HD SDI TEST GENERATOR

SG-7802
Operational Manual

2000. 5.22

Ver 1 .0

Astrodesign, Inc.

Table of Contents

Introduction

Thank you very much for selecting the SG-7802, our HDTV SDI signal generator.

This manual explains the functions of the SG-7802 and provides operating and safety instructions that should be followed when using it.

Please be sure to read this manual to learn the proper use of the SG-7802 before using it, in order to avoid improper handling that may result in a hazard.

After reading this manual, please keep it in a safe place for future reference so it will not be lost.

Safety Instructions

⚠ WARNING

Power Cable

- When disconnecting the power cable from the receptacle, be sure to grasp the plug of the cable.
- Do not bend the power cable forcefully or bundle it while in use. Doing so may result in a fire hazard.
- Do not place a heavy item on the power cable. Doing so may damage the cable and result in a fire or an electric shock hazard.

Foreign Matters

- Do not spill any liquid or drop a flammable or metal item inside the equipment. Using the equipment under such conditions may result in damage to the equipment, a fire hazard, or an electric shock hazard.

⚠ CAUTION

Power Supply and Grounding

Use this equipment with a power supply of between 100 and 240 VAC. Grounding of this equipment is achieved through a two-pole, three-wire grounded power cable. Be sure to connect the power cable to a two-pole, three-wire grounded AC power outlet for safe use of the equipment.

Where to Install and Use the Equipment

No special care is necessary for use in a normal room. Avoid installing and using the equipment in places or areas as listed below, because doing so may result in damage to the equipment, or other hazards:

- Where ambient temperature exceeds the range between 0 and 40℃;
- Where ambient temperature exceeds the range between 30 and 80 ％RH;
- Near an air conditioning blowout where rapid changes in temperature or condensing can occur;
- Where direct sunlight may reach the equipment;
- Where sprays or drops of water, oil, and/or other chemicals can reach the equipment;
- Where vibrations are mediated by the floor;
- Where stable installation of the equipment can not be achieved; or
- Where the ventilation holes on the sides of the equipment can be covered, preventing proper airflow. These holes are provided to avoid an excessive internal temperature increase in the equipment. Be sure to avoid covering these holes. Doing so may result in damage to the equipment.

Exerting Shocks to the Equipment

- This is precision equipment. Exerting shocks to it may result in malfunctions or damage to the equipment. Be sure to take care when moving it.

In Case of an Error or Malfunction

- If an error or malfunction occurs, turn off the power by operating the power switch, unplug the power cable, and then contact your dealer or the sales group of Astrodesign, Inc.

Chapter 1. SG-7802

1.1 Overview

The SG-7802 is an HDTV SDI serial digital output signal generator that complies with BTA S-004A and SMPTE 292M standards.

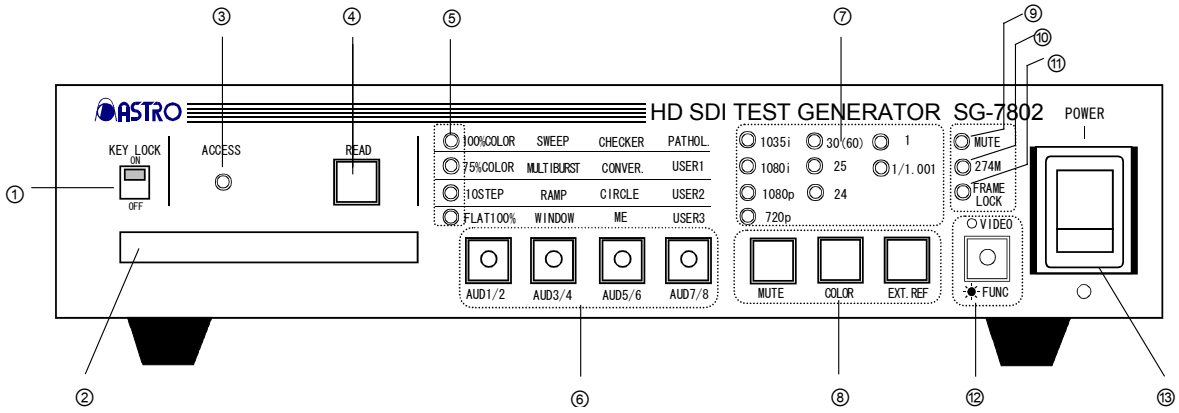
It supports multi-formats such as SMTPE 260M, 274M, and 296M. It can be driven by external sync signals and also display natural pictures.

1.2 Features

- The SG-7802 provides four systems of HDTV SDI outputs and one for each of YPbPr analog video output for the monitor, analog audio stereo output, and tri-level sync output.
- The unit frame-locks to external signals conforming to: SMTPE 240M/274M/296M, and PAL/NTSC formats.
- The output conforms to: SMTPE 260M/274M/296M.
- It supports 1035, 1080, and 720 lines displayed.
- Its standard video test signals include color bars, multi-burst, ramp waveforms, flat field, and others.
- It displays pictures that are loaded into the three user areas (USER1, USER2, and USER3) through the IC card function or USB connection.
- Eight channels (four channel pairs) of audio data can be set for the audio test signal with each channel generating sine waves in the range of 1 kHz to 8 kHz. In addition, one channel pair can be selected and used for analog output.
- Operation can be easily done on the front panel. Controls through the RS-232C interface are also possible.
- The memory function allows saving user settings. When the unit is turned on the next time, operation can resume from the settings in memory.

Chapter 2. Name and Function of Each Part

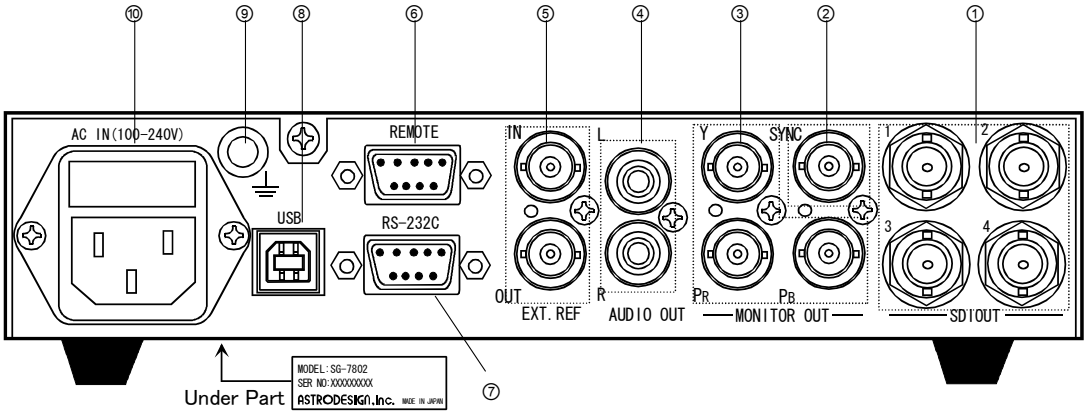
2.1 Front Panel



No.	Name	Description
①	KEY LOCK Switch	When turned ON, or RS-232C or USB communication is taking place, the LED is lit up and all switches except the POWER switch is locked.
②	IC Card Slot	Insertion and extraction of an IC card should be done slowly.
③	IC Card Access Lamp	It is lit up while accessing the IC card. Do not attempt a removal or insertion of the IC card while it is lit up, lest the card may be damaged.
④	READ Button	When selecting a pattern from USER1, USER2, or USER3, this button is used to read graphics data stored in the IC card.
⑤	Pattern LEDs	When an output pattern is selected from a row of patterns, the LED next to that row of patterns lights up. A pattern indicated by crossing of a row for which the Pattern LED is lit up and a column for which the LED of the Pattern Select button is lit up will be output.
⑥	Pattern Select Buttons	When the LED of the VIDEO/FUNC button is turned off, these four buttons can be used to select a test pattern. If one of these buttons is pressed, the LED of that button is lit up and each successive pressing on it selects the next item down the column above the button.
	Analog Audio Output Select Buttons	When the LED of the VIDEO/FUNC button is lit up, selections of analog audio output can be made. The LED of the button pressed lights up and the channel pair indicated below the button is selected.

