SYNC GENERATOR

# SL-7036

## Operating Manual

**2001. 9. 20**

Ver 1.00

**Astrodesign, Inc.**

# Table of Contents

# Introduction

Thank you very much for selecting the SL-7036, our Sync Generator.
This manual explains the functions of the SL-7036 and provides operating and safety instructions that should be followed when using it.
In order to avoid improper handling that may result in a safety hazard, please be sure to read this manual thoroughly before using the product to learn the proper method of operation.
After reading this manual, please keep it in a safe place for future reference so it will not be lost.

# Safety Introduction

## ⚠ WARNING

### AC Cable and AC Adapter

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

### Foreign Matter

- Do not allow any liquid to be spilled or any flammable or metal objects to be dropped inside the equipment. Using the equipment under such conditions may result in damage to the equipment, a fire, or an electric shock.

### Disassembly of Product

- Do not disassemble the equipment. If a customer tries to open the enclosure or to remove or replace internal boards, it may cause an electric shock, personal injury or malfunction of the equipment.

# ⚠ CAUTION

## Power Supply

Use this equipment with a power supply of 12V DC (with the AC cable and the AC adapter that are supplied).

## 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 the places or areas listed below, because doing so may result in damage to the equipment, or other safety hazards:

- Where ambient temperature falls outside the range between 5 and 40ºC
- Where ambient humidity falls outside 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 transmitted by the floor
- Where stable installation of the equipment cannot be achieved
- Where the ventilation holes on the sides of the equipment may 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 sudden jolts to it may result in malfunction 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, unplug the power cable and then contact your dealer or the Astrodesign, Inc. sales group.

# 1 SL-7036

## 1.1 General

The SL-7036 is a sync signal converter and distributor which is capable of providing up to 12 distributions of sync signal which is synchronized with an external reference input. When operated as a standalone unit, it can be used as a sync signal generator as well.

SDTV format BBS signals or HDTV format tri-level CS signals can be input to the equipment as external reference.

Two output channels (maximum six distributions per channel) are available. The channels can simultaneously output signals selected individually for each channel from SDTV BBS, HDTV tri-level CS, and SDTV Slow-PAL that is synchronized for the external reference.

If frame rates between the external reference input and the output sync signal are matched, adjustment of the lock phase is available. Even if frame rates are not matched between the external reference input and the output sync signal, the output can be locked to the external reference signal at the least common multiple of the frame rates.

## 1.2 Features

- Genlock Phase Adjustment

  When frame rates between the output sync signal and the external reference input are matched, the lock phases of selected output signals can be adjusted independently of each other.

- Locking Between Signals with Different Frame Rates

  If frame rates between the output sync signal and the external reference input are not matched, the sync signal can be output while being locked to the reference signal at the least common multiple of the frame rates.

- Function to Generate Sync Signals

  The equipment can be operated as a standalone unit to generate sync signals according to the internal reference clock.

- Function to Select Output Signal

  Output signals can be selected from two types of formats, NTSC or PAL, for SDTV BBS signals, 18 types of formats in SMPTE-274M/ SMPTE-296M for HDTV tri-level CS signals, and 2 types of formats in Slow-PAL for SDTV CS signals.

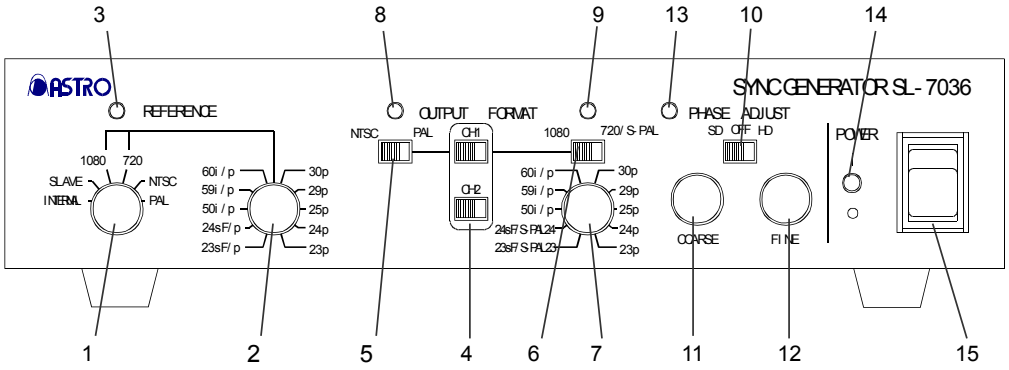
  Two output channels (maximum six distributions per channel) are available and the output format can be set independently for each channel.

- Digital Clock Input and Output

  Thanks to the input and output function of the internal digital clock, multiple units of the SL-7036 can be operated at the same digital clock.

