TIVi (Time Imposer for Video) Ver2.0 Operating Manual

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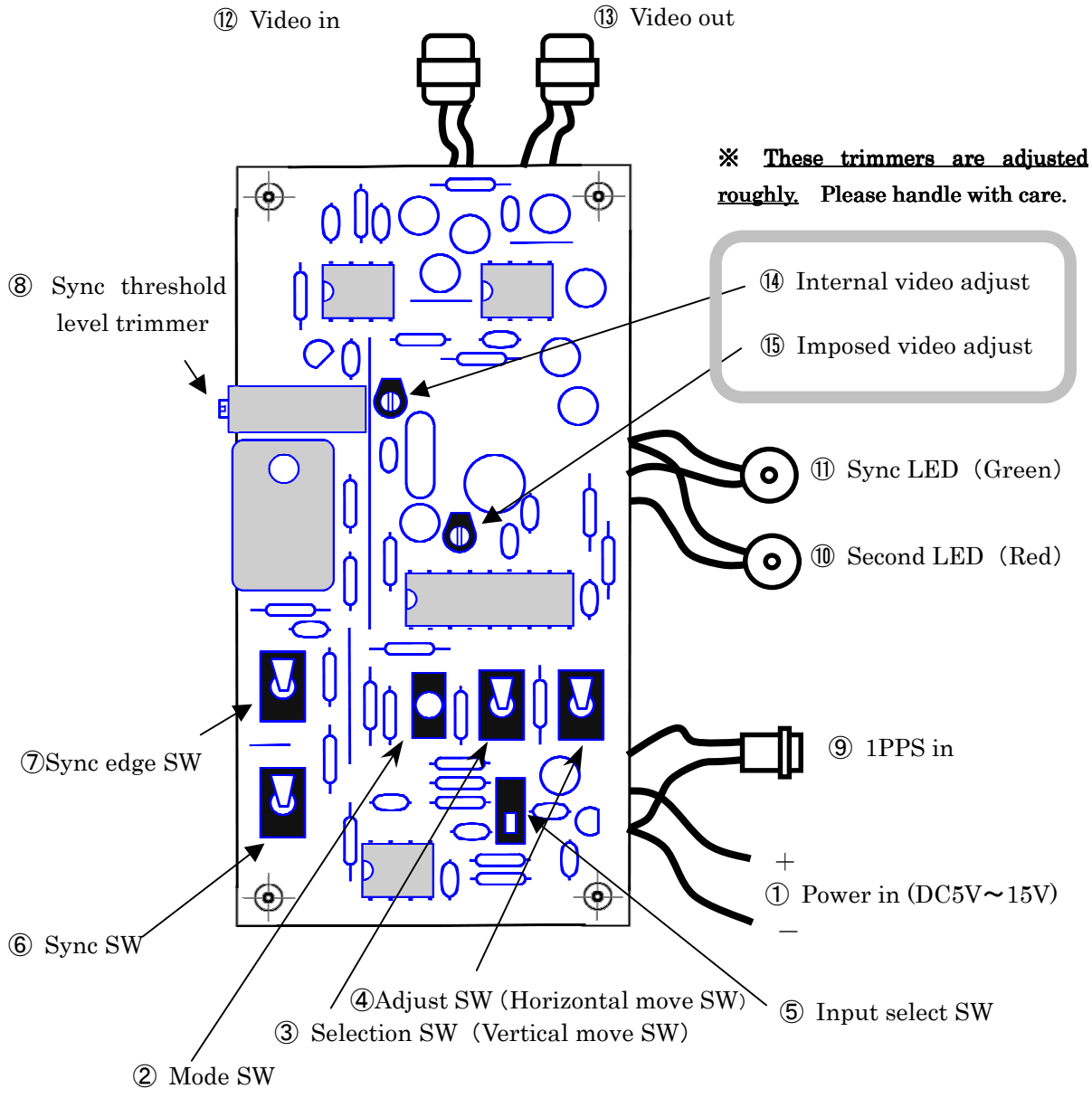
1. Description of TIVi

TIVi (Time Imposer for Video) can superimpose the accurate time image (year, month, day, hour, minute, second, 10 msec) on the external video signal. TIVi is set between video camera and video cartridge recorder.