⑦	Video Format LEDs	Each successive pressing of a Video Format Select button will select the next item down the column of available values above the button. The LED next to a selected item will light up.
⑧	Video Format Select Buttons	When the LED of the VIDEO/FUNC button is turned off, a video format can be set. Each successive pressing of one of these buttons will select the next item down the column above the button and the LED next to that item lights up.
	MUTE Button	When the LED of the VIDEO/FUNC button is lit up, pressing this button will cause the setting to switch between MUTE and NON MUTE and the MUTE LED to turn on and off.
	COLOR Button	When the LED of the VIDEO/FUNC button is lit up, pressing this button will cause the color format setting to switch between SMPTE274M and SMPTE240M and the 274M LED to turn on and off.
	EXT.REF Button	When the LED of the VIDEO/FUNC button is lit up, pressing this button will cause the setting to switch between external sync and internal sync and the FRAME LOCK LED to turn on and off. In addition, if this button is pressed for more than two seconds while frame-locked to external sync signal, H/V adjustment mode will be entered.
⑨	MUTE LED	This LED will light when MUTE has been selected. It will be turned off when NON MUTE has been selected.
⑩	274M LED	This LED will light when SMPTE274M has been selected. It will be turned off when SMPTE240M has been selected.
⑪	FRAME LOCK LED	This LED will light when external sync has been selected. It will be turned off when internal sync has been selected. However, if no external sync signal exists or can be frame-locked to, it blinks.
⑫	VIDEO/FUNC Button	By switching the modes between VIDEO and FUNC, functions of the buttons ⑥ and ⑧ are switched. While it is set to VIDEO (the LED of this button is turned off), video pattern selection and video format setting can be done. While it is set to FUNC (the LED of this button is lit up), settings for analog audio output, muting, color format, and external sync can be done. Further, pressing the VIDEO/FUNC button for more than two seconds will cause all the settings to be saved (memory function).
⑬	POWER Switch	It turns the power on to the system.

2.2 Back Panel



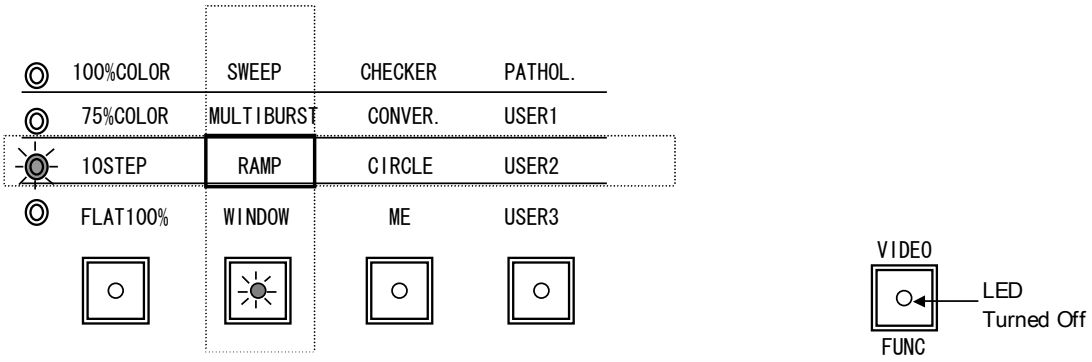
No.	Name		Description
①	SDI Output Connectors, 4Ch		They are used to output four channels of HDTV SDI signals.
②	Analog Tri-level Sync Output		It is for the tri-level sync output.
③	Analog Video Output Connectors (Y Pb Pr)	Y	It is for the Y output.
		Pb	It is for the Pb output.
		Pr	It is for the Pr output.
④	Analog Audio Output		It is for the analog audio output.
⑤	Reference Connectors		They are for input of sync signals (BBS/CS or tri-level sync) which will be the basis of the outputs. While the loop-out is not used, they are terminated at 75Ω.
⑥	REMOTE Connector		It is used for connecting with the Remote Box. (D-SUB, 9pin, female)
⑦	RS-232C Connector		It is a connector for external connections. (D-Sub, 9-pin, male)
⑧	USB Series B Connector		It is a connector for external connections.
⑨	Frame Ground Terminal		Use it to connect the unit to the ground level.
⑩	AC Power Connector		Connect the AC power cable supplied with the unit.

Chapter 3. **Operation**

3.1 Selecting a Test Pattern

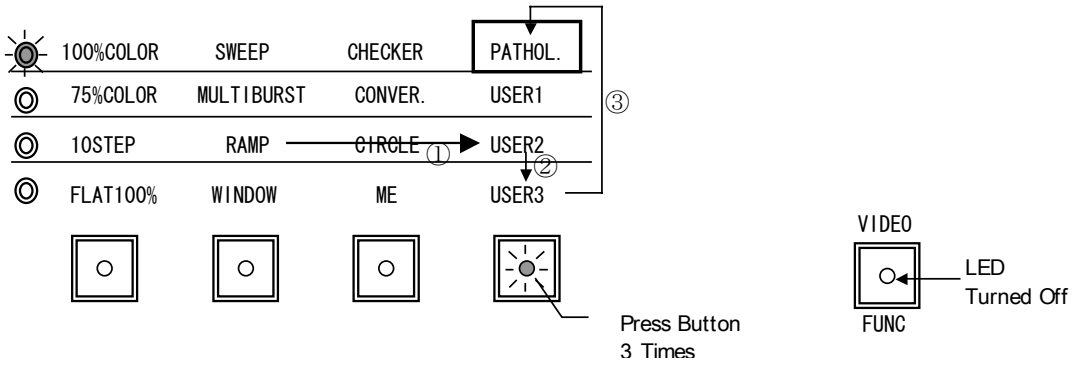
Selection of a test pattern can be performed while the LED of the VIDEO/FUNC button is turned off. In case the LED is lit up, press the VIDEO/FUNC button.

Successively pressing on one of the Pattern Select buttons will allow selecting the next pattern down the column that is located above the button being pressed.
The selected test pattern is indicated by crossing of a column for which the LED below it is lit up and a row for which the Pattern LED on the left is lit up. In the example shown in the diagram below, "RAMP" is currently selected.



