astro snap **HD DIGITAL Line Doubler**

SC-2060
Instruction Manual

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Ver.1.01

ASTRODESIGN, INC.

ASTRO

CONTENTS

INTRODUCTION

Thank you very much for purchasing HD digital line doubler SC-2060. This manual describes the functions and operating procedures to be used and the checkpoints to be observed when operating the SC-2060.

Please read through these instructions to ensure that you will operate the line doubler correctly.

After reading through the manual, keep it in a safe place for future reference.

SAFETY PRECAUTIONS

⚠ WARNING

Concerning the power cord

- Always take hold of the molded part of the plug when disconnecting the power cord.

- Do not use force to bend the power cord or bundle it with other cords for use. This may cause a fire.

- Do not place heavy objects on top of the power cord. This may damage the cord, causing a fire or electrical shock.

Concerning foreign matter

- Do not spill liquids inside the line doubler or drop inflammable objects or metal parts into it. Operating the line doubler under these conditions may cause a fire, electric shocks and/or malfunctioning.

Concerning disassembly of the product

- Do not attempt to disassemble the line doubler. Users run the risk of electric shocks or injury and of causing malfunctioning if they open the panels and plug or unplug the internal circuit boards themselves.

⚠ CAUTION

Concerning the power supply and grounding

Use a supply voltage within the range of AC 100V-240V for this line doubler. The line doubler is grounded through a 3-wire type of power cable with a grounding line. To ensure safe operation, be absolutely sure to connect the power cable to a power outlet that is equipped with a grounding terminal for protection.

Concerning installation and operation

No special precautions need be taken if this line doubler is to be operated in a normal indoor environment. Installation and operation in the following locations should be avoided. Failure to do so may cause malfunctioning and accidents.

- Locations where the ambient temperature is outside the range of 5 to 40 degrees Celsius.

- Locations where the ambient humidity is outside the range of 30 to 80% RH.

- Near air conditioners or locations which are susceptible to sudden changes in temperature or the formation of condensation

- Locations with high concentrations of corrosive gases or dust

- Locations which are exposed to direct sunlight

- Locations where the line doubler may be splashed with water, oil, chemicals, etc.

- Locations where vibrations may be transmitted from the floor to the line doubler

- Unstable locations

- The ventilation holes are provided in the side panels to prevent the internal temperature from rising.On no account should they be blocked since doing so can cause malfunctioning.

Concerning impact

- This is a precision instrument and, as such, subjecting it to impact may cause malfunctioning. Take special care when moving the line doubler.

If trouble or malfunctioning should occur

- In the unlikely event that trouble or malfunctioning has occurred in the line doubler, disconnect its power cord, and contact your dealer or an Astrodesign sales representative.

Concerning use

Precautions concerning copyrights

- The copying or duplication of copyright materials for purposes other than personal use without the permission of the holders of the copyrights and holders or other rights is prohibited by copyright laws and the stipulations of related international agreements. ASTRODESIGN will in no way be liable in the event that the line doubler is used in a manner which infringes these laws and stipulations.

1. Concerning the SC-2060

1.1 General outline

The SC-2060 digital HDTV line doubler uses "astrosnap" (a high-accuracy I/P conversion technology which is short for ASTRO Super Natural Motion Picture) to convert HDTV system SDI (serial digital) video signals (complying with the BTA S-004B standard) into double-speed progressive DVI digital signals. Furthermore, it comes with a 2-3/2-2 pull-down processing function which enables film images and computer graphics images to be displayed with no deterioration in their resolution.

1.2 Features

1.2.1 "astrosnap" I/P conversion function

By using the newly developed algorithms provided by "astrosnap" for the processing which converts interlaced signals into progressive signals, high-quality progressive images free from image quality deterioration can be enjoyed.

1.2.2 2-3/2-2 pull-down function

By automatically identifying the 24- or 30-frame video data of film images, computer graphics images, etc. and by using the optimum I/P conversion processing, high-quality progressive images free from image quality deterioration can be enjoyed.

1.2.3 10-bit processing

The color space conversion processing which converts YCbCr signals into RGB signals and the I/P conversion processing which converts interlaced signals into progressive signals are performed at a 10-bit accuracy.

1.2.4 External reference sync function, frame synchronizing function

Output signals synchronized with the reference signal can be obtained by using the external reference sync function.

1.2.5 Image quality adjustment functions
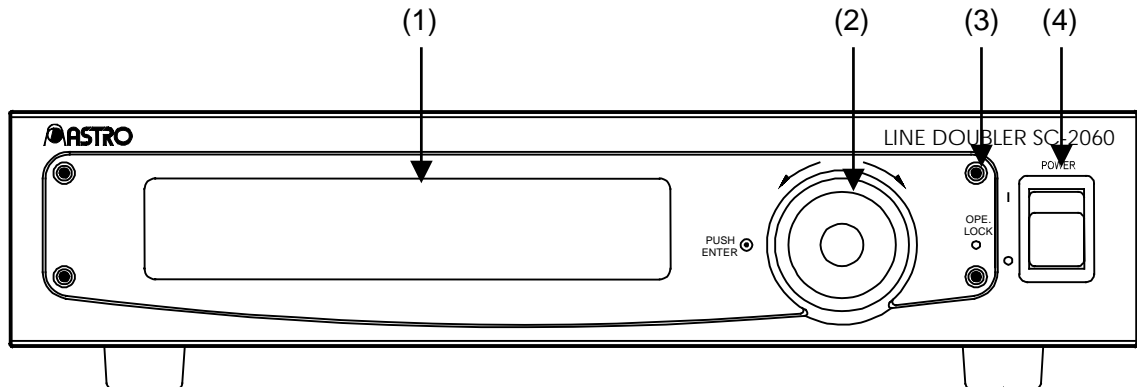
Utilization of the following image quality adjustment functions enables the image quality to be adjusted to suit the video source and display used.

- Black level adjustment function
- White level adjustment function
- White balance adjustment function
- Enhance adjustment function
- Hue adjustment function
- Color adjustment function
- Noise reduction adjustment function

1.3 Parts and their functions

Main unit/front panel

No.	Part	Description
(1)	Display	The default display appears when the main unit is started up. The input signals, input channels, external lock status and pull-down status are displayed. Refer to "3.1 What appears on the display." Both menu items and setting screens appear on the display. If a menu screen is displayed and the shuttle button is not operated for a minute or so, the menu screen is replaced with the default screen. If AUTO has been selected as the dimmer setting, the display brightness is turned down if shuttle button is not operated for 3 minutes or so.
(2)	Shuttle button	Use this to change the menu items and settings. Refer to "3.2 Menu operation methods."
(3)	OPE LOCK LED	This lights when ON has been selected as the operation lock setting. "Refer to "3.3.10 Operation lock setting."
(4)	POWER	This is the power switch. After turning off the power, wait at least 5 seconds before turning it back on.