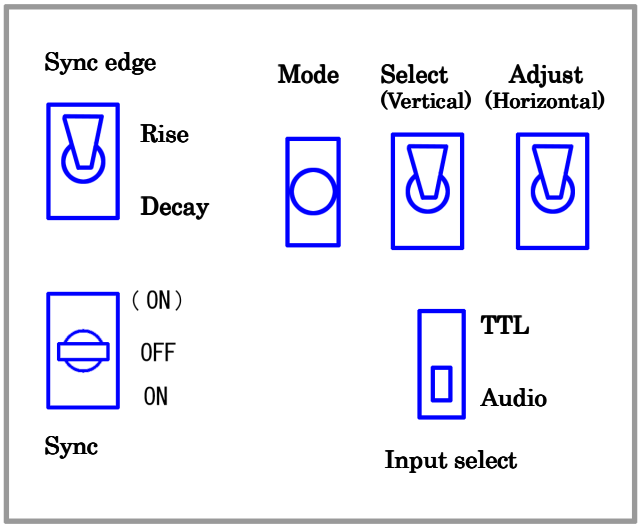
[Video Camera]-----[TIVi]-----[Video Cartridge Recorder]

External signal; e.g. GPS-receiver or telephone time signal can synchronize TIVi with the start timing of a second automatically. TIVi can also be synchronized manually. Time accuracy that TIVi can keep is less than 3 seconds par month (measured value: 0.5 seconds par month) without using a continuous synchronization.

2. Names of each component



Switch



3. Basic usage

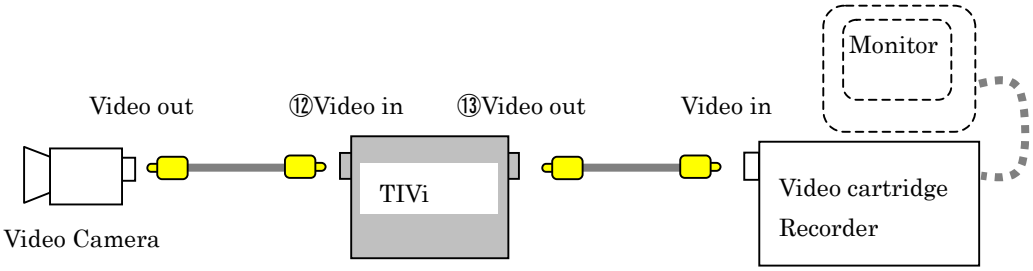
(1) Turn on

DC5V-15V is available. The required power is not so much that four dry cells (DC6V) are enough. Please make sure its polarity. If new four AA size alkaline dry cells are used, TIVi will work about twenty hours.

(2) Interconnection with the video equipment

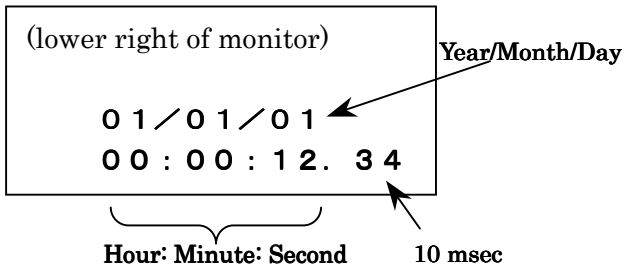
Interconnect TIVi with video camera and video cartridge recorder as shown in the following diagram.

*** TIVi cannot be used for the video camera built in a video cartridge recorder. But even the camera of this type (ex. general home edition video camera) is available either as a "video camera" with using an external output terminal, or as a "video cartridge recorder" with using an external input terminal in many cases.**



When TIVi is turned on, the date and the time is displayed on the lower right of the monitor as shown in the right figure. If no signal is received via "video in", monitor displays blue back.

Displayed date and time start from [01/01/01 00:00:00.00] when TIVi is turned on.

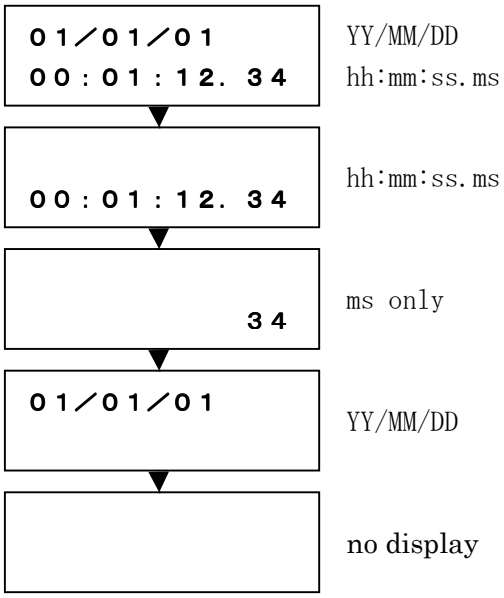


(3) Selection of the display mode

When the TIVi is turned on, it displays all items. But items to be displayed can be changed by pushing the "mode selection SW". The mode is changed cyclically as following.

