COMMAND A
   (EXECUTION, OFF, or 1 sec. to 1000 sec.).
   [COMMAND B] OFF ▼ keys: Set the flash time of COMMAND B
   ▲▼ keys: Set the flash time of COMMAND B
   (EXECUTION, OFF, or 1 sec. to 1000 sec.).
   ... ▲▼ keys
   [DISPLAY POWER] EXECUTION ▲▼ keys: Set the flash time of DISPLAY POWER 4
   ▲▼ keys: Set the flash time of DISPLAY POWER 4
   (EXECUTION, OFF, or 1 sec. to 1000 sec.).
   ▼ ESC key: Returns to the previous screen.
```

2. To set the flash time of command keys and display power keys using menu:
@STF: Set flash time (Command keys and DISPLAY POWER keys)
@GTF: Get flash time (Command keys and DISPLAY POWER keys)
8.13 Preset memory

8.13.1 Loading cross point [LOAD CROSS POINT]

You can load the video and audio channel settings that have been saved in the cross point memory.

1. To load the cross point using menu:

   MSD-5404
   Top

   ↓ SET key

   [FUNCTION SELECT] ▲▼: Select “PRESET MEMORY”.
   PRESET MEMORY

   ↓ SET key

   [PRESET MEMORY] ▲▼: Select “LOAD CROSS POINT”.
   LOAD CROSS POINT

   ↓ SET key  ↑ ESC: Cancels loading and returns to the previous screen.

   [LOAD CROSS POINT] ▲▼: Select the desired memory number (1 to 9).
   No. 1

   ↓ SET key: Loads settings.

   [CROSS POINT 1] NOW LOADING...

   Displays the message for 1 second before automatically returning to the previous screen.

   ↓

   [PRESET MEMORY] ▲▼: LOAD CROSS POINT

2. To load the cross point using commands:

   @RCM: Load video and audio channel setting from cross point memory
   @RCV: Load video channel setting from cross point memory
   @RCA: Load audio channel setting from cross point memory
8.13.2 Saving cross point [SAVE CROSS POINT]

You can save the current settings of video and audio channels into the cross point memory.

**Note:**
Do not turn off the MSD while “NOW SAVING...” is displayed. Otherwise, setting data may be lost.

1. To save the cross point using menu:

   MSD-5404 Top
   ↓ SET key
   [FUNCTION SELECT] [PRESET MEMORY] ▲▼ keys: Select “PRESET MEMORY”.
   ↓ SET key
   [PRESET MEMORY] [SAVE CROSS POINT] ▲▼ keys: Select “SAVE CROSS POINT”.
   ↓ SET key ↑ ESC key: Cancels the setting and returns to the previous screen.
   [SAVE CROSS POINT] No. ▲▼ keys: Select the desired memory number (1 to 9).
   ↓ ▲▼ keys [SAVE CROSS POINT] No. ▲▼ keys: Set the cross point memory name (20 to 7D of “9 ASCII codes”).
   ▲▼ keys: Moves the cursor to the next character (Up to 10 characters).
   ↓ ▲▼ keys [SAVE] EDIT CONTINUE No. ▲▼ keys: Select the desired write method (CONTINUE, DELETE).
   ↓ SET key: Saves settings.
   [CROSS POINT 1] NOW SAVING... Displays the message for 1 second before automatically returning to the previous screen.
   ↓ [PRESET MEMORY] SAVE CROSS POINT ▲▼

* If you select a memory number that is set to not control channels, you can select the write method.
   “CONTINUE”: The settings will be kept.
   “DELETE”: The settings will be overwritten.
(For settings to not control channels, see “8.13.3 Editing cross point”)

![Figure 8.57] Saving cross point
2. To save the cross point using commands:
   @SCM: Overwrite video and audio channel setting in cross point memory
   @SCV: Overwrite video channel setting in cross point memory
   @SCA: Overwrite audio channel setting in cross point memory
   @SEM: Save video and audio channel setting in cross point memory
   @SEV: Save video channel setting in cross point memory
   @SEA: Save audio channel setting in cross point memory
8.13.3 Editing cross point [EDIT CROSS POINT]

**Note:**
Do not turn off the MSD while “NOW SAVING...” is displayed. Otherwise, setting data may be lost.

1. To edit the cross point using menu:

   MSD-5404
   ▼ SET key
   [FUNCTION SELECT] PRESET MEMORY ▼
   ▲▼ keys: Select “PRESET MEMORY”.
   ▼ SET key
   [PRESET MEMORY] EDIT CROSS POINT ▼
   ▲▼ keys: Select “EDIT CROSS POINT”.
   ▼ SET key
   [EDIT CROSS POINT] No. [ ] ▼
   ▲▼ keys: Select the desired memory number (1 to 9).
   ▼ SET key ▲ ESC key: Cancels the setting and returns to the previous screen.

   [CROSS POINT 1] ▲▼ keys: Select output (OUT1 to OUT4).
   ▼ ▲ keys
   [CROSS POINT 1] ▲▼ keys: Select the desired video input channel (---, 1 to 9, or OFF).*
   ▼ ▲ keys
   [CROSS POINT 1] ▲▼ keys: Select the desired audio input channel (---, 1 to 9, or OFF).*
   ▼ ▲ keys
   [CROSS POINT 1] ▲▼ keys: Set the memory name (20 to 7D of “9 ASCII codes”).
   ▲▼ keys: Moves the cursor to the next character (Up to 10 characters).
   ▼ SET key: Displays confirmation screen. ▲ ESC key
   [CROSS POINT 1] SAVE? = No ▼
   ▲▼ keys: Select “Yes” or “No”.
   ▼ Select “YES” and press the “SET” key: Saves settings
   Select “NO” and press the “SET” key: Not save settings and returns to the former display
   [CROSS POINT 1] NOW SAVING... Displays the message for 1 second before automatically returning to the previous screen.
   ▼
   [PRESET MEMORY] EDIT CROSS POINT ▼

* “---” is displayed for settings that do not control channels. Outputs that do not control channels when cross point memory is loaded do not switch channels.
All cross point memories are set to not to control channel by factory default.
2. To edit the cross point using commands:
   @ECM: Edit video and audio channel setting in cross point memory
   @ECV: Edit video channel setting in cross point memory
   @ECA: Edit audio channel setting in cross point memory
   @GCM: Get video and audio channel setting in cross point memory
   @GCV: Get video channel setting in cross point memory
   @GCA: Get audio channel setting in cross point memory
8.13.4 Loading all settings [LOAD ALL SETTING]

Once you perform this operation, all settings related to video and audio I/O except for some environmental settings will be updated. (For settings to be loaded, see the next page) Operate this menu with great attention. This menu is not displayed if setting is not saved in memory. Since no setting is saved in any memories by factory default, this menu is not displayed.

1. To load the settings saved in the preset memory using menu:

   1. To load the settings saved in the preset memory using menu:

   ![Menu Diagram]

   - **MSD-5404**
   - **Top**
   - **SET key**
   - **[FUNCTION SELECT]**
   - **PRESET MEMORY**
   - ▲▼ keys: Select “PRESET MEMORY”.
   - **SET key**
   - **[PRESET MEMORY]**
   - **LOAD ALL SETTING**
   - ▲▼ keys: Select “LOAD ALL SETTING”.
   - **SET key**
   - **↑ ESC key**: Cancels loading and returns to the previous screen.
   - **[LOAD ALL SETTING]**
   - **No. 1**
   - ▲▼ keys: Select the desired memory number (1 to 8).
   - Memory name is displayed on the right of the memory number.
   - **SET key**: Displays the confirmation screen.  
   - **↑ ESC key**
   - **[PRESET MEMORY 1]**
   - **LOAD? = NO**
   - ▲▼ keys: Select “YES” or “NO”.
   - To load the setting: Select “YES” and press the “SET” key.
   - To return to the menu without any loading: Select “NO” and press the “SET” key.
   - **[PRESET MEMORY 1]**
   - **NOW LOADING...**
   - Displays the message for 1 second before automatically returning to the previous screen.
   - **[PRESET MEMORY]**
   - **LOAD**

* You cannot select a preset memory number in which settings are not saved.

2. To load the settings saved in the preset memory using command:

   @RPM: Load all settings from preset memory
8.13.5 Saving all settings [SAVE ALL SETTING]

You can save up to 8 settings of the following settings:

- 7.1 Selecting Input Channels
- 8.3 Setting Position, Size, and Masking
- 8.3.1 Output resolutions
- 8.3.2 Aspect ratio control of output video
- 8.3.3 Aspect ratio control of input video
- 8.3.4 Aspect ratio
- 8.3.5 Overscan
- 8.3.6 Input position
- 8.3.7 Input size
- 8.3.8 Input masking
- 8.3.9 Output resolution
- 8.3.10 Output position
- 8.3.11 Output size
- 8.3.12 Output masking
- 8.3.13 Background color
- 8.3.14 Background color
- 8.3.15 Test pattern
- 8.4 Video Correction
- 8.4.1 Input brightness
- 8.4.2 Input contrast
- 8.4.3 Hue
- 8.4.4 Saturation
- 8.4.5 Black level
- 8.4.6 Output contrast
- 8.4.7 Output brightness
- 8.4.8 Output contrast
- 8.4.9 Output brightness
- 8.5 Input Settings
- 8.5.1 No-signal input monitoring
- 8.5.2 HDCP input enabled/disable
- 8.5.3 Input equalizer
- 8.5.4 Signal type of analog input
- 8.5.5 Automatic detection of input video interruption
- 8.6 Input Timing Settings
- 8.6.1 The total number of horizontal dots
- 8.6.2 Horizontal start position
- 8.6.3 Horizontal display period
- 8.6.4 Vertical start position
- 8.6.5 Vertical display period
- 8.6.6 Automatic measurement of start position
- 8.6.7 Automatic setting of input timing
- 8.6.8 Automatic setting of input timing
- 8.6.9 Tracking
- 8.7 Output Settings
- 8.7.1 Output equalizer
- 8.7.2 Output mode
- 8.7.3 Synchronous signal output with no input video
- 8.7.4 Output video with no input video
- 8.7.5 Window transition effect
- 8.7.6
- 8.7.7 Wipe color
- 8.7.8 HDCP output mode
- 8.7.9 The number of HDCP retries
- 8.7.10 Deep Color
- 8.7.11 CEC (Consumer Electronics Control)
- 8.8 Audio Settings
- 8.8.1 Output level
- 8.8.2 Output mute
- 8.8.3 Input selection
- 8.8.4 Input level
- 8.8.5 Output lip sync
- 8.8.6 Input lip sync
- 8.8.7 Sampling frequency of analog audio input
- 8.8.8 Output connector
- 8.8.9 Multi-channel audio output
- 8.8.10 Test tone
- 8.9 EDID (Extended Display Identification Data)
- 8.9.1 EDID setting
- 8.9.2 PC resolutions
- 8.9.3 Deep Color
- 8.9.4 Audio format
- 8.9.5 Audio format
- 8.9.6 Speaker configuration

Note:
Do not turn off the MSD while “NOW SAVING...” is displayed. Otherwise, setting data may be lost.
1. To save all settings using menu:

MSD-5404 Top

↓ SET key

[FUNCTION SELECT] PRESET MEMORY ▼

▼▼keys: Select “PRESET MEMORY”.

↓ SET key

[PRESET MEMORY] SAVE ALL SETTING ▼

▼▼keys: Select “SAVE ALL SETTING”.

↓ SET key ↑ ESC key: Cancels the setting and returns to the previous screen.

[SAVE ALL SETTING]
No. 1 ▼

▼▼keys: Select the desired memory number (1 to 8).

↓ △► keys

[SAVE ALL SETTING]
No. 1 ▼

▼▼ keys: Enter the memory name (20 to 7D of “9 ASCII codes”).

►► keys: Moves the cursor to the next character (up to 10 characters).

↓ SET key: Displays the confirmation screen. ↑ ESC key

[PRESET MEMORY 1]
SAVE? = NO ▼

▼▼ keys: Select “YES” or “NO”.

↓ To save the setting: Select “YES” and press the “SET” key.

To return to the menu without any saving: Select “NO” and press the “SET” key.

[PRESET MEMORY 1]
NOW SAVING...

Displays the message for 1 second before automatically returning to the previous screen.

↓

[PRESET MEMORY] SAVE ALL SETTING ▼

2. To save all settings using command:

@SPM: Save all settings in preset memory

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8.13.6 Startup settings [STARTUP]

- Cross point memories: CROSS POINT1 to 9
  Starts up with the channel settings saved in the selected cross point memory. For settings other than channel settings, starts up with the settings of the last MSD power off.

- CHANNEL OFF
  Channel setting will be OFF. For settings other than channel setting, starts up with the settings of the last MSD power off.

- LAST CHANNEL [Default]
  Starts up with the settings of the last MSD power off.

- Preset memory: PRESET MEMORY 1 to 8
  Starts up with the settings saved in the preset memory. For settings that are not saved in the preset memory, it starts up with the settings of the last MSD power off. (For settings that can be saved in the preset memory, see "8.13.5 Saving all settings").

1. To set the startup setting using menu:

   MSD-5404
   Top
   ↓ SET key
   [FUNCTION SELECT] PRESET MEMORY ▲▼ keys: Select “PRESET MEMORY”.
   ↓ SET key
   [PRESET MEMORY] STARTUP ▲▼ keys: Select “STARTUP”.
   ↓ SET key
   [STARTUP] LAST CHANNEL ▲▼ keys: Select the setting for startup (CROSS POINT 1 to 9, CHANNEL OFF, LAST CHANNEL, PRESET MEMORY 1 to 8).
   ↓ ESC key: Returns to the previous screen.

* You cannot select a preset memory whose settings are not saved. Nothing is saved in all preset memories by factory default.

2. To set the startup setting using commands:

   @SMU: Set startup status
   @GMU: Get startup status
8.14 Parallel

The MSD can be controlled from external contact points. Since photocoupler input is used for parallel input connectors, it is electrically insulated from the connected device. When each pin of parallel input connector is pulled to GND, functions assigned to these pins will be performed.

You can assign the following functions to each pin by following the instruction of “8.14.1 Assigning functions”:

1. Switching input channels
2. Changing channel switching modes (independent from the front panel switching mode)
3. Sending control commands
4. Locking/releasing parallel inputs
5. Turning on/off display devices
6. Operating menu
7. Locking/releasing front panel
8. Loading cross point/ preset memory
9. Adjusting audio output level

If the contact input operation is unstable due to switch chattering, change the chattering reduction time longer in “8.14.7 Chattering reduction”.

---

**Table: Pin locations of parallel input connector**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 26</td>
<td>N.C. (No connection)</td>
</tr>
<tr>
<td>2 ~ 24</td>
<td>Function assignable</td>
</tr>
<tr>
<td>27 ~ 49</td>
<td></td>
</tr>
<tr>
<td>25, 50</td>
<td>GND</td>
</tr>
</tbody>
</table>

---

**Example of contact control circuit**

[Figure 8.59] Pin locations of parallel input connector

[Figure 8.60] Example of contact control circuit
### 8.14.1 Assigning functions [FUNCTION ASSIGN]

You can assign functions ([Table 8.27] to [Table 8.28]) to parallel input connectors.

1. **To assign functions using menu:**

   MSD-5404

   ![MSD-5404](image)

   Top

   ![Top](image)

   ↓ SET key

   ![Set key](image)

   [FUNCTION SELECT]  
   PARALLEL  

   ▲▼ keys: Select "PARALLEL".

   ↓ SET key

   [PARALLEL]  
   FUNCTION ASSIGN  

   ▲▼ keys: Select "FUNCTION ASSIGN".

   ↓ SET key  
   ↑ ESC key: Cancel settings and returns to the menu.

   [PARALLEL PIN: 2]  
   OUT1-IN1

   ▲▼ keys: Select the desired function for input pin 2.

   ![Select function for pin 2](image)

   ◄► keys

   [PARALLEL PIN: 49]  
   NOT USE

   ▲▼ keys: Select the desired function for input pin 49.

   ↓ SET key: Applies settings.

   ![Apply settings](image)

   Displays the message for 1 second before automatically returning to the previous screen.

   ![Display message](image)

   ↓

   [PARALLEL]  
   FUNCTION ASSIGN  

   * You cannot assign functions to the following pins, and they are not displayed: Pins 1, 25, 26, and 50.

   !important:

   If you do not press the “SET” key, the assignment is not changed. Make sure to press the “SET” key.

2. **To assign functions using commands:**

   @SPE: Assigning function of parallel input

   @GPE Get function assignment of parallel input
### MSD-5401 and MSD-5401SL: Settings of parallel input connectors by factory default

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Description</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No Connection</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>OUT1-IN1</td>
<td>Selecting input channel of OUT1(^1)</td>
</tr>
<tr>
<td>3</td>
<td>OUT1-IN2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>OUT1-IN3</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>OUT1-IN4</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>OUT1-IN5</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>OUT1-IN6</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>OUT1-IN7</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>OUT1-IN8</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>OUT1-IN9</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>OUT1-OFF</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>SWITCHING–V&amp;A</td>
<td>Selecting channel switching mode(^3)</td>
</tr>
<tr>
<td>13</td>
<td>SWITCHING–VIDEO</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>SWITCHING–AUDIO</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>COMMAND A</td>
<td>Sending control commands</td>
</tr>
<tr>
<td>16</td>
<td>COMMAND B</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>COMMAND C</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>COMMAND D</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>COMMAND E</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>COMMAND F</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>COMMAND G</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>COMMAND H</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>COMMAND I</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>AUDIO-OUT1 UP/Phase A</td>
<td>Audio output level of OUT1(^4)</td>
</tr>
<tr>
<td>25</td>
<td>GND</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>No Connection</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>AUDIO-OUT1 DOWN/Phase B</td>
<td>Audio output level of OUT1(^4)</td>
</tr>
<tr>
<td>28</td>
<td>AUDIO-OUT1 MUTE</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>DISPLAY1 POWER ON/OFF</td>
<td>Controlling display device power of OUT1(^5)</td>
</tr>
<tr>
<td>30</td>
<td>PARALLEL LOCK</td>
<td>Locking parallel input(^6)</td>
</tr>
<tr>
<td>31</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>43</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>46</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>47</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>48</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>49</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>GND</td>
<td></td>
</tr>
</tbody>
</table>

---

\(^1\) Channels (video/audio) to be switched depend on each channel switching mode.

\(^2\) To switch the selected channel and turn “OFF” alternately, set “8.14.6 Toggle” to “ON”.

If you want to perform the automatic measurement of input timing setting, set “8.14.9 Analog input measurement” to “ENABLE” and press one of IN6 to IN9 keys for 2 seconds or longer. For details of automatic measurement, see “8.6.6 Analog input automatic measurement”.

\(^3\) Channel switching modes of the front panel and parallel input are independent from each other. If you want to use the fixed channel switching control mode, set it using menu in “8.14.5 Switching mode”.

\(^4\) For audio output level, you can select “PUSH SWITCH” or “ROTARY ENCODER” in “8.14.2 Audio level”.

\(^5\) Toggle operation from the current state. (If it is “OFF”, it is turned to “ON”, and vice versa.)

\(^6\) All parallel inputs are locked. You cannot select a target function that will be locked. This function can also be set in “8.14.4 Enable/Disable”.

---

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**Table 8.24** MSD-5402 and MSD-5402SL: Parallel input connectors by default

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Description</th>
<th>Function</th>
<th>Pin No.</th>
<th>Description</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No Connection</td>
<td></td>
<td>26</td>
<td>No Connection</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>OUT1-IN1 (^\text{1})</td>
<td>Selecting input channel of OUT1 (^\text{1})</td>
<td>27</td>
<td>COMMAND A</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>OUT1-IN2 (^\text{2})</td>
<td></td>
<td>28</td>
<td>COMMAND B</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>OUT1-IN3 (^\text{2})</td>
<td></td>
<td>29</td>
<td>COMMAND C</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>OUT1-IN4 (^\text{2})</td>
<td></td>
<td>30</td>
<td>COMMAND D</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>OUT1-IN5 (^\text{2})</td>
<td></td>
<td>31</td>
<td>COMMAND E</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>OUT1-IN6 (^\text{2})</td>
<td></td>
<td>32</td>
<td>COMMAND F</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>OUT1-IN7 (^\text{2})</td>
<td></td>
<td>33</td>
<td>COMMAND G</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>OUT1-IN8 (^\text{2})</td>
<td></td>
<td>34</td>
<td>COMMAND H</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>OUT1-IN9 (^\text{2})</td>
<td></td>
<td>35</td>
<td>COMMAND I</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>OUT1-OFF</td>
<td></td>
<td>36</td>
<td>AUDIO-OUT1 UP/Phase A</td>
<td>Audio output level of OUT 1 (^\text{4})</td>
</tr>
<tr>
<td>12</td>
<td>OUT2-IN1 (^\text{2})</td>
<td>Selecting input channel of OUT2 (^\text{1})</td>
<td>37</td>
<td>AUDIO-OUT1 DOWN/B</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>OUT2-IN2 (^\text{2})</td>
<td></td>
<td>38</td>
<td>AUDIO-OUT1 MUTE</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>OUT2-IN3 (^\text{2})</td>
<td></td>
<td>39</td>
<td>AUDIO-OUT2 UP/Phase A</td>
<td>Audio output level of OUT 2 (^\text{4})</td>
</tr>
<tr>
<td>15</td>
<td>OUT2-IN4 (^\text{2})</td>
<td></td>
<td>40</td>
<td>AUDIO-OUT2 DOWN/Phase B</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>OUT2-IN5 (^\text{2})</td>
<td></td>
<td>41</td>
<td>AUDIO-OUT2 MUTE</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>OUT2-IN6 (^\text{2})</td>
<td></td>
<td>42</td>
<td>DISPLAY1 POWER ON/OFF</td>
<td>Controlling display device power of OUT 1 (^\text{5})</td>
</tr>
<tr>
<td>18</td>
<td>OUT2-IN7 (^\text{2})</td>
<td></td>
<td>43</td>
<td>DISPLAY2 POWER ON/OFF</td>
<td>Controlling display device power of OUT 2 (^\text{5})</td>
</tr>
<tr>
<td>19</td>
<td>OUT2-IN8 (^\text{2})</td>
<td></td>
<td>44</td>
<td>PARALLEL LOCK</td>
<td>Locking parallel input (^\text{6})</td>
</tr>
<tr>
<td>20</td>
<td>OUT2-IN9 (^\text{2})</td>
<td></td>
<td>45</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>OUT2-OFF</td>
<td></td>
<td>46</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>SWITCHING–V&amp;A</td>
<td>Selecting channel switching mode (^\text{3})</td>
<td>47</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>SWITCHING–VIDEO</td>
<td></td>
<td>48</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>SWITCHING–AUDIO</td>
<td></td>
<td>49</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>GND</td>
<td></td>
<td>50</td>
<td>GND</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>GND</td>
<td></td>
<td>50</td>
<td>GND</td>
<td></td>
</tr>
</tbody>
</table>

\(^{1}\) Channels (video/audio) to be switched depend on the channel switching mode selected.

\(^{2}\) If you want to switch the selected channel and turn “OFF” alternately, set “8.14.6 Toggle” to “ON”.

If you want to perform automatic measurement of input timing setting, set “8.14.9 Analog input measurement” to “ENABLE” and press one of IN6 to IN9 keys for 2 seconds or longer. For details of automatic measurement, see “8.6.6 Analog input automatic measurement”.

\(^{3}\) Channel switching modes of the front panel and parallel input are independent from each other. If you want
to use the fixed channel switching mode, set it using menu in “8.14.5 Switching mode”.

**4** For audio output level, you can select “PUSH SWITCH” or “ROTARY ENCODER” in “8.14.2 Audio level”.

**5** Toggle operation from the current state. (If it is now “OFF”, it turns to be “ON”, and vice versa.)

**6** All parallel inputs are locked. You cannot select a target function that will be locked. This function can also be set in “8.14.4 Enable/Disable”.
<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Description</th>
<th>Function</th>
<th>Pin No.</th>
<th>Description</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No Connection</td>
<td></td>
<td>26</td>
<td>No Connection</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>OUT1-IN1 (^2)</td>
<td>Selecting input channel of OUT1 (^1)</td>
<td>27</td>
<td>OUT3-IN4 (^2)</td>
<td>Selecting input channel of OUT 3 (^1)</td>
</tr>
<tr>
<td>3</td>
<td>OUT1-IN2 (^2)</td>
<td></td>
<td>28</td>
<td>OUT3-IN5 (^2)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>OUT1-IN3 (^2)</td>
<td></td>
<td>29</td>
<td>OUT3-IN6 (^2)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>OUT1-IN4 (^2)</td>
<td></td>
<td>30</td>
<td>OUT3-IN7 (^2)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>OUT1-IN5 (^2)</td>
<td></td>
<td>31</td>
<td>OUT3-IN8 (^2)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>OUT1-IN6 (^2)</td>
<td></td>
<td>32</td>
<td>OUT3-IN9 (^2)</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>OUT1-IN7 (^2)</td>
<td></td>
<td>33</td>
<td>OUT3-INOFF</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>OUT1-IN8 (^2)</td>