Main unit/rear panel

(6) (4) (5)

(7) (1) (2) (3)
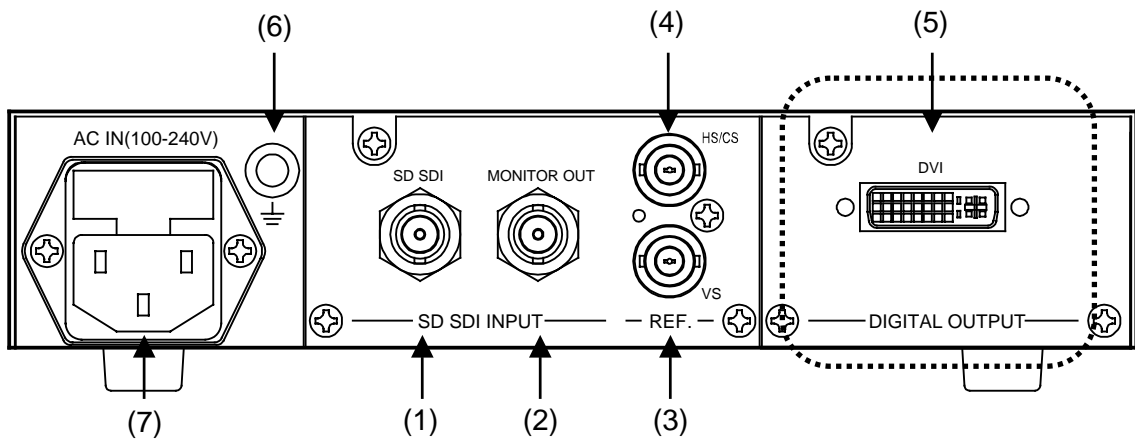
No.	Part	Description
(1)	SDI input connector	Input connector for the HD-SDI signals. (BNC connector)
(2)	SDI monitor output connector	Output connector for the HD-SDI signals. (BNC connector)
(3)	REF VS input connector	Input connector for the external reference VS sync signal. (BNC connector)
(4)	REF HS/CS input connector	Input connector for the external reference HS sync signal or CS sync signal. (BNC connector)
(5)	Digital output connector	TMDS video signal output connector. (DVI-I connector, 29 pins)
(6)	FG terminal	The frame ground is connected here.
(7)	AC power socket	The accessory power cable is connected here.

2. Connections with peripherals units

2.1 Connecting the input signals

Connect the HD SDI output signals of the equipment to the INPUT connector on the SC-2060, as shown in the figure below.

DVD or
LD Player   VTR   CAMERA

Connect from the HD-SDI connector of the units.

AC IN(100-240V)   HD SDI   MONITOR OUT   HS/CS   DVI

        HD SDI INPUT   REF. VS   DIGITAL OUTPUT

Connect from the sync signal connectors of the units
 * Connect these connectors only when using an external reference.
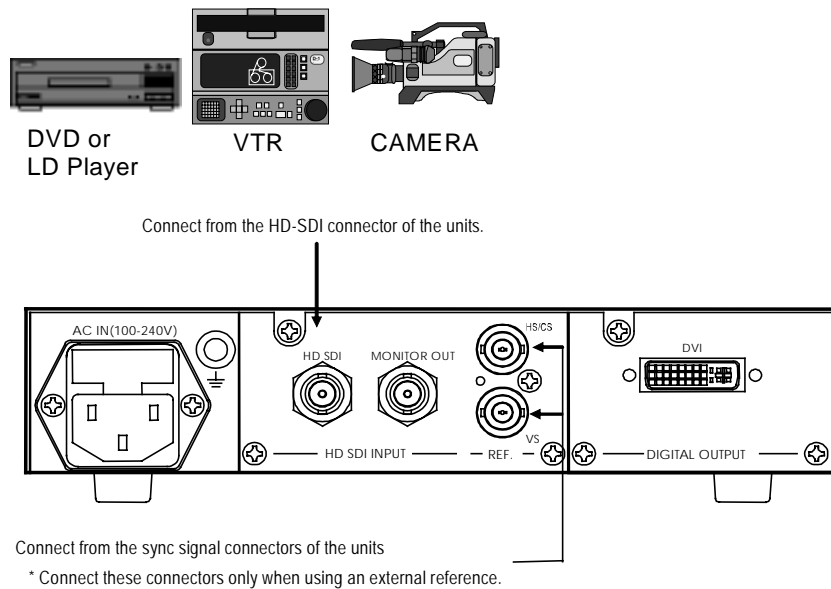
2.2 Connecting the output signals

As shown in the figures below, connect the SC-2060's output signals from the output connectors (DVI) in a manner which meets the input conditions of the peripheral connectors.

*   Depending on the specifications of the display unit, some output signals may not be displayed. Check these specifications before proceeding with the connections.

Projector

Connect this connector to the DVI input connector on the peripheral device.

AC IN(100-240V)   HD SDI   MONITOR OUT   HS/CS   DVI

        HD SDI INPUT   REF. VS   DIGITAL OUTPUT
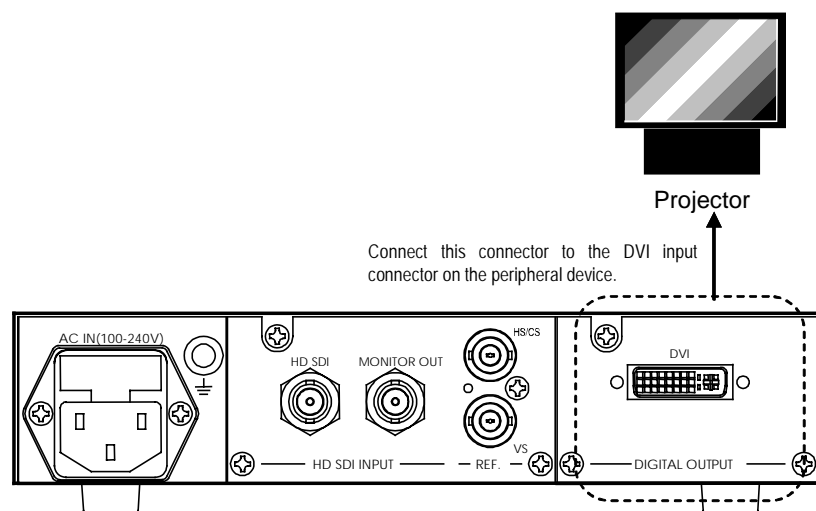
*   The maximum allowable length of the DVI cable is 5 meters.