Changing the patterns

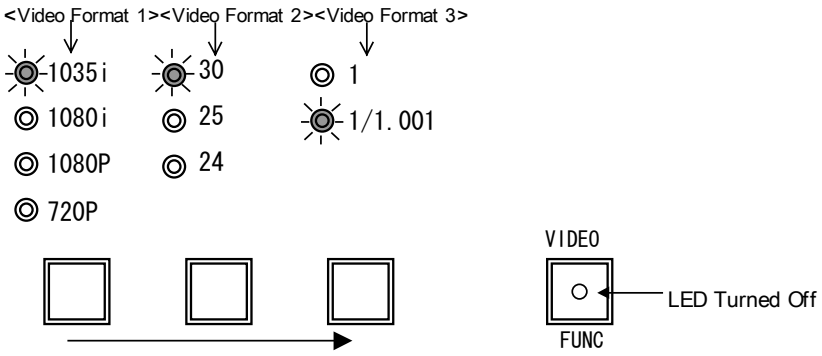
Pressing the button of the column with the next desired pattern will cause the pattern selection to be changed to the pattern in the new column but still in the same row as the previously selected pattern.
Pressing the same button in succession changes the selected pattern to the next one down in the same column, going up to the top row next when the bottom row is reached.
"RAMP" can be changed to "PATHOL." as shown below.



3.2 Setting the Video Format

Setting of the video format can be performed while the LED of the VIDEO/FUNC button is turned off. In case the LED is lit up, press the VIDEO/FUNC button.

Settings are made using the combination of the three columns: Video Format 1, Video Format 2, and Video Format 3.
A setting is started from the left most column to the right.
Pressing each of the buttons successively will allow selecting the next setting value down in the respective column and the LED corresponding to the value will be lit up.



The video formats supported by the SG-7802 are: SMPTE 260M, 274M, and 296M.
The combinations of values from the columns correspond to SMTPE standard settings as follows:

	Standard Setting	Frame Frequency	Video Format 1	Video Format 2	Video Format 3
SMPTE260M	1920*1035*30i	30Hz	1035i	30	1
		29.97Hz	1035i	30	1/1.001
SMPTE274M	1920*1080*30i	30Hz	1080i	30	1
		29.97Hz	1080i	30	1/1.001
	1920*1080*25i	25Hz	1080i	25	1
	1920*1080*24sF	24Hz	1080i	24	1
		23.98Hz	1080i	24	1/1.001
	1920*1080*30P	30Hz	1080P	30	1
		29.97Hz	1080P	30	1/1.001
	1920*1080*25P	25Hz	1080P	25	1
	1920*1080*24P	24Hz	1080P	24	1
		23.98Hz	1080P	24	1/1.001
SMPTE296M	1280*720*60P	60Hz	720P	30	1
		59.94Hz	720P	30	1/1.001

※ When changing the settings of video formats, the screen may become temporarily unstable.

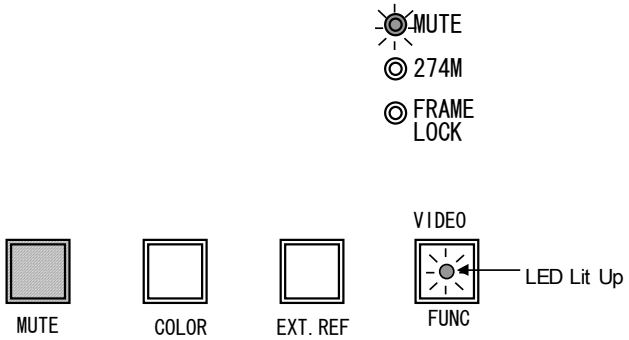
3.3 Selecting Analog Audio Output

Selection of audio test signals can be performed while the LED of the VIDEO/FUNC button is lit up. In case the LED is turned off, press the VIDEO/FUNC button.

A channel pair is selected for analog monitor output (L/R) from 1/2CH, 3/4CH, 5/6CH, and 7/8CH.
The channel pair indicated by the lit LED is currently selected. In the diagram of example below, 7/8CH is selected.

3.4 Muting the Audio

The audio can be set to MUTE mode while the LED of the VIDEO/FUNC button is lit up. In case the LED is turned off, press the VIDEO/FUNC button.

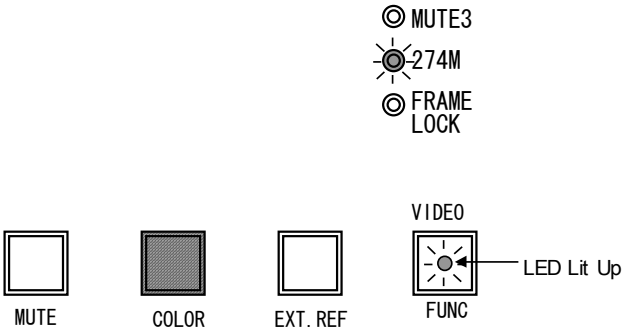


Each pressing on the MUTE button switches the setting between MUTE and NON MUTE.

Setting	MUTE LED	Output Level
MUTE	On	No Sound
NON MUTE	Off	-20 dBFS

3.5 Setting the Color Format

Color format setting can be changed while the LED of the VIDEO/FUNC button is lit up. In case the LED is turned off, press the VIDEO/FUNC button.



Each pressing on the COLOR button switches the setting between SMPTE240M and SMPTE274M.

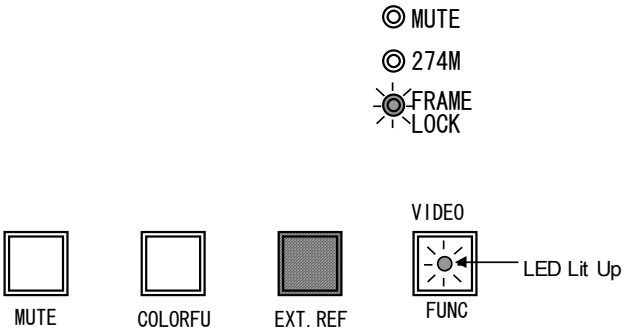
Setting	274M LED
SMPTE274M	On
SMPTE240M	Off

※ The color format settings of USER1, USER2, and USER3 can not be changed from what were set when the graphics data were read. For the method of setting the color format during read operation, please refer to "**3.7 IC Card Function**".

3.6 External Sync Function

3.6.1 Setting the Sync Mode

Setting the sync mode can be performed while the LED of the VIDEO/FUNC button is lit up. In case the LED is turned off, press the VIDEO/FUNC button. In external sync mode, outputs can be made in sync with the external sync signal.



Each pressing on the EXT.REF button switches the setting between external sync and internal sync.