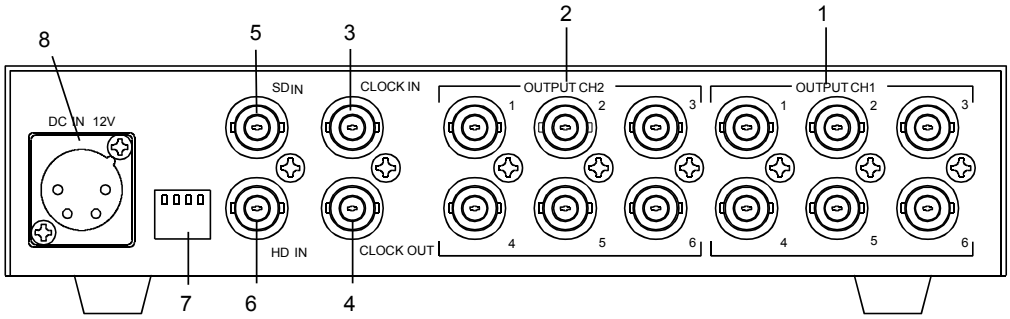
# 2 Name and Function of Each Part

## 2.1 Front Panel




| No | Name | Description |
|---|---|---|
| 1 | REFERENCE Selection Dial | The reference clock, from which to generate output signals, or the operation mode is selected with this dial. |
| 2 | REFERENCE SMPTE Selection Dial | When an HDTV tri-level CS signal is input as an external reference, input format is selected with this dial. |
| 3 | REFERENCE LED | When selections made with REFERENCE Selection Dial and REFERENCE SMPTE Selection Dial are matched to the input of an SDTV BBS signal or an HDTV tri-level CS signal, this LED is turned on (green); when not matched, it flashes (green). |
| 4 | Output Format Selection CH1 Switch and CH2 Switch (SDTV⇔HDTV + Slow-PAL) | Output format for each output channel (CH1/CH2) is selected with these switches.<br>When turned to the left, an SDTV BBS signal is selected; when turned to the right, an HDTV tri-level CS signal or an SDTV CS signal Slow-PAL is selected. |
| 5 | Output Format Selection NTSC⇔PAL Switch | When output is set to an SDTV BBS signal, format is selected between NTSC and PAL with this switch. |
| 6 | Output Format Selection 1080⇔720/S-PAL Switch | When output is set to an HDTV tri-level CS signal or Slow-PAL, output format is selected according to the combination of this switch and SMPTE selection dial. |
| 7 | Output Format SMPTE Selection Dial | When output is set to an HDTV tri-level CS signal or Slow-PAL, output format is selected according to the combination of this switch and 1080⇔720/S-PAL switch. |
| 8 | SD Output LED | This LED indicates the lock status of the SDTV BBS signal output. |
| 9 | HD Output LED | This LED indicates the lock status of the HDTV tri-level CS signal output or the SDTV CS signal Slow-PAL output. |
| 10 | Phase Adjustment SD⇔HD Switch | The output signal as the subject of lock phase adjustment is selected with this switch. |
| 11 | COARSE Phase Adjustment Dial | Lock phase adjustment (coarse adjustment) is executed with this dial. |
| 12 | FINE Phase Adjustment Dial | Lock phase adjustment (fine adjustment) is executed with this dial. |
| 13 | Lock Phase Adjustment Status LED | This LED indicates the status of lock phase adjustment by lighting up in red or green. |
| 14 | Power LED | This LED is turned on (green) while power is turned on. |
| 15 | Power Switch | Power is turned ON or OFF with this switch. |

# 2.2 Back Panel




| No | Name | Description |
|---|---|---|
| 1 | OUTPUT CH1 1-6 | The sync signal of the format set for CH1 is distributed from these six output ports. |
| 2 | OUTPUT CH2 1-6 | The sync signal of the format set for CH2 is distributed from these six output ports. |
| 3 | CLOCK IN | The digital clock is input into this port. |
| 4 | CLOCK OUT | The digital clock is output from this port. |
| 5 | SD IN | External reference (SDTV BBS signal) is input into this port. |
| 6 | HD IN | External reference (HDTV tri-level CS signal) is input into this port. |
| 7 | DIP Switch | Use or nonuse of Setup level (available for only NTSC) is set with this switch. |
| 8 | DC Power Connector | The AC adapter supplied with the product is connected to this connector. |

# 3 Connection

## 3.1 Connection to Power Supply

Connect the AC adapter supplied with the product to the power connector.

## 3.2 Connection of Reference Signals

### SDTV Reference Signals

NTSC-BBS signals or PAL-BBS signals can be input.

Connect the signal to the SD IN terminal.

### HDTV Reference Signals

Tri-level CS signals in the formats of SMPTE-274M and SMPTE-296M can be input.

Connect the signal to the HD IN terminal.

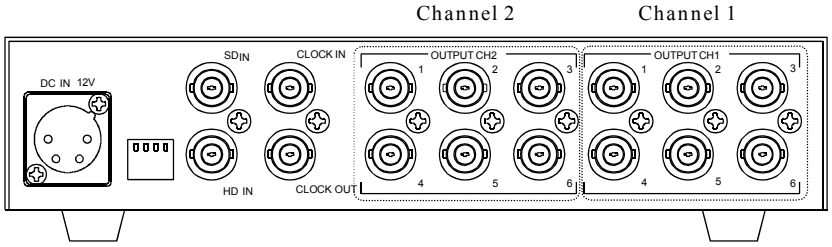
## 3.3 Connection of Output Channels

Two output channels are available and connections for up to six distributions for each channel are available.

The formats of the output signals can be set independently for CH1 and CH2 by operating the front panel.

If the same output format is selected for both channels, a maximum of 12 distributions of the same output will be available.

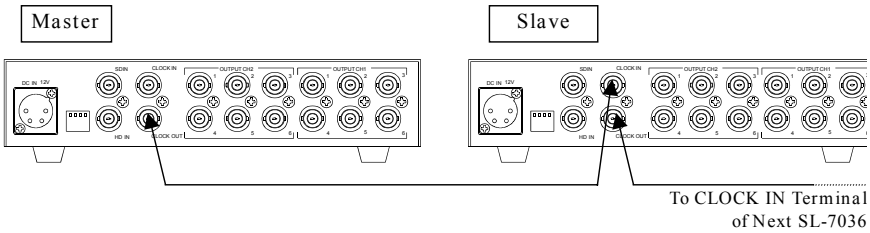
Refer to p4-3
4.1.2 Output Format Selection



# 3.4 Connection of Clock Input and Output

By connecting multiple units of the SL-7036 together to operate on the same digital clock, more than 12 distributions will be available.

Refer to p5-4
5.4 Increase Number of Distributions




The unit that generates the reference clock will be the master and the unit that operates based on the external clock input will be the slave.

The CLOCK OUT terminal of the maser unit and the CLOCK IN terminal of the slave unit are connected with a BNC cable.

When more than one slave unit is connected, the clock connection must be made in such a way that every two adjacent slaves are connected from the CLOCK OUT terminal of the one closer to the master to the CLOCK IN terminal of the next.

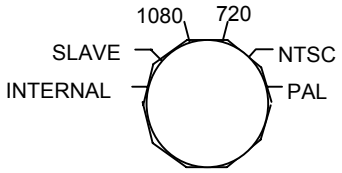
# 4 Operation Method of Dials and Switches

## 4.1 Front Panel

### 4.1.1 Reference Selection

#### (1) Reference Selection Dial

The reference clock, from which to generate output signals, or the operation mode is selected with this dial.