3. Operation methods

3.1 What appears on the display

When the unit is started up, the following settings and other statuses appear on the front display. (Default screen)

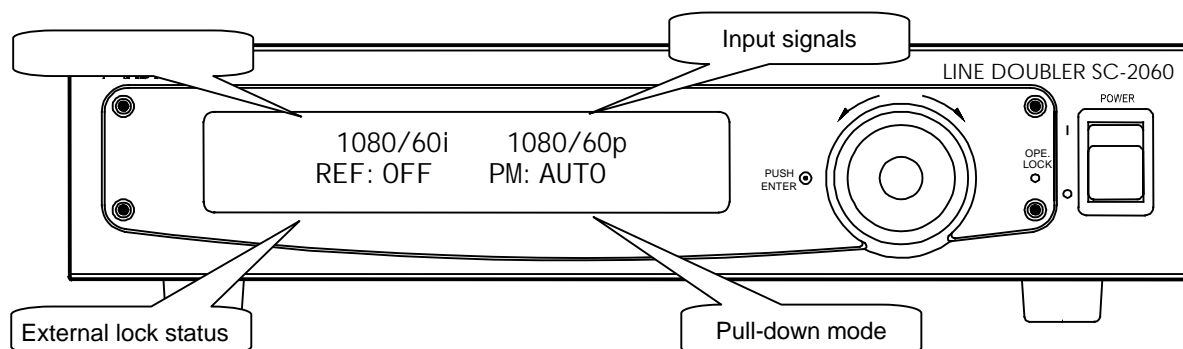|		
Input format	The current input signals are displayed here.	
	1080/60i	When 1080/60i, 1080/59.94i, 1080/30sf or 1080/29.97sf system signals are input
	1080/50i	When 1080/50i, 1080/25sf system signals are input
	1080/30p	When 1080/30i, 1080/29.97p system signals are input
	1080/25p	When 1080/25p system signal is input
	1080/24sf	When 1080/24sf, 1080/23.98sf system signals are input
	1080/24p	When 1080/24p, 1080/23.98p system signals are input
	1035/60i	When 1035/60i, 1035/59.94i system signals are input
	720/60p	When 720/60p, 720/59.94p system signals are input
	720/50p	When 720/50p system signal is input
	720/30p	When 720/30p, 720/59.97p system signals are input
	720/25p	When 720/25p system signal is input
	720/24p	When 720/24p, 720/23.97p system signals are input
	No Signal No Sync	No input video signals detected
Output format	When 1080 system signals are input, the fixed output timing of 1080/60p is displayed. When 720 system signals are input, the fixed output timing of 720/60p is displayed.	
External lock status	The current external lock status is displayed here.	
	TBC OFF	Synchronized with input video signals
	Timing designation	Synchronized with external reference sync signal ⇨ Refer to "3.3.5 Setting the external reference input."
	Not Std	Synchronized with internal crystal oscillator
	UnLock!! *1	No synchronization with external reference sync signal possible ⇨ Refer to "3.3.5 Setting the external reference input."
	Measure	Now measuring external reference sync signal
	No Signal No Sync *1	External reference sync signal not yet detected
	Warning! ! *1	
	Set Err!! *1	Outside external reference sync signal frequency specification
	Error!! *1	
	Hs Err!! *1	Error in external reference horizontal sync signal frequency
	Vs Err!! *1	Error in external reference vertical sync signal frequency
	Unknown *1	External reference sync signal not yet detected
	*1: Normal video signals are not output.	
Pull-down	The currently set pull-down mode is displayed here.	
	AUTO	When "AUTO" has been set as the pull-down mode
	2-3PULL	When the pull-down mode has been set
	2-2PULL	