Setting	FRAME LOCK LED
External Sync Mode	On (while frame-locked on external signal)
	Blinking (No external signal or timing mismatch)
Internal Sync Mode	Off

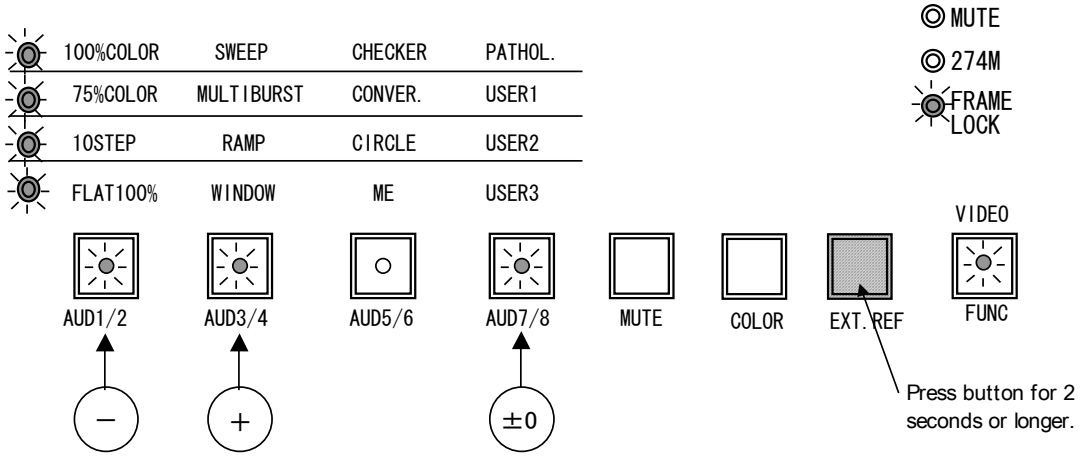
3.6.2 H/V Phase Adjustment

H/V phase can be adjusted while the SG-7802 is frame-locked on external signal. The adjustable range is +/-5 lines (by 1 dot).

Procedure to Adjust H/V Phase

1. H/V phase adjustment requires the VIDEO/FUNC button to be lit up. If it is turned off, please press the button.

2. While frame-locked on external signal (FLAME LOCK LED is lit up), pressing the EXT.REF button for a relatively long time (approximately two seconds) will cause the unit to be in H/V phase adjustment mode and all the Pattern LEDs to light up.



3. The adjustment is done with the buttons: AUD1/2, AUD3/4, and AUD7/8. The AUD1/2 button is used to decrease the phase value and the AUD3/4 button to increase. The AUD7/8 sets the value to +/-0.
   While in H/V phase adjustment mode, the LEDs of these three buttons will light up, however depending on the phase value set one of the LEDs will be turned off:
   When the phase value is set to “minimum”, the AUD1/2 LED will be turned off;
   When the phase value is set to “maximum”, the AUD3/4 LED will be turned off; or
   When the phase value is set to “+/-0”, the AUD7/8 will be turned off.
   The button whose LED is turned off is disabled.

4. Pressing the EXT.REF button again for a relatively long time (approximately two seconds) will cause the H/V phase adjustment mode to end and the LEDs to return to their previous states.

5. While in H/V phase adjustment mode, pressing the EXT.REF button to switch to internal sync will cause the H/V phase adjustment mode to end and the LEDs to return to their previous states (The FRAME LOCK LED will be turned off.)
   Additionally, while in H/V phase adjustment mode, if the external signal is lost or timing mismatch occurs, the H/V phase adjustment mode will be ended and the LEDs will return to their previous states (The FRAME LOCK LED will start blinking.)

※ When switching the setting between external sync and internal sync or adjusting the phase, the screen may become temporarily unstable.

3.7 IC Card Function

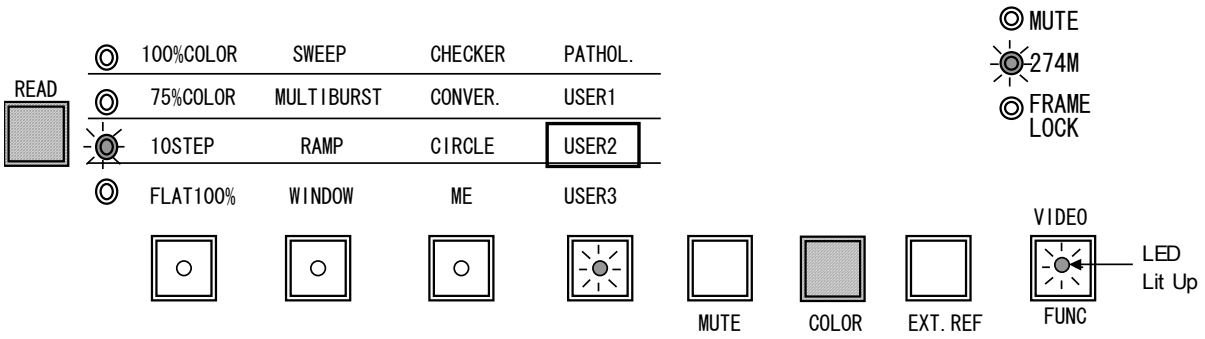
The IC card function is available to read and display graphics data from an optional IC card that may be purchased separately.

If a graphics data is read from an IC card, it will be stored, by overwriting what may have been already in the memory, in one of the user pattern areas available: USER1, USER2, and USER3.

The color format needs to be changed, if so desired, before performing the read operation.

Procedure to read from an IC card

1. Insert an IC card.
2. Select a user pattern to be overwritten from “USER1”, “USER2”, and “USER3”.
   The color format set for the selected user pattern will be indicated by the 274M LED. (If the LED is off, it is set to SMPTE240M; if on, SMPTE274M.)
3. If no color change is desired, press the READ button.



4. To change the color format, follow the procedure below:
   ① While the user pattern to be overwritten is selected, press the VIDEO/FUNC button for FUNC mode (LED on).
   ② Press the COLOR button to change the color format (the 274M LED will light up or be turned off).
   ③ Then press the READ button to write the graphics data from the IC card with the selected color format. (Pressing the VIDEO/FUNC button before the READ button is pressed, the new setting will be thrown away.)
5. While reading from the IC card or writing the pattern, a Pattern LED and a Pattern Select LED will blink. In addition, the graphics data of the IC card will be written to the corresponding user pattern. The following table shows the correspondence:

Selected Pattern	IC Card
USER1	Graphics Data ① will be read.
USER2	Graphics Data ② will be read.
USER3	Graphics Data ③ will be read.

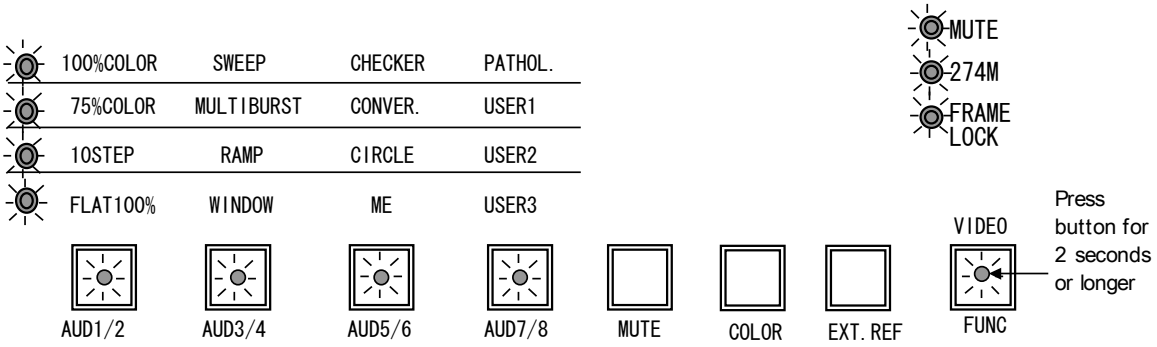
(NOTE) To avoid errors in operation, please do not leave the IC card in the slot while it is not used.

3.8 Memory Function

This function is used to save all settings made in memory. When the SG-7802 is powered on the next time, the unit can be used with all the saved settings turned on.