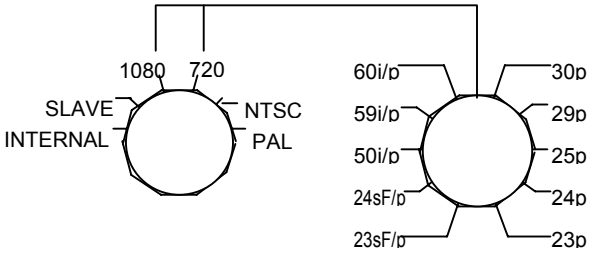

| Item | Function |
|---|---|
| INTERNAL | Select this for standalone operation.<br>The output sync signal will be generated from the internal clock. |
| SLAVE | Select this when the unit is going to be used as a slave in a multiple SL-7036 configuration which will be operated on a single digital clock.<br>The output sync signal will be generated from the external clock input. |
| 1080 or 720 | Select this to input an HDTV tri-level CS signal as the external reference signal.<br>The output sync signal will be generated from the clock signal which is synchronized with an external reference signal input to the HD IN terminal. "1080" provides "SMPTE-274 format"; and "720" provides "SMPTE-296M format." The frame format can be selected with the SMPTE selection dial on the right. |
| NTSC | Select this to input an NTSC-BBS signal as the external reference signal. The output sync signal will be generated from the clock signal which is synchronized with an NTSC-BBS signal input to the SD IN terminal. |
| PAL | Select this to input a PAL -BBS signal as the external reference signal. The output sync signal will be generated from the clock signal which is synchronized with a PAL -BBS signal input to the SD IN terminal. |

Refer to p4-2
4.1.1(2) SMPTE Selection Dial

## (2) SMPTE Selection Dial

When "1080" or "720" is selected with the REFERENCE selection dial, the SMPTE selection dial is used to select the frame format of the HDTV tri-level CS signal.

Please note that the items indicated to the left of the dial mean, for instance, if "60i/p" is selected, that the unit operates on "60i" when "1080 (SMPTE-274M)" is selected and on "60p" when "720 (SMPTE-296M)" is selected.




When "1080" is selected:

| Item | Frame Format |
|---|---|
| 60i/p | SMPTE-274M 60i |
| 59i/p | SMPTE-274M 59.94i |
| 50i/p | SMPTE-274M 50i |
| 24sF/p | SMPTE-274M 24sF |
| 23sF/p | SMPTE-274M 23.98sF |

| Frame Format | Item |
|---|---|
| SMPTE-274M 30p | 30p |
| SMPTE-274M 29.97p | 29p |
| SMPTE-274M 25p | 25p |
| SMPTE-274M 24p | 24p |
| SMPTE-274M 23.98p | 23p |

When "720" is selected:

| Item | Frame Format |
|---|---|
| 60i/p | SMPTE-296M 60p |
| 59i/p | SMPTE-296M 59.94p |
| 50i/p | SMPTE-296M 50p |
| 24sF/p | SMPTE-296M 24p |
| 23sF/p | SMPTE-296M 23.98p |

| Frame Format | Item |
|---|---|
| SMPTE-296M 30p | 30p |
| SMPTE-296M 29.97p | 29P |
| SMPTE-296M 25p | 25p |
| SMPTE-296M 24p | 24p |
| SMPTE-296M 23.98p | 23P |

NOTE:
When "720" is selected, selecting either "24p" or "24sF/p" will produce the same result and so will selecting "23p" or "23sF/p."

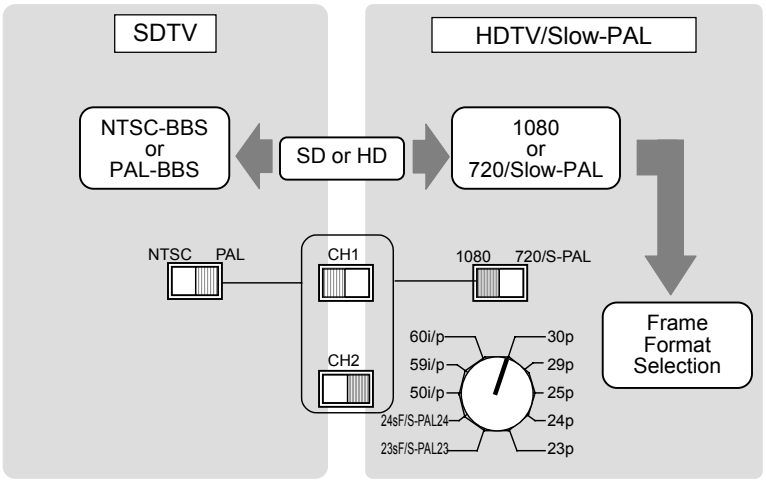
## (3) REFERENCE LED

When the reference is properly selected, this LED is activated in green. While the power is turned ON, it will be either lit up continuously or it will flash and will never turn off.

| LED | Status |
|---|---|
| Turned On in Green | When the REFERENCE selection dial is set to INTERNAL, it will always be on. |
| | When the REFERENCE selection dial is set to SLAVE, if a proper digital clock is input to the CLOCK IN terminal, the LED display will be activated. |
| | When the REFERENCE selection dial is set to 1080 or 720, if a proper HDTV tri-level signal is input to the HD IN terminal, the LED display will be activated. |
| | When the REFERENCE selection dial is set to NTSC or PAL if a proper SDTV BBS signal is input to the SD IN terminal, the LED display will be activated. |
| Flashes | In all other conditions than above. |

## 4.1.2 Output Format Selection

The output formats of the output sync signals are selected with these switches and dial. The output formats can be selected independently for the various output channels (CH1 and CH2).




### (1) CH1 Switch and CH2 Switch

The output formats are selected independently for the various output channels.

| Switch | Function |
|---|---|
| Turned to the Left | SDTV Format |
| Turned to the Right | HDTV Format or SDTV Slow-PAL |

### (2) NTSC⇔PAL Switch

When the CH1 and/or CH2 switches are turned to the left (SDTV selected), the NTSC-BBS or the PAL-BBS is selected with this switch.

| Switch | Function |
|---|---|
| NTSC | NTSC-BBS Format |
| PAL | PAL-BBS Format |

### (3) 1080⇔720/S-PAL Switch

When the CH1 and/or CH2 switches are turned to the right (HDTV or Slow-PAL selected), the output formats are selected as shown below.