<td></td>
<td>34</td>
<td>SWITCHING–V&amp;A</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>OUT1-IN9 (^2)</td>
<td></td>
<td>35</td>
<td>SWITCHING–VIDEO</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>OUT1-OFF</td>
<td></td>
<td>36</td>
<td>SWITCHING–AUDIO</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>OUT2-IN1 (^2)</td>
<td>Selecting input channel of OUT2 (^1)</td>
<td>37</td>
<td>COMMAND A</td>
<td>Sending control commands</td>
</tr>
<tr>
<td>13</td>
<td>OUT2-IN2 (^2)</td>
<td></td>
<td>38</td>
<td>COMMAND B</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>OUT2-IN3 (^2)</td>
<td></td>
<td>39</td>
<td>COMMAND C</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>OUT2-IN4 (^2)</td>
<td></td>
<td>40</td>
<td>COMMAND D</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>OUT2-IN5 (^2)</td>
<td></td>
<td>41</td>
<td>COMMAND E</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>OUT2-IN6 (^2)</td>
<td></td>
<td>42</td>
<td>COMMAND F</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>OUT2-IN7 (^2)</td>
<td></td>
<td>43</td>
<td>COMMAND G</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>OUT2-IN8 (^2)</td>
<td></td>
<td>44</td>
<td>COMMAND H</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>OUT2-IN9 (^2)</td>
<td></td>
<td>45</td>
<td>COMMAND I</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>OUT2-OFF</td>
<td></td>
<td>46</td>
<td>DISPLAY1 POWER ON/OFF</td>
<td>Controlling power of OUT 1 (^4)</td>
</tr>
<tr>
<td>22</td>
<td>OUT3-IN1 (^2)</td>
<td>Selecting input channel of OUT 3 (^1)</td>
<td>47</td>
<td>DISPLAY2 POWER ON/OFF</td>
<td>Controlling power of OUT 2 (^4)</td>
</tr>
<tr>
<td>23</td>
<td>OUT3-IN2 (^2)</td>
<td></td>
<td>48</td>
<td>DISPLAY3 POWER ON/OFF</td>
<td>Controlling power of OUT 2 (^4)</td>
</tr>
<tr>
<td>24</td>
<td>OUT3-IN3 (^2)</td>
<td></td>
<td>49</td>
<td>PARALLEL LOCK</td>
<td>Lock parallel input (^5)</td>
</tr>
<tr>
<td>25</td>
<td>GND</td>
<td></td>
<td>50</td>
<td>GND</td>
<td></td>
</tr>
</tbody>
</table>

\(^1\) Channels (video/audio) to be switched depend on the channel switching mode selected.

\(^2\) If you want to switch the selected channel and turn “OFF” alternately, set “8.14.6 Toggle” to “ON”.

If you want to perform automatic measurement of input timing setting ([Ref. 8.6.6 Analog input auto]), set “8.14.9 Analog input measurement” to “ENABLE” and press one of IN6 to IN9 keys for 2 seconds or longer. For details of automatic measurement, see “8.6.6 Analog input automatic measurement”.

\(^3\) Channel switching modes of the front panel and parallel input are independent from each other. If you want to use the fixed channel switching mode, set it using menu in “8.14.5 Switching mode”.

\(^4\) Toggle operation from the current state. (If it is now “OFF”, it is turned to “ON”, and vice versa.)

\(^5\) All parallel inputs are locked. You cannot select a target function that has been locked. This function can also be set in “8.14.4 Enable/Disable”.

---

**MSD-5403**

[Table 8.25] MSD-5403: Parallel input connectors by default

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199
<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Description</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No Connection</td>
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</tr>
<tr>
<td>2</td>
<td>OUT1-IN1&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Selecting input channel of OUT1&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>3</td>
<td>OUT1-IN2&lt;sup&gt;2&lt;/sup&gt;</td>
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</tr>
<tr>
<td>4</td>
<td>OUT1-IN3&lt;sup&gt;2&lt;/sup&gt;</td>
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</tr>
<tr>
<td>5</td>
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<td>6</td>
<td>OUT1-IN5&lt;sup&gt;2&lt;/sup&gt;</td>
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</tr>
<tr>
<td>7</td>
<td>OUT1-IN6&lt;sup&gt;2&lt;/sup&gt;</td>
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</tr>
<tr>
<td>8</td>
<td>OUT1-IN7&lt;sup&gt;2&lt;/sup&gt;</td>
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</tr>
<tr>
<td>9</td>
<td>OUT1-IN8&lt;sup&gt;2&lt;/sup&gt;</td>
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</tr>
<tr>
<td>10</td>
<td>OUT1-IN9&lt;sup&gt;2&lt;/sup&gt;</td>
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</tr>
<tr>
<td>11</td>
<td>OUT1-OFF</td>
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<td>12</td>
<td>OUT2-IN1&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Selecting input channel of OUT2&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>13</td>
<td>OUT2-IN2&lt;sup&gt;2&lt;/sup&gt;</td>
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</tr>
<tr>
<td>14</td>
<td>OUT2-IN3&lt;sup&gt;2&lt;/sup&gt;</td>
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<tr>
<td>15</td>
<td>OUT2-IN4&lt;sup&gt;2&lt;/sup&gt;</td>
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<td>OUT2-IN6&lt;sup&gt;2&lt;/sup&gt;</td>
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<td>18</td>
<td>OUT2-IN7&lt;sup&gt;2&lt;/sup&gt;</td>
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</tr>
<tr>
<td>19</td>
<td>OUT2-IN8&lt;sup&gt;2&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>OUT2-IN9&lt;sup&gt;2&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>OUT2-OFF</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>OUT3-IN1&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Selecting input channel of OUT3&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>23</td>
<td>OUT3-IN2&lt;sup&gt;2&lt;/sup&gt;</td>
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<tr>
<td>24</td>
<td>OUT3-IN3&lt;sup&gt;2&lt;/sup&gt;</td>
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</tr>
<tr>
<td>25</td>
<td>GND</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>No Connection</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>OUT3-IN4&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Selecting input channel of OUT3&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>28</td>
<td>OUT3-IN5&lt;sup&gt;2&lt;/sup&gt;</td>
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<tr>
<td>29</td>
<td>OUT3-IN6&lt;sup&gt;2&lt;/sup&gt;</td>
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</tr>
<tr>
<td>30</td>
<td>OUT3-IN7&lt;sup&gt;2&lt;/sup&gt;</td>
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</tr>
<tr>
<td>31</td>
<td>OUT3-IN8&lt;sup&gt;2&lt;/sup&gt;</td>
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<tr>
<td>32</td>
<td>OUT3-IN9&lt;sup&gt;2&lt;/sup&gt;</td>
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<td>33</td>
<td>OUT3-INOFF</td>
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<td>34</td>
<td>OUT4-IN1&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Selecting input channel of OUT4&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
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<td>OUT4-IN2&lt;sup&gt;2&lt;/sup&gt;</td>
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<td>36</td>
<td>OUT4-IN3&lt;sup&gt;2&lt;/sup&gt;</td>
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<tr>
<td>37</td>
<td>OUT4-IN4&lt;sup&gt;2&lt;/sup&gt;</td>
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<tr>
<td>38</td>
<td>OUT4-IN5&lt;sup&gt;2&lt;/sup&gt;</td>
<td></td>
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<tr>
<td>39</td>
<td>OUT4-IN6&lt;sup&gt;2&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>OUT4-IN7&lt;sup&gt;2&lt;/sup&gt;</td>
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<tr>
<td>41</td>
<td>OUT4-IN8&lt;sup&gt;2&lt;/sup&gt;</td>
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<td>42</td>
<td>OUT4-IN9&lt;sup&gt;2&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>43</td>
<td>OUT4-OFF</td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>SWITCHING–V&amp;A</td>
<td>Selecting channel switching mode&lt;sup&gt;3&lt;/sup&gt;</td>
</tr>
<tr>
<td>45</td>
<td>SWITCHING–VIDEO</td>
<td></td>
</tr>
<tr>
<td>46</td>
<td>SWITCHING–AUDIO</td>
<td></td>
</tr>
<tr>
<td>47</td>
<td>PARALLEL LOCK</td>
<td>Lock parallel input&lt;sup&gt;4&lt;/sup&gt;</td>
</tr>
<tr>
<td>48</td>
<td>NOT USE</td>
<td>No assignment</td>
</tr>
<tr>
<td>49</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>GND</td>
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</tbody>
</table>

<sup>1</sup> Channels (video/audio) to be switched depend on the channel switching mode selected.

<sup>2</sup> If you want to switch the selected channel and turn “OFF” alternately, set “8.14.6 Toggle” to “ON”.

If you want to perform automatic measurement of input timing setting ([Ref. 8.6.6 Analog input auto]), set “8.14.9 Analog input measurement” to “ENABLE” and press one of IN6 to IN9 keys for 2 seconds or longer. For details of automatic measurement, see “8.6.6 Analog input automatic measurement”.

<sup>3</sup> Channel switching modes of the front panel and parallel input are independent from each other. If you want to use the fixed channel switching mode, set it using menu in “8.14.5 Switching mode”.

<sup>4</sup> All parallel inputs are locked. You cannot select a target function that has been locked. This function can also be set in “8.14.4 Enable/Disable”.

---

*Table 8.26 MSD-5404: Parallel input connectors by default*
### Functions

<table>
<thead>
<tr>
<th>Description</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUT1-IN1 (^2)</td>
<td>Selecting input channel of OUT1 (^1)</td>
</tr>
<tr>
<td>to OUT1-IN9 (^2)</td>
<td></td>
</tr>
<tr>
<td>OUT1-OFF</td>
<td></td>
</tr>
<tr>
<td>OUT2-IN1 (^2)</td>
<td>Selecting input channel of OUT2 (^1)</td>
</tr>
<tr>
<td>to OUT2-IN9 (^2)</td>
<td></td>
</tr>
<tr>
<td>OUT2-OFF</td>
<td></td>
</tr>
<tr>
<td>OUT3-IN1 (^2)</td>
<td>Selecting input channel of OUT3 (^1)</td>
</tr>
<tr>
<td>to OUT3-IN9 (^2)</td>
<td></td>
</tr>
<tr>
<td>OUT3-OFF</td>
<td></td>
</tr>
<tr>
<td>OUT4-IN1 (^2)</td>
<td>Selecting input channel of OUT4 (^1)</td>
</tr>
<tr>
<td>to OUT4-IN9 (^2)</td>
<td></td>
</tr>
<tr>
<td>OUT4-OFF</td>
<td></td>
</tr>
<tr>
<td>SWITCHING–V&amp;A</td>
<td>Selecting channel switching mode (^3)</td>
</tr>
<tr>
<td>SWITCHING–VIDEO</td>
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</tr>
<tr>
<td>SWITCHING–AUDIO</td>
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<tr>
<td>COMMAND UNLOCK</td>
<td>Unlock control commands (^4)</td>
</tr>
<tr>
<td>COMMAND A</td>
<td>Sending control commands</td>
</tr>
<tr>
<td>to COMMAND I</td>
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</tr>
<tr>
<td>AUDIO-OUT1 UP/A</td>
<td>Audio output level of OUT1 (^5)</td>
</tr>
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<td>AUDIO–OUT1 DOWN/B</td>
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<tr>
<td>AUDIO-OUT1 MUTE</td>
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<tr>
<td>AUDIO-OUT2 UP/A</td>
<td>Audio output level of OUT2 (^5)</td>
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<td>AUDIO-OUT2 MUTE</td>
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<td>AUDIO-OUT3 UP/A</td>
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<tr>
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<tr>
<td>AUDIO-OUT3 MUTE</td>
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<td>AUDIO-OUT4 UP/A</td>
<td>Audio output level of OUT4 (^5)</td>
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<tr>
<td>SWITCHING–V&amp;A:OUT1</td>
<td>Selecting video and audio input channels of OUT1 (^9)</td>
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<td>COMMAND I</td>
<td>Sending control commands</td>
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<tr>
<td>to COMMAND I</td>
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<tr>
<td>AUDIO-OUT1 UP/A</td>
<td>Audio output level of OUT1 (^5)</td>
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<td>AUDIO-OUT1 MUTE</td>
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<td>AUDIO-OUT2 UP/A</td>
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<td>AUDIO-OUT3 MUTE</td>
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<tr>
<td>AUDIO-OUT4 UP/A</td>
<td>Audio output level of OUT4 (^5)</td>
</tr>
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<td>AUDIO-OUT4 MUTE</td>
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<tr>
<td>SWITCHING–V&amp;A:OUT1</td>
<td>Selecting video input channels of OUT1 (^9)</td>
</tr>
<tr>
<td>SWITCHING–VIDEO:OUT1</td>
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</tr>
<tr>
<td>SWITCHING–AUDIO:OUT1</td>
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</tr>
<tr>
<td>COMMAND I</td>
<td>Sending control commands</td>
</tr>
<tr>
<td>to COMMAND I</td>
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</tr>
<tr>
<td>AUDIO-OUT1 UP/A</td>
<td>Audio output level of OUT1 (^5)</td>
</tr>
<tr>
<td>AUDIO–OUT1 DOWN/B</td>
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<tr>
<td>AUDIO-OUT1 MUTE</td>
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<tr>
<td>AUDIO-OUT2 UP/A</td>
<td>Audio output level of OUT2 (^5)</td>
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<td>AUDIO–OUT2 DOWN/B</td>
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<td>AUDIO-OUT2 MUTE</td>
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<tr>
<td>AUDIO-OUT3 UP/A</td>
<td>Audio output level of OUT3 (^5)</td>
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<td>AUDIO-OUT3 MUTE</td>
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<tr>
<td>AUDIO-OUT4 UP/A</td>
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<td>AUDIO-OUT4 MUTE</td>
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<td>SWITCHING–AUDIO:OUT1</td>
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### Table 8.27 Functions of parallel input connector (1/2)

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<tr>
<th>Description</th>
<th>Function</th>
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<tbody>
<tr>
<td>CROSS POINT 1 LOAD</td>
<td>Load cross point memory</td>
</tr>
<tr>
<td>to</td>
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<tr>
<td>CROSS POINT 9 LOAD</td>
<td>Load preset memory</td>
</tr>
<tr>
<td>to</td>
<td></td>
</tr>
<tr>
<td>PRESET 1 LOAD</td>
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</tr>
<tr>
<td>to</td>
<td></td>
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<tr>
<td>PRESET 8 LOAD</td>
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<td>PARALLEL LOCK</td>
<td>Lock parallel input (^6)</td>
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<tr>
<td>MENU-MENU/SET</td>
<td>Operating menu</td>
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<td>MENU-UP</td>
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<td>MENU-LEFT</td>
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<td>MENU-RIGHT</td>
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<td>FRONT KEY LOCK</td>
<td>Lock front panel (^7)</td>
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<tr>
<td>DISPLAY1 POWER ON/OFF</td>
<td>Controlling power of display (^8)</td>
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<td>V&amp;A:OUT1-TO</td>
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</tr>
<tr>
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<td></td>
</tr>
<tr>
<td>V&amp;A:OUT1-IN1 (^2)</td>
<td>Selecting video and audio input channels of OUT1 (^9)</td>
</tr>
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<td>to</td>
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<td>V&amp;A:OUT1-IN9 (^2)</td>
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<td>V&amp;A:OUT1-OFF</td>
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<td>VIDEO:OUT1-IN1 (^2)</td>
<td>Selecting video input channels of OUT1 (^9)</td>
</tr>
<tr>
<td>to</td>
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</tr>
<tr>
<td>VIDEO:OUT1-IN9 (^2)</td>
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<tr>
<td>VIDEO:OUT1-OFF</td>
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<td>AUDIO:OUT1-IN1 (^2)</td>
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<td>to</td>
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### Functions (cont’d)

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<tr>
<td>V&amp;A:OUT2-IN1</td>
<td>Selecting video and audio input channels of OUT 2 *9</td>
</tr>
<tr>
<td>V&amp;A:OUT2-IN9</td>
<td></td>
</tr>
<tr>
<td>VIDEO:OUT2-IN1</td>
<td>Selecting video input channels of OUT 2 *9</td>
</tr>
<tr>
<td>VIDEO:OUT2-IN9</td>
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</tr>
<tr>
<td>AUDIO:OUT2-IN1</td>
<td>Selecting audio input channels of OUT 2 *9</td>
</tr>
<tr>
<td>AUDIO:OUT2-IN9</td>
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</tr>
<tr>
<td>V&amp;A:OUT3-IN1</td>
<td>Selecting video and audio input channels of OUT 3 *9</td>
</tr>
<tr>
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</tr>
<tr>
<td>VIDEO:OUT3-IN1</td>
<td>Selecting video input channels of OUT 3 *9</td>
</tr>
<tr>
<td>VIDEO:OUT3-IN9</td>
<td></td>
</tr>
<tr>
<td>AUDIO:OUT3-IN1</td>
<td>Selecting audio input channels of OUT 3 *9</td>
</tr>
<tr>
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<thead>
<tr>
<th>Description</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>V&amp;A:OUT4-IN1</td>
<td>Selecting video and audio input channels of OUT 4 *9</td>
</tr>
<tr>
<td>V&amp;A:OUT4-IN9</td>
<td></td>
</tr>
<tr>
<td>VIDEO:OUT4-IN1</td>
<td>Selecting video input channels of OUT 4 *9</td>
</tr>
<tr>
<td>VIDEO:OUT4-IN9</td>
<td></td>
</tr>
<tr>
<td>AUDIO:OUT4-IN1</td>
<td>Selecting audio input channels of OUT 4 *9</td>
</tr>
<tr>
<td>AUDIO:OUT4-IN9</td>
<td></td>
</tr>
</tbody>
</table>

*1 Channels (video/audio) to be switched depend on the channel switching mode selected.

*2 If you want to switch the selected channel and turn “OFF” alternately, set “8.14.6 Toggle” to “ON”.

*3 Channel switching modes of the front panel and parallel input are independent from each other. If you want to use the fixed channel switching mode, set it using the menu in “8.14.5 Switching mode”.

*4 While control command is locked, you cannot input parallel of COMMANDs A to I. The front panel and parallel inputs have their own settings for control commands and can lock independently.

*5 For audio output level, you can select “PUSH SWITCH” or “ROTARY ENCODER” in “8.14.2 Audio level”.

*6 All parallel inputs are locked. You cannot select a specific function that has been locked. This function can also be set in “8.14.4 Enable/Disable”.

*7 All parallel inputs are locked. You cannot select a specific function that will be locked. This function can also be set in “8.18.1 Setting key lock”.

*8 Toggle operation from the current state. (If it is now “OFF”, it turns to “ON”, and vice versa.)

*9 Channels (video/audio) to be switched do not depend on the selected channel switching mode.
8.14.2 Audio level [AUDIO VOLUME]

You can select the operation switch for audio output level.

- ROTARY ENCODER
- PUSH SWITCH [Default]

For ROTARY ENCODER: Use a rotary encoder that outputs phase difference of two signals (Phase A and B).
For your reference: IDK uses the following rotary encoder for presentation switchers, MSD-4401-A/MSD-4402-A/MSD-4403-A. We recommend the use of a similar rotary encoder.

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Model number</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALPS ELECTRIC CO., LTD.</td>
<td>EC11E1530401</td>
</tr>
</tbody>
</table>

1. To set the audio level switch using menu:

   MSD-5404 Top
   ↓ SET key
   [FUNCTION SELECT] ▲▼ keys: Select “PARALLEL”.
   ↓ SET key
   [PARALLEL] AUDIO VOLUME ▲▼ keys: Select “AUDIO VOLUME”.
   ↓ SET key
   [AUDIO VOLUME] PUSH SWITCH ▲▼ keys: Select “ROTARY ENCODER” or “PUSH SWITCH”.

   ↓ ESC key: Returns to the previous screen.

2. To set the audio level switch using commands:
   @SPV: Set audio operation switch (parallel input)
   @GPV: Get audio operation switch (parallel input)
8.14.3 The number of clicks (Rotary encoder) [ROTARY ENCODER]

You can set the amount of click of rotary encoder to change the audio output level. This function is valid only if you select “ROTARY ENCODER” in “8.14.2 Audio level”.

- The number of clicks: 1 to 50  [Default]: 5

![Diagram of rotary encoder click pulse]

[Figure 8.61] Clicks of rotary encoder

1. To set the number of rotary encoder clicks using menu:

   MSD-5404
   Top
   ▼ SET key
   [FUNCTION SELECT] PARALLEL
   ◀▼ keys: Select “PARALLEL”.
   ▼ SET key
   [PARALLEL] ROTARY ENCODER
   ◀▼ keys: Select “ROTARY ENCODER”.
   ▼ SET key
   [ROTARY ENCODER] CLICK
   ◀▼ keys: Set the number of rotary encoder clicks (1 to 50).
   ▼ ESC key: Returns to the previous screen.

2. To set the number of rotary encoder clicks using commands:

   @SPP: Set the number of rotary encoder clicks (parallel input)
   @GPP: Get the number of rotary encoder clicks (parallel)
8.14.4 Enable/Disable [LOCK SETTING]

You can select whether to accept control from parallel input connector:

- UNLOCK  [Default]
- LOCK: All parallel input functions will be prohibited.

1. To set the parallel lock using menu:

   [FUNCTION SELECT]  
   PARALLEL  
  ▲▼ keys: Select “PARALLEL”.
   ↓SET key

   [PARALLEL]  
   LOCK SETTING  
  ▲▼ keys: Select “LOCK SETTING”.
   ↓SET key

   [PARALLEL LOCK]  
   UNLOCK  
  ▲▼ keys: Select “UNLOCK” or “LOCK”.
   ↓SET key: Returns to the previous screen.

2. To set the parallel lock using commands:

   @SPL: Enable/Disable parallel input
   @GPL: Get lock status of parallel input
8.14.5 Switching mode [SWITCHING MODE]

This setting is independent from channel switching mode of the front panel keys.

- Video and audio together: V&A  [Default]
- Video only: VIDEO
- Audio only: AUDIO

1. To set the parallel switching mode using menu:

   MSD-5404 Top
   ↓ SET key
   [FUNCTION SELECT] PARALLEL  ▲▼ keys: Select “PARALLEL”.
   ↓ SET key
   [PARALLEL] SWITCHING MODE  ▲▼ keys: Select “SWITCHING MODE”.
   ↓ SET key
   [SWITCHING MODE] V&A  ▲▼ keys: Select “V&A”, “VIDEO”, or “AUDIO”.
   ↓ ESC key: Returns to the previous screen.

2. To set the parallel switching mode using commands:
   @SPN: Set parallel switching mode
   @GPN: Get parallel switching mode
8.14.6 Toggle [CHANNEL TOGGLE]

You can set the toggle for the time of input selection. If you select “ON”, switching of the selected channel and turning OFF alternately every time you select an input. Use this function if you do not want to have the “OFF” button for inputs on the console.

- OFF  [Default]
- ON

1. To set the toggle operation using menu:

   MSD-5404
   ↓ SET key
   [FUNCTION SELECT]
   PARALLEL  ▲▼ keys: Select “PARALLEL”.
   ↓ SET key
   [PARALLEL]
   CHANNEL TOGGLE  ▲▼ keys: Select “CHANNEL TOGGLE”.
   ↓ SET key
   [CHANNEL TOGGLE]
   OFF  ▲▼ keys: Select “OFF” or “ON”.
   ↓ ESC key: Returns to the previous screen.

2. To set the toggle operation using commands:

   @SPT: Set toggle operation at parallel input selection
   @GPT: Get toggle operation at parallel input selection
8.14.7 Chattering reduction [CHATTERING FILTER]

If operation is unstable due to chattering* caused by switching contacts, set the chattering reduction time longer.

- Chattering filter time: 0 to 300 ms.
  [Default]: Push switch: 30 ms.
  Rotary encoder: 0 ms

* Chattering: Operation is unstable immediately after contacts of relays or switches are switched, and then signals are turned on and off repeatedly.

1. To set the chattering reduction time using menu:

   MSD-5404
   ↓ SET key
   [FUNCTION SELECT] PARALLEL
     ▲▼ keys: Select “PARALLEL”.
   ↓ SET key
   [PARALLEL] CHATTERING FILTER
     ▲▼ keys: Select “CHATTERING FILTER”.
   ↓ SET key
   [SWITCH FILTER] 30 ms
     ▲▼ keys: Set the chattering time for the push switch (0 to 300).
   ↓ ▸ ◄ keys
   [ROTARY ENC FILTER] 0 ms
     ▲▼ keys: Set the chattering time for the rotary encoder (0 to 300).
   ↓ ESC key: Returns to the previous screen.

2. To set the chattering reduction time using commands:
   @SFP: Set chattering reduction time
   @GFP: Get chattering reduction time
8.14.8 Buzzer [BUZZER]

You can turn on/off buzzer (sounding every time you press a key) for external control.

- OFF [Default]
- ON

1. To set the parallel buzzer using menu:

```
MSD-5404 Top
↓ SET key
[FUNCTION SELECT] PARALLEL ▲▼keys: Select “PARALLEL”.
↓ SET key
[PARALLEL] BUZZER ▲▼keys: Select “BUZZER”.
↓ SET key
[PARALLEL BUZZER] OFF ▲▼keys: Select “OFF” or “ON”.
↓ ESC key: Returns to the previous screen.
```

2. To set the parallel buzzer using command:
None

8.14.9 Analog input measurement [AUTO SETUP]

You can select whether or not to perform an automatic measurement of input timing when one of the analog input keys for the parallel inputs (IN6 to IN9) is pressed for 2 seconds or longer. For details of automatic measurement, see “8.6.6 Analog input automatic measurement”.

- DISABLE
- ENABLE [Default]

1. To enable/disable analog input measurement using menu:

```
MSD-5404 Top
↓ SET key
[FUNCTION SELECT] PARALLEL ▲▼keys: Select “PARALLEL”.
↓ SET key
[PARALLEL] AUTO SETUP ▲▼keys: Select “AUTO SETUP”.
↓ SET key
[AUTO SETUP] ENABLE ▲▼keys: Select “DISABLE” or “ENABLE”.
↓ ESC key: Returns to the previous screen.
```

2. To enable/disable analog input measurement using command:
None
8.14.10 Function initialization [INITIALIZE]

You can initialize functions of parallel input connector that are set in "8.14.1 Assigning functions".

- FACTORY DEFAULT: Functions of parallel input connectors will be restored to the factory default as shown in [Table 8.23] to [Table 8.26].
- ALL CLEAR: All functions of parallel input connectors will be set to “UNUSED”.
- Tally->PARALLEL COPY: Functions of parallel input connectors will be the same as those of Tally output connectors.

1. To initialize parallel input functions using menu:

   1. To initialize parallel input functions using command:

   @PDE: Initialize parallel input function assignment
8.15 Tally

The maximum supply current of the internal power supply (pins 1 and 26) is 300 mA. Do not use the external and internal power supplies at the same time. The maximum load capacity of Tally output varies depending on pin numbers:

- Pins 2 to 21 and 27 to 46: DC 48 V, 50 mA
- Pins 22 to 24 and 47 to 49: DC 48 V, 1 A

* You can use pins 22 to 24 and 47 to 49 to control external devices in settings of “8.12 Control Command Settings”.

<table>
<thead>
<tr>
<th>Pin number</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 26</td>
<td>+5 V (4.5 V to 5.5 V)</td>
</tr>
<tr>
<td>2 to 24</td>
<td>Functions can be assigned</td>
</tr>
<tr>
<td>27 to 49</td>
<td>GND</td>
</tr>
<tr>
<td>25, 50</td>
<td>GND</td>
</tr>
</tbody>
</table>

[Figure 8.62] Pin assignment of Tally output connector

[Figure 8.63] Circuit example of Tally output (Internal power supply)

[Figure 8.64] Circuit example of Tally output (External power supply)
8.15.1 Assigning functions [FUNCTION ASSIGN]

1. To assign functions to Tally output connectors using menu:

```
<table>
<thead>
<tr>
<th>MSD-5404</th>
<th>Top</th>
</tr>
</thead>
<tbody>
<tr>
<td>SET key</td>
<td></td>
</tr>
</tbody>
</table>
| [FUNCTION SELECT] TALLY | ▲▼ keys: Select “Tally”.
| SET key  |     |
| [TALLY] FUNCTION ASSIGN | ▲▼ keys: Select “FUNCTION ASSIGN”.
| SET key  | ESC key: Cancels the setting and returns to the previous screen. |
| [TALLY PIN: 2] OUT1-IN1 | ▲▼ keys: Select the desired function for input pin 2.* |
|         |     |
| TALLY PIN: 49 NOT USE | ▲▼ keys: Select the desired function for input pin 49.* |
| SET key  |     |
| [TALLY FUNCTION] NOW UPDATE... | Displays the message for 1 second before automatically returning to the previous screen. |
|         |     |
| [TALLY] FUNCTION ASSIGN |     |
```

* You cannot assign functions to the following pins, and they are not displayed: Pins 1, 25, 26, and 50.

**Note:**
If you do not press the “SET” key, the assignment is not changed. Make sure to press the “SET” key.

2. To assign functions to Tally output connectors using commands:

- @STE: Set function assignment of Tally output
- @GTE Get function assignment of Tally output
### Table 8.29 Factory default of Tally output connectors of MSD-5401, MSD-5401SL

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Description</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+5V</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>OUT1-IN1</td>
<td>Selecting input channel of OUT1</td>
</tr>
<tr>
<td>3</td>
<td>OUT1-IN2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>OUT1-IN3</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>OUT1-IN4</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>OUT1-IN5</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>OUT1-IN6</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>OUT1-IN7</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>OUT1-IN8</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>OUT1-IN9</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>OUT1-OFF</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>SWITCHING–V&amp;A</td>
<td>Selecting channel switching mode</td>
</tr>
<tr>
<td>13</td>
<td>SWITCHING–VIDEO</td>
<td>Sending control commands</td>
</tr>
<tr>
<td>14</td>
<td>SWITCHING–AUDIO</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>COMMAND A</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>COMMAND B</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>COMMAND C</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>COMMAND D</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>COMMAND E</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>COMMAND F</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>COMMAND G</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>COMMAND H</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>COMMAND I</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>AUDIO-OUT1 MAX</td>
<td>Audio output level of OUT1</td>
</tr>
<tr>
<td>25</td>
<td>GND</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>+5V</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>AUDIO–OUT1 MIN</td>
<td>Audio output level of OUT1</td>
</tr>
<tr>
<td>28</td>
<td>AUDIO–OUT1 MUTE</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>DISPLAY1 POWER</td>
<td>Controlling display power of OUT1</td>
</tr>
<tr>
<td>30</td>
<td>PARALLEL LOCK</td>
<td>Lock parallel input</td>
</tr>
<tr>
<td>31</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>43</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>46</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>47</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>48</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>49</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>GND</td>
<td></td>
</tr>
</tbody>
</table>

*1 Pins for the currently selected channels are pulled to ground, allowing current to flow through them. Output target of video and audio depends on channel switching mode. (If video and audio channels are not the same and “V&A” is selected for channel switching mode, the video channel is output.)

*2 Pins for the switching mode channels currently selected in parallel are pulled to ground.

*3 Control commands that are registered in COMMANDs A to I are pulled to ground. However, each command execution condition (COMMAND A to I) has two planes (PLANE A and PLANE B). If control commands are registered in both planes, the control commands are executed alternately every time parallel input of COMMAND A to I is turned ON/OFF. If PLANE A is set to be executed at the next parallel input ON, it is pulled to ground (lights); if PLANE B is set to be executed at the next parallel input ON, ground is set ON/OFF alternately (blinks). Ground can only be output when the control command is executed according to the setting of “8.12.7 Command key setting”. Ground is set ON/OFF alternately (blinks) when control commands are executed according to the setting of “8.12.8 Flash time (Command keys and DISPLAY POWER keys)”.

*4 The following pins are pulled to ground:

Pins of “MAX” if maximum level is set; “MIN” if minimum level is set; “MUTE” during mute.

*5 Pins are pulled to ground when the MSD is turned on.

*6 Pin is pulled to ground while parallel input is locked.
### Table 8.30 Factory default of Tally output connectors of MSD-5402, MSD-5402SL

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Description</th>
<th>Function</th>
<th>Pin No.</th>
<th>Description</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+5V</td>
<td></td>
<td>26</td>
<td>+5V</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>OUT1-IN1</td>
<td></td>
<td>27</td>
<td>COMMAND A</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>OUT1-IN2</td>
<td></td>
<td>28</td>
<td>COMMAND B</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>OUT1-IN3</td>
<td></td>
<td>29</td>
<td>COMMAND C</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>OUT1-IN4</td>
<td></td>
<td>30</td>
<td>COMMAND D</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>OUT1-IN5</td>
<td></td>
<td>31</td>
<td>COMMAND E</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>OUT1-IN6</td>
<td></td>
<td>32</td>
<td>COMMAND F</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>OUT1-IN7</td>
<td></td>
<td>33</td>
<td>COMMAND G</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>OUT1-IN8</td>
<td></td>
<td>34</td>
<td>COMMAND H</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>OUT1-IN9</td>
<td></td>
<td>35</td>
<td>COMMAND I</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>OUT1-OFF</td>
<td></td>
<td>36</td>
<td>AUDIO-OUT1 MAX</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>OUT2-IN1</td>
<td></td>
<td>37</td>
<td>AUDIO-OUT1 MIN</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>OUT2-IN2</td>
<td></td>
<td>38</td>
<td>AUDIO-OUT1 MUTE</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>OUT2-IN3</td>
<td></td>
<td>39</td>
<td>AUDIO-OUT2 MAX</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>OUT2-IN4</td>
<td>Selecting input channel of OUT2 '2'</td>
<td>40</td>
<td>AUDIO-OUT2 MIN</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>OUT2-IN5</td>
<td></td>
<td>41</td>
<td>AUDIO-OUT2 MUTE</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>OUT2-IN6</td>
<td></td>
<td>42</td>
<td>DISPLAY1 POWER ON</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>OUT2-IN7</td>
<td></td>
<td>43</td>
<td>DISPLAY2 POWER ON</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>OUT2-IN8</td>
<td></td>
<td>44</td>
<td>PARALLEL LOCK</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>OUT2-IN9</td>
<td></td>
<td>45</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>OUT2-OFF</td>
<td></td>
<td>46</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>SWITCHING–V&amp;A</td>
<td>Selecting channel switching mode '2'</td>
<td>47</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>SWITCHING–VIDEO</td>
<td></td>
<td>48</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>SWITCHING–AUDIO</td>
<td></td>
<td>49</td>
<td>NOT USE</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>GND</td>
<td></td>
<td>50</td>
<td>GND</td>
<td></td>
</tr>
</tbody>
</table>

'1' Pins for the currently selected channels are pulled to ground, allowing current to flow through them. Output target of video and audio depends on channel switching mode. (If video and audio channels are not the same and "V&A" is selected for channel switching mode, the video channel is output.)

'2' Pins for the switching mode channels currently selected in parallel are pulled to ground.

'3' Control commands that are registered in COMMANDs A to I are pulled to ground. However, each command execution condition (COMMAND A to I) has two planes (PLANE A and PLANE B). If control commands are registered in both planes, the control commands are executed alternately every time parallel input of COMMAND A to I is turned ON/OFF. If PLANE A is set to be executed at the next parallel input ON, it is pulled to ground (lights); if PLANE B is set to be executed at the next parallel input ON, ground is set.

'4' Audio output level of OUT1 and OUT2

'5' Controlling display power of OUT1 and OUT2

'6' Lock parallel input

'7' Not assigned
ON/OFF alternately (blinks).

Ground can only be output when the control command is executed according to the setting of “8.12.7 Command key setting”. Ground is set ON/OFF alternately (blinks) when control commands are executed according to the setting of “8.12.8 Flash time (Command keys and DISPLAY POWER keys)”.

*4 The following pins are pulled to ground:

Pins of “MAX” if maximum level is set; “MIN” if minimum level is set; “MUTE” during mute.

*5 Pins are pulled to ground when the MSD is turned on.

*6 Pin is pulled to ground while parallel input is locked.
### Table 8.31 Factory default of Tally output connectors of MSD-5403

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Description</th>
<th>Function</th>
<th>Pin No.</th>
<th>Description</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+5V</td>
<td>+5V</td>
<td>26</td>
<td>+5V</td>
<td>+5V</td>
</tr>
<tr>
<td>2</td>
<td>OUT1-IN1</td>
<td>Selecting input channel of OUT 1 &lt;sup&gt;1&lt;/sup&gt;</td>
<td>27</td>
<td>OUT3-IN4</td>
<td>Selecting input channel of OUT 3 &lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>3</td>
<td>OUT1-IN2</td>
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<td>28</td>
<td>OUT3-IN5</td>
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<td>OUT1-IN3</td>
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<td>29</td>
<td>OUT3-IN6</td>
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<td>OUT3-IN7</td>
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</tr>
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<td>OUT1-IN5</td>
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<td>31</td>
<td>OUT3-IN8</td>
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<td>7</td>
<td>OUT1-IN6</td>
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<td>OUT3-OFF</td>
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</tr>
<tr>
<td>9</td>
<td>OUT1-IN8</td>
<td></td>
<td>34</td>
<td>SWITCHING–V&amp;A</td>
<td>Selecting channel switching mode</td>
</tr>
<tr>
<td>10</td>
<td>OUT1-IN9</td>
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<td>35</td>
<td>SWITCHING–VIDEO</td>
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<tr>
<td>11</td>
<td>OUT1-OFF</td>
<td></td>
<td>36</td>
<td>SWITCHING–AUDIO</td>
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<tr>
<td>12</td>
<td>OUT2-IN1</td>
<td>Selecting input channel of OUT 2 &lt;sup&gt;2&lt;/sup&gt;</td>
<td>37</td>
<td>COMMAND A</td>
<td>Sending control commands &lt;sup&gt;3&lt;/sup&gt;</td>
</tr>
<tr>
<td>13</td>
<td>OUT2-IN2</td>
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<td>38</td>
<td>COMMAND B</td>
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<td>14</td>
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<td>39</td>
<td>COMMAND C</td>
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<td>16</td>
<td>OUT2-IN5</td>
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<td>41</td>
<td>COMMAND E</td>
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<td>17</td>
<td>OUT2-IN6</td>
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<td>COMMAND F</td>
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<td>OUT2-IN7</td>
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<td>43</td>
<td>COMMAND G</td>
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<td>COMMAND H</td>
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<td>20</td>
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<td>45</td>
<td>COMMAND I</td>
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</tr>
<tr>
<td>21</td>
<td>OUT2-OFF</td>
<td></td>
<td>46</td>
<td>DISPLAY1 POWER ON</td>
<td>Controlling display power of OUT 1 &lt;sup&gt;4&lt;/sup&gt;</td>
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<tr>
<td>22</td>
<td>OUT3-IN1</td>
<td>Selecting input channel of OUT 3 &lt;sup&gt;3&lt;/sup&gt;</td>
<td>47</td>
<td>DISPLAY2 POWER ON</td>
<td>Controlling display power of OUT 2 &lt;sup&gt;4&lt;/sup&gt;</td>
</tr>
<tr>
<td>23</td>
<td>OUT3-IN2</td>
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<td>48</td>
<td>DISPLAY3 POWER ON</td>
<td>Controlling display power of OUT 1 &lt;sup&gt;4&lt;/sup&gt;</td>
</tr>
<tr>
<td>24</td>
<td>OUT3-IN3</td>
<td></td>
<td>49</td>
<td>PARALLEL LOCK</td>
<td>Controlling display power of OUT 2 &lt;sup&gt;5&lt;/sup&gt;</td>
</tr>
<tr>
<td>25</td>
<td>GND</td>
<td></td>
<td>50</td>
<td>GND</td>
<td></td>
</tr>
</tbody>
</table>

<sup>1</sup> Pins for the currently selected channels are pulled to ground, allowing current to flow through them. Output target of video and audio depends on channel switching mode. (If video and audio channels are not the same and "V&A" is selected for channel switching mode, the video channel is output.)

<sup>2</sup> Pins for the switching mode channels currently selected in parallel are pulled to ground.

<sup>3</sup> Control commands that are registered in COMMANDS A to I are pulled to ground. However, each command execution condition (COMMAND A to I) has two planes (PLANE A and PLANE B). If control commands are registered in both planes, the control commands are executed alternately every time parallel input of COMMAND A to I is turned ON/OFF. If PLANE A is set to be executed at the next parallel input ON, it is pulled to ground (lights); if PLANE B is set to be executed at the next parallel input ON, ground is set ON/OFF alternately (blinks). Ground can only be output when the control command is executed according to the setting of “8.12.7 Command key setting”. Ground is set ON/OFF alternately (blinks) when control commands are executed according to the setting of “8.12.8 Flash time (Command keys and DISPLAY POWER keys)”.

<sup>4</sup> Pins are pulled to ground when the MSD is turned on.

<sup>5</sup> Pin is pulled to ground while parallel input is locked.
### Factory default of Tally OUTPUT connectors of MSD-5404

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Description</th>
<th>Function</th>
<th>Pin No.</th>
<th>Description</th>
<th>Function</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>+5V</td>
<td></td>
<td>26</td>
<td>+5V</td>
<td>Selecting input channel of OUT 3 &lt;sup&gt;1&lt;/sup&gt;</td>
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<td>OUT1-IN8</td>
<td></td>
<td>34</td>
<td>OUT4-IN1</td>
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</tr>
<tr>
<td>10</td>
<td>OUT1-IN9</td>
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<td>35</td>
<td>OUT4-IN2</td>
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<td>37</td>
<td>OUT4-IN4</td>
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<td>OUT2-IN2</td>
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<td>OUT4-IN5</td>
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<tr>
<td>14</td>
<td>OUT2-IN3</td>
<td>Selecting input channel of OUT 2 &lt;sup&gt;1&lt;/sup&gt;</td>
<td>39</td>
<td>OUT4-IN6</td>
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</tr>
<tr>
<td>15</td>
<td>OUT2-IN4</td>
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<td>16</td>
<td>OUT2-IN5</td>
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<td>41</td>
<td>OUT4-IN8</td>
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<td>17</td>
<td>OUT2-IN6</td>
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<td>OUT4-IN9</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>OUT2-IN7</td>
<td></td>
<td>43</td>
<td>OUT4-OFF</td>
<td>Selecting channel switching mode</td>
</tr>
<tr>
<td>19</td>
<td>OUT2-IN8</td>
<td></td>
<td>44</td>
<td>SWITCHING-V&amp;A</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>OUT2-IN9</td>
<td></td>
<td>45</td>
<td>SWITCHING-VIDEO</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>OUT2-OFF</td>
<td></td>
<td>46</td>
<td>SWITCHING-AUDIO</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>OUT3-IN1</td>
<td>Selecting input channel of OUT 3 &lt;sup&gt;1&lt;/sup&gt;</td>
<td>47</td>
<td>PARALLEL LOCK</td>
<td>Lock parallel input &lt;sup&gt;3&lt;/sup&gt;</td>
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<tr>
<td>23</td>
<td>OUT3-IN2</td>
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<td>48</td>
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<td>Not assigned</td>
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<tr>
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<td>OUT3-IN3</td>
<td></td>
<td>49</td>
<td>NOT USE</td>
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<tr>
<td>25</td>
<td>GND</td>
<td></td>
<td>50</td>
<td>GND</td>
<td></td>
</tr>
</tbody>
</table>

<sup>1</sup> Pins for the currently selected channels are pulled to ground, allowing current to flow through them.

Output target of video and audio depends on channel switching mode. (If video and audio channels are not the same and “V&A” is selected for channel switching mode, the video channel is output.)

<sup>2</sup> Pins for the switching mode channels currently selected in parallel are pulled to ground.

<sup>3</sup> Pin is pulled to ground while parallel input is locked.
### Functions

<table>
<thead>
<tr>
<th>Description</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUT1-IN1 to OUT1-IN9</td>
<td>Selecting input channel of OUT 1 *1</td>
</tr>
<tr>
<td>OUT2-IN1 to OUT2-IN9</td>
<td>Selecting input channel of OUT 2 *1</td>
</tr>
<tr>
<td>OUT3-IN1 to OUT3-IN9</td>
<td>Selecting input channel of OUT 3 *1</td>
</tr>
<tr>
<td>OUT4-IN1 to OUT4-IN9</td>
<td>Selecting input channel of OUT 4 *1</td>
</tr>
<tr>
<td>SWITCHING–VIDEO OUT4-OFF</td>
<td>Unlocking control commands *3</td>
</tr>
<tr>
<td>SWITCHING–AUDIO</td>
<td>Sending control commands *4</td>
</tr>
<tr>
<td>COMMAND I AUDIO-OUT1 MAX</td>
<td>Audio output level of OUT 1 *5</td>
</tr>
<tr>
<td>AUDIO-OUT1 MIN</td>
<td>Audio output level of OUT 2 *5</td>
</tr>
<tr>
<td>AUDIO-OUT2 MAX</td>
<td>Audio output level of OUT 3 *5</td>
</tr>
<tr>
<td>AUDIO-OUT2 MIN</td>
<td>Audio output level of OUT 4 *5</td>
</tr>
<tr>
<td>AUDIO-OUT3 MAX</td>
<td>Audio output level of OUT 1 *5</td>
</tr>
<tr>
<td>AUDIO-OUT3 MIN</td>
<td>Audio output level of OUT 2 *5</td>
</tr>
<tr>
<td>AUDIO-OUT3 MUTE</td>
<td>Audio output level of OUT 3 *5</td>
</tr>
<tr>
<td>AUDIO-OUT3 MAX</td>
<td>Audio output level of OUT 4 *5</td>
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</table>

### Functions of Tally output connector (1/2)

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>CROSS POINT 1 LOAD to CROSS POINT 9 LOAD</td>
<td>Loading cross points *6</td>
</tr>
<tr>
<td>PRESET 1 LOAD to PRESET 8 LOAD</td>
<td>Loading preset memory *7</td>
</tr>
<tr>
<td>PARALLEL LOCK</td>
<td>Parallel input lock *8</td>
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<tr>
<td>MENU-MENU/SET</td>
<td>Operating menu *9</td>
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<tr>
<td>MENU-ESC</td>
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<td>MENU-UP</td>
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<td>MENU-DOWN</td>
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<td>MENU-LEFT</td>
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<td>MENU-RIGHT</td>
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<td>FRONT KEY LOCK</td>
<td>Locking front panel *6</td>
</tr>
<tr>
<td>DISPLAY1 POWER ON to DISPLAY4 POWER ON</td>
<td>Controlling display power *10</td>
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<tr>
<td>V&amp;A:OUT1-IN1 to V&amp;A:OUT1-IN9</td>
<td>Selecting video and audio input channels of OUT 1 *11</td>
</tr>
<tr>
<td>V&amp;A:OUT1-OFF</td>
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<tr>
<td>VIDEO:OUT1-IN1 to VIDEO:OUT1-OFF</td>
<td>Selecting video input channels of OUT 1 *11</td>
</tr>
<tr>
<td>AUDIO:OUT1-IN1 to AUDIO:OUT1-OFF</td>
<td>Selecting audio input channels of OUT 1 *11</td>
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<td>AUDIO:OUT1-IN9</td>
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<td>AUDIO:OUT1-OFF</td>
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### Functions (continuance)

<table>
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<tr>
<th>Descriptions</th>
<th>Functions</th>
<th>Descriptions</th>
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<tr>
<td>V&amp;A:OUT2-IN1</td>
<td>Selecting video and audio input channels of OUT 2 &quot;11</td>
<td>V&amp;A:OUT4-IN1</td>
<td>Selecting video and audio input channels of OUT 4 &quot;11</td>
</tr>
<tr>
<td>to</td>
<td></td>
<td>to</td>
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</tr>
<tr>
<td>V&amp;A:OUT2-IN9</td>
<td></td>
<td>V&amp;A:OUT4-IN9</td>
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<td>V&amp;A:OUT2-OFF</td>
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<td>V&amp;A:OUT4-OFF</td>
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<td>VIDEO:OUT2-IN1</td>
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<td>VIDEO:OUT4-IN1</td>
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</tr>
<tr>
<td>to</td>
<td>Selecting video input channels of OUT 2 &quot;11</td>
<td>to</td>
<td>Selecting video input channels of OUT 4 &quot;11</td>
</tr>
<tr>
<td>VIDEO:OUT2-IN9</td>
<td></td>
<td>VIDEO:OUT4-IN9</td>
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</tr>
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<td>VIDEO:OUT2-OFF</td>
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<td>VIDEO:OUT4-OFF</td>
<td></td>
</tr>
<tr>
<td>AUDIO:OUT2-IN1</td>
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<td>AUDIO:OUT4-IN1</td>
<td>Selecting audio input channels of OUT 4 &quot;11</td>
</tr>
<tr>
<td>to</td>
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<td>to</td>
<td></td>
</tr>
<tr>
<td>AUDIO:OUT2-IN9</td>
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<td>AUDIO:OUT4-IN9</td>
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<td>AUDIO:OUT2-OFF</td>
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<td>AUDIO:OUT4-OFF</td>
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<tr>
<td>V&amp;A:OUT3-IN1</td>
<td>Selecting video and audio input channels of OUT 3 &quot;11</td>
<td>PRESET COMMAND</td>
<td>Outputting of control commands &quot;12</td>
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<tr>
<td>to</td>
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<td>V&amp;A:OUT3-OFF</td>
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</tr>
<tr>
<td>VIDEO:OUT3-IN1</td>
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</tr>
<tr>
<td>to</td>
<td>Selecting video input channels of OUT 3 &quot;11</td>
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<td></td>
</tr>
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<td>VIDEO:OUT3-IN9</td>
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<td>VIDEO:OUT3-OFF</td>
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</tr>
<tr>
<td>to</td>
<td>Selecting audio input channels of OUT 3 &quot;11</td>
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<td>AUDIO:OUT3-IN9</td>
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<tr>
<td>AUDIO:OUT3-OFF</td>
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</tbody>
</table>

*1 Pins for the currently selected channels are pulled to ground, allowing current to flow through them. Output target of video and audio depends on channel switching mode. (If video and audio channels are not the same and "V&A" is selected for channel switching mode, the video channel is output.)

*2 Pins for the switching mode channels currently selected in parallel are pulled to ground.

*3 Pin is pulled to ground while parallel input is locked.

*4 Control commands that are registered in COMMANDs A to I are pulled to ground. However, each command execution condition (COMMAND A to I) has two planes (PLANE A and PLANE B). If control commands are registered in both planes, the control commands are executed alternately every time parallel input of COMMAND A to I is turned ON/OFF. If PLANE A is set to be executed at the next parallel input ON, it is pulled to ground (lights); if PLANE B is set to be executed at the next parallel input ON, ground is set ON/OFF alternately (blinks).

Ground can only be output when the control command is executed according to the setting of "8.12.7 Command key setting". Ground is set ON/OFF alternately (blinks) when control commands are executed according to the setting of "8.12.8 Flash time (Command keys and DISPLAY POWER keys)".

*5 The following pins are pulled to ground:

Pins of "MAX" if maximum level is set; "MIN" if minimum level is set; "MUTE" during mute.

*6 Pulled to ground while a cross point memory is being loaded into settings.

*7 Pulled to ground for 0.5 seconds during preset memory load.
*8 Pulled to ground when front panel keys are locked.

*9 Pins for the currently available key are pulled to ground.

*10 Pins are pulled to ground when the MSD is turned on.

*11 The channels selected on each pin are pulled to ground, allowing current to flow through them. Channels of video and audio to be output are independent from the channel switching modes. (If video and audio channels are not the same when “V&A:OUTn-1n” is selected, channel selection state of video will be output.)

*12 You can select only pins 22 to 24 and 47 to 49. You can use pins that are set to “PRESET COMMAND” to control external devices in “8.12 Control Command Settings”.
8.15.2 Function initialization [INITIALIZE]

You can initialize functions of Tally output connector set in the menu of “8.15.1 Assigning functions”.

- FACTORY DEFAULT: Functions of Tally output connectors will be restored to the factory default as shown in [Table 8.23] to [Table 8.26].
- ALL CLEAR: All functions of Tally output connectors will be set to “UNUSED”.
- PARALLEL->Tally COPY: Settings of all the functions of Tally output connectors will be the same as those settings already used for the parallel input connector.

1. To initialize Tally output functions using menu:

```
MSD-5404    Top
  [FUNCTION SELECT] TALLY ▼ ▲: keys: Select “Tally”.
  [TALLY] INITIALIZE ▼ ▲: keys: Select "INITIALIZE".
  [FACTORY DEFAULT] ▼ ▲: keys: Select the desired initialization mode (FACTORY DEFAULT, ALL CLEAR, PARALLEL->Tally COPY).
  [SURE? = NO] ▼ ▲: keys: Select “YES” or “NO”.
  [FACTORY DEFAULT] NOW INITIALIZING...
```

2. To initialize Tally output functions using command:

@TDE: Initialize Tally output function assignments
8.16 Bitmap

The MSD outputs a bitmap for approximately 5 seconds after it is turned on by setting "8.16.2 Bitmap output" to “ON”, selecting a video input set in “8.16.6 Input bitmap channel assignment”, or setting "8.16.7 Bitmap" to “ON”. IDK’s logo is displayed by factory default, but you can change it to the bitmap you want to display. You can register up to four images, and you can capture input videos to register it as bitmap images.

[Image: IDK logo]

[Figure 8.65] Default bitmap image

8.16.1 Bitmap transfer

To send bitmap files to the MSD, you can use browser, serial communication, and LAN communication. The MSD supports DIB (Device Independent Bitmap) with a header generally used for Windows, and those files have to meet the following requirements:

- **File header:**
  - Having “BITMAPFILEHEADER”
- **Information header:**
  - Having “BITMAPCOREHEADER” (for OS/2) or “BITMAPINFOHEADER” (for Windows)
  (“BITMAPV4HEADER” or “BITMAPV5HEADER” are not supported.)
- **The number of colors:**
  - One of the following: 2 colors (monochrome, 1 bit), 16 colors (4 bits), 256 colors (8 bits), 16.77 million colors (TRUE COLOR, 24 bits)
- **Resolution:**
  - The maximum resolution: [Horizontal resolution x Vertical resolution x The number of bytes per pixel] = 8,388,608 bytes or less. If you register several bitmaps, the total bytes of all bitmaps should be 8,388,608 bytes or less. (Aspect ratio does not matter as long as it is within the maximum resolution).
  - Bytes per pixel: 1 byte per pixel for 2 colors (monochrome, 1 bit), 16 colors (4 bits), and 256 colors (8 bits); 3 bytes per pixel for 16.77 million colors (TRUE COLOR, 24 bits).
  - Bitmaps can be enlarged but cannot be reduced. The larger the resolution is, the longer the output time will be, and it may take a maximum of approximately six seconds to output a bitmap. Register a bitmap having smaller resolution than that of the display device.
- **Compression format:**
  - One of the following: No compression (BI_RGB), 8 bit-run-length compression (BI_RLE8), 4 bit-run-length compression (BI_RLE4)
[Transferring bitmap file via browser]
*IDK evaluated the operation on Microsoft Internet Explorer 6.0, 7.0 and 8.0 for Windows. It may not operate correctly on other versions or on other browsers.

Open the WEB browser on a PC using the same LAN and enter the IP address of the MSD followed by “/bitmap.html” to open the window that is for sending bitmap files.

- When “80” is set for port number of browser control port:
  http://192.168.1.199(bitmap.html)
- When a number other than “80” (5000 to 5999) is set for port number of browser control port:
  (For example, the port number is 5000)
  http://192.168.1.199:5000(bitmap.html)

1. (Memory Number is displayed only if the bitmap area is divided.) Select the number you want to register.
2. Click “Browse” to display the file selection window and select the desired bitmap file.
3. Click “SEND” to send the bitmap file to the MSD.

![Figure 8.66] Sending a bitmap file from browser

When bitmap file is sent correctly, the message below is displayed on the VFD screen and the bitmap file is being saved. Do not turn off the MSD while the message is displayed.

| BITMAP SAVE NOW |
| PLEASE WAIT |
If a bitmap file is not valid, one of the following error messages will be displayed.

FILE NAME INVALID: The file name is not valid.
FILE DATA INVALID: The MSD does not support the file.
FILE DATA SIZE OVER: Exceeds the maximum resolution.
MEMORY ALLOCATE ERROR: Enough memory to save the bitmap file temporarily could not be allocated.

You may solve this error by rebooting the MSD and sending the bitmap file again.

![Bitmap send error](image)

**Note:**
The MSD has an approximately 900,000-byte memory to save data temporarily after all bitmap data is received. However, if bitmap data whose size is larger than 900,000 is sent, receiving and writing data are performed simultaneously, and the browser sends a time-out status. As a result, the writing operation may fail. In this case, use IDK’s free remote control application (see “7.8 Remote Control”) to send the bitmap file to the MSD.
8.16.2 Bitmap output [BITMAP OUTPUT]

- To output the normal image: OFF [Default]
- To output a bitmap image: ON

1. To set bitmap output using menu:

   MSD-5404
   Top
   SET key
   [FUNCTION SELECT] BITMAP
   SET key
   [BITMAP] BITMAP OUTPUT
   SET key
   [OUT1 BITMAP OUTPUT] OFF
   ESC key: Returns to the previous screen.

   * If several bitmaps are registered, select the bitmap number you want to output.

2. To set bitmap output using commands:

   @SBM: Set bitmap output
   @GBM: Get bitmap output
8.16.3 Background color [BACKGROUND COLOR]

You can select the background color from approx. 16.7 million color combinations of red, green, and blue.

- BACKGROUND COLOR (R): 0 to 255 [Default]: 255
- BACKGROUND COLOR (G): 0 to 255 [Default]: 255
- BACKGROUND COLOR (B): 0 to 255 [Default]: 255

1. To set background color using menu:

```
MSD-5404

↓ SET key

[FUNCTION SELECT] ▲▼ keys: Select “BITMAP”.

BITMAP ▼▼ keys: Select “BACKGROUND COLOR”.

↓ SET key

[OUT1 COLOR] LINK: ON
1 R: 255 G: 255 B: 255

[OUT1 COLOR] LINK: ON
1 R: 255 G: 255 B: 255

▲▼ keys: Set “LINK” of R&G&B to “OFF” or “ON”. *1

▲▼ keys: Select the desired bitmap number (1 to 4). *2

▲▼ keys: Set the background color (Red) for OUT1 (0 to 255).

▲▼ keys: Set the background color (Green) for OUT1 (0 to 255). *3

▲▼ keys: Set the background color (Blue) for OUT1 (0 to 255). *3

ESC key: Returns to the previous screen.
```

*1 If you set “LINK” to “ON”, you can set only Red (R). Settings of Green (G) and Blue (B) are also changed according to the setting of the Red (R). For example, if you increase Red (R) +2, Green (G) and Blue (B) are also increased (+2). If one of these three colors reaches the limiting value, it cannot be changed any further.

*2 This is displayed only if you register several bitmaps. Select the bitmap number you want to set.

*3 Only if you set “LINK” to “OFF”, you can set the background color for Green and Blue individually.

2. To set background color using commands:

@SBB: Set background color
@GBB: Get background color
8.16.4 Aspect ratio [ASPECT]

- AUTO [Default]
- FULL
- THROUGH

[Figure 8.68] Setting aspect ratio

Note:
Bitmaps can be enlarged but cannot be reduced. If you select “AUTO”, the aspect ratio is kept. However, if either of horizontal or vertical is enlarged and the other is reduced, the aspect ratio cannot be kept. In such a case, the image is displayed using “THROUGH” automatically to keep the aspect ratio.
1. To set bitmap aspect using menu:

<table>
<thead>
<tr>
<th>MSD-5404</th>
<th>Top</th>
</tr>
</thead>
<tbody>
<tr>
<td>SET key</td>
<td></td>
</tr>
<tr>
<td>[FUNCTION SELECT] BITMAP</td>
<td>▲▼ keys: Select “BITMAP”.</td>
</tr>
<tr>
<td>SET key</td>
<td></td>
</tr>
<tr>
<td>[BITMAP] ASPECT</td>
<td>▲▼ keys: Select “ASPECT”.</td>
</tr>
<tr>
<td>SET key</td>
<td></td>
</tr>
<tr>
<td>[OUT1 ASPECT] No. 1 AUTO</td>
<td>▲▼ keys: Select the desired bitmap number. (1 to 4) *</td>
</tr>
<tr>
<td>keys</td>
<td></td>
</tr>
<tr>
<td>[OUT1 ASPECT] No. 1 AUTO</td>
<td>▲▼ keys: Select the desired aspect ratio for OUT1. (AUTO, FULL, THROUGH)</td>
</tr>
</tbody>
</table>

*If several bitmaps are registered, select the bitmap number you want to set.

2. To set bitmap aspect using commands:

@SBT: Set bitmap aspect ratio
@GBT Get bitmap aspect ratio
8.16.5 Position [POSITION]

\[
\begin{align*}
\cdot \text{CENTER} & \quad \cdot \text{BOTTOM-LEFT} & \quad \cdot \text{BOTTOM-RIGHT} \\
\cdot \text{TOP-LEFT} & \quad \cdot \text{TOP-RIGHT}
\end{align*}
\]

1. To set bitmap position using menu:

```
MSD-5404

↓ SET key

[FUNCTION SELECT] BITMAP  ▲▼ keys: Select "BITMAP".

↓ SET key

[BITMAP] POSITION  ▲▼ keys: Select "POSITION".

↓ SET key

[OUT1 POSITION] No. 1 CENTER  ▲▼ ▲▼ keys: Select the desired bitmap number (1 to 4).

↓ ◄► keys

[OUT1 POSITION] No. 1 CENTER  ▲▼ keys: Set the desired display position for OUT1 (CENTER, TOP-LEFT, BOTTOM-LEFT, TOP-RIGHT, BOTTOM-RIGHT).
```

*If several bitmaps are registered, select the bitmap number you want to set.

2. To set bitmap position using commands:

- @SZP: Set bitmap display position
- @GZP: Get bitmap display position
8.16.6 Input bitmap channel assignment [CHANNEL ASSIGN]

A bitmap can be treated as an input video source by assigning the bitmap to any input that is not currently being used. A bitmap can be assigned to an output or input separately.

- Not assign bitmap to input: OFF [Default]
- Assign bitmap to input: ON

**Note:**
Larger resolutions require a longer writing time; it may take approximately 6 seconds at a maximum to write a bitmap. If you switch a normal image to a bitmap image, it takes longer time to output the image, and you cannot perform other operations while the bitmap is being written.

1. To assign bitmap channel using menu:

   **To assign bitmap channel using menu:**

   MSD-5404
   ↓ SET key
   [FUNCTION SELECT] BITMAP [FUNCTION SELECT] BITMAP
   ↑↓ keys: Select “BITMAP”.
   ↓ SET key
   [BITMAP] CHANNEL ASSIGN [BITMAP]
   ↑↓ keys: Select “CHANNEL ASSIGN”.
   ↓ SET key
   [OUT1 ASSIGN] IN1 OFF [OUT1 ASSIGN] IN1 OFF
   ↑↓ keys: Select the desired input assigned for OUT1 (IN1 to IN9).
   ←→ keys
   [OUT1 ASSIGN] IN1 OFF [OUT1 ASSIGN] IN1 OFF
   ↑↓ keys: Select “OFF” or “ON”.
   ↓ SET key: Applies settings.
   [CHANNEL ASSIGN] NOW UPDATE...
   Displays the message for 1 second before automatically returning to the previous screen.
   [BITMAP] CHANNEL ASSIGN [BITMAP]

   **Note:**
   If you do not press the “SET” key, the assignment is not changed. Make sure to press the “SET” key.

   * If several bitmaps are registered, select the bitmap number you want to output.

2. To assign bitmap channel using commands:

   @SBA: Set bitmap input channel assignment
   @GBA Get bitmap input channel assignment
8.16.7 Bitmap output at startup [POWER ON BITMAP]

You can enable or disable bitmap output at the time of startup.

\[
\begin{align*}
\text{OFF}: & \text{ Bitmap is not output. [Default]} \\
\text{ON}: & \text{ Bitmap is output.}
\end{align*}
\]

1. To enable or disable bitmap output using menu:

```
MSD-5404
↓ SET key
[FUNCTION SELECT] BITMAP
↑↓ keys: Select “BITMAP”.
↓ SET key
[BITMAP] POWER ON BITMAP
↑↓ keys: Select “POWER ON BITMAP”.
↓ SET key
[OUT1 POWER ON] OFF
↑↓ keys: Select “OFF” or “ON”.
↓ ESC key: Returns to the previous screen.
```

*If several bitmaps are registered, select the bitmap number you want to output.

2. To enable or disable bitmap output using commands:

@SPB: Set startup bitmap
@GPB: Get startup bitmap
8.16.8 Dividing memory area [DIVIDE MEMORY]

You can register up to four bitmaps within the available memory area by dividing the memory. You can select one of three dividing modes or specify the size you want to divide manually.

Memory areas are controlled by blocks. 1 block = 65,536 bytes; 128 blocks = 8,388,608 bytes in total.

**Auto**
- Before device: 8MByte
- After divide: 2MByte, 2MByte, 2MByte, 2MByte

**Resize**
- Before device: 8MByte
- After divide: 2MByte, 2MByte, 2MByte, 2MByte

**Delete**
- Before device: 8MByte
- After divide: 2MByte, 2MByte, 2MByte, 2MByte

The memory area is divided equally regardless of whether bitmap is registered or not.

*Fig. 8.69* Divide mode
1. To divide memory area using menu:

```
<table>
<thead>
<tr>
<th>MSD-5404</th>
<th>Top</th>
</tr>
</thead>
<tbody>
<tr>
<td>↓ SET key</td>
<td></td>
</tr>
<tr>
<td>[FUNCTION SELECT]</td>
<td>BITMAP</td>
</tr>
<tr>
<td>↓ SET key</td>
<td></td>
</tr>
<tr>
<td>[BITMAP]</td>
<td>DIVIDE MEMORY</td>
</tr>
<tr>
<td>↓ SET key</td>
<td></td>
</tr>
<tr>
<td>[DIVIDE MEMORY]</td>
<td>MODE: RESIZE NUMBER: 1</td>
</tr>
<tr>
<td></td>
<td>▲▼ keys: Select the desired divide mode (AUTO, RESIZE, DELETE).</td>
</tr>
<tr>
<td>↓ keys</td>
<td></td>
</tr>
<tr>
<td>[DIVIDE MEMORY]</td>
<td>MODE: RESIZE NUMBER: 1</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>[DIVIDE MEMORY]</td>
<td>DISPLAY: BLOCK</td>
</tr>
<tr>
<td></td>
<td>▲▼ keys: Select the desired display mode (BLOCK, BYTE).</td>
</tr>
<tr>
<td>↓ keys</td>
<td></td>
</tr>
<tr>
<td>[BITMAP1 BLOCK]</td>
<td>0– 63( ) → 0– 68</td>
</tr>
<tr>
<td></td>
<td>▲▼ keys: Set the end block position of “BITMAP1” (0 to 127).</td>
</tr>
<tr>
<td>↓ keys</td>
<td></td>
</tr>
<tr>
<td>[BITMAP2 BLOCK]</td>
<td>64–127( ) → 64–127</td>
</tr>
<tr>
<td></td>
<td>▲▼ keys: Set the end block position of “BITMAP2” (0 to 127).</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>↓ SET key: Displays the confirmation screen.</td>
<td>↑ ESC key</td>
</tr>
<tr>
<td>[DIVIDE MEMORY]</td>
<td>SURE? = NO</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>To execute divide: Select “YES” and press the “SET” key.</td>
</tr>
<tr>
<td></td>
<td>To return to the menu without divide: Select “NO” and press the “SET” key.</td>
</tr>
<tr>
<td>[DIVIDE MEMORY]</td>
<td>NOW UPDATE... Displays the message for 1 second before automatically returning to the previous screen.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>[BITMAP]</td>
<td>DIVIDE MEMORY</td>
</tr>
</tbody>
</table>
```

* If you select “BLOCK” for “DISPLAY”, the current start and end block positions are displayed on the left of the VFD screen. If a bitmap is registered, the final block position is displayed in parentheses. The start and end block positions after divide are displayed on the right. If you want to specify the after-divide size directly, change the end block position.

* If you select “BYTE”, the currently reserved memory size is displayed on the left. If a bitmap is registered, the number of bytes is displayed in parentheses. The memory size after divide is displayed on the right so that you can specify directly the after-division memory size.

* In case the registered bitmap will be deleted as a result of specifying the size directly, an “S” or “E” is displayed in the upper right.
In case the total number of blocks exceeds 128 as a result of setting the size manually, a message shown right is displayed when you press the “SET” key and the setting cannot be applied.

2. To divide memory area using commands:

@SBD: Set bitmap memory divide
@GBD: Get bitmap memory divide
@GBV Get bitmap memory usage
8.16.9 Input image capture [VIDEO CAPTURE]

An input video can be treated as a bitmap by capturing the input video. The maximum resolution has to be [Horizontal resolution x Vertical resolution x 3 (the number of bytes per pixel; “3” is fixed)] = 8,388,608 bytes or less. If you register several bitmaps and captured video, the total resolution of all bitmaps and captured videos has to be 8,388,608 bytes or less (aspect ratio does not matter).

Captured images can be displayed in the same size or enlarged size but not in the reduced size. Larger resolutions require a longer writing time; it may take approximately six seconds at a maximum to write a bitmap. Register images with lower resolution than that of the display device. (If an input image is larger than the output image, capture it with reduced image size. If an input image is the same size or smaller, capture the image without changing its size. You can register images with lower resolution by setting “8.3.1 Output resolutions” to smaller value and capture the images.)

1. To capture input video using menu:

   | MSD-5404 |
   | Top |
   | ▼▼ keys: Select “BITMAP”.
   | ▼▼ keys: Select “VIDEO CAPTURE”.
   | ▼▼ keys: Select the desired output for capturing the video (OUT 1 to OUT 4).
   | ▼▼ keys: Set the capture registration number (1 to 4). "1"
   | ▼▼ keys: Displays the confirmation screen. ↑ ESC key "2"
   | ▼▼ keys: Select “YES” or “NO”.
   | ▼ To execute capture registration: Select “YES” and press the “SET” key.
   | To return to the menu without registration: Select “NO” and press the “SET” key.
   | Returns to menu automatically after executing registration

"1" Displayed only if memory area is divided into several sections.
"2" To freeze the input video temporarily, press the “SET” key. To register the frozen video, select “YES” and then press the “SET” key again. To release freeze, press the “ESC” key. It can be released automatically when an input is switched or input signal changes.

If resolution of input video is too large against the reserved memory area and it causes a memory shortage, a message shown on the right is displayed after you press the “SET” key. In such a case, registration will not be executed.
2. To capture input video using commands:
   @SFZ: Set freeze
   @GFZ: Get freeze
   @CAP: Capture input image

Capturing input video using browser

IDK evaluated the operation on Microsoft Internet Explorer 6.0, 7.0 and 8.0 of Windows. It may not be performed correctly on other versions and browsers.

Open the WEB browser on a PC using the same LAN and enter the IP address of the MSD followed by “/capture.html” to open the window for capturing images.

- "80" is set for port number of browser control port: 80 (normal case)
  http://192.168.1.199/capture.html

- To set a number (5000 to 5999) other than “80” for port number of browser control port:
  (For example, the port number is 5000)

[Figure 8.71] Capturing input video using browser

1. Displayed only if the bitmap area is divided. Select the number you want to register.
2. Click “FREEZE OFF” to freeze the video. “FREEZE ON” is displayed while freezing. Click the button again to release freeze.
3. Click “CAPTURE” to start. Freeze is released automatically when capture is completed.
When the capture starts, the message below is displayed. Do not turn off the MSD while it is being displayed.

<table>
<thead>
<tr>
<th>CAPTURE NOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLEASE WAIT</td>
</tr>
</tbody>
</table>

If the capture fails, one of the following error messages is displayed.

- **NOT AVAILABLE NOW**: Cannot be captured, because the input video is not displayed.
- **MEMORY SIZE ERROR**: Cannot be saved, because the input video is larger than the reserved memory area.

![Capture error of input video using browser](image)

*[Figure 8.72] Capture error of input video using browser*
8.17 Startup Settings

8.17.1 DISPLAY POWER keys [DISPLAY POWER]

You can set whether display devices will be turned on or not when the MSD is powered on.

- OFF [Default]
- ON

1. To set whether to turn on display device using menu:

   MSD-5404
   ↓ SET key
   [FUNCTION SELECT] POWER ON SETTING ▲▼ keys: Select “POWER ON SETTING”.
   ↓ SET key
   [POWER ON SETTING] DISPLAY POWER ▲▼ keys: Select “DISPLAY POWER”.
   ↓ SET key
   [DISPLAY POWER] OFF ▲▼ keys: Select “OFF” or “ON”.
   ◄► keys: Select the target output (DISPLAY1 to DISPLAY 4).
   ↓ ESC key: Returns to the previous screen.

2. To set whether to turn on display device using commands:

   None
8.17.2 Control command keys [COMMAND KEY]

You can set the operation mode of the control command execution keys for when MSD is turned on.

- AUTO [Default]
- COMMAND
- PRESET LOAD
- LOCK

If you select “AUTO” and turn on the MSD, the previous mode (when you turned off the MSD last time) of control command execution key will be applied. To fix the operation mode, set this menu to a mode other than “AUTO”.

[Table 8.35] Operation mode of control command execution keys

<table>
<thead>
<tr>
<th>Setting</th>
<th>Previous operation mode</th>
<th>Operation mode that will be applied when turning ON</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUTO (Default)</td>
<td>COMMAND</td>
<td>COMMAND</td>
</tr>
<tr>
<td></td>
<td>PRESET LOAD</td>
<td>PRESET LOAD</td>
</tr>
<tr>
<td></td>
<td>LOCK</td>
<td>LOCK</td>
</tr>
<tr>
<td>COMMAND</td>
<td>COMMAND</td>
<td></td>
</tr>
<tr>
<td>PRESET LOAD</td>
<td>PRESET LOAD</td>
<td></td>
</tr>
<tr>
<td>LOCK</td>
<td>LOCK</td>
<td></td>
</tr>
</tbody>
</table>

1. To set operation mode of the control command keys using menu:

   MSD-5404
   ↓ SET key
   [FUNCTION SELECT] POWER ON SETTING ▲▼ keys: Select “POWER ON SETTING”.
   ↓ SET key
   [POWER ON SETTING] COMMAND KEY ▲▼ keys: Select “COMMAND KEY”.
   ↓ SET key
   [COMMAND KEY] AUTO ▲▼ keys: Set the desired operation mode of control command execution key. (AUTO, COMMAND, PRESET LOAD, LOCK)
   ↓ ESC key: Returns to the previous screen.

2. To set operation mode of the control command keys using commands:

   None
8.17.3 Key lock [KEY LOCK]

You can enable or disable key lock for when MSD is turned on.

- AUTO  [Default]
- UNLOCK
- LOCK

If you select "AUTO" and turn on the MSD, the previous mode (when you turned off the MSD last time) will be applied. To fix the key lock state, select “UNLOCK” or “LOCK”.

[Table 8.36] Key lock mode when MSD is powered on

<table>
<thead>
<tr>
<th>Setting</th>
<th>Previous key lock mode</th>
<th>Key lock mode that will be applied when turning ON</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUTO (Default)</td>
<td>UNLOCK</td>
<td>UNLOCK</td>
</tr>
<tr>
<td></td>
<td>LOCK</td>
<td>LOCK</td>
</tr>
<tr>
<td>UNLOCK</td>
<td></td>
<td>UNLOCK</td>
</tr>
<tr>
<td>LOCK</td>
<td></td>
<td>LOCK</td>
</tr>
</tbody>
</table>

1. To set key lock mode using menu:

1. MSD-5404 Top
   ▼ SET key
   [FUNCTION SELECT] POWER ON SETTING ▼
   ▲▼ keys: Select “POWER ON SETTING”.
   ▼ SET key
   [POWER ON SETTING] KEY LOCK ▼
   ▲▼ keys: Select “KEY LOCK”.
   ▼ SET key
   [KEY LOCK] AUTO ▼
   ▲▼ keys: Select the desired key lock mode (AUTO, UNLOCK, LOCK).
   ▼ ESC key: Returns to the previous screen.

2. To set key lock mode using commands:

None
8.17.4 Tally outputs [COMMAND Tally]

You can set the state of Tally output connector for when MSD is turned on. This setting is valid only to the Tally output connector set to “PRESET COMMAND” in “8.15.1 Assigning functions”.

\[
\begin{align*}
\text{AUTO} \\
\text{OFF} \ [\text{Default}] \\
\text{ON}
\end{align*}
\]

If you select “AUTO” and turn on the MSD, the previous state of Tally output connector will be applied. To fix the state, select “OFF” or “ON”.

**[Table 8.37] Tally output state**

<table>
<thead>
<tr>
<th>Setting</th>
<th>Previous Tally output</th>
<th>Tally output that will be applied when turning ON</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUTO</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>ON†</td>
</tr>
<tr>
<td>OFF (Default)</td>
<td></td>
<td>OFF</td>
</tr>
<tr>
<td>ON</td>
<td></td>
<td>ON†</td>
</tr>
</tbody>
</table>

* Even if you set it to “AUTO” or “ON”, “OFF” is output for approximately two seconds after turning off the MSD, and then “ON” will then be output.

1. To set Tally output using menu:

```
MSD-5404
Top
[FUNCTION SELECT] POWER ON SETTING ▲▼ keys: Select “POWER ON SETTING”.
[POWER ON SETTING] COMMAND TALLY ▲▼ keys: Select “COMMAND Tally”.
[COMMAND TALLY] OFF ▲▼ keys: Select the desired Tally output mode. (AUTO, OFF, ON)
ESC key: Returns to the previous screen.
```

2. To set Tally output using commands:

None
8.18 Others

8.18.1 Setting key lock mode [KEY LOCK MODE]

You can set the key lock mode for each key group on the front panel.
The front panel consists of six groups of keys as shown below. If you set "7.6 Locking/Unlocking Front keys" to "ON", keys set to “LOCK” in this menu will be locked and cannot be operated. If you set "8.17.3 Key lock" to “ON”, keys set to “LOCK” in this menu will be locked and cannot be operated when you turn on the MSD.

```
-UNLOCK
-LOCK [Default]
```

* Control command execution/ Cross point loading keys cannot operate at the same time; it is selected by the command operation mode selection key.

![Front key group diagram]

[Figure 8.73] Front key group

1. To set key lock mode using menu:

```
MSD-5404

↓ SET key

[FUNCTION SELECT]
OTHERS

↓ SET key

[OTHERS]
KEY LOCK MODE

↓ SET key

[KEY LOCK MODE] <->
CHANNEL : LOCK

↓ ◄► keys

[KEY LOCK MODE] <->
CHANNEL MODE : LOCK

↓ ◄► keys
```

▲▼ keys: Select “OTHERS”.

▲▼ keys: Select “KEY LOCK MODE”.

▲▼ keys: Select “UNLOCK” or “LOCK” for “Input channel selection keys”.

▲▼ keys: Select “UNLOCK” or “LOCK” for “SWITCHING MODE key”.

242
2. To set key lock mode using commands:
   @SLM: Set key lock target for front panel
   @GLM: Get key lock target for front panel

8.18.2 Key buzzer [BUZZER]

You can turn ON/OFF the buzzer function (sounding every time you press a front panel key).

\[
\begin{align*}
\text{OFF} & \\
\text{ON} \quad \text{[Default]} & 
\end{align*}
\]

1. To set buzzer using menu:

\[
\begin{align*}
\text{MSD-5404} & \\
\downarrow \text{SET key} & \\
[\text{FUNCTION SELECT}] &  \\
\downarrow \text{SET key} & \\
[\text{OTHERS}] &  \\
\downarrow \text{SET key} & \\
[\text{BUZZER}] &  \\
\downarrow \text{SET key} & \\
\text{ON} &  \\
\downarrow \text{ESC key: Returns to the previous screen.} & 
\end{align*}
\]

2. To set buzzer using commands:
   @SBZ: Set buzzer
   @GBZ: Get buzzer
8.18.3 Automatic key lock for control command keys [COMMAND AUTO LOCK]

You can enable or disable the key lock function to automatically control the command execution keys if no operation is performed for 30 seconds during the unlocked mode. This setting is common to both front panel and parallel input.

If you select “ON” and no operation of menu control keys is performed for 30 seconds, the display brightness will be reduced to approximately 25%. When you operate any key operation, the luminance will return to 100%.

- OFF
- ON [Default]

1. To set auto key lock using menu:

```
MSD-5404
Top

[FUNCTION SELECT]

[OTHERS]

[COMMAND AUTO LOCK]

[COMMAND AUTO LOCK]

ON

[COMMAND AUTO LOCK]

ON

[OTHERS]

COMMAND AUTO LOCK

ON

[OTHERS]

COMMAND AUTO LOCK

ON

[OTHERS]
```

▲▼ keys: Select “OTHERS”.

▲▼ keys: Select “COMMAND AUTO LOCK”.

▲▼ keys: Select “OFF” or “ON”.

↓ ESC key: Returns to the previous screen.

2. To set command auto lock commands:

None
8.18.4 DISPLAY POWER key pressing time length [POWER SWITCH ON]

You can set the pressing response time of the DISPLAY POWER keys to prevent the device from being turned off when the switch is pressed accidentally:

0 ms. (starts the operation immediately after you press the power switch) to 5000 ms. (5 seconds); by 10 ms. [Default]: 0 ms.

1. To set time for pressing power switch using menu:

```
MSD-5404

↓ SET key

[FUNCTION SELECT] ▲▼ keys: Select “OTHERS”.

OTHERS

↓ SET key

[OTHERS] ▲▼ keys: Select “POWER SWITCH ON”.

POWER SWITCH ON

↓ SET key

[FRONT POWER SW] ▲▼ keys: Set the time length for the front panel (0 to 5000).

ms

↓◄► keys

[PARALLEL POWER SW] ▲▼ keys: Set the pressing time length for the parallel input (0 to 5000).

ms

↓ ESC key: Returns to the previous screen.
```

2. To set time for pressing power switch using commands:

None
8.18.5 Input channel automatic linking [INPUT CHANNEL LINK]

Menus to be adjusted for each channel can be adjusted after the input number is selected. With this menu, you can select input to be adjusted automatically by switching input in "7.1 Selecting Input Channels". This function is convenient to adjust each input channel based on specific display devices or AV amplifiers.

- Inputs to be adjusted are not selected automatically: OFF [Default]
- When inputs of OUT1 is switched, the input to be adjusted automatically will be selected: OUT1.
- When inputs of OUT2 is switched, the input to be adjusted automatically will be selected: OUT 2.
- When inputs of OUT3 is switched, the input to be adjusted automatically will be selected: OUT 3.
- When inputs of OUT4 is switched, the input to be adjusted automatically will be selected: OUT 4.

Input number to be adjusted keeps settings separately for video and audio.

Valid for the following menus (video input channel number):

8.3 Setting Position, Size, and Masking
8.3.3 Aspect ratio control of input video
8.3.4 Aspect ratio control
8.3.5 Overscan
8.3.6 Input position
8.3.7 Input size
8.3.8 Input masking
8.3.9 Input automatic sizing
8.4 Video Correction
8.4.1 Input brightness
8.4.2 Input contrast
8.4.3 Hue
8.4.4 Saturation
8.4.5 Black level
8.4.6 Input default color

Valid for the following menus (audio input channel number):

8.8 Audio Settings
8.8.4 Input level
8.8.6 Input lip sync

[Figure 8.74] Automatic channel selection

Valid for the following menus (audio input channel number):

8.8 Audio Settings
8.8.4 Input level
8.8.6 Input lip sync

8.5 Input Settings
7.5.4 Signal type of analog input
8.6 Input Timing Settings
8.6.1 The total number of horizontal dots
8.6.2 Horizontal start position
8.6.3 Horizontal display period
8.6.4 Vertical start position
8.6.5 Vertical display period
8.6.6 Analog input automatic measurement
8.6.9 Loading device data
8.6.10 Registering device data
8.6.11 Tracking
8.18 Others
8.18.7 Input signal status
1. To set input channel automatic linking using menu:

```
MSD-5404  Top
↓ SET key
[FUNCTION SELECT] OTHERS ▲▼keys: Select “OTHERS”.
↓ SET key
[OTHERS] INPUT CHANNEL LINK ▲▼keys: Select “INPUT CHANNEL LINK”.
↓ SET key
[INPUT CHANNEL LINK] VIDEO: OFF ▲▼keys: Select the automatic selection of video adjustment channel (OFF, OUT1, OUT2, OUT3, OUT4).
↓ ◄► keys
[INPUT CHANNEL LINK] AUDIO: OFF ▲▼keys: Select the automatic selection of audio adjustment channel (OFF, OUT1, OUT2, OUT3, OUT4).
↓ ESC key: Returns to the previous screen.
```

2. To set input channel automatic linking using commands:

None
8.18.6 Top VFD screen [TOP DISPLAY]

- NORMAL  [Default]
- AUDIO VOLUME
- INPUT STATUS
- MONITOR STATUS

“NORMAL”

```
MSD-5404
```

“AUDIO VOLUME”

```
[OUT1 AUDIO]
```

“INPUT STATUS”

```
IN 1 2 3 4 5 6 7 8 9
```

“MONITOR STATUS”

```
OUT 1 2 3 4
```

In “8.18.7 Input signal status”, you can check input signal status that is from video input connectors. If you select “INPUT STATUS” in this menu, the input status is displayed on the top VFD screen at all times. For “INPUT STATUS”, see "8.18.7 Input signal status”.

In “8.18.8 Display device status”, you can check display device status connected to video output connector. If you select “MONITOR STATUS” in this menu, the display device status is displayed on the top VFD screen at all times. For “MONITOR STATUS”, see "8.18.8 Display device status”.

1. To set top VFD screen using menu:

```
Top
```

```
[FUNCTION SELECT] OTHERS
```

▲▼ keys: Select “OTHERS”.

```
[OTHERS] TOP DISPLAY
```

▲▼ keys: Select “TOP DISPLAY”.

```
[TOP DISPLAY] NORMAL
```

▲▼ keys: Select the information you want to display on the top VFD screen (NORMAL, AUDIO VOLUME, INPUT STATUS, MONITOR STATUS).

↓ ESC key: Returns to the previous screen.

2. To set top VFD screen using commands:

None
8.18.7 Input signal status [INPUT STATUS]

You can display the input signal status that is from video input connectors.

1. To display input status using menu:

```
1. To display input status using menu:

   MSD-5404
   ▼ SET key
   [FUNCTION SELECT]
   ▼▲▼ keys: Select “OTHERS”.
   OTHERS
   ▼ SET key
   [OTHERS]
   ▼▲▼ keys: Select “INPUT STATUS”.
   INPUT STATUS
   ▼ SET key
   IN1 2 3 4 5 6 7 8 9
       ▼▲▼ keys
   Displays statuses of all input connectors.
   [IN1 FORMAT] 24
   1080p 59.94Hz
   ▼▲▼ keys
   Displays video input status of IN1.
   [IN1 AUDIO]
   LINEAR PCM 48kHz
   ▼▲▼ keys
   Displays audio input status of IN1.
   [IN2 FORMAT]
   NO SIGNAL
   ▼▲▼ keys
   Displays video input status of IN2.
   [IN9 FORMAT]
   1080i 59.94Hz
   ▼▲▼ keys
   Displays video input status of IN9.
```

ESC key: Returns to the previous screen.

For the status of all input connectors, channel numbers are displayed on the upper row and input signal status is displayed on the lower row.

[Input signal type]
These alphabets are displayed under the input numbers:
H: HDMI signals are input
D: DVI signals are input
R: Analog RGB signals are input
Y: Analog YPbPr signals are input
V: Analog composite video signals are input
S: Analog S-Video signals are input
No alphabet: No signal is input

"H" (upper, if it is with HDCP) or “A” (lower, if digital audio is embedded) is displayed at the right of an alphabet above appear only for IN1 to IN5.
[Formats of video input signals]

<table>
<thead>
<tr>
<th>Resolution</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1080i 59.94 Hz</td>
<td>SDTV/HDTV signals are input. Format type and vertical synchronous frequency are displayed.</td>
</tr>
<tr>
<td>800 x 600 60.00 Hz</td>
<td>RGB signals are input. Value of [Horizontal resolution x Vertical resolution] and vertical synchronous frequency are displayed.</td>
</tr>
<tr>
<td>NTSC</td>
<td>Analog composite video signals or analog S-Video signals are input, and the format type is displayed.</td>
</tr>
<tr>
<td>56.83 kHz 60.02 Hz</td>
<td>Signals that cannot be recognized are input. Horizontal and vertical synchronous frequencies are displayed. These signals can be recognized by adjusting input timings in “8.6 Input Timing Settings” and registering the data in section “8.6.10 Registering device data”.</td>
</tr>
<tr>
<td>NO SIGNAL</td>
<td>No signal is input.</td>
</tr>
</tbody>
</table>

[Video input signal types and other information]
For the alphabets displayed at the lower right, see the descriptions of inputs. Only if HDMI signals are input, the color depth is displayed at the upper right:
24: HDMI signals of 24-BIT COLOR are input.
30: HDMI signals of 30-BIT COLOR are input.

[If non-supported video signals are input]
If sampling clock exceeds 165 MHz is input, an “E” is displayed at the left of input signal type alphabet in the lower row, and video is not output.

[Types of audio input signals displayed only for IN1 to IN5]

<table>
<thead>
<tr>
<th>Audio signal type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LINEAR PCM 48 kHz:</td>
<td>Linear PCM signals are input. Sampling frequency is displayed on the right.</td>
</tr>
<tr>
<td>COMPRESSED AUDIO:</td>
<td>Compressed audio signals (such as Dolby Digital and DTS) are input. All compressed audio signals are displayed in the same way, because The MSD does not recognize detailed formats.</td>
</tr>
<tr>
<td>NO SIGNAL:</td>
<td>No audio signal is input</td>
</tr>
</tbody>
</table>

[Other information]
If multi-channel audio signals are input, an “M” is displayed on the upper right.

2. To display input signal status using commands:
   @GSS: Get I/O status
You can display the status of display device connected to video output connectors.

1. To display status of display device using menu:

   MSD-5404
   ↓ SET key
   [FUNCTION SELECT] OTHERS
   ▲▼ keys: Select "OTHERS".
   ↓ SET key
   [OTHERS] MONITOR STATUS
   ▲▼ keys: Select "MONITOR STATUS".
   ↓ SET key
   OUT 1 2 3 4
   ▲▼ keys
   Displays the status of the display device connected to output connectors.

   [OUT1 MONITOR] H30
   HDCP SUPPORT
   ▲▼ keys
   Displays the statuses of display device connected to OUT1.

   [OUT4 MONITOR] UNCONNECTED
   ▲▼ keys
   Displays the statuses of display device connected to OUT4.

   ↓ ESC key: Returns to the previous screen.

A) To output all connectors, channel number is displayed on the upper row and HDCP authentication state is displayed on the lower row with one of the following alphabet characters.

B) To output each connector, HDCP authentication state is displayed on the lower row with one of the following character strings.

<table>
<thead>
<tr>
<th>A)</th>
<th>B)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>HDCP SUPPORT</td>
<td>HDCP-compliant display device is connected.</td>
</tr>
<tr>
<td>N</td>
<td>HDCP NOT SUPPORT</td>
<td>Non-HDCP-compliant display device is connected.</td>
</tr>
<tr>
<td>E</td>
<td>HDCP ERROR</td>
<td>HDCP-compliant display device is connected, but the authentication failed.</td>
</tr>
<tr>
<td>C</td>
<td>HDCP CHECK NOW</td>
<td>Status of display device is being checked. (such as when connection status of monitor is changed.)</td>
</tr>
<tr>
<td>D</td>
<td>MONITOR DISCONNECT</td>
<td>Monitor is disconnected (displayed only for 1 second)</td>
</tr>
<tr>
<td></td>
<td>UNCONNECTED</td>
<td>No display device is connected.</td>
</tr>
</tbody>
</table>

If it is displayed for each output connector and if a display device is connected, output signal type is displayed on the upper right, and color depth is displayed only if HDMI is output.

H24: HDMI signals of 24-BIT COLOR are output.
H30: HDMI signals of 30-BIT COLOR are output.
D: DVI signals are output.
Displaying for each output connector: the output statuses of video and audio are displayed on the lower right. The status characters are shown from the left to the right, the statuses of video output to HDMI output connector, audio output to HDMI output connector, and audio output to the analog audio output connector are displayed. The status of HDMI output connector is displayed only if a display device is connected. If video or audio cannot be output, an error code number or alphabet character is displayed.

### Table 8.38 Output status

<table>
<thead>
<tr>
<th>Status</th>
<th>Video output</th>
<th>Audio output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>—</td>
<td>“8.8.2 Output mute” is set to “ON”.</td>
</tr>
<tr>
<td>2</td>
<td>Displayed only for IN1 to IN5. DDC power supply is not input. (If no input device is connected, this status is displayed.)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>No video signal is input.</td>
<td>No audio signal is input (^{1})</td>
</tr>
<tr>
<td>4</td>
<td>Displayed only for IN1 to IN5. Video or audio output of source device is in a Mute status.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Displayed only for IN1 to IN5. Signals with HDCP are input, but the display device does not support HDCP. (This may also be displayed while authenticating HDCP.)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Displayed only for IN1 to IN5. The source device does not output required information (packets) for outputting video or audio.</td>
<td>Audio cannot be output, because compressed audio is input. (Compressed audio can be output only to display devices supporting compressed audio.)</td>
</tr>
<tr>
<td>7</td>
<td>Signals that are not supported by the MSD are input. (Sampling clock is out of the range.)</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>—</td>
<td>“8.8.8 Output connector” is set to “OFF”.</td>
</tr>
<tr>
<td>9</td>
<td>—</td>
<td>“8.7.2 Output mode” is set to “DVI MODE” or a display device that does not support audio is connected. (^{2})</td>
</tr>
<tr>
<td>A</td>
<td>Input is set to “OFF”.</td>
<td></td>
</tr>
</tbody>
</table>

\(^{1}\) Input status of analog audio signals cannot be detected. Even if this status is not displayed, audio may sometimes not be output when analog input is selected.

\(^{2}\) This status is only for HDMI output connectors.

2. To display status of display device using commands:

@GSS: Get I/O status
8.18.9 EDID of display device [EDID STATUS]

You can display the EDID loaded from the display device that is connected to the video output connector.

1. To display EDID using menu:

   MSD-5404 Top
   ↓ SET key
   [FUNCTION SELECT] OTHERS ▲▼ keys: Select “OTHERS”.
   ↓ SET key
   [OTHERS] EDID STATUS ▲▼ keys: Select “EDID STATUS”.
   ↓ SET key

   Displays the monitor name, resolution, and pixel clock of the display device connected to OUT1.

   Displays the HDMI correspondence status and sampling configuration of the display device connected to OUT1.

   Displays color depth of the display device connected to OUT1.

   Displays sampling frequency of the display device connected to OUT1.

   Displays bit length, the number of channels, and correspondence status of compressed audio of the display device connected to OUT1.

   ESC key: Returns to the previous screen.

EDID information is displayed into five screen pages at a maximum.

1st screen page:
Monitor name is displayed on the upper row. Resolution is displayed on the lower left and pixel clock is displayed on the lower right.
If no display device is connected, “UNCONNECTED” is displayed. If EDID cannot be loaded, “EDID READ ERROR” is displayed. In these cases, only the first screen page is displayed.

2nd screen page:
If the display device does not support HDMI, “DVI” is displayed on the lower row, and only the 1st and 2nd screen pages are displayed.
If the display device supports HDMI, “HDMI” is displayed on the upper row and the supported sampling configuration is displayed on the lower row. If only RGB signals are supported, “RGB” is displayed; and if color-difference signals are also supported, “YCbCr444” or “YCbCr422/444” follows “RGB”.

3rd screen page:
The supported color depth is displayed. If Deep Color is not supported, “24BIT COLOR” is displayed; if Deep Color is supported, the supported color depth is
displayed such as “24/30BIT COLOR” or “24/30/36BIT COLOR”.

4th screen page:
The supported audio sampling frequency is displayed.

5th screen page:
The supported audio bit length such as “16BIT” and “16/20/24BIT” is displayed on the upper row, and the number of the supported audio channels, such as “2CHANNEL” and “8CHANNEL”, is displayed on the lower left. If the compressed audio is supported, “COMPRESSED” is displayed on the lower right.

2. To display EDID using commands:
   @GES: Get monitor's EDID information
8.18.10 Version information [VERSION]

1. To display firmware version using menu:

```
<table>
<thead>
<tr>
<th>MSD-5404</th>
<th>Top</th>
</tr>
</thead>
<tbody>
<tr>
<td>↓ SET key</td>
<td></td>
</tr>
<tr>
<td>[FUNCTION SELECT] OTHERS</td>
<td>▲▼ keys: Select “OTHERS”.</td>
</tr>
<tr>
<td>↓ SET key</td>
<td></td>
</tr>
<tr>
<td>[OTHERS] VERSION</td>
<td>▲▼ keys: Select “VERSION”.</td>
</tr>
<tr>
<td>↓ SET key</td>
<td></td>
</tr>
<tr>
<td>[VERSION] MSD-5404 1.00</td>
<td>Displays the firmware version.</td>
</tr>
<tr>
<td>↓ ESC key: Returns to the previous screen.</td>
<td></td>
</tr>
</tbody>
</table>
```

2. To display firmware version using commands:

@GIV: Get version information
## 9 ASCII codes

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NUL</td>
<td>00</td>
<td>SP</td>
<td>20</td>
<td>@</td>
<td>40</td>
<td>`</td>
<td>60</td>
</tr>
<tr>
<td>SOH</td>
<td>01</td>
<td>!</td>
<td>21</td>
<td>a</td>
<td>61</td>
<td>9</td>
<td>71</td>
</tr>
<tr>
<td>STX</td>
<td>02</td>
<td>&quot;</td>
<td>22</td>
<td>b</td>
<td>62</td>
<td>ASCII</td>
<td>118</td>
</tr>
<tr>
<td>ETX</td>
<td>03</td>
<td>#</td>
<td>23</td>
<td>c</td>
<td>63</td>
<td>code</td>
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<tr>
<td>EOT</td>
<td>04</td>
<td>$</td>
<td>24</td>
<td>d</td>
<td>64</td>
<td>[Table 9.1] ASCII code (1/2)</td>
<td></td>
</tr>
<tr>
<td>ENQ</td>
<td>05</td>
<td>%</td>
<td>25</td>
<td>e</td>
<td>65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACK</td>
<td>06</td>
<td>&amp;</td>
<td>26</td>
<td>f</td>
<td>66</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BEL</td>
<td>07</td>
<td>'</td>
<td>27</td>
<td>g</td>
<td>67</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BS</td>
<td>08</td>
<td>(</td>
<td>28</td>
<td>h</td>
<td>68</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HT</td>
<td>09</td>
<td>)</td>
<td>29</td>
<td>i</td>
<td>69</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LF</td>
<td>0A</td>
<td>*</td>
<td>2A</td>
<td>j</td>
<td>6A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VT</td>
<td>0B</td>
<td>+</td>
<td>2B</td>
<td>k</td>
<td>6B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF</td>
<td>0C</td>
<td>,</td>
<td>2C</td>
<td>l</td>
<td>6C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CR</td>
<td>0D</td>
<td>-</td>
<td>2D</td>
<td>m</td>
<td>6D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SO</td>
<td>0E</td>
<td>.</td>
<td>2E</td>
<td>n</td>
<td>6E</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SI</td>
<td>0F</td>
<td>/</td>
<td>2F</td>
<td>o</td>
<td>6F</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DLE</td>
<td>10</td>
<td>0</td>
<td>30</td>
<td>p</td>
<td>70</td>
<td></td>
<td></td>
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<td>DC1</td>
<td>11</td>
<td>1</td>
<td>31</td>
<td>q</td>
<td>71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DC2</td>
<td>12</td>
<td>2</td>
<td>32</td>
<td>r</td>
<td>72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DC3</td>
<td>13</td>
<td>3</td>
<td>33</td>
<td>s</td>
<td>73</td>
<td></td>
<td></td>
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<td>DC4</td>
<td>14</td>
<td>4</td>
<td>34</td>
<td>t</td>
<td>74</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NAK</td>
<td>15</td>
<td>5</td>
<td>35</td>
<td>u</td>
<td>75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SYN</td>
<td>16</td>
<td>6</td>
<td>36</td>
<td>v</td>
<td>76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ETB</td>
<td>17</td>
<td>7</td>
<td>37</td>
<td>w</td>
<td>77</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAN</td>
<td>18</td>
<td>8</td>
<td>38</td>
<td>x</td>
<td>78</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EM</td>
<td>19</td>
<td>9</td>
<td>39</td>
<td>y</td>
<td>79</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUB</td>
<td>1A</td>
<td>:</td>
<td>3A</td>
<td>z</td>
<td>7A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ESC</td>
<td>1B</td>
<td>;</td>
<td>3B</td>
<td>{</td>
<td>7B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FS</td>
<td>1C</td>
<td>&lt;</td>
<td>3C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GS</td>
<td>1D</td>
<td>=</td>
<td>3D</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RS</td>
<td>1E</td>
<td>&gt;</td>
<td>3E</td>
<td>}</td>
<td>7D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>US</td>
<td>1F</td>
<td>?</td>
<td>3F</td>
<td>^</td>
<td>5E</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
- 3A and 7A are only available in 7-bit mode.
- 3E and 7E are only available in 8-bit mode.
# Table 9.2 ASCII code (2/2)

<table>
<thead>
<tr>
<th>Abbrev.</th>
<th>Hex</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUL</td>
<td>00</td>
<td>NULI</td>
</tr>
<tr>
<td>SOH</td>
<td>01</td>
<td>Start Of Heading</td>
</tr>
<tr>
<td>STX</td>
<td>02</td>
<td>Start of TeXt</td>
</tr>
<tr>
<td>ETX</td>
<td>03</td>
<td>End of TeXt</td>
</tr>
<tr>
<td>EOT</td>
<td>04</td>
<td>End Of Transmission</td>
</tr>
<tr>
<td>ENQ</td>
<td>05</td>
<td>ENQuiry</td>
</tr>
<tr>
<td>ACK</td>
<td>06</td>
<td>ACKnowledge</td>
</tr>
<tr>
<td>BEL</td>
<td>07</td>
<td>BELI</td>
</tr>
<tr>
<td>BS</td>
<td>08</td>
<td>Back Space</td>
</tr>
<tr>
<td>HT</td>
<td>09</td>
<td>Horizontal Tabulation</td>
</tr>
<tr>
<td>LF</td>
<td>0A</td>
<td>Line Feed</td>
</tr>
<tr>
<td>VT</td>
<td>0B</td>
<td>Vertical Tabulation</td>
</tr>
<tr>
<td>FF</td>
<td>0C</td>
<td>Form Feed</td>
</tr>
<tr>
<td>CR</td>
<td>0D</td>
<td>Carriage Return</td>
</tr>
<tr>
<td>SO</td>
<td>0E</td>
<td>Shift Out</td>
</tr>
<tr>
<td>SI</td>
<td>0F</td>
<td>Shift In</td>
</tr>
<tr>
<td>DLE</td>
<td>10</td>
<td>Data Link Escape</td>
</tr>
<tr>
<td>DC1</td>
<td>11</td>
<td>Device Control 1</td>
</tr>
<tr>
<td>DC2</td>
<td>12</td>
<td>Device Control 2</td>
</tr>
<tr>
<td>DC3</td>
<td>13</td>
<td>Device Control 3</td>
</tr>
<tr>
<td>DC4</td>
<td>14</td>
<td>Device Control 4</td>
</tr>
<tr>
<td>NAK</td>
<td>15</td>
<td>Negative Acknowledge</td>
</tr>
<tr>
<td>SYN</td>
<td>16</td>
<td>SYNchronous idle</td>
</tr>
<tr>
<td>ETB</td>
<td>17</td>
<td>End of Transmission Block</td>
</tr>
<tr>
<td>CAN</td>
<td>18</td>
<td>CANcel</td>
</tr>
<tr>
<td>EM</td>
<td>19</td>
<td>End of Medium</td>
</tr>
<tr>
<td>SUB</td>
<td>1A</td>
<td>SUBstitute</td>
</tr>
<tr>
<td>ESC</td>
<td>1B</td>
<td>ESCape</td>
</tr>
<tr>
<td>FS</td>
<td>1C</td>
<td>File Separator</td>
</tr>
<tr>
<td>GS</td>
<td>1D</td>
<td>Group Separator</td>
</tr>
<tr>
<td>RS</td>
<td>1E</td>
<td>Record Separator</td>
</tr>
<tr>
<td>US</td>
<td>1F</td>
<td>Unit Separator</td>
</tr>
<tr>
<td>SP</td>
<td>20</td>
<td>SPace</td>
</tr>
<tr>
<td>DEL</td>
<td>7F</td>
<td>DELete</td>
</tr>
</tbody>
</table>
## 10 Specification

**Specifications and appearance are subject to change without notice.**

<table>
<thead>
<tr>
<th>Item</th>
<th>Video</th>
<th>Description</th>
<th>Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input signal</td>
<td>HDMI/DVI</td>
<td>5 inputs</td>
<td>VESA (PC)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TMDS Single Link, HDCP 1.4, TMDS clock: 25 MHz to 225 MHz</td>
<td>SDTV/HDTV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HDMI Deep Color (*1)/DVI 1.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cable equalization, EDID emulation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Connector: Female HDMI Type A (19 pin)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Analog</td>
<td>4 inputs</td>
<td>NTSC/PAL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Automatically recognizing composite video, S-Video, analog RGB, and analog YPbPr</td>
<td>VESA (PC)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Composite video (VBS Signal): 1.0 V[p-p] @ 75 Ω</td>
<td>SDTV/HDTV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S-Video (Y/C Signal): 1.0 V[p-p] (Y)/0.286 V[p-p] (C) @ 75 Ω</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Analog RGB: 0.7 V[p-p] (1.0 V[p-p] for Sync on Green) @ 75 Ω</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>HS/VS TTL level, CS TTL level, Sync on Green</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Analog YPbPr: 1.0 V[p-p] (Y)/0.7 V[p-p] (Pb・Pr) @ 75 Ω</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>EDID emulation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Connector: Female high-density D-Sub 15 pin</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Supported</td>
<td>NTSC/PAL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>formats</td>
<td>VESA (PC): Dot clock 25 to 165 MHz (VGA to QWXGA)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SDTV/HDTV: 480i/480p/576i/576p/720p/1080i/1080p</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Note: For WUXGA/QWXGA, only Reduced Blanking is supported.</td>
<td></td>
</tr>
<tr>
<td>Audio Digital</td>
<td>5 inputs</td>
<td>Multi-channel linear PCM: up to 8 channels</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sampling frequency: 32 to 192 kHz, Quantization bit rate: 16 to 24 bit</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reference level: -20 dBFS, Input level: up to 0 dBFS</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Connector: Female HDMI Type A (19 pin)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Note: Can be switched to L/R of analog audio.</td>
<td></td>
</tr>
<tr>
<td>Analog</td>
<td>9 inputs</td>
<td>Stereo L/R unbalanced</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Input impedance: 24 kΩ</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reference level: -10 dBu, Input level: up to +10 dBu</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Connector: RCA pin jack</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Note: IN1 to IN5: used for switching to digital audio.</td>
<td></td>
</tr>
<tr>
<td>Output signal</td>
<td>Video</td>
<td>HDMI/DVI</td>
<td></td>
</tr>
<tr>
<td>---------------</td>
<td>-------</td>
<td>----------</td>
<td></td>
</tr>
<tr>
<td>MSD-5401: 1 output, MSD-5402: 2 outputs, MSD-5403: 3 outputs, MSD-5404: 4 outputs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSD-5401SL: 1 output, MSD-5402SL: 2 outputs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TMDS Single Link, HDCP 1.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HDMI Deep Color (*1)/DVI 1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cable equalization</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connector: Female HDMI Type A (19 pin)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Formats supported</th>
<th>Digital</th>
</tr>
</thead>
<tbody>
<tr>
<td>VESA: VGA/SVGA/XGA/WXGA (1280x768)/WXGA (1280x800)/Quad-VGA/SXGA/WXGA (1360x768)/WXGA (1366x768)/SXGA+/WXGA+/UXGA/WUXGA/QWXGA</td>
<td></td>
</tr>
<tr>
<td>Note: VESA1080/WUXGA/QWXGA is only output with Reduced Blanking.</td>
<td></td>
</tr>
<tr>
<td>SDTV/HDTV: 480i/480p/576i/576p/720p/1080i/1080p (*2)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Audio</th>
<th>Digital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-channel linear PCM up to 8 outputs</td>
<td></td>
</tr>
<tr>
<td>Sampling frequency: 32 to 192 kHz, Quantization bit rate: 16 to 24 bit</td>
<td></td>
</tr>
<tr>
<td>Reference level: -20 dBFS, Output level: up to 0 dBFS</td>
<td></td>
</tr>
<tr>
<td>Connector: Female HDMI Type A (19 pin)</td>
<td></td>
</tr>
<tr>
<td>Note: Sound multiplex only for HDMI output mode</td>
<td></td>
</tr>
</tbody>
</table>

| Analog | MSD-5401: 1 output, MSD-5402: 2 outputs, MSD-5403: 3 outputs, MSD-5404: 4 outputs |
| MSD-5401SL: 1 output, MSD-5402SL: 2 outputs |
| Unbalanced stereo L/R |
| Output impedance: 75 Ω |
| Reference level: -10 dBu, Output level: up to +10 dBu |
| Note: When multi-channel linear PCM signals are input, any two channels or down-mixed audio are output. |
| Connector: RCA pin jack |

<table>
<thead>
<tr>
<th>Functions</th>
<th>Analog video processing unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>3D Y/C separation</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scan converter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspect ratio control, Picture adjustment (brightness, contrast, display position, display size, and so on), Pseudo seamless switching (MSD-5401/5402/5403/5405) (*4)</td>
</tr>
<tr>
<td>Truly seamless switching (MSD-5401SL/5402SL)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume adjustment (settable for input/output separately), Video/audio (non-interlock) switching</td>
</tr>
<tr>
<td>Cross point memory (9 memories), Preset memory (8 memories + start-up memory)</td>
</tr>
<tr>
<td>Anti-Snow (*5), Connection reset (*6)</td>
</tr>
<tr>
<td>External control commands (32 commands), Key lock of front panel</td>
</tr>
</tbody>
</table>

Note: VESA1080/WUXGA/QWXGA is only output with Reduced Blanking. SDTV/HDTV: 480i/480p/576i/576p/720p/1080i/1080p (*2) |
### External control

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RS-232C</strong></td>
<td>2 ports, Male D-sub 9 pin connector</td>
</tr>
<tr>
<td><strong>LAN</strong></td>
<td>1 port, RJ-45 connector, 10Base-T/100Base-TX (Auto Negotiation), Auto MDI/MDI-X</td>
</tr>
</tbody>
</table>
| **PARALLEL input** | 1 port, Female 50 pin Amphenol, Non-voltage contact (make contact) input  
Note: Functions of PARALLEL input connectors can be selected arbitrarily. |
| **Tally output** | Female 50-pin Amphenol, Open collector outputs (*7)  
Note: Functions of Tally output connectors can be selected arbitrarily. |
| **External control** | Command output to RS-232C or LAN and contact control from Tally output for external devices  
PJLink (class1) for projector control established by JBMIA  
Power control of display devices using CEC (*8) |

### Others

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>
| **Power supply voltage** | AC ~ 100 V - 240 V ±10%  
50 Hz/60 Hz ±3 Hz |
| **Power consumption** | 0.6 A |
| **Enclosure dimensions** | 16.93(W) x 3.46(H) x 13.78(D)/430(W) x 88(H) x 350(D) mm  
(EIA rack 2U, not including projections) |
| **Product weight** | 12.13 lbs./5.5 kg |
| **Temperature** | Operating temperature: 32°F to 104 °F/0°C to + 40°C  
Storage temperature: -4°F to 176°F/-20°C to + 80°C |
| **Humidity** | Operating/Storage humidity: 20% to 90% (Non-condensing) |
| **Accessories** | One power cable (1.8 m/ 5.9 feet), one RS-232C cable (1.8 m/ 5.9 feet), one set of brackets for mounting rack,  
Cable clamps: x n  
n: 6 for MSD-5401 and 5401SL, 7 for MSD-5402 and 5402SL, 8 for MSD-5403, 9 for MSD-5404 |

---

*1 30 bit/ pixel (10 bit/ component) Deep Color is supported.  
vYCC, Lip Sync, 3D, ARC, and HEC are not supported. (Lip Sync: manually adjustable)

*2 For MSD-5402SL, resolution cannot be set for each output separately. OUT1 and OUT2 are output always with the same resolution.

*3 Extended distance depends on the connected device. The data above is the maximum distance obtained when IDK’s cable (AWG24) was used and signals, 1080p 60Hz 24 bit/ pixel (8 bit/ component), were input and output. If you use other cables or for other combinations of I/O devices, video signals may be unstable or may not be output even if it is within the distance range indicated above.

*4 Seamless with a black frame or background color

*5 This function automatically recovers from a snow noise problem occurring when video signals having HDCP are displayed. It is mainly for the time of start-up and does not work if the problem has already occurred in signals input to the MSD or due to a low-grade transmission line.

*6 Connection reset function: Fixing problems automatically when a cable is repeatedly plugged in and out. This function may not be enabled if another device is connected between the MSD and display device.

*7 Voltage resistance: Up to DC 48V / 50 mA for pins 2 to 21 and 27 to 46, DC 48V / 1A for pins 22 to 24 and 47 to 49.  

*8 Display device needs to support CEC. Some display device cannot be controlled by CEC from the MSD.

---

11 Trouble shooting

This chapter recommends what to do if you have problems operating the MSD.

In case the MSD does not work correctly, please check the following items first.

・Are the MSD and all devices plugged in and powered on normally?
・Are cables connected correctly?
・Are there no loose connections?
・Are correct cables supported by devices being used?
・Are signal specifications of connected devices matched to each other?
・Are settings of the display device correct?
・Are there any close objects that may cause noise?

If the problem still cannot be solved, perform the following actions. Refer to manuals of connected devices as well, since they may possibly be the cause of the problem.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Cause/Check item/Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video output</td>
<td>Check the error code in &quot;8.18.8 Display device status&quot;. (The MSD has multiple output connectors. Check the error code of the output connector that does not output video.)&lt;br&gt;• Error code 2: Check if the source device is connected and turned on.&lt;br&gt;• Error code 3: Signals are not input. Check [1] to [6] on the next page.&lt;br&gt;• Error code 4: A problem may occur in the source device or HDCP authentication. Check [2], [5], and [6].&lt;br&gt;• Error code 5: With using a sink device that is not HDCP compliant, only video without content protection (such as analog input and test pattern) can be output, and go black if signal with content protection is input. Some source devices check whether the sink device is HDCP compliant or not and output HDCP at all times. Since the MSD supports HDCP, output video cannot be output if the display device is not HDCP compliant. In that case, you can disable HDCP input from the source device in &quot;8.5.2 HDCP input enabled/disable&quot; in order to display the video.&lt;br&gt;• Error code 6 and 7: There are problems in the input device.&lt;br&gt;• If no error code is displayed: Set &quot;8.3.15 Test pattern&quot; to a pattern other than “OFF”. If any test pattern is not output, check [5] to [7]. If a test pattern is output, the source device may not be outputting video.</td>
</tr>
<tr>
<td>Problem</td>
<td>Cause/Check item/Solution</td>
</tr>
<tr>
<td>---------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Digital input video is not output.</td>
<td>[1] The set time for monitoring a no-signal input may be too short.</td>
</tr>
<tr>
<td></td>
<td>[2] Change the setting of input equalizer.</td>
</tr>
<tr>
<td>Analog input video is not output.</td>
<td>[3] Change the input signal type.</td>
</tr>
<tr>
<td>Video is not output</td>
<td>[4] If the source device has multiple output connectors, check the video output settings of the device.</td>
</tr>
<tr>
<td>Video is disappeared, interrupted, or has noise.</td>
<td>[5] If using a long cable for input or output, replace it with a 5 m/16.4 ft. or shorter cable. Since the MSD has the equalizing function, long cables can be connected, but the MSD may not provide its full performance depending on the cable quality and the connected device. If the problem is solved by replacing the cable, signals might have been degraded due to the long haul transmission. We have high-quality cables, equalizers, and extenders. Please contact us as needed.</td>