Procedure to Save Settings in Memory

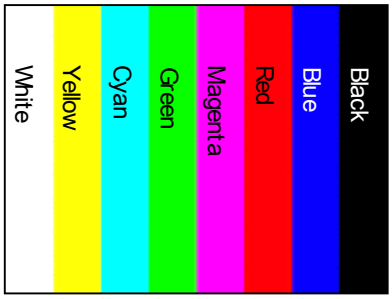
1. Pressing the VIDEO/FUNC button for a relatively long time (approximately two seconds) will cause all LEDs to light up to indicate that saving all settings in memory has been completed.



2. When saving settings to memory is finished, all LEDs will return to their previous states.

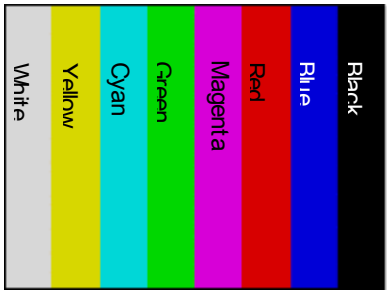
Chapter 4. Test Patterns

(1) 100% Color Bars

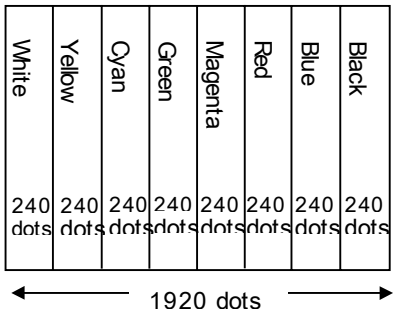


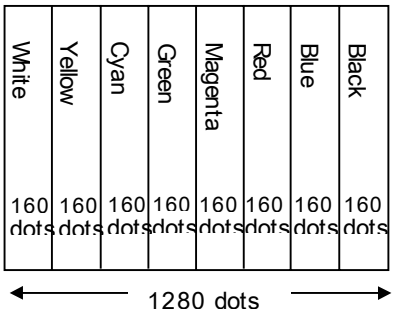
Placement： (from the left) white, yellow, cyan, green, magenta, red, blue, and black
(All colors set to 100%)

(2) 75% Color Bars

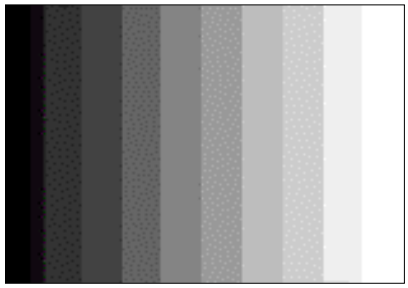


Placement： (from the left) white, yellow, cyan, green, magenta, red, blue, and black
(All colors set to 75%)



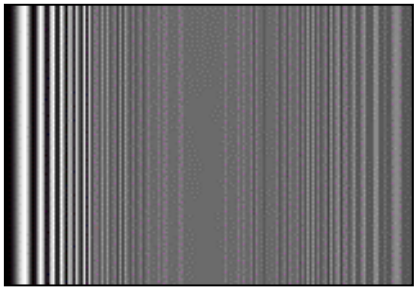


(3) 10-Step Staircase



(4) 100% Flat Field

(5) Sweep



(6) Multi-burst

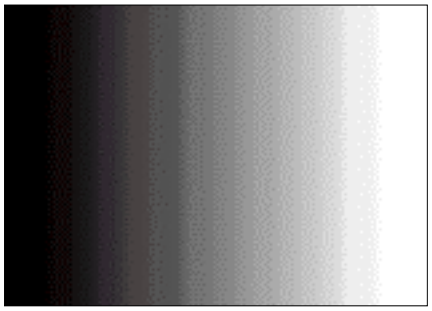
White Bar	50 %	1 MHz	50 %	5 MHz	50 %	10 MHz	50 %	15 MHz	50 %	20 MHz	50 %	25 MHz	50 %	30 MHz
219 dots	24 dots	219 dots	24 dos	219 dots	24 dots	219 dots	24 dots	219 dots	24 dots	219 dots	24 dots	219 dots	24 dots	219 dots

1920 dots

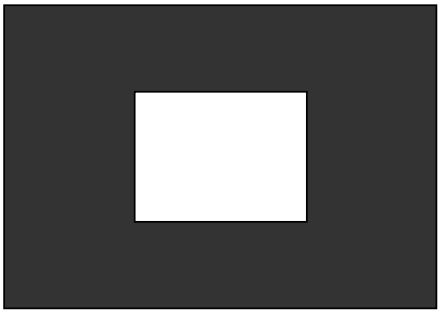
White Bar	50 %	1 MHz	50 %	5 MHz	50 %	10 MHz	50 %	15 MHz	50 %	20 MHz	50 %	25 MHz	50 %	30 MHz
146 dots	16 dots	146 dots	16 dots	146 dots	16 dots	146 dots	16 dots	146 dots	146 dots	146 dots	16 dots	146 dots	16 dots	146 dots