	VIDEO	

3.2   Menu operation methods

The shuttle button is tilted in the up, down, left and right directions, rotated or pushed to perform menu operations.
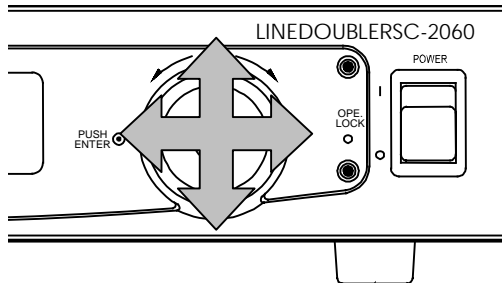
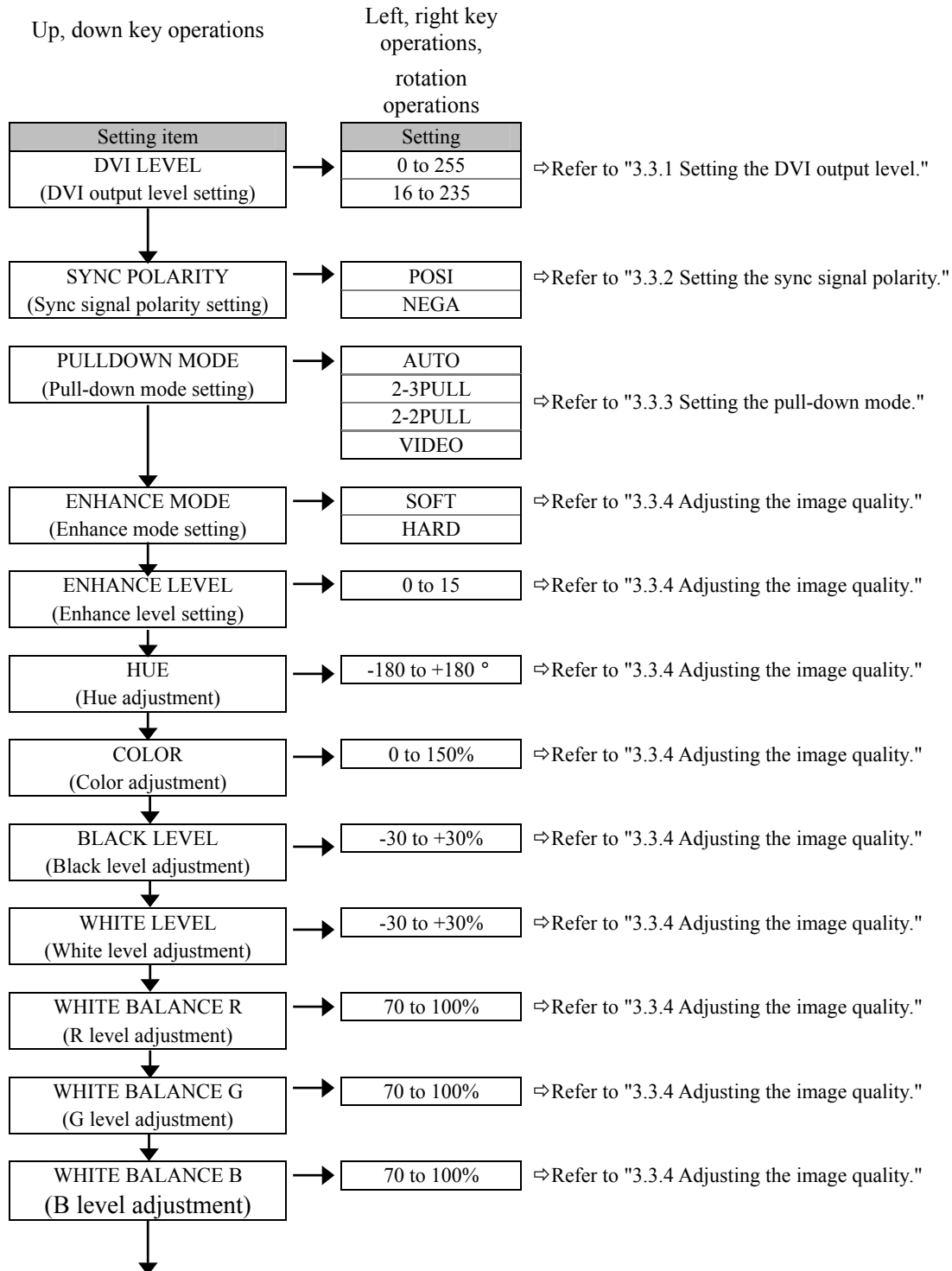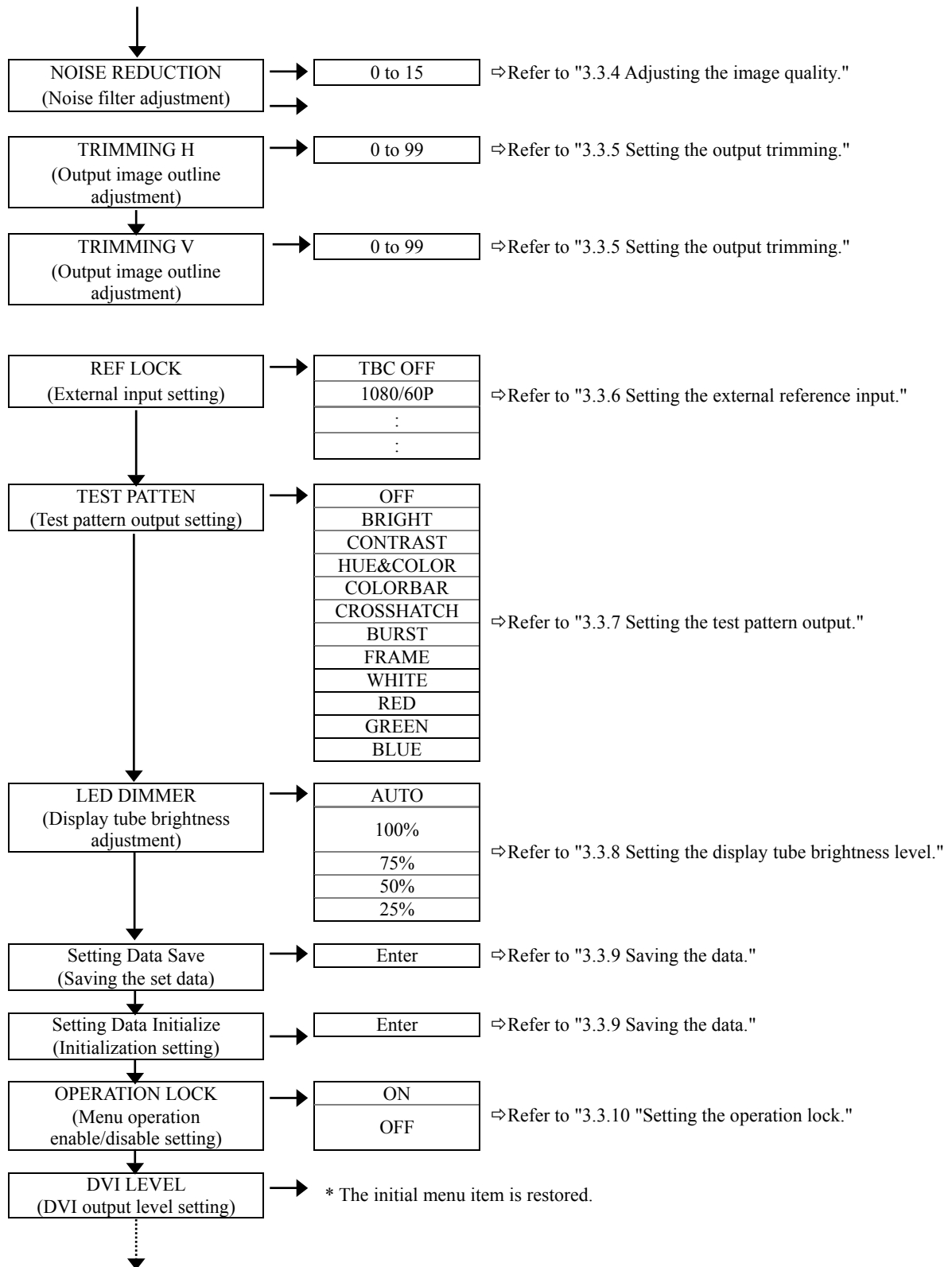Tilting the button in the up, down, left and right directions
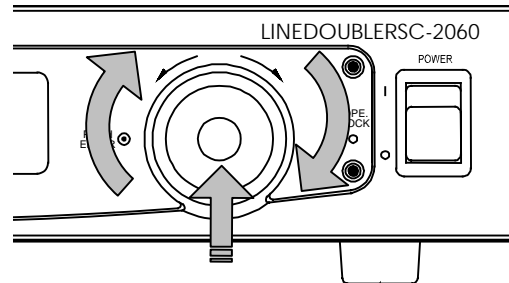
Turning and pushing the button

(1)   How to select the setting items
Tilt the shuttle button up or down to select the setting items.

(2)   Selecting the settings
Rotate the shuttle button or tilt it to the left or right to select the settings.

(3)   Items with   ENTER   on menu displays
Pushing the shuttle button initiates the   ENTER   operation.

3.3   Menu configuration

The menu configuration shown below is entered from the default screen by tilting the shuttle button in the up, down, left or right direction.

Up, down key operations

Left, right key operations,

rotation operations

Setting item	Setting
DVI LEVEL (DVI output level setting)	0 to 255 / 16 to 235

⇨Refer to "3.3.1 Setting the DVI output level."

SYNC POLARITY (Sync signal polarity setting)	POSI / NEGA

⇨Refer to "3.3.2 Setting the sync signal polarity."

PULLDOWN MODE (Pull-down mode setting)	AUTO / 2-3PULL / 2-2PULL / VIDEO

⇨Refer to "3.3.3 Setting the pull-down mode."

ENHANCE MODE (Enhance mode setting)	SOFT / HARD

⇨Refer to "3.3.4 Adjusting the image quality."

ENHANCE LEVEL (Enhance level setting)	0 to 15

⇨Refer to "3.3.4 Adjusting the image quality."

HUE (Hue adjustment)	-180 to +180°

⇨Refer to "3.3.4 Adjusting the image quality."

COLOR (Color adjustment)	0 to 150%

⇨Refer to "3.3.4 Adjusting the image quality."

BLACK LEVEL (Black level adjustment)	-30 to +30%

⇨Refer to "3.3.4 Adjusting the image quality."

WHITE LEVEL (White level adjustment)	-30 to +30%

⇨Refer to "3.3.4 Adjusting the image quality."

WHITE BALANCE R (R level adjustment)	70 to 100%

⇨Refer to "3.3.4 Adjusting the image quality."

WHITE BALANCE G (G level adjustment)	70 to 100%

⇨Refer to "3.3.4 Adjusting the image quality."

WHITE BALANCE B (B level adjustment)	70 to 100%

⇨Refer to "3.3.4 Adjusting the image quality."

NOISE REDUCTION (Noise filter adjustment)	0 to 15

⇨Refer to "3.3.4 Adjusting the image quality."

TRIMMING H (Output image outline adjustment)	0 to 99

⇨Refer to "3.3.5 Setting the output trimming."

TRIMMING V (Output image outline adjustment)	0 to 99

⇨Refer to "3.3.5 Setting the output trimming."