Note: the frame formats are selected with the SMPTE selection dial.

| Switch | Function |
|---|---|
| 1080 | SMPTE-274M Format |
| 720/S-PAL | SMPTE-296M Format or SDTV Slow-PAL |

## (4) SMPTE Selection Dial

When the CH1 and/or CH2 switches are turned to the right (HDTV or Slow-PAL is selected), the frame formats are selected according to the combination of this dial and the 1080⇔720/S-PAL switch.

Please note that the items indicated to the left of the dial mean, for instance, if "60i/p" is selected, that the unit operates on "60i" when "1080 (SMPTE-274M)" is selected and on "60p" when "720 (SMPTE-296M)" is selected.

When "1080" is selected with the 1080⇔720/S-PAL switch:

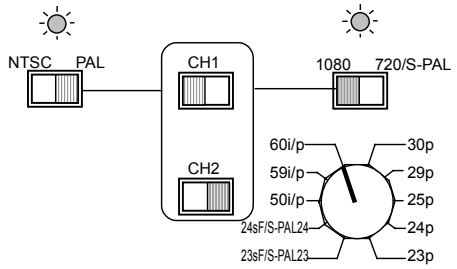
| Item | Frame Format | Frame Format | Item |
|---|---|---|---|
| 60i/p | SMPTE-274M 60i | SMPTE-274M 30p | 30p |
| 59i/p | SMPTE-274M 59.94i | SMPTE-274M 29.97p | 29p |
| 50i/p | SMPTE-274M 50i | SMPTE-274M 25p | 25p |
| 24sF/S-PAL24 | SMPTE-274M 24sF | SMPTE-274M 24p | 24p |
| 23sF/S-PAL23 | SMPTE-274M 23.98sF | SMPTE-274M 23.98p | 23p |

When "720/S-PAL" is selected with the 1080⇔720/S-PAL switch:

| Item | Frame Format | Frame Format | Item |
|---|---|---|---|
| 60i/p | SMPTE-296M 60p | SMPTE-296M 30p | 30p |
| 59i/p | SMPTE-296M 59.94p | SMPTE-296M 29.97p | 29p |
| 50i/p | SMPTE-296M 50p | SMPTE-296M 25p | 25p |
| 24sF/S-PAL24 | Slow-PAL 24 | SMPTE-296M 24p | 24p |
| 23sF/S-PAL23 | Slow-PAL 23.98 | SMPTE-296M 23.98p | 23p |

## (5) Example of Output Format Selection

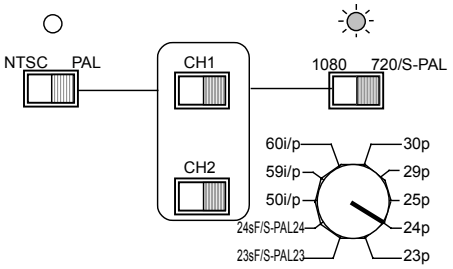
Ex. 1




CH1：SDTV PAL-BBS Output

CH2：HDTV SMPTE-274M 60i Output

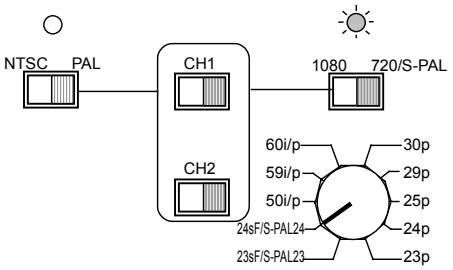
Ex. 2




CH1：HDTV SMPTE-296M 24p Output

CH2：HDTV SMPTE-296M 24p Output (same as CH1)

Ex. 3




CH1：SDTV Slow-PAL 24Hz Output

CH2：SDTV Slow-PAL 24Hz Output (same as CH1)

## (6) SD Output LED and HD Output LED

These LED's indicate the lock status of the output signals. The SD output LED is for the SDTV output, and the HD output LED is for the HDTV (including the SDTV Slow-PAL) output.

If a type of output is selected for neither output channel, the corresponding LED will not be turned on.

SD Output LED

| LED | Status |
|---|---|
| Turned On in Green | When the REFERENCE LED is turned on and an SDTV output is selected with either the CH1 switch or the CH2 switch |
| Turned Off | When an SDTV output is selected with either the CH1 switch or the CH2 switch but the REFERENCE LED is flashing |
| | The SDTV is not selected for output with either the CH1 switch or the CH2 switch |

HD Output LED

| LED | Status |
|---|---|
| Turned On in Green | When the REFERENCE LED is turned on and an HDTV output (including SDTV Slow-PAL ) is selected with either the CH1 switch or the CH2 switch |
| Turned Off | When an HDTV output (including SDTV Slow-PAL ) is selected with either the CH1 switch or the CH2 switch but the REFERENCE LED is flashing |
| | The HDTV (including SDTV Slow-PAL ) is not selected for output with either the CH1 switch or the CH2 switch |

## 4.1.3 Lock Phase Adjustment

When the frame rates between the external reference signal and the output sync signal are matched, the lock phase of the output signal can be adjusted.
This adjustment can be performed independently for each output format.

### (1) SD⇔HD Switch

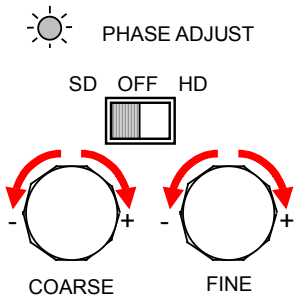
Output signal as the subject of lock phase adjustment is selected with this switch.

| Switch Position | Function |
|---|---|
| SD | Lock phase is adjusted for the NTSC-BBS signal output or the PAL-BBS signal output. |
| OFF | Phase adjustment is turned OFF |
| HD | Lock phase is adjusted for the HDTV tri-level CS signal output or the SDTV CS signal Slow-PAL output. |

### (2) Phase Adjustment Dial(COARSE/FINE)

Phase adjustment is executed with the COARSE dial and the FINE dial.

| Dial | Function |
|---|---|
| COARSE | Lock phase adjustment is executed by the dot. |
| FINE | When the SD⇔HD switch is set to SD, lock phase adjustment is executed by 2 ns. |
| | When the SD⇔HD switch is set to HD, lock phase adjustment is executed by 1 ns. |




While phase adjustment is available, the lock phase status LED is lit up in green.
When the limit of lock phase adjustment is reached, the lock phase status LED changes to red, and turning the dial further does not provide any further adjustment even though the dial keeps turning in the same direction. After the adjustment is finished, set the SD⇔HD switch to the OFF position.
The adjustment value will be retained.