"YY/MM/DD hh:mm:ss.ms"
→"hh:mm:ss.ms"
→"ms" only
→"YY/MM/DD"
→ no display

Note) YY: Year, MM: Month, DD: Day
hh: Hour, mm: minute, ss: second
ms: 10msec



(4) Changing the date and time

When the TIVi is turned on, the date and time start from "01/01/01 00:00:00.00". So you must adjust their values.

By pushing "③ **Select SW**", a part of characters starts blinking. The value of this blinking one is selected changeable. The blinking part can be changed by every pushing of "③ Select SW". If you keep pushing "③ Select SW", the blinking part moves continuously.

For example, when the display mode is " YY/MM/DD hh:mm:ss.ms", the blinking part moves as the following order. Select the character that you want to change the value by pushing "③ Select SW".

→ "decade year"→"1 year"→"month"→"day"→"hour"→"minute"→"second"→"10 msec"→(selection off)

By pushing "④ **Adjust SW**", the value of blinking part increase. Keep pushing the button until the value becomes right one.
Adjustment of "10 msec" is described in the next section: "⑤ Manual setting of the start timing of a second".

*** Only the displayed value can be changed for any display mode.**
*** The blinking state is automatically released unless the switch is operated.**
*** Time is displayed on the basis of twenty-four hours.**

(5) Manual setting of the start timing of a second

The start timing of a second can be set by pushing "④ **Adjust SW**" when the character of "10 msec" is blinking as described in previous section(4). The value is reset to "**. 00**" and is kept during the switch pushed.

***In this manual way of setting, the accuracy can be about 0.1 seconds and it varies by personal equation. To synchronize it strictly at msec level, Read the section (5): "Synchronizing by external signal/ [1] TTL level signal" or section (6): "Synchronizing by external signal/ [2] time tone signal".**

*** It is easier to set from lower to higher order; "10 msec"→"second"→"minute"→….**

(6) Time accuracy

TCXO (Temperature Compensated X'tal(crystal) Oscillator) is adopted to TIVi v2.0. Though the general crystal unit is accurate, but it has a fault that frequency fluctuates by temperature charge. Even the highly accurate crystal has the error of several 10 PPM. TCXO is an oscillation module having the function of repairing accuracy against temperature change. The catalogued value for the accuracy is within 1PPM. TIVi is expected to have the accuracy of **less than +/- 3 seconds par month** by adopting this module. (Actual value is less than 0.5 seconds par month.)

* **This time accuracy is held in the case that the power voltage is kept over 5V. If power voltage drops below 5V, the accuracy becomes worse. Especially take care of the exhaustion of dry cells. In the case that new alkaline AA size dry cells are used, TIVi will work well about twenty hours.**

4. The position where the information is displayed

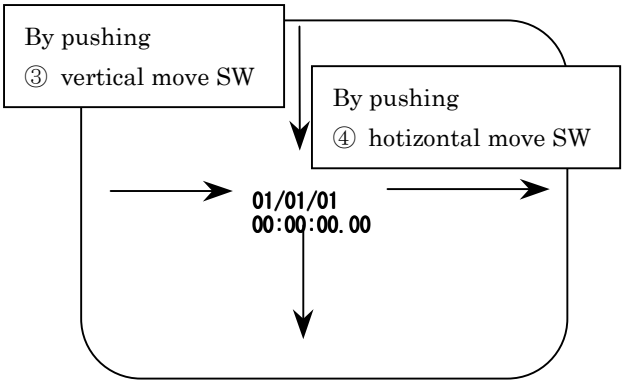
Time information is displayed at lower right by default setting. This position can be changed to arbitrary position.

(1) Position-changing mode

By turning on the TIVi with "**② Mode SW**" pushed, "**Position-changing mode**" starts. In this mode, all information become "**01/01/01 00:00:00.00**" and blink. This state indicates that TIVi is in "Position-changing mode".