1280 dots

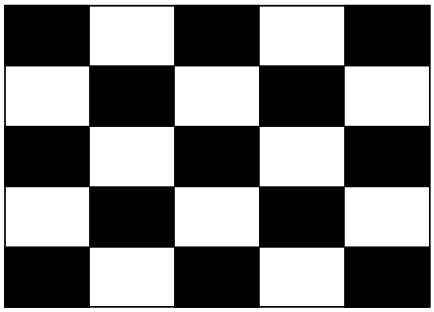
(7) Ramp



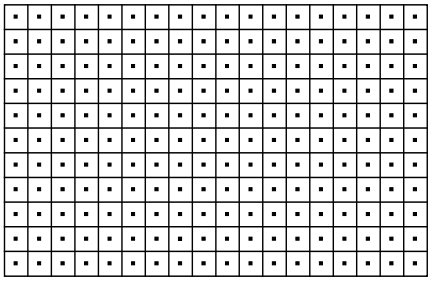
(8) Window



(9) Checker



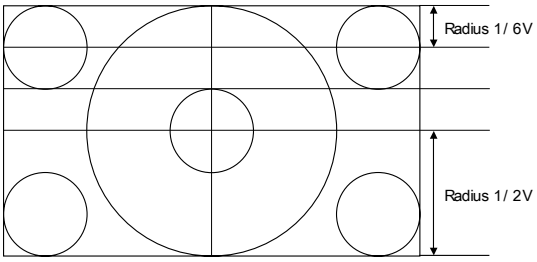
(10) Convergence



Line Width: 2 dots

1920×1035	18 ×10 divisions
1920×1080	18 ×11 divisions
1280×720	18 ×11 divisions

(11) Circles



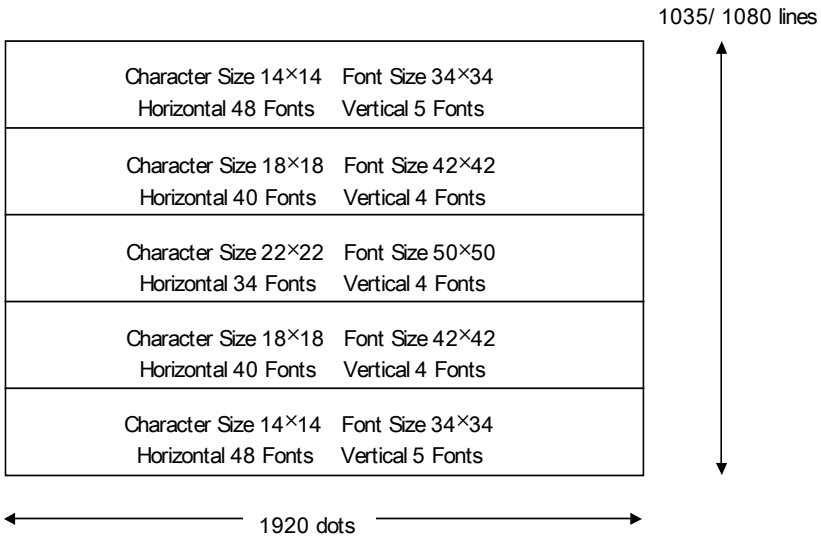
Radius 1/2V × 1 Radius 1/6V × 5

(12) ME Characters

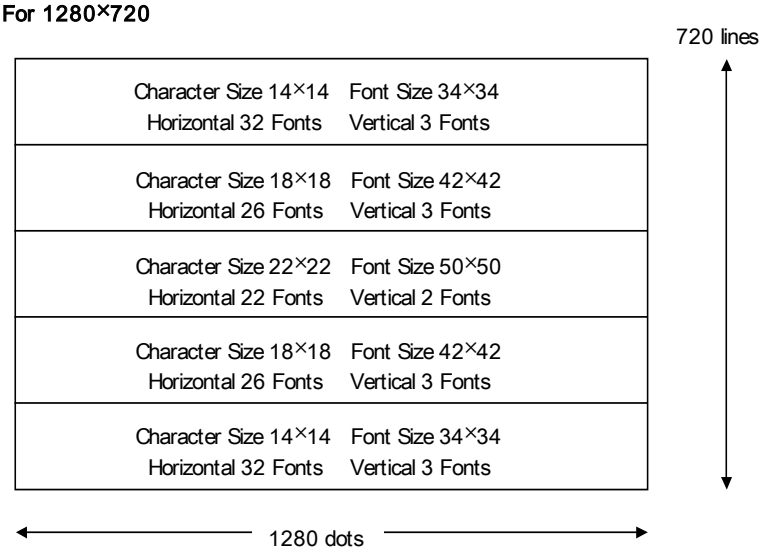
The ME characters of three sizes, 14×14, 18×18, and 22×22, are placed on the screen as shown in the following diagrams.

Four of the characters of the same size are grouped as a font, which is placed, according to the different sizes, by the numbers vertically and horizontally as shown in the diagrams to form the rectangular blocks. These blocks are placed symmetrically in the vertical direction to cover the screen.