Refer to p4-8
4.1.3(3) Phase Adjustment Status LED

NOTE:
When the power is turned OFF, the adjustment value will be set back to ±0.

### (3) Phase Adjustment Status LED

When phase adjustment is available, this LED lights up in green. When phase adjustment cannot be performed, it lights up in red. See the following table for more details.

| LED | Status |
|---|---|
| Turned On in Green | When the REFERENCE selection is set to 1080, 720, NTSC, or PAL,<br>if the input-output combination is such that genlock phase adjustment is available and if the phase is within the adjustable range, the LED will light up in green. |
| Turned On in Red | When the REFERENCE selection is set to INTERNAL or SLAVE,<br>if the SD⇔HD switch is set to a position other than OFF, the LED will light up in red. |
| | When the REFERENCE selection is set to 1080, 720, NTSC, or PAL,<br>if the input-output combination is such that genlock phase adjustment is available, but the phase reaches the limit of adjustable range, the LED will shine red.<br>Also, when the frame rates between the external reference and the output sync signal are not matched and the phase is locked on the lowest common multiple of the two values, it is turned on in red. |
| Turned Off | When the REFERENCE LED is flashing, this LED is turned off. |
| | When the SD⇔HD switch is turned off, this LED is also off. |

Refer to ➔p6-2 Combinations of Input and Output for Which Genlock Phase Adjustment Is Available

# 4.2 Back Panel

## 4.2.1 Back Panel DIP Switch (Setting of Setup Level)

Setting of “use” or “nonuse” of the Setup level for NTSC can be made with the DIP switch on the back panel.

This setting is valid for NTSC output only.

The available settings of the 4-bit DIP switch is as follows:

| No. | Content | Setting | Meaning of Setting |
|---|---|---|---|
| 1 | Use or Nonuse of Setup Level | OFF | Setup Not Used |
| | | ON | Setup Used (valid for NTSC only) |
| 2 | Reserve | | |
| 3 | Reserve | | |
| 4 | Reserve | | |

# 5 Method of Use

## 5.1 Basic Procedure for Use

Before turning the power on, ensure that all connections are correctly made.
Make setting of use or nonuse of Setup level for NTSC with the DIP switch on the back panel.

Refer to ➔p4-8

1. Turn the power switch to ON.

2. Select settings for the REFERENCE signal.

Operation Method ➔p4-1

Select a reference clock or an operation mode to generate output signals from.
Use the REFERENCE selection dial and the SMPTE selection dial for selection.

3. Select the format of the sync signal output from each channel.

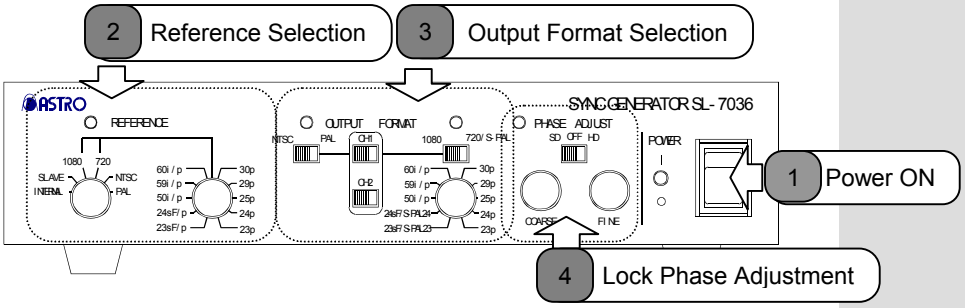
Operation Method ➔p4-3

LED lighting status can be used to determine whether the output is properly locked to the reference.

4. Lock phase can be adjusted only if frame rates between the reference input and the output sync signal are matched.

Operation Method ➔p4-7

Refer to ➔p6-2 Combinations of Input and Output for Which Genlock Phase Adjustment Is Available



# 5.2 Use as Sync Signal Converter

An external reference signal is input and sync signals that are locked to the reference signal are output.

If the output is of either SDTV type or HDTV type (or SDTV Slow-PAL), up to a maximum of 12 distributions are available. If two types are output, up to 6 distributions for each type are available.

## Check the Connections

1. Connection of the power (AC adapter)
2. Connection of the external reference signal

   Connect SDTV reference signals to the SD IN terminal, and HDTV signals to the HD IN terminal.
3. Connection of the output

Refer to ➔p3-1

## Make the Settings

1. Select the type of reference with the REFERENCE selection dial.

Operation Method ➔p4-1 and p4-2

| | |
|---|---|
| For SDTV | NTSC or PAL |
| For HDTV | 1080 (SMPTE-274M) or 720 (SMPTE-296M)<br>Select the frame format with the SMPTE selection dial on the right. |

2. Select the format of the sync signal output.

Operation Method ➔p4-3

Make settings for each channel.

| | |
|---|---|
| For SDTV | (1) Turn the CH switch to the left.<br>(2) Use the NTSC⇔PAL switch to select either NTSC or PAL. |
| For HDTV | (1) turn the CH switch to the right.<br>(2) Use the 1080⇔720/S-PAL switch to select either 1080 (SMPTE-274M) or 720 (SMPTE-296M).<br>(3) Use the SMPTE selection dial to select the frame format. |
| For Slow-PAL | (1) turn the CH switch to the right.<br>(2) Turn the 1080⇔720/S-PAL switch to the right (to select S-PAL).<br>(3) Use the SMPTE selection dial to select either S-PAL24 or S-PAL23. |

If either the SD output LED or the HD output LED is turned on (green), each output is properly locked to the external reference.

Refer to ➔p4-6

3. Adjust the lock phase. (This is available only when the frame rates of input and output are matched.)
   (1) Select the subject of phase adjustment (the SD⇔HD switch).
   (2) Use the COARSE and the FINE dials to adjust the lock phase.
   (3) Turn the switch back to OFF position.