(2) Change position

During TIVi is in "Position-changing mode", the position of the information displayed can be moved arbitrarily by pushing "**③ vertical move SW**" and/or "**④ horizontal move SW**".



(3) Return from "Position-changing mode"

TIVi returns from "Position-changing mode" to standard operation by pushing "**② Mode SW**" or by keeping switches not operated for more than 30 seconds.

Once the position of the information displayed is changed, TIVi will keep its settings even if it is turned off.

5. Synchronizing by external signal

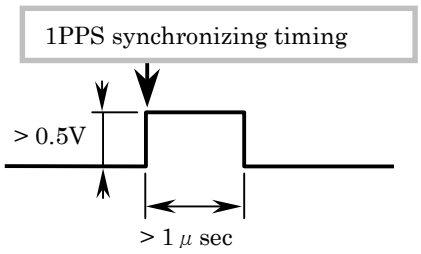
[1] TTL level signal

This is a method to synchronize precisely with the start timing of a second. TTL level signal such as a 1PPS signal from GPS receiver etc. is available to synchronize TIVi properly. Since this method is most reliable, it is recommended to use this way as a first priority, if the external equipment outputs 1PPS signal with TTL level.

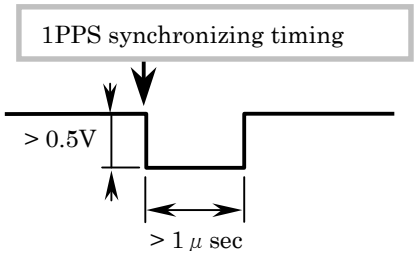
(1) Acceptable signals

■TTL level 1 pulse signal

1PPS signal whose pulse height is **higher than 0.5V** and its **pulse width is longer than 1 micro sec.** is also acceptable as an external synch signal as well as TTL level signal. C-MOS level also satisfies these criteria. "**Rise**" or "**Decay**" can be assigned for the edge of synchronization.



Example of rising edge



Example of decaying edge

■Example of available GPS receiver

Available GPS receiver is listed below, which is checked by author. (Jan.01.2002)

GPS Receiver	Manufacturer	1PPS signal	Sync edge	Pulse width	Note
Jupiter	SPA	TTL level	Rise	25.7msec	Time message is sync with 1PPS signal (Binary)
Gemini	SPA(JRC)	C-MOS level	Rise	15.6 μ sec	Time message is not sync with 1PPS signal
GT-77	Furuno (SPA deals in)	TTL level	Rise	0.5sec	Time message is sync with 1PPS signal (NMEA)
GN-79	Furuno (SPA deals in)	TTL level	Rise	0.5sec	Time message is not sync with 1PPS signal
CCA-450J	JRC (SPA deals in)	C-MOS level	Rise	15.6 μ sec	Time message is not sync with 1PPS signal
G 8	Ashtech	TTL level	Rise	1msec	
et36tm	SPA (GARMIN)	TTL level	Rise	100msec (20 − 980msec variable)	Time message is sync with 1PPS signal (NMEA)

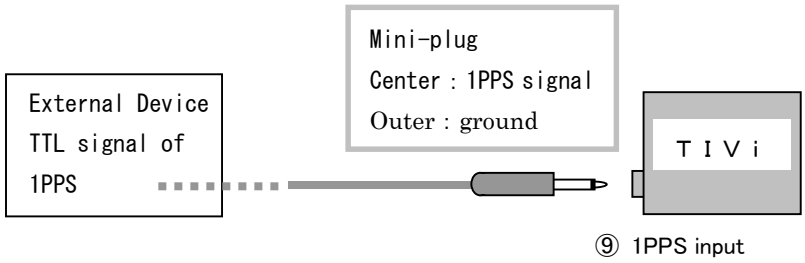
*** Availability is judged only from its specifications. So it is not certain if these receivers are really available.**

*** LSI designed for GHS-clock (GHS-2) outputs the reverse logic of 1PPS, specifically "decay" edge must be used for synchronization with the start timing of 1PPS.**

*** 1PPS is an abbreviation for "1 Pulse Per Second". It is a pulse signal that synchronizes with a second of UTC.**

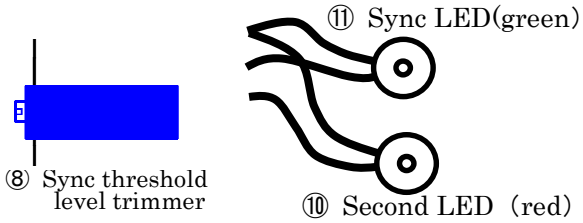
(2) Interconnection

TIVi receives 1PPS signal through mini-plug from external device that outputs 1PPS signal such as GPS receiver. The interconnection between the external device and a mini-plug should be done in advance. The polarity of mini-plug is "**center: 1PPS signal / outer: ground**".