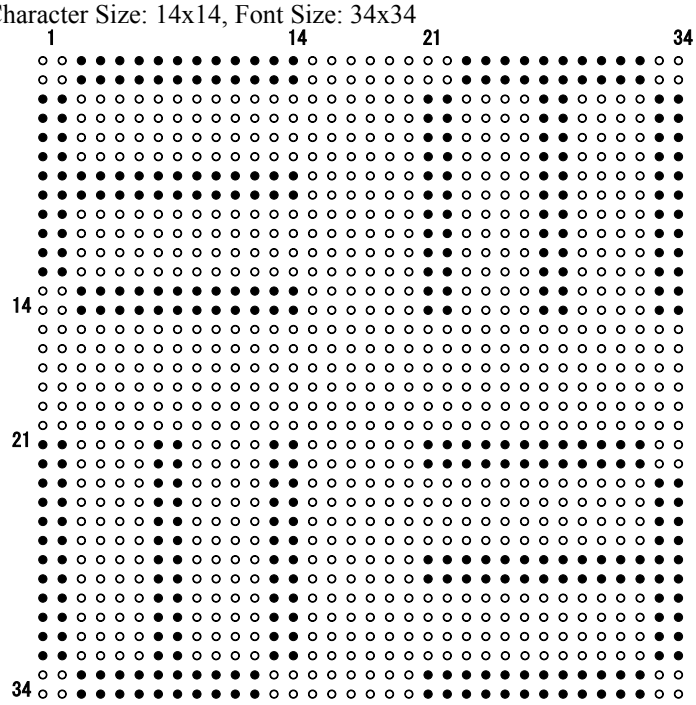
For 1920×1035 and 1920×1080



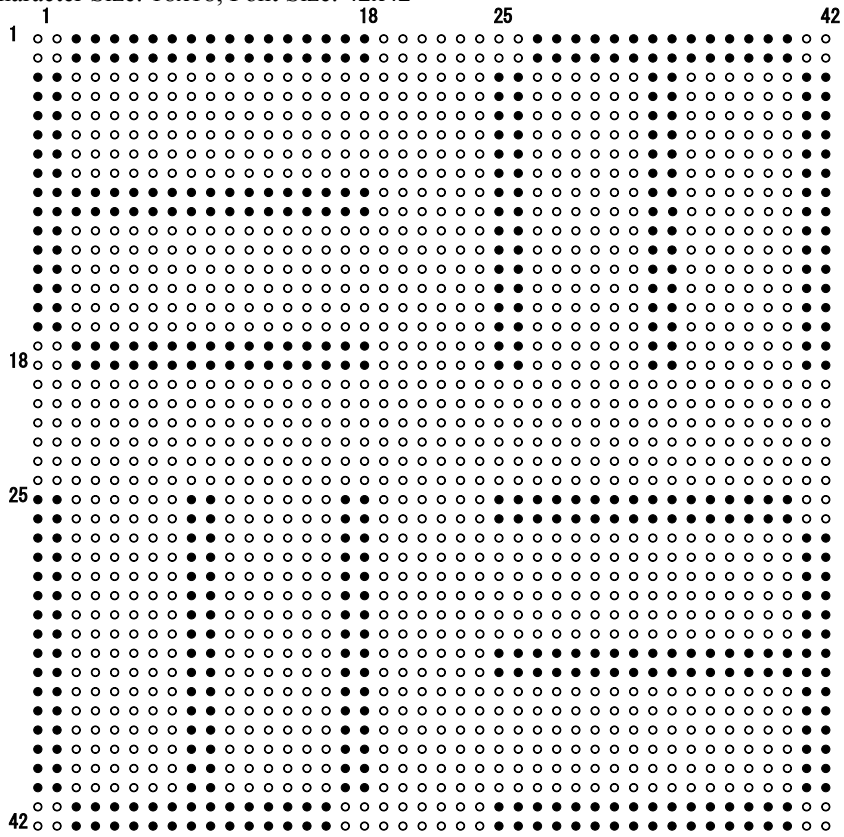
For 1280×720



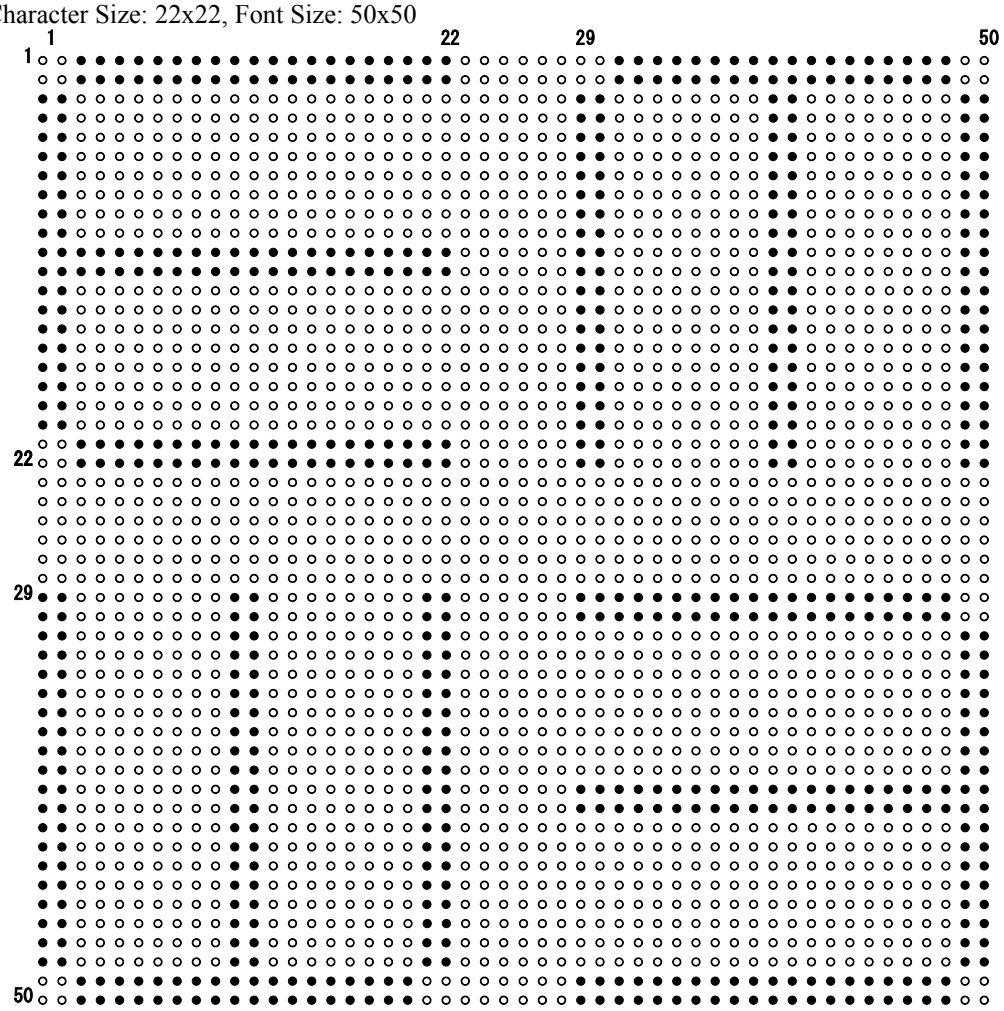
Character Size: 14x14, Font Size: 34x34



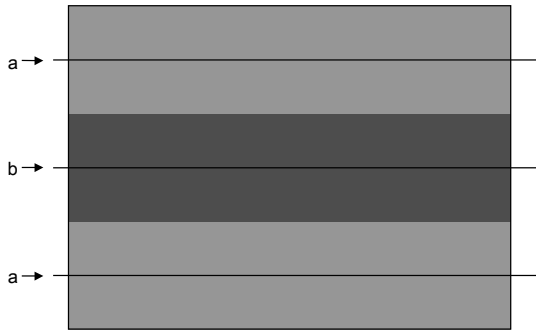
Character Size: 18x18, Font Size: 42x42



Character Size: 22x22, Font Size: 50x50



(13) Pathological



a	Y：408D(198H)　Pb,Pr：768D(300H)
b	Y：272D(110H)　Pb,Pr：512D(200H)

(14) USER1

Monoscope (1920×1080)※

(ITE Hi-Resolution Chrat for Hi-Definition TV Systems)

(15) USER2

Circular Zone (1920×1080)※

(16) USER3

Yacht Harbor ※

(ITE Hi-Vision Standard Test Pictures)

※ USER1 ～ USER3 can be overwritten by other graphics data from IC cards (purchased separately) or through USB.

Chapter 5. IC Card

5.1 Compatible IC Cards

MITSUBISHI	MF00□□M-03BTXX Series
HITACHI	HB289□□□A4 Series

5.2 IC Card Capacity and Number of Graphics Files Storable

IC Card Capacity	Number of Files Storable	
30/32 MB	3	
45/48 MB	5	※
60/64 MB	7	※
75/80 MB	9	※
90/96 MB	11	※
120/128 MB	14	※

※ If four or more graphics files are stored, the fourth and the later files can only be downloaed by using the command to communicate with IC cards. For details, please refer to "SG-7802 Command Reference".

5.3 Available Picture Data

	Picutre Name	File Name
ITE Hi-Vision Standard Test Pictures	Yacht Harbor	YACHT
ITE Hi-Resolution Chart for Hi-Definition TV Systems	Monoscope (1920×1080)	MONO1080 ＊
	Monoscope (1920×1035)	MONO1035
	Monoscope (1280×720)	MONO720
Circular Zones	1920×1080	CZP1080 ＊
	1920×1035	CZP1035
	1280×720	CZP720

＊: These are pre-loaded in the SG-7802 as standard.

Chapter 6. Main Specifications

6.1 Input/Output Signals

Item	Specification	
Scan Method	SMPTE-260M (1920×1035i), SMPTE-274M (1920×1080i/sF/p), SMPTE-296M (1280×720p)	
Frame Frequencies	60.00/59.94/30.00/29.97/25.00/24.00/23.98 Hz	
Digital Output Signal	Video	SMPTE-292M, 1.485 Gbits/s
	Audio	SMPTE-272M. 48 kHz, 24 bits/ch
Analog Output Signal	Video	YPbPr: Y (0.7 V), Pb Pr (+/-0.35 Vpp) Sync: Tri-level (+/-0.3 V)
	Audio	CH1: 1 kHz / CH2: 2 kHz / CH3: 3 kHz / CH4: 4 kHz CH5: 5 kHz / CH6: 6 kHz / CH7: 7 kHz / CH8: 8 kHz Level: -20 dBFS
	Tri-level Sync Signals	Positive Pulse Width: 593.0ns+/-40.0ns, -300mV +/-6.0mV Negative Pulse Width: 593.0ns+/-40.0ns, -300mV +/-6.0mV
External Sync Signal	Scan Method	SMPTE 240M/274M/296M, and PAL/NTSC
	Input Signal Level	+/-6 dB or less
	Lock Range	+/-50 ppm or more
	Lock Jitter	+/-5 ns (1125) or more, +/-30 ns (525) or more
	Adjustable Range	+/-5 lines (by 1 dot)

6.2 General Specifications

Item	Specification
Power Consumption	30 W (60 VA)
Heat Generated	26 kcal
Supply Voltage	100 V～240 VAC (50/60 Hz)
Operating Temperatrue Range	0～40 ℃ (non-condensing)
Operating Humidity Range	30～80 %RH (non-condensing)
External Measurements	210(W)×44(H)×370(D) mm (excluding protrudings)
Weight	Approximately 2 kg

6.3 Accessories

AC Power Cable	1 piece
AC Power Adapter	1 piece
CD-ROM (Graphics Data)	1 piece
Instructions (Operational Manual/Command Referecne)	1 set