Operation Method ➔p4-7

Refer to ➔p6-2 Combinations of Input and Output for Which Genlock Phase Adjustment Is Available

# 5.3 Use as Standalone Sync Signal Generator

If the SL-7036 is operated standalone, it can be used as a sync signal generator.

It generates sync signals based on the internal reference signal and provides up to a maximum of 12 distributions of single format output or 6 distributions for each channel when different output formats are selected for the channels.

## Check the Connections

1. Connection of the power (AC adapter)
2. Connection of the output

Refer to ➔p3-1

## Make the Settings

1. Select "INTERNAL" with the REFERENCE selection dial.

Operation Method ➔p4-1

2. Select the format of the sync signal to be output.

   Make settings for each channel.

   For SDTV
   (1) Turn the CH switch to the left.
   (2) Use the NTSC⇔PAL switch to select either NTSC or PAL.

   For HDTV
   (1) turn the CH switch to the right.
   (2) Use the 1080⇔720/S-PAL switch to select either 1080 (SMPTE-274M) or 720 (SMPTE-296M).
   (3) Use the SMPTE selection dial to select the frame format.

   For Slow-PAL
   (1) turn the CH switch to the right.
   (2) Turn the 1080⇔720/S-PAL switch to the right (to select S-PAL).
   (3) Use the SMPTE selection dial to select either S-PAL24 or S-PAL23.

3. Sync signals of the selected format will be output from each output terminal for CH1 and CH2.

Refer to ➔p4-6

# 5.4 Increase Number of Distributions by Connecting Multiple Units

By connecting multiple units of the SL-7036 together to operate on the same digital clock, more than 12 distributions will be available.

NOTE:
To operate multiple units that are connected together, power must be supplied to all individual units.

## Check the Connections

1. Connection of the power (AC adapters)
2. Connection of the CLK-OUT and the CLK-IN terminals of the multiple SL-7036 units in the correct sequence

Refer to ➔p3-1 and p3-2

3. Connection of an external reference signal to the master unit (when reference is used)

   Connect SDTV reference signal to the SD IN terminal and HDTV signal to the HD IN terminal.
4. Connection of the output

   Connect to the output terminals of the master and the slave(s).

## Make the Settings on the Master Side

1. Make a selection with the REFERENCE dial.

   To operate with the internal clock, select "INTERNAL."

   To lock to an external reference signal, select the format of the reference.

   For SDTV NTSC or PAL

   For HDTV 1080 (SMPTE-274M) or 720 (SMPTE-296M)

   Select the frame format with the SMPTE selection dial on the right.

Operation Method ➔p4-1 and p4-2

2. Select the format of the sync signal to be output.

   Make settings for each channel.

   For SDTV
   (1) Turn the CH switch to the left.
   (2) Use the NTSC⇔PAL switch to select either NTSC or PAL.

   For HDTV
   (1) turn the CH switch to the right.
   (2) Use the 1080⇔720/S-PAL switch to select either 1080 (SMPTE-274M) or 720 (SMPTE-296M).
   (3) Use the SMPTE selection dial to select the frame format.

   For Slow-PAL
   (1) turn the CH switch to the right.
   (2) Turn the 1080⇔720/S-PAL switch to the right (to select S-PAL).
   (3) Use the SMPTE selection dial to select either S-PAL24 or S-PAL23.

Operation Method ➔p4-3

## Make Setting on the Slave Side

1. Select "SLAVE" with the REFERENCE selection dial.

Operation Method ➔p4-1

2. Make the settings of the output sync signals the same as the master.

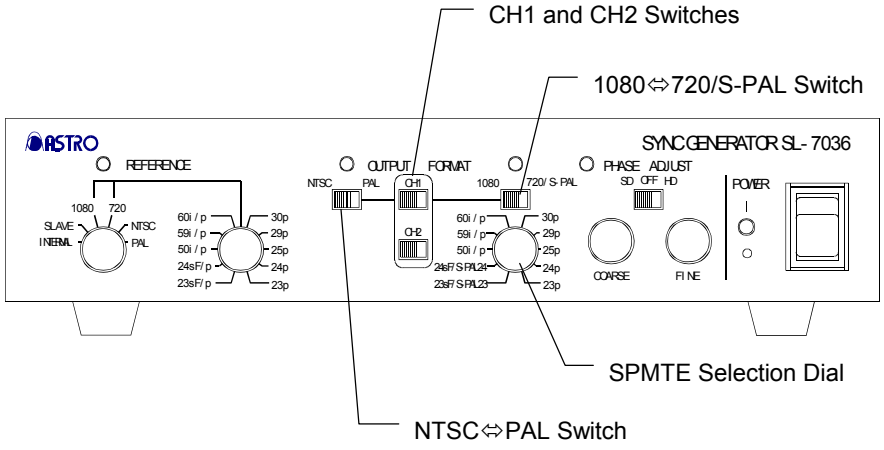
Operation Method ➔p4-3

# 6 Reference Information

## 6.1 List of Output Format Settings

| CH1 and CH2 Switches | NTSC⇔PAL Switch | 1080⇔ 720/S-PAL Switch | SMPTE Selection Dial | Output Signal* |
|---|---|---|---|---|
| Left | NTSC | Not Used | | NTSC BBS |
| | PAL | | | PAL BBS |
| Right | Not Used | 1080 | 60i/p | SMPTE-274M Compliant, 2200 x 1125 x 60i |
| | | | 59i/p | SMPTE-274M Compliant, 2200 x 1125 x 59.94i |
| | | | 50i/p | SMPTE-274M Compliant, 2640 x 1125 x 50i |
| | | | 30p | SMPTE-274M Compliant, 2200 x 1125 x 30p |
| | | | 29p | SMPTE-274M Compliant, 2200 x 1125 x 29.97p |
| | | | 25p | SMPTE-274M Compliant, 2640 x 1125 x 25p |
| | | | 24p | SMPTE-274M Compliant, 2750 x 1125 x 24p |
| | | | 23p | SMPTE-274M Compliant, 2750 x 1125 x 23.98p |
| | | | 24sF/S-PAL24 | SMPTE-274M Compliant, 2750 x 1125 x 24sF |
| | | | 23sF/S-PAL23 | SMPTE-274M Compliant, 2750 x 1125 x 23.98sF |
| | | 720/S-PAL | 60i/p | SMPTE-296M Compliant, 1650 x 750 x 60p |
| | | | 59i/p | SMPTE-296M Compliant, 1650 x 750 x 59.94p |
| | | | 50i/p | SMPTE-296M Compliant, 1980 x 750 x 50p |
| | | | 30p | SMPTE-296M Compliant, 3300 x 750 x 30p |
| | | | 29p | SMPTE-296M Compliant, 3300 x 750 x 29.97p |
| | | | 25p | SMPTE-296M Compliant, 3960 x 750 x 25p |
| | | | 24p | SMPTE-296M Compliant, 4125 x 750 x 24p |
| | | | 23p | SMPTE-296M Compliant, 4125 x 750 x 23.98p |
| | | | 24sF/S-PAL24 | Slow-PAL24 CS |
| | | | 23sF/S-PAL23 | Slow-PAL23.98 CS |