(3) Synchronizing

After connecting TIVi and external device that outputs 1PPS signal, it can be synchronized as follows.



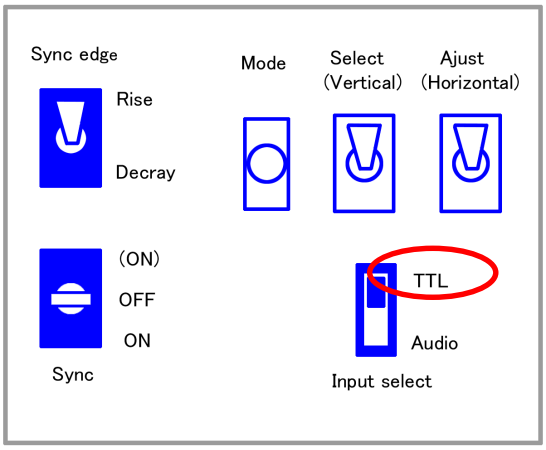
(Step1)

Slide "**⑤ Input select SW**" to "**TTL**". Then specify "**Rise**" or "**Decay**" by "**⑦ Sync edge SW**".

(Step2)

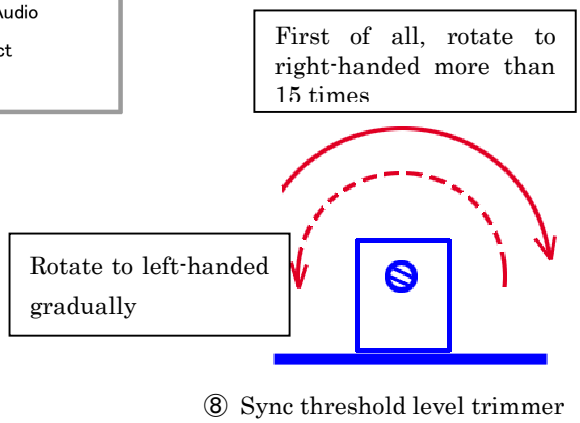
By tilting "**⑥ Sync SW**" to "**(ON)**" or "**ON**", TIVi becomes to accept 1PPS signal.

* "**(ON)**" is momentary.
  If released, it returns to "OFF".
* "**ON**" is toggle. It keeps "ON".



(Step3)

Rotate "**⑧ Sync threshold level trimmer**" to right-handed more than fifteen times, and the threshold level is set to upper limit. This trimmer reaches a full scale by fifteen revolutions, because there is no stopper for upper and lower limit.



(Step4)

Rotate "**⑧ Sync threshold level trimmer**" to left-handed gradually until "**⑪ Sync LED (Green)**" blink stably at 1sec cycle. If 1PPS signal is a good-quality TTL level signal, TIVi must be synchronized at (step3).

(Step5)

When TIVi is synchronized at (step4), the adjustment finished. In the case a stable good-quality 1PPS signal is continuously supplied to as a synchronization signal, and "**⑥ Sync SW**" is tilted to "**(ON)**", TIVi is calibrated every second and always synchronized with 1PPS signal. If synchronization signal is unstable or external noise is concerned, it is recommended to return the "**⑥ Sync SW**" to "**OFF**" after synchronization.

Even if "**⑥ Sync SW**" is "**OFF**", TIVi can keep its accuracy to be high(1ppm) using internal TCXO. In this case, the error is less than one frame of video (1/30 sec) for 10 hours.

6. Synchronizing by external signal

[2] Audio time signal

This is a method to synchronize precisely with the start timing of a second. A 60dB amplifier is built in TIVi. So audio time signal from telephone, GHS-clock, etc. is available to synchronize TIVi. Because the way of synchronization using audio signal is more sensitive to noise than "5. Synchronizing by external signal/ [1] TTL level signal", the signal should have as high S/N as possible. For instance, the audio signal of GHS-clock is better than phone time signal.