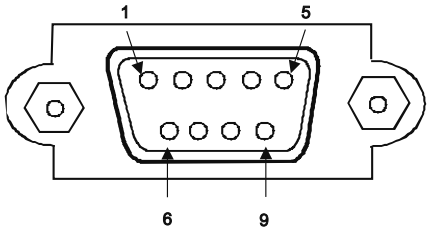
6.4 RS-232C Port

6.4.1 RS－232C Specifications

Transfer Rate	9600 bps
Communication Method	Full-duplex Communication
Start Bit	1 bit
Data Length	8 bits
Stop Bit	1 bit

6.4.2 Connector Specifications

Type: D-Sub 9-Pin (Male)



Pin #	I/O	Signal
1	-	NC
2	I	TXD, Transmit Data
3	O	RXD, Receive Data
4	-	DSR
5	-	SG, Signal Ground
6	-	DTR
7	I	CTS, Ready to Send
8	O	RTS, Request to Send
9	-	NC

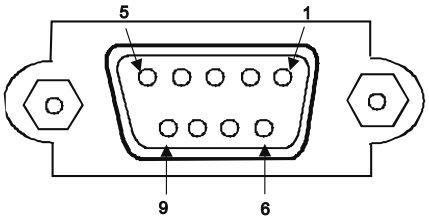
6.5 Remote Port

6.5.1 Remote Port Specification

Method	Matrix Contact Method

6.5.2 Connector Specifications

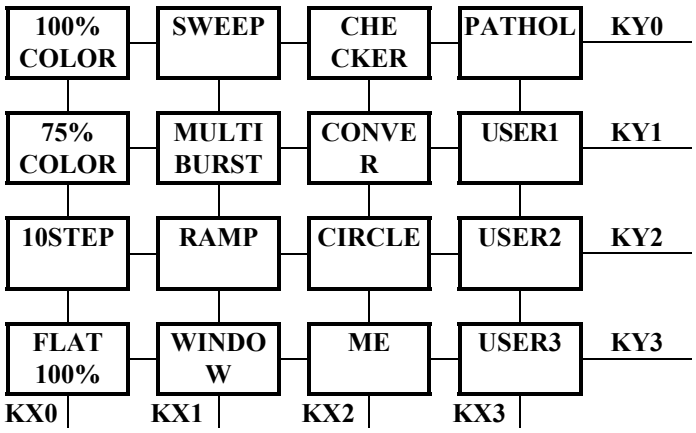
Type: D-Sub 9-Pin (Female)



Pin #	I/O	Signal
1	I	KX0
2	I	KX1
3	I	KX2
4	I	KX3
5	-	GND
6	O	KY0
7	O	KY1
8	O	KY2
9	O	KY3

Pins 1 to 4 are pulled up inside the SG-7802.

The relationships between the signals and the key contacts of the Remote Box (optional) form a matrix as shown below.



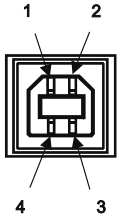
6.6 USB Port

6.6.1 USB Port Specification

Specification	USB Specification Revision 1.1
Data Rate	12 Mbps (full-speed mode)

6.6.2 Connector Specifications

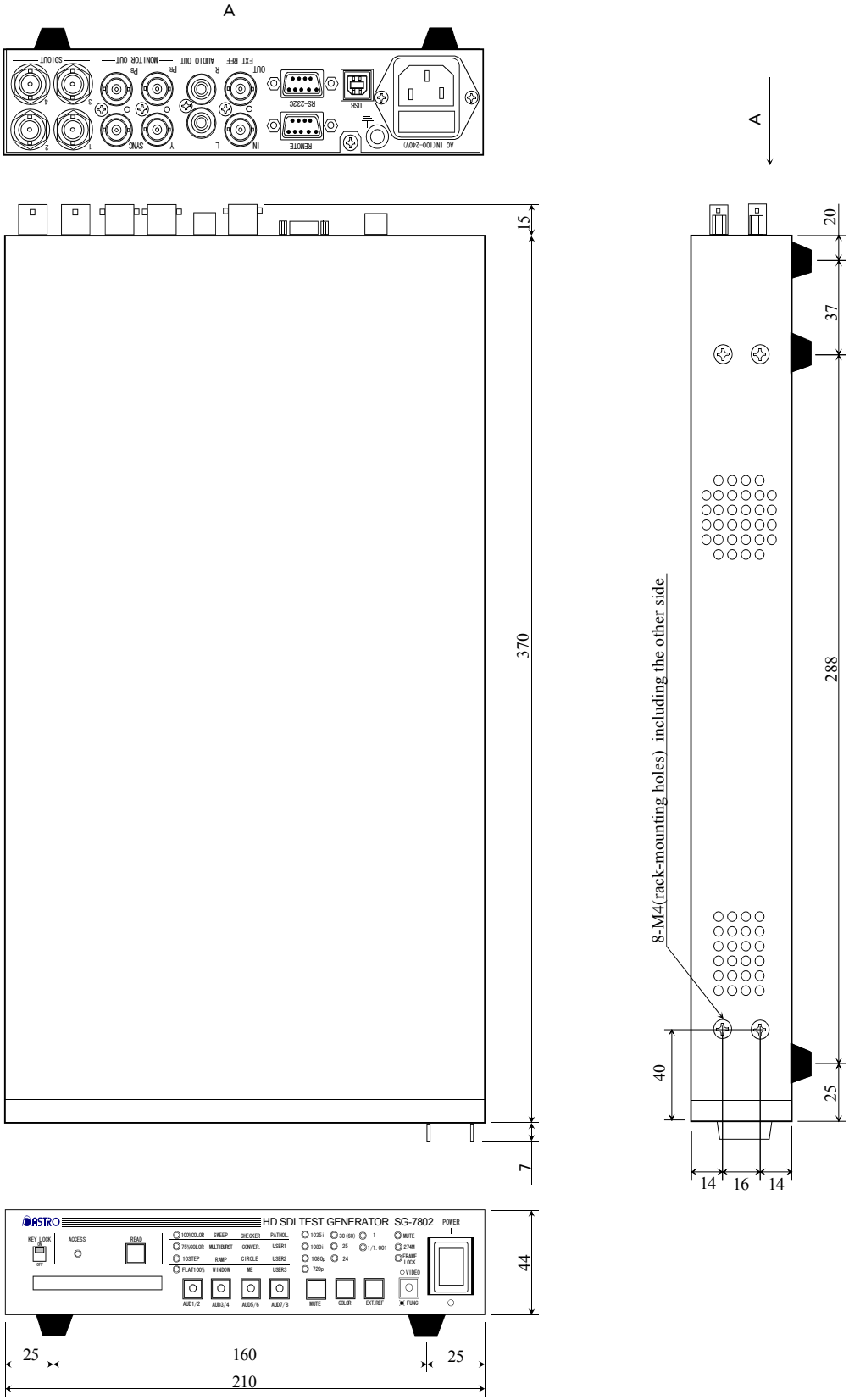
Type: USB (Series B)



Pin #	I/O	Signal
1	-	Vbus
2	I/O	D-
3	I/O	D+
4	-	GND

Vbus (power supply from host side) is not used.

6.7 External Drawing



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SG-7800 Operational Manual **NoC07802-0-C00-47-01-0**

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