REF LOCK (External input setting)	TBC OFF
	1080/60P
	:
	:

⇨Refer to "3.3.6 Setting the external reference input."

TEST PATTEN (Test pattern output setting)	OFF
	BRIGHT
	CONTRAST
	HUE&COLOR
	COLORBAR
	CROSSHATCH
	BURST
	FRAME
	WHITE
	RED
	GREEN
	BLUE

⇨Refer to "3.3.7 Setting the test pattern output."

LED DIMMER (Display tube brightness adjustment)	AUTO
	100%
	75%
	50%
	25%

⇨Refer to "3.3.8 Setting the display tube brightness level."

Setting Data Save (Saving the set data)	Enter

⇨Refer to "3.3.9 Saving the data."

Setting Data Initialize (Initialization setting)	Enter

⇨Refer to "3.3.9 Saving the data."

OPERATION LOCK (Menu operation enable/disable setting)	ON
	OFF

⇨Refer to "3.3.10 "Setting the operation lock."

DVI LEVEL (DVI output level setting)	

* The initial menu item is restored.

*‚ÄÉIf no key operations are performed for the menu items during the space of one minute, the default display (input signals, external lock status and pull-down mode) is restored.

*‚ÄÉWhen a series of menu operations are performed, the menu item corresponding to the last operation appears on the display. When the unit's power is turned off, the default screen display is restored.

3.3.1 Setting the DVI output level

The dynamic range of the DVI digital output can be changed.

Setting item	Setting	Remarks
DVI LEVEL	0 to 255	When reproducing the digital video data using an 8-bit gray scale, the black level is set to 0 and white level to 255.
	16 to 235	When reproducing the digital video data using an 8-bit gray scale, the black level is set to 16 and white level to 235.

3.3.2 Setting the sync signal polarity

The polarity of the sync signals can be set.

Setting item	Setting	Remarks
SYNC POLARITY	POSI	Sync signals with a positive polarity complying with the EIA standards are output.
	NEGA	Sync signals with a negative polarity that is the reverse of the EIA standards are output.

3.3.3 Setting the pull-down mode

The SC-2060 can automatically identify the 24- or 30-frame video data of film images, computer graphics images, etc. (if AUTO is set) and reproduce the optimum progressive images.

Setting item	Setting	Remarks
PULLDOWN MODE	AUTO	The pull-down system matching the video sources is automatically identified as 2-3 PULL DOWN, 2-2 PULL DOWN or VIDEO MODE.
	2-3PULL	For video sources whose film images (24 frames per second) are converted (= telecine) to video images (60 images per second), the 2-3, 2-3, 2-3 interpolation pattern is automatically identified from the flow of images, and displayed. * Select this setting if it is known ahead of time that the images are from a film source.
	2-2PULL	For still image video sources whose single frame images in even- or odd-numbered fields are reproduced, the 2-2, 2-2 interpolation pattern is automatically identified from the flow of images, and displayed. * Select this setting if it is known ahead of time that the images are CG images or some other 2-2 pull-down pattern.
	VIDEO	In this mode, regular interlaced moving images are converted into progressive images. * This setting is used when it is known that the mode is neither 2-3 pull-down nor 2-2 pull-down.

* When 2-3 PULL or 2-2 PULL mode is used, the video signals may be disrupted if they do not match the interpolation pattern of the input video source.

3.3.4　Adjusting the image quality

The following image quality adjustments can be conducted on the SC-2060.
Perform them in such a way that the optimum image quality is achieved for the images displayed.

| Adjustment item	Type of adjustment	Setting	Remarks
ENHANCE MODE	Enhance effect	SOFT / HARD	The outlines look more accentuated by controlling frequency response of the images.
ENHANCE LEVEL	Enhance effect	0 to 15 LEVEL	
HUE	Hue adjustment	-180° to +180°	The hue is adjusted.
COLOR	Color adjustment	0% to 150%	The intensity of the colors is adjusted.
BLACK LEVEL	Black level adjustment	-30% to +30%	The reference level (black level) for the brightness of the entire screen is adjusted.
WHITE LEVEL	White level adjustment	-30% to +30%	The white areas (white level) on the entire screen are adjusted.
WHITE BALANCE R	R level adjustment	70% to 100%	The white areas (white level) on the entire screen are adjusted.
WHITE BALANCE G	G level adjustment	70% to 100%	
WHITE BALANCE B	B level adjustment	70% to 100%	
NOISE REDUCTION	Noise level reduction	0 to 15 LEVEL	The noise mixed in with the video signals is reduced.
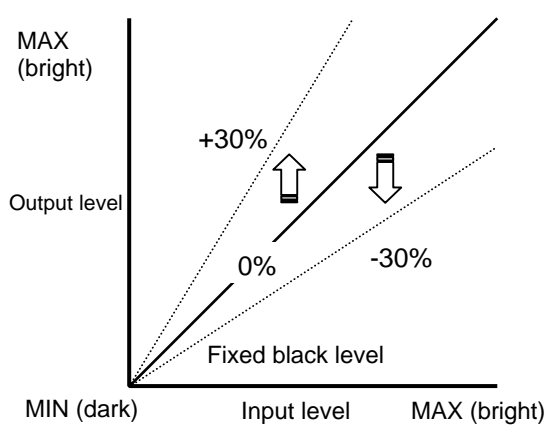
White level adjustment
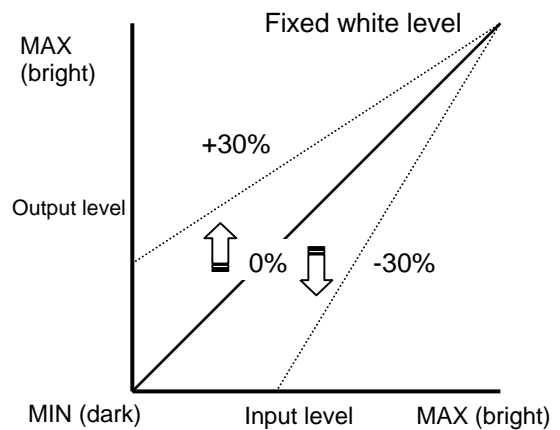
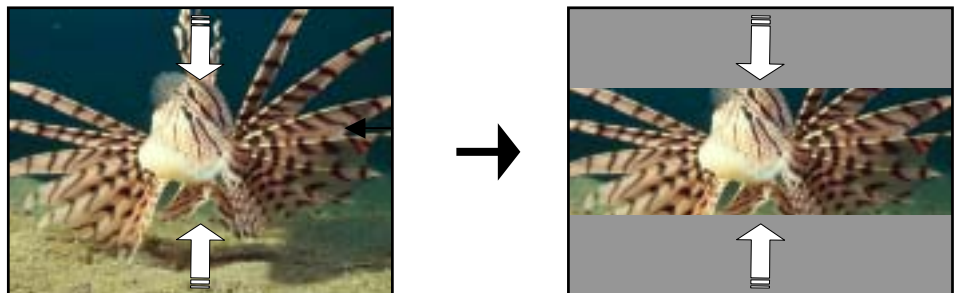Black level adjustment

3.3.5 Setting the output trimming

The output image display period can be adjusted on the SC-2060.