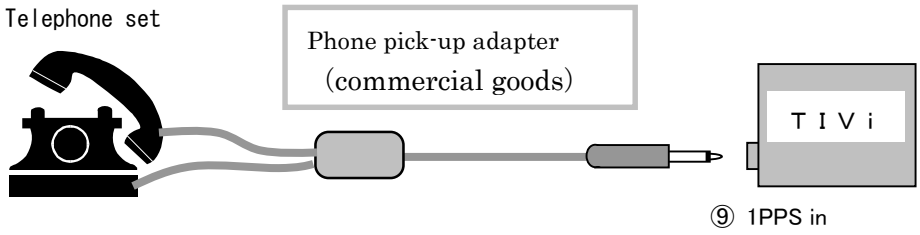
(1) Acceptable signal

"Phone time signal (phone number: 117 in Japan)", "line out signal of GHS-clock (audio signal of 1PPS)", etc. are acceptable.

(2) Cable connection

■ Interconnection with telephone

Using the phone pick-up adapter (Victor TF-A12 etc.), interconnect the modular jack of telephone receiver with "**⑨ 1PPS in**" of TIVi.



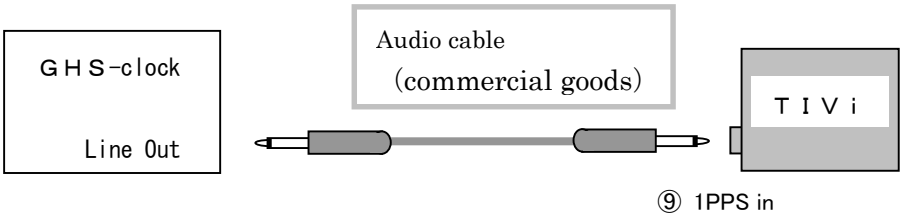
*** Please use the commercial phone pick-up adapter.**

*** Even the telephone, for which pick-up adapter is not available, may be of use with using a microphone. (Not confirmed)**

*** The error of phone time signal (117) is about 0.03sec according to the measurement. In the case of mobile phone (including PHS), the delay of about 0.2sec can occur.**

■ Interconnection with GHS-clock

Using an audio cable (Sony RK-G69 etc.), interconnect "Line out" terminal of GHS-clock with "**⑨ 1PPS in**" of TIVi.

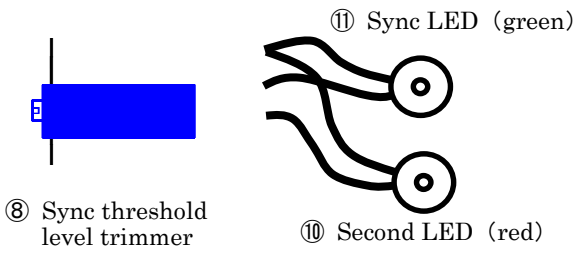


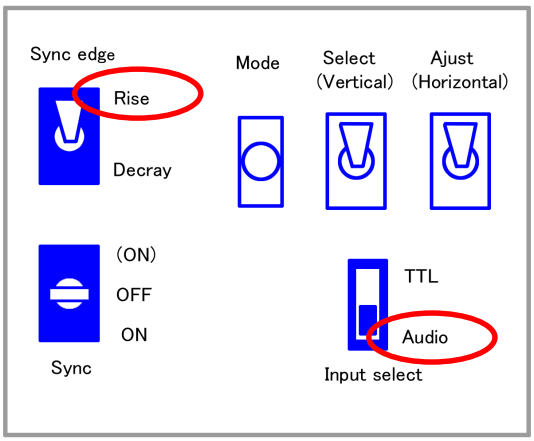
*** Please use commercial audio cable and plug adapter.**

*** "GHS-clock" was developed by us and distributed by Seibundo Shinkosha Publishing Corp.**

(3) Synchronizing

After connecting "Telephone", "GHS-clock", etc. with TIVi, it can be synchronized as follows.





(Step1)

Slide "**⑤ Input selection SW**" to "**Audio** ". Then specify "**Rise**" by "**⑦ Sync edge SW**".

(Step2)

By tilting "**⑥ Sync SW**" to "**(ON)**" or "**ON**", TIVi becomes to accept 1PPS signal.

* "**(ON)**" is momentary.