</tr>
<tr>
<td></td>
<td>[6] When high-speed signals (high resolution: such as UXGA, WUXGA, 1080p; DEEP COLOR signals) are input or output, video may not be displayed or noise may appear depending on the cable quality and the connected device. If the problem occurs only when a specific input is selected, the problem was caused by the input side. If it occurs for all inputs or only when a test pattern is displayed, the problem was caused by the output side. Change the resolution to a lower level and/or disable Deep color. You can check the resolution and color depth of the input signals in &quot;8.18.7 status&quot; and limit resolution and color depth of input signal according to the EDID setting. You can also specify output resolution and check the color depth of the output signals in &quot;8.18.8 Display device status&quot; and limit the output signal color depth.</td>
</tr>
<tr>
<td>Input video and test pattern are not output.</td>
<td>[7] If you set the output resolution other than &quot;AUTO&quot;, check if the selected resolution is supported by the sink device. If you select 480i, 576i, or 1080i, video may not be output to sink devices that do not support interlaced signals. For TV output resolutions (480i to 1080p), check the vertical synchronous frequency. PC output resolutions (VGA to QWXGA) may not be output to LCD TVs.</td>
</tr>
<tr>
<td>Video is interrupted.</td>
<td>If you set &quot;8.5.5 Automatic detection of input video interruption&quot; to &quot;ON&quot;, false detection may occur. Change the setting to &quot;OFF&quot;.</td>
</tr>
<tr>
<td>Video is interrupted or has noise.</td>
<td>If the problem occurs only with specific digital input, change settings of the input equalizer.</td>
</tr>
<tr>
<td></td>
<td>If the problem occurs with all input channels or when a test pattern is displayed and if a long cable is connected for output, change the output equalizer setting.</td>
</tr>
<tr>
<td>Problem</td>
<td>Cause/Check item/Solution</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Video from analog input is displayed in black-and-white or green.</td>
<td>Change the input signal type.</td>
</tr>
<tr>
<td>VHS reproduction or fast-forward is choppy when analog composite video or analog S-Video is input.</td>
<td>Automatic detection of input signals failed. Set the input signal type manually to “VIDEO AUTO”, “VIDEO”, or “Y/C”.</td>
</tr>
<tr>
<td>The left, right, top and bottom sides are cut off.</td>
<td>If the problem occurs only when “CROSS HATCH” (a test pattern) is output, the sink device enlarges and displays the video. Adjust the sink device. If the device does not have the adjusting function, set the video size and position of the output. If the problem occurs even if “CROSS HATCH” is output to all outputs, check [8] to [13].</td>
</tr>
<tr>
<td>Part of video is cut off or black is displayed at edge(s).</td>
<td>[8] Check the overscan setting.</td>
</tr>
<tr>
<td></td>
<td>[9] Settings of the display position or size are not changed?</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> Display position and size can be set for each input or output.</td>
</tr>
<tr>
<td></td>
<td>[10] If aspect ratios of the input signals and output resolution do not match, video may be cut off or a black bar(s) may be displayed at edge(s) automatically depending on settings. If the video is displayed on the full screen by setting the aspect ratio to “FULL”, there is no problem. If the aspect ratio does not match, you can select a) or b) below: a) video will be cut off b) a black bar(s) will be displayed at edge(s)</td>
</tr>
<tr>
<td></td>
<td>[11] If vertical and horizontal frequencies are displayed in “<strong>8.18.7 Input signal status</strong>”, signals that are not registered in the built-in table of the MSD will be input. If “<strong>8.6.8 timing</strong>” is set to “AUTO SETUP ON”, input timing is measured when new signals are input. However, if correct video is not input, the measurement may fail. In this case, measure the input timing manually and register the device data.</td>
</tr>
<tr>
<td></td>
<td>[12] For analog input, adjust the scanning start position and fit the left and top edges. If the problem is still not resolved, set the total number of horizontal dots and the display period. For digital input, you do not normally need to set the starting point and active area, but set them only if the edge of approximately 1 to 2 dots is cut off. (You cannot set the total number of horizontal dots.)</td>
</tr>
<tr>
<td>Problem</td>
<td>Cause/Check item/Solution</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Black appears at top, bottom, right and left on PC video or only part of the PC video is displayed, and the rest is displayed by scrolling with the mouse.</td>
<td><img src="http://example.com/image.png" alt="Image" /> [13] Does the resolution setting for the PC (You can check it in “Properties” of the PC) and the resolution output from the PC (You can check it in “8.18.7 Input signal status”) match? If not, set the EDID and PC resolution manually.</td>
</tr>
<tr>
<td>Video is reduced vertically or horizontally.</td>
<td>Do the selected aspect ratio of the output resolution and that of the connected sink device match? If not, set the aspect ratio of the sink device.</td>
</tr>
<tr>
<td></td>
<td>Check the set aspect ratio of the input signals.</td>
</tr>
<tr>
<td></td>
<td>Check the monitor setting of the source device (such as 4:3, 16:9, letter box and the like).</td>
</tr>
<tr>
<td>Video flickers.</td>
<td>If a still image of interlace signals is input, the video may blink.</td>
</tr>
<tr>
<td></td>
<td>If interlace signals are input to a sink device that does not support interlace signals, the video may blink. Check the output resolution of the sink device.</td>
</tr>
<tr>
<td>PC’s dual monitor cannot be set or the setting is canceled.</td>
<td>If the monitoring function for no-signal input works, the dual monitor function may not operate correctly. In this case, turn the monitoring function “OFF”.</td>
</tr>
<tr>
<td>It takes a long time to output video after video input is switched.</td>
<td>If you set the HDCP output to “HDCP INPUT ONLY”, some display devices may fail HDCP authentication. In this case, it may temporarily not output video and audio when a channel signal without HDCP support is input and then is switched to a channel signal with HDCP support is input. In this case, set the HDCP output setting to “ALWAYS”.</td>
</tr>
<tr>
<td>Video from a PC of analog input is displayed with bright-and-dark vertical stripes</td>
<td>Set the total number of horizontal dots. If you change the total number of horizontal dots, you may sometimes have to set the start position of scanning and the display period.</td>
</tr>
<tr>
<td>Light shadows appear on fine lines of video from an analog input PC.</td>
<td>Adjust the tracking.</td>
</tr>
<tr>
<td>Fluctuation appears on the analog input video.</td>
<td>Adjust the tracking.</td>
</tr>
<tr>
<td>Automatic measurement of input timing fails.</td>
<td>In order to enable this menu, the input video must have 25% or more brightness and its edges (all sides) needs to be in contact with the circumscribed rectangle in the active area.</td>
</tr>
<tr>
<td>Problem</td>
<td>Cause/Check item/Solution</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Display position of analog input video changes on its own.</td>
<td>If the function that automatically adjusts the display position (upper left of the display) works by automatic measurement, the video may move on its own. In this case, disable the adjusting position function.</td>
</tr>
<tr>
<td>Part of the bitmap is cut off, or bitmap is not displayed on the full screen.</td>
<td>If the bitmap resolution and output resolution are not matched, the bitmap may be partially cut off or may not be displayed on the full screen depending on settings of aspect ratio and display position. In this case, set the aspect ratio and display position as necessary.</td>
</tr>
<tr>
<td><strong>Audio output</strong></td>
<td>If audio is not output, first check the error code in “8.18.8 Display device status”. (The MSD has multiple output connectors. Find the error code of the output connector that does not output audio.)</td>
</tr>
<tr>
<td>Audio is not output.</td>
<td>• Error code 1: Turn “8.8.2 Output mute” to “OFF”.</td>
</tr>
<tr>
<td></td>
<td>• Error code 2: Ensure that the source device is connected and turned on.</td>
</tr>
<tr>
<td></td>
<td>• Error code 3: Signals are not input. Check [14],[15],[17], and [18].</td>
</tr>
<tr>
<td></td>
<td>• Error code 4: There may be problems in the source device side or HDCP authentication. Check [14].</td>
</tr>
<tr>
<td></td>
<td>• Error code 5: If the display device or AV amplifier does not support HDCP, only audio without content protection (such as analog input) is output; audio is not output when signals with content protection are input. Some HDMI/DVI devices will check if the connected device supports HDCP and determines whether to output HDCP signals or not. As the MSD supports HDCP, audio may not be output if the MSD is connected to a sink device or AV amplifier that does not support HDCP. In this case, disable HDCP input from the input device in “8.5.2 HDCP input enabled/disable”.</td>
</tr>
<tr>
<td></td>
<td>• Error code 6: There are problems in the input device.</td>
</tr>
<tr>
<td></td>
<td>• Error code 7: LCD monitors may not output compressed audio, such as Dolby Digital, DTS, and so on. If playing contents with compressed audio (such as Blu-ray disc), check the audio output setting. Audio signals output from the source device can be controlled by setting EDID.</td>
</tr>
<tr>
<td></td>
<td>• Error code 8: Turn “8.8.8 Output connector” to “ON”.</td>
</tr>
<tr>
<td></td>
<td>• Error code 9: Set “8.7.2 Output mode” to a mode other than “DVI MODE”.</td>
</tr>
<tr>
<td></td>
<td>• Error code is not displayed: Check [14] to [18]. The input device may not be outputting audio.</td>
</tr>
<tr>
<td>Problem</td>
<td>Cause/Check item/Solution</td>
</tr>
<tr>
<td>---------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>Audio is not output from digital input.</td>
<td>[14] Is video being output correctly? If not, check [1], [2], [5], and [6].</td>
</tr>
<tr>
<td></td>
<td>[15] Are DVI signals output from the source device? You can check the input signal type in “8.18.7 Input signal status”. DVI signals may be output depending on EDID settings.</td>
</tr>
<tr>
<td></td>
<td>[16] Is audio format being used supported by the connected sink device or AV amplifier input? LCD monitors, especially, may not output 88.2 kHz or more sampling frequency of linear PCM and compressed audio (such as Dolby Digital, DTS, and so on). Audio signals output from the source device can be controlled by setting EDID.</td>
</tr>
<tr>
<td>Audio from IN 1 to IN 5 is not output.</td>
<td>[17] Is “8.8.3 Input selection” set to “AUTO”? If not, change the setting to “AUTO” in order to switch the audio automatically.</td>
</tr>
<tr>
<td>Audio is not output.</td>
<td>[18] If the input device has multiple output connectors, check audio output settings of the selected input device.</td>
</tr>
<tr>
<td>Audio is output from digital output connectors but not from analog output connectors.</td>
<td>If compressed audio (such as Dolby Digital, DTS, and so on) is input, analog audio is not output. You can check the input audio type in “8.18.7 Input signal status”.</td>
</tr>
<tr>
<td>Audio is output from analog output connectors but not from digital output connectors.</td>
<td>Can the connected display device or AV amplifier output audio with the selected resolution? With output resolutions for PCs (VGA to QWXGA), some display devices and AV amplifiers cannot output audio.</td>
</tr>
<tr>
<td></td>
<td>Is the sampling frequency supported by the connected display device or AV amplifier? Plasma and LCD monitors may not output audio with a high sampling frequency (88.2 kHz or higher). If digital input audio is output, check the “SAMPLING FREQUENCY” of the input audio in “8.18.7 Input signal status”. “SAMPLING FREQUENCY” output from the input device can be controlled by setting EDID. If analog input audio is output, set the “SAMPLING FREQUENCY”.</td>
</tr>
<tr>
<td>Compressed audio (such as Dolby Digital, DTS) is not output from the source device.</td>
<td>Compressed audio input is controlled (EDID settings) by factory default. If using compressed audio, change the EDID setting. In order to output the compressed audio of multi-channel, set the number of speakers. Check the audio output settings of the source device.</td>
</tr>
<tr>
<td>Multi-channel audio is not output.</td>
<td>In order to output multi-channel audio, set the number of speakers.</td>
</tr>
<tr>
<td>Problem</td>
<td>Cause/Check item/Solution</td>
</tr>
<tr>
<td>---------</td>
<td>---------------------------</td>
</tr>
<tr>
<td><strong>Key operation</strong></td>
<td><strong>Keys do not operate.</strong></td>
</tr>
<tr>
<td></td>
<td>Since no control command is registered by factory default, “DISPLAY POWER” and “COMMAND A to I” keys do not work. Register and associate control commands in order to enable these keys.</td>
</tr>
<tr>
<td></td>
<td>When a control command is executed using a key on the front panel, all keys are disabled until the command is executed or “INVALID TIME” passes.</td>
</tr>
<tr>
<td></td>
<td>Immediately after start-up, all keys are disabled until the connection of the display device is completed.</td>
</tr>
<tr>
<td></td>
<td><strong>Settings are not saved or reflected to the actual operation.</strong></td>
</tr>
<tr>
<td><strong>Communication command control</strong></td>
<td><strong>Communication command control from the PC to the MSD cannot be performed.</strong></td>
</tr>
<tr>
<td></td>
<td>Is COM PORT’s FUNCTION set to “RECIEVER” mode?&lt;br&gt;If it is set to “TRANSMITTER” mode, the communication command of the MSD cannot be controlled externally.</td>
</tr>
<tr>
<td></td>
<td><strong>“@ERR,6” is returned.</strong></td>
</tr>
<tr>
<td></td>
<td>Immediately after start-up, communication command controls are disabled until connection of the sink device is confirmed.</td>
</tr>
<tr>
<td><strong>Sending control commands</strong></td>
<td><strong>Control command is not sent.</strong></td>
</tr>
<tr>
<td></td>
<td>Is the registered control command linked to the desired control command execution condition?</td>
</tr>
<tr>
<td></td>
<td>Is COM PORT’s FUNCTION set to “TRANSMITTER” mode?&lt;br&gt;If it is set to “TRANSMITTER” mode, the communication command of MSD cannot be controlled externally. Set the communication port for sending control commands to &quot;TRANSMITTER&quot; mode. If using LAN, set the IP address and other settings of connected device.</td>
</tr>
<tr>
<td></td>
<td><strong>“RETRY OVER ERROR” is displayed and control command is not sent completely.</strong></td>
</tr>
<tr>
<td></td>
<td>Make sure that the setting of “TIME OUT” for checking control commands is not too short.</td>
</tr>
<tr>
<td>Problem</td>
<td>Cause/Check item/Solution</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Control using Tally output cannot be performed.</td>
<td>Is Tally output connector’s FUNCTION ASSIGN set to “PRESET COMMAND”? If not, set it to “PRESET COMMAND”.</td>
</tr>
<tr>
<td>Control through CEC output cannot be performed.</td>
<td>Do you use cables supporting CEC? For CEC control, an HDMI cable supporting CEC is required.</td>
</tr>
<tr>
<td></td>
<td>Does the display device support CEC? Is the HDMI association function of the display device set correctly? Enable the HDMI link control and Power on association function (for turning on the display device by external devices) of the display device.</td>
</tr>
<tr>
<td>Parallel input/Tally output</td>
<td>The MSD cannot be controlled from parallel input. Are operations from parallel input locked? They must be unlocked.</td>
</tr>
<tr>
<td></td>
<td>Are functions of the parallel input connector already assigned?</td>
</tr>
<tr>
<td></td>
<td>If control command is executed from parallel input, operations from the parallel input are disabled until execution of control commands finishes or “INVALID TIME” passes.</td>
</tr>
<tr>
<td></td>
<td>Immediately after starting-up, operations from parallel input are disabled until connection of the display device is confirmed.</td>
</tr>
<tr>
<td></td>
<td>Even though only one operation is performed from parallel input, the same operation is performed for several times. Set the time period for “CHATTERING FILTER”.</td>
</tr>
<tr>
<td></td>
<td>Even though rotary encoder is moved slightly, the setting is changed. The settings are not changed unless the rotary encoder is moved significantly. Set the number of clicks (ROTARY ENCODER).</td>
</tr>
<tr>
<td>Others</td>
<td>Input signals temporarily disappear when IN1 to IN 5 are switched. When the CEC connection changes, EDID may change. In this case, input signals are interrupted. Check the connection settings.</td>
</tr>
<tr>
<td></td>
<td>Devices cannot be controlled through CEC. Are HDMI cables supporting CEC being used? To use CEC, enable HDMI link control of the connected devices (such as LCD TVs, Blu-ray recorder, and so on).</td>
</tr>
</tbody>
</table>
If additional assistance is required, please perform the following tests and then contact us.

<table>
<thead>
<tr>
<th>Test</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Does the same problem occur at all channels?</td>
<td>-Yes-</td>
</tr>
<tr>
<td></td>
<td>-No-</td>
</tr>
<tr>
<td>2. Does the problem occur even if you directly connect the source and display devices using the genuine cable without using the MSD in-between?</td>
<td>-Yes-</td>
</tr>
<tr>
<td></td>
<td>-No-</td>
</tr>
</tbody>
</table>

The problem still cannot be solved? Please contact us for assistance.
12 Fuse

The MSD is equipped with a glass tube-type fuse (5×20 mm/ 0.2"x0.79"), which prevents overcurrent from flowing into the MSD when a circuit or circuit part is broken. If the MSD cannot be turned on, first check if the fuse placed in the AC inlet is blown or not. If it is blown, replace the blown fuse with the spare one by following the procedure below.

1. Turn off the MSD and unplug the power supply plug.
2. Remove the power connector from the AC inlet.
3. Remove the fuse holder by pulling out the depressed portion of the connection area for power supply connector using a screw driver or the like.

![Figure 12.1] Fuse holder

4. Replace the current fuse with the spare fuse.

![Figure 12.2] Replacing fuses

5. Put the fuse holder back into the original position.

*Note:* In case the fuse blows again even after the blown fuse is replaced, the MSD may have problems. Please Contact your dealer.
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