Setting item	Setting	Remarks
TRIMMING H	0 to 99	Both the left and right ends of the images are masked on the display.
TRIMMING V	0 to 99	The top and bottom of the images are masked on the display.

TRIMMING H setting
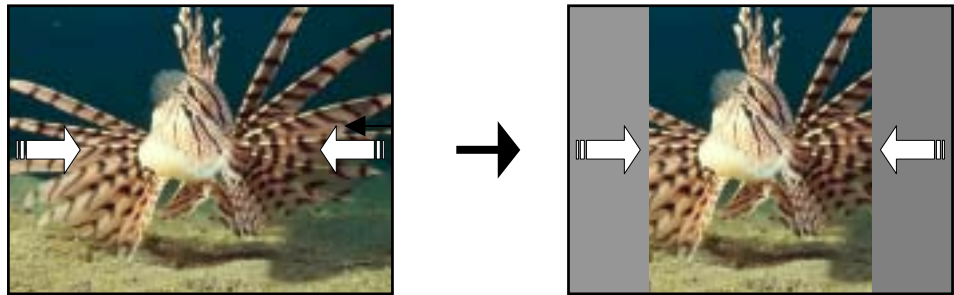
TRIMMING V setting

3.3.6 Setting the external reference input

Using the sync signal supplied to the external reference connector as the reference, the SC-2060 enables output video signals matching the vertical frequency of the input signal to be obtained.

When the external reference connector is used, the sync signal corresponding to the input signal must be selected from the table below.

Setting item	Setting	Remarks	H period	V period
REF LOCK	TBC OFF	TBC function OFF; synchronized with input signal.	—	—
	1080/60p	Equivalent to 1920 × 1080/60P, 1920 × 1080/59.94P	67.43K	59.94
	1080/50p	Equivalent to 1920 × 1080/50P	56.25K	50.00
	1080/30p	Equivalent to 1920 × 1080/30P, 1920 × 1080/29.97P	33.72K	29.97
	1080/25p	Equivalent to 1920 × 1080/25P	28.16K	25.00
	1080/24p	Equivalent to 1920 × 1080/24P, 1920 × 1080/23.98P	26.97K	23.98
	1080/60i	Equivalent to 1920 × 1080/60I, 1920 × 1080/59.94I	33.71K	59.94
	1080/50i	Equivalent to 1920 × 1080/50I	28.13K	50.00
	1080/30sf	Equivalent to 1920 × 1080/30sf, 1920 × 1080/29.97sf	33.72K	29.97
	1080/25sf	Equivalent to 1920 × 1080/25sf	28.16K	25.00
	1080/24sf	Equivalent to 1920 × 1080/24sf	27.00K	24.00
	720/60p	Equivalent to 1280 × 720/60P, 1280 × 720/59.94P	44.95K	59.94
	720/50p	Equivalent to 1280 × 720/50P	37.50K	50.00
	720/30p	Equivalent to 1280 × 720/30P, 1280× 720/29.97P	22.48K	29.97
	720/25p	Equivalent to 1280 × 720/25P	18.75K	25.00
	720/24p	Equivalent to 1280 × 720/24P, 1280× 720/23.98P	17.98K	23.98
	480/60p	Equivalent to 720 × 480/60P, 720× 480/59.94P	31.47K	59.94
	576/50p	Equivalent to 720 × 576/50P	31.25K	50.00
	480/60i	Equivalent to 720 × 480/60I, 720 × 480/59.94I	15.73K	59.94
	576/50i	Equivalent to 720 × 576/50I	15.63K	50.00
	UXGA@60Hz	VESA standard 1600 × 1200/60 Hz * Only HS, VS supported	75.00K	60.00
	SXGA@60Hz	VESA standard 1280 × 1024/60Hz * Only HS, VS supported	63.98K	60.02
	XGA@60Hz	VESA standard 1024 × 768/60Hz * Only HS, VS supported	48.36K	60.00
	SVGA@60Hz	VESA standard 800 × 600/60Hz * Only HS, VS supported	37.88K	60.32
	VGA@60Hz	VESA standard 640 × 480/60Hz * Only HS, VS supported	31.45K	59.94

* If the unit is used with the TBC function OFF, jitter may occur in the output video signals depending on the input video signals. If this is the case, set the TBC function to ON for use.

* When using the external reference sync signal, input a signal with no deterioration such as one from a reference signal source as the sync input signal.

* When using the external reference sync signal, the images may be disrupted if there is no sync input signal or if a timing value at variance from the setting is input.

* When using the external reference sync signal, the vertical frequency of the output sync signal may match but the vertical phase may not match.

* When the REF LOCK item is selected, the horizontal frequency and vertical frequency of the signal supplied to the external reference input connector as well as the timing designations (recommended timing designations) which can be set are displayed by pressing the | ENTER | key.

```
┌──────────────────────────────┐          ┌──────────────────────────────┐
│  REF  LOCK      UXGA@60Hz     │  ENTER▶  │  Search  Timing :   480/60 i  │
│  TEST  PATTERN      OFF       │          │  H : 16.27KHz   V :  59.94Hz  │
└──────────────────────────────┘          └──────────────────────────────┘
```

Search Timing: Currently input timing designation

H:, V: Horizontal frequency and vertical frequency of currently input signal

* An error of ±5% or so may occur.

3.3.7 Setting the test pattern output

Seven different test patterns can be output by the SC-2060.

Use these patterns to adjust the display unit.

Setting item	Setting	Remarks
TEST PATTEN	OFF	Normal screen display
	BRIGHT	⇨ Refer to "6.1.6 (1) Brightness."
	CONTRAST	⇨ Refer to "6.1.6 (2) Contrast."
	HUE&COLOR	⇨ Refer to "6.1.6 (3) Hue & color."
	COLORBAR	⇨ Refer to "6.1.6 (5) Crosshatch."
	CROSSHATCH	⇨ Refer to "6.1.6 (6) Burst."
	BURST	⇨ Refer to "6.1.6 (4) Color bar."
	FRAME	⇨ Refer to "6.1.6 (7) Frame."
	WHITE	⇨ Refer to "6.1.6(8) White/red/green/blue."
	RED	
	GREEN	
	BLUE	

* When these patterns are used in a REF LOCK setting, they will not be output unless the external sync signal is supplied.

3.3.8 Setting the display tube brightness level

The brightness level of the display tube can be set by the SC-2060.

Setting item	Setting	Remarks
LED DIMMER	AUTO	The brightness level of the display is reduced to 25% if no key operations have been performed for 3 minutes. It is restored to 100% when the shuttle button is operated.
	100%	The brightness level is set to 100%.
	75%	The brightness level is set to 75%.
	50%	The brightness level is set to 50%.
	25%	The brightness level is set to 50%.

3.3.9 Saving the data

Data can be saved in the SC-2060's non-volatile memory or the factory data can be restored (= initialization).

Since the data adjusted for the SC-2054 will be deleted when the unit's power is turned off, get into the habit of saving the data before turning off the power. When the power is then turned back on, the saved data will take effect after the unit starts up.

Memory configuration of SC-2060
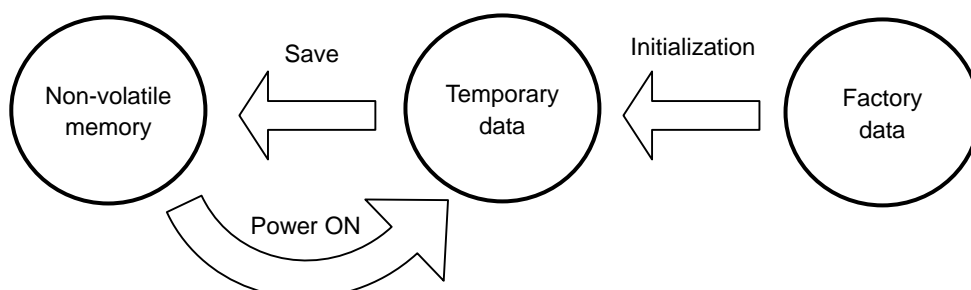
(1) Saving all the data

Setting item	Description
Setting Data Save	All the temporary data is saved in the non-volatile memory, overwriting the data already stored there.

(2) Restoring the factory data (initializing)

Setting item	Description
Setting Data Initialize	The temporary data is overwritten by the factory data, and the display is also initialized.

Displays common to (1), (2)

When the ENTER key is pressed at YES, the data is saved or initialized.

The tables below list the factory data.

Setting item	Setting
DVI LEVEL	0 to 255
PULLDOWN MODE	AUTO
ENHANCE MODE	SOFT
ENHANCE LEVEL	1
HUE	+0°
COLOR	100%
BLACK LEVEL	+0%
WHITE LEVEL	+0%
WHITE BALANCE R	100%

Setting item	Setting
WHITE BALANCE G	100%
WHITE BALANCE B	100%
NOISE REDUCTION	0
TRIMMING H	0
TRIMMING V	4
REF LOCK	TBC OFF
TEST PATTEN	OFF
LED DIMMER	AUTO
OPERATION LOCK	OFF

3.3.10 Setting the operation lock

The SC-2060 allows menu operations to be enabled (unlocked) or disabled (locked). Set the operation lock to ON to ensure that no unintentional changes will be made to the settings.

Item	Setting	Remarks
OPERATION LOCK	ON	The menu operations are disabled (locked).
	OFF	The menu operations are enabled (unlocked).

OPERATION LOCK ON (operation lock setting)

When ON is selected for the OPERATION LOCK item, no further menu operations can be performed.

OPERATION LOCK OFF (operation unlock setting)

When OFF is selected for the OPERATION LOCK item, menu operations can be performed by pressing the keys as usual.

* The default display appears when the ENTER key is pressed at the operation lock item.

4. Main specifications

4.1 Input video signals

(1) HD-SDI input signals

Item	Specification
Scanning system	1920 × 1080/59.94i, 1920 × 1080/50i, 1920 × 1080/29.97sf, 1920 × 1080/29.97p, 1920 × 1080/25sf, 1920 × 1080/25p, 1920 × 1080/23.98sF, 1920 × 1080/23.98p, 1920x1035/59.94i 1280 × 720/59.94p, 1208 × 720/50p, 1280 × 720/29.97p, 1280 × 720/25p, 1280 × 720/23.98p
Signal system	SMPTE274M, SMPTE292M, SMPTE296M, BTAS-004 standard complied with
Connector	BNC connector, 1 system
Resolution	10bit

4.2 External reference input signal

Item	Specification
Scanning system	SMPTE274M standard complied with SMPTE296M standard complied with VESA standard complied with
Horizontal frequency Vertical frequency	SMPTE274M standard (60, 59.94, 50Hz) complied with SMPTE296M standard (60, 59.94, 50Hz) complied with VESA standard (60 Hz) complied with
Sync signal	CS 0.3/TTL 75Ω HS TTL/75Ω VS TTL/75Ω
Connectors	BNC connectors × 2, 1 system; connectors serve as both CS and HS connectors

4.3 Output signals

(1) DVI output signals

Item	When 1920/1080 system signals are input	When 1920/720 system signals are input
Scanning system	1920 × 1080/60P	1920 × 720/60P
Horizontal frequency	67.43KHz/67.50KHz (*1)	44.96KHz/45.00KHz (*1)
Vertical frequency	59.94Hz/60.00Hz (*1)	59.94Hz/60.00Hz (*1)
Pixel clock frequency	148.35KHz/148.50MHz (*1)	74.18MHz/74.25MHz (*1)
Resolution	8bit	
Data format	TMDS	
Sync signal	HS/VS	
DDC	Not supported	
Hot Pulg Detect	Not supported	
Connector	DVI-I connector (digital output only)	

*1: These frequencies are dependent on the input signals.

4.4 General specifications

Item	Specification	
Power	Effective power	16W MAX
	Apparent power	17VA MAX
	Power factor	0.91 TYP
Power requirements	AC100 - 120 200-240V(50/60Hz)	
Operating temperature range	5 to 40°C (no condensation)	
Operating humidity range	30 to 80%RH (no condensation)	
Dimensions	Half rack size	
	210 (W) × 44 (H) × 312 (D) mm (excluding protrusions)	
Weight	Approx. 1.7 kg	

4.5 Accessories

Item	Specification
AC cable	1 pc
Instruction manual	1 copy

5. Outline drawings

4-M4, also on opposite panel
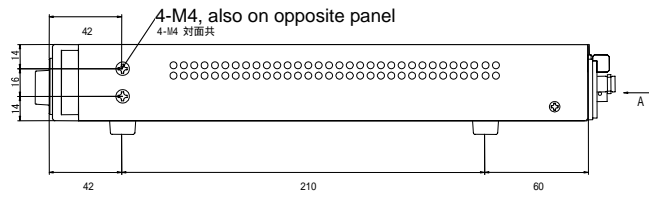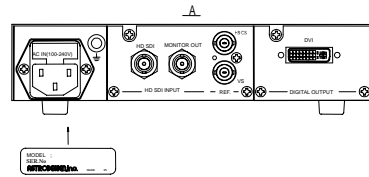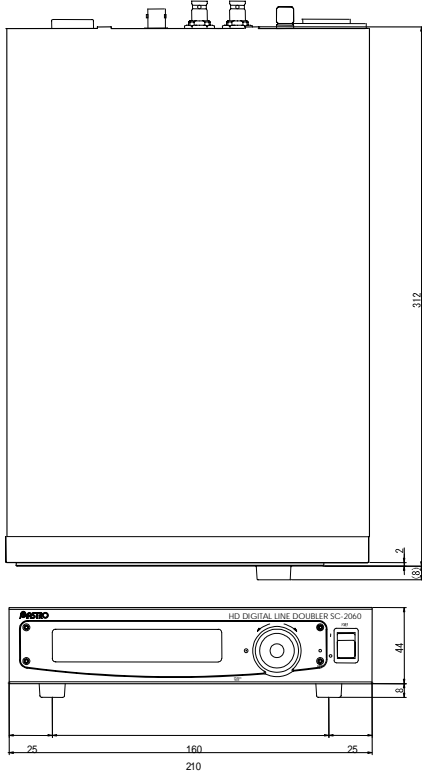
6. Appendix

6.1 Definitions of terms used

6.1.1 "astrosnap"

The term "astrosnap" (which stands for Astro SuperNatural motion Picture) is a high-accuracy I/P (interlaced/progressive) conversion technology developed by ASTRODESIGN.

With the interlaced signals of the NTSC, PAL, HDTV and other systems, the scanning lines that render a single image look like a venetian blind with every other line missing: this means that when I/P conversion is to be performed, the missing signals must be inferred and interpolated.

The I/P conversion technology used in the past caused a deterioration in the resolution referred to as "jaggies" when the signals were inferred and interpolated. In contrast, "astrosnap" is capable of significantly enhancing the contour parts of the images and reproducing the images at a high resolution whether the images are moving rapidly or slowly. It achieves this by using high-accuracy inference and interpolation algorithms.

6.1.2 DVI

DVI is short for digital video interface. Since it is capable of sending the images as digital signals, high-quality images free from signal deterioration can be enjoyed.

6.1.3 Interlaced

Interlaced images are rendered by two scans for every other line. The total number of 525 scanning lines, consisting of one screen with 262.5 odd-numbered lines and another screen with 262.5 even-numbered lines, are reproduced by updating the field at a rate of 60 frames per second. This means only the vertical resolution of 262.5 lines is achieved for the actual images which in turn means that the images take on a pronounced roughness when displayed on large screens, and fast-moving images cannot be tracked.

Even-numbered field (1/60 sec.)   Odd-numbered field (1/60 sec.)

6.1.4 Progressive

With the progressive system, on the other hand, images are rendered by a single scan. Unlike interlaced images, progressive scanning can achieve a rate of 60 frames per second for 525 lines, and so it is able to maintain a high image quality even when images are displayed on a large screen.

Frame (1/60 sec.)

6.1.5 Time base corrector (TBC)

This function corrects time base errors. During VTR playback, the time-based fluctuations caused by irregularities in the rotational speed of the heads and unevenness in the tape transport speed, for example, are superimposed onto the video signals. The TBC function can correct these fluctuations and reproduce video signals with the correct time base.

6.1.6 Test patterns

These patterns employ video signals to serve as a reference for adjusting the contours and quality of images shown on video display units.

(1) Brightness

Using black as the reference, this pattern consists of 8 successive steps to represent increasing levels of brightness.

It is used to adjust the black level of display systems in such a way that the boundary between brightness levels 7 and 8 shown in the figure below is perceptible.

(2) Contrast

Using white as the reference, this pattern consists of 8 successive steps to represent decreasing levels of brightness.

It is used to adjust the white level of display systems in such a way that the boundary between brightness levels 1 and 2 shown in the figure below is perceptible.
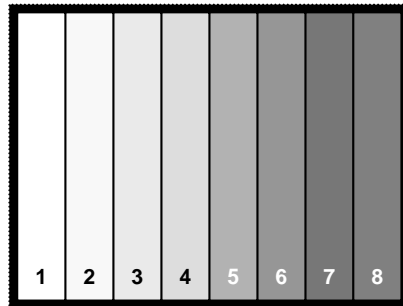

(3) Hue & color

In this pattern, the white level and black level are attenuated to 75% and 25%, respectively, for each of the RGB signals in the color bar signals. It is used to adjust the hue and colors of display systems.
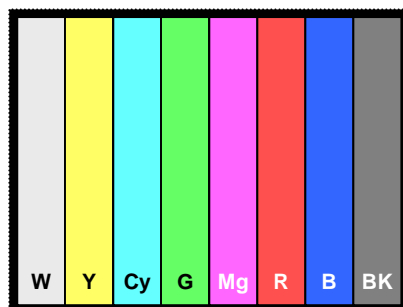
(4) Color bar

This signal pattern is used to check the color reproducibility. The colors are arranged in the following order of their brightness from the left: white, yellow, cyan, green, magenta, red, blue and black. The pattern is used to adjust the colors of display systems.
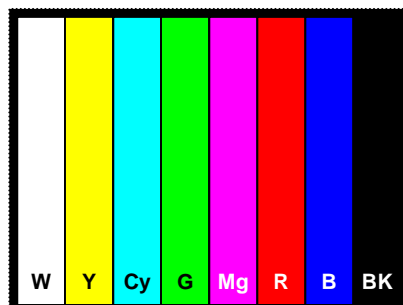
(5) Crosshatch

This signal pattern is used to check for image distortion in display systems. Horizontal and vertical lines are drawn at equal intervals, and they show how the patterns appear. The trapezoidal distortion and other forms of distortion in display systems are adjusted in such a way that the shapes of the squares appear uniform.

The pattern is also used to adjust the convergence in projectors with CRT tubes.
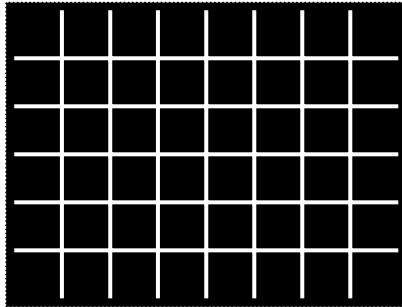
(6) Burst

This pattern is formed by alternately repeating a line of one white dot and a line of one black dot horizontally across the screen. In display units such as an LCD or DLP projector with a tracking adjustment function (for adjusting the sampling number within one scanning period), a high image quality can be obtained by adjusting in such a way that the white and black lines of the pattern are clearly differentiated.

Some projectors do not come with a tracking adjustment function.
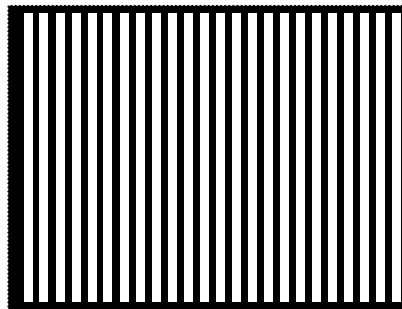
(7) Frame

The outer frame of the effective display period of the SC-2060 is displayed with one pixel and one line in this pattern. It is used to adjust the display position in such a way that the entire frame appears on the screen.

* With some display units, the outer frame may not fit neatly within the confines of the screen.

(8) White/red/green/blue

This pattern turns the entire screen white, red, green and blue.
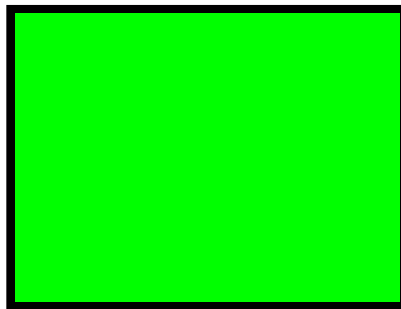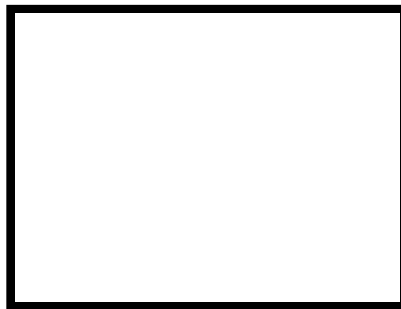
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