* Output Signal: BBS signals for SDTV, CS signals for Slow-PAL
tri-level CS signals for HDTV



# 6.2 Combinations of Input and Output for Which Genlock Phase Adjustment Is Available

Combinations of input and output for which genlock phase adjustment is available are as follows.

| Input \ Output | | NTSC | PAL | 1080 | | | | | | | | | | 720 | | | | | | | | w-PAL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 59.94i | 50i | 60i | 59.94i | 50i | 24sF | 23.98sF | 30p | 29.97p | 25p | 24p | 23.98p | 60p | 59.94p | 50p | 30p | 29.97p | 25p | 24p | 23.98p | 24 | 23.98 |
| NTSC | 59.94i | ○ | | | ○ | | | | | ○ | | | | | ○ | | | ○ | | | | | |
| PAL | 50i | | ○ | | | ○ | | | | | ○ | | | | | ○ | | | ○ | | | | |
| 1080 | 60i | | | ○ | | | | | ○ | | | | | ○ | | | ○ | | | | | | |
| | 59.94i | ○ | | | ○ | | | | | ○ | | | | | ○ | | | ○ | | | | | |
| | 50i | | ○ | | | ○ | | | | | ○ | | | | | ○ | | | ○ | | | | |
| | 24sF | | | | | | ○ | | | | | ○ | | | | | | | | ○ | | ○ | |
| | 23.98sF | | | | | | | ○ | | | | | ○ | | | | | | | | ○ | | ○ |
| | 30p | | | ○ | | | | | ○ | | | | | ○ | | | ○ | | | | | | |
| | 29.97p | ○ | | | ○ | | | | | ○ | | | | | ○ | | | ○ | | | | | |
| | 25p | | ○ | | | ○ | | | | | ○ | | | | | ○ | | | ○ | | | | |
| | 24p | | | | | | ○ | | | | | ○ | | | | | | | | ○ | | ○ | |
| | 23.98p | | | | | | | ○ | | | | | ○ | | | | | | | | ○ | | ○ |
| 720 | 60p | | | ○ | | | | | ○ | | | | | ○ | | | ○ | | | | | | |
| | 59.94p | ○ | | | ○ | | | | | ○ | | | | | ○ | | | ○ | | | | | |
| | 50p | | ○ | | | ○ | | | | | ○ | | | | | ○ | | | ○ | | | | |
| | 30p | | | ○ | | | | | ○ | | | | | ○ | | | ○ | | | | | | |
| | 29.97p | ○ | | | ○ | | | | | ○ | | | | | ○ | | | ○ | | | | | |
| | 25p | | ○ | | | ○ | | | | | ○ | | | | | ○ | | | ○ | | | | |
| | 24p | | | | | | ○ | | | | | ○ | | | | | | | | ○ | | ○ | |
| | 23.98p | | | | | | | ○ | | | | | ○ | | | | | | | | ○ | | ○ |

# 6.3 What to Do in Cases Like These

Following phenomena may not necessarily be faults. Please check the list below before requesting repair service.

| Symptom | Cause | Measure | Refer-ence Page |
|---|---|---|---|
| Power does not turn on. | AC cable or AC adapter is disconnected. | Connect the AC cable and the AC adapter properly. | □ |
| Output signal format is not correct. | Output format is not selected correctly. | Output formats are selected by combination of the CH (CH1 and CH2) switches, the NTSC⇔PAL switch, the 1080⇔720/S-PAL switch and the SMPTE selection dial. Check to see if output selection is correctly made or not. | 4-3 |
| | Output terminal connections are not correct. | Output format must be set for each channel. Check the settings of output channels and CH1 switch and CH2 switch. | 3-1 |
| REFERENCE LED flashes. | Reference selection is not correct. | Ensure that reference selection by the front panel matches the reference signal being input. | 4-1 |
| | Input terminal connections are not correct. | Ensure that SDTV reference signal is connected to the SD IN terminal and HDTV reference to the HD IN terminal. | 3-1 |
| SD Output LED does not turn on (does not lock correctly). | Reference is not selected correctly. | Ensure that reference selection is correct (REFERENCE LED is turned on). | 4-1 |
| | SDTV is not selected for both channels of output. | Unless both the CH1 and the CH2 switches are set to SDTV (left side), LED will not be turned on. | 4-6 |
| HD Output LED does not turn on (does not lock correctly). | Reference is not selected correctly. | Ensure that reference selection is properly made (REFERENCE LED is turned on). | 4-1 |
| | HDTV is not selected for both channels of output. | Unless both the CH1 and the CH2 switches are set to HDTV (right side), LED will not be turned on. | 4-6 |
| Lock phase cannot be adjusted. | Change Switch is in OFF position. | Select the output signal as subject of lock phase with the SD⇔HD switch. | 4-7 |
| | Frame rates between input and output are not the matched. | Lock phase cannot be adjusted while locked on the lowest common multiple due to different frame rates between input and output (lock phase adjustment status LED is lit red). | 4-8 |
| | Limit of phase adjustment is reached. | After reaching the limit of adjustment value, turning the phase adjustment dial any further does not provide further adjustment even though the dial keeps turning in the same direction. In this case, the lock phase adjustment status LED is lit red. | 4-7 |

# 7 Main Specifications

## 7.1 Input Signals

| Item | | Specification | |
|---|---|---|---|
| Sync Signal | SDTV BBS Signal | Input Level Range | 300±50mV (75Ω Termination, Negative Polarity) |
| | | Lock Range | ±50ppm or More (75Ω Ternimation) |
| | | Lock Jitter | ±5ns or Less |
| | | Connector | BNC Connector (75Ω Termination) |
| | HDTV Tri-Level CS Signal | Input Level Range | ±300±50mV (75Ω Termination) |
| | | Lock Range | ±50ppm or More (75Ω Ternimation) |
| | | Lock Jitter | ±5ns or Less |
| | | Connector | BNC Connector (75Ω Termination) |
| Digital Clock Input | | Input Frequency | 27MHz |
| | | Input Level | 0.8V (75Ω Termination) |
| | | Connector | BNC Connector |

## 7.2 Output Signals

| Item | | Specification | |
|---|---|---|---|
| Sync Signal | SDTV BBS signal (Slow-PAL: CS Signal) | Output Level Range | NTSC: 286 mV, PAL/Slow-PAL: 300mV (75Ω Termination, Negative Polarity) |
| | | Setup Level | 0 or 7.5IRE (use back panel DIP switch to adjust) (for NTSC output only) |
| | | Jitter | ±5ns or Less |
| | | Connector | BNC Connector |
| | HDTV Tri-Level CS Signal | Output Level Range | ±300mV (75Ω Termination) |
| | | Jitter | ±5ns or Less |
| | | Connector | BNC Connector |
| Digital Clock Output | | Output Frequency | 27MHz |
| | | Output Level | 1.0V or More (75Ω Termination) |
| | | Connector | BNC Connector |

## 7.3 General Specifications

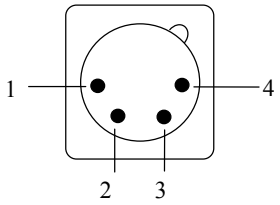
| Item | Specification |
|---|---|
| Power Consumption | 16W |
| Power Supply | DC12V (±10%) (AC Adapter) |
| Operating Temperature | 0 to 40ºC (non-condensing) |
| Operating Humidity | 30 to 80%RH (non-condensing) |
| External Measurement | 210(W)x44(H)x280(D)mm (excluding protrusions) |
| Weight | Approx. 1.8 kg |

## 7.4 Accessories

| | |
|---|---|
| AC Adapter | 1 piece |
| AC Cable | 1 piece |
| Operating Manual | 1 copy |

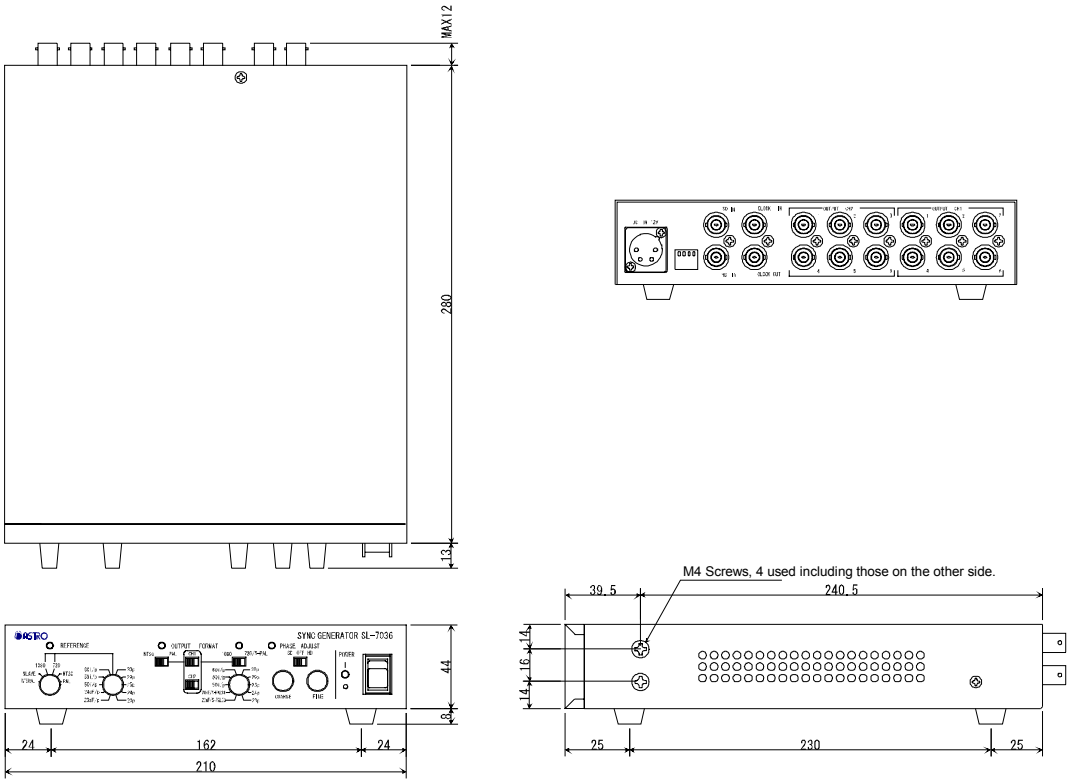
# 7.5 DC Power Connector Specifications

XLR4-Pin Male




| Pin Number | Signal Name |
|---|---|
| 1 | GND |
| 2 | NC |
| 3 | NC |
| 4 | DC+12V |

# 7.6 External Drawing



# Notice

- If this copy of the manual has missing or damaged pages, it will be replaced.
- Astrodesign, Inc. holds the copyright of the product.
- This manual, whether in part or in whole, shall not be reproduced by any means without the written permission of Astrodesign, Inc.
- The contents of this manual are subject to change without prior notice for modifications.
- Astrodesign shall not be, in any way, liable for effects or results arising from the misapplication or improper use of the product.
- For questions regarding the product, contact your dealer or the address below.
- The products and product names that appear in this manual are either registered trademarks or trademarks of their respective owners.



**Astrodesign, Inc.**
**4-15-5 Shinsaku, Takatsu-ward, Kawasaki, Kanagawa, Japan 213-0014**
**TEL:(044)861-2511 FAX:(044)861-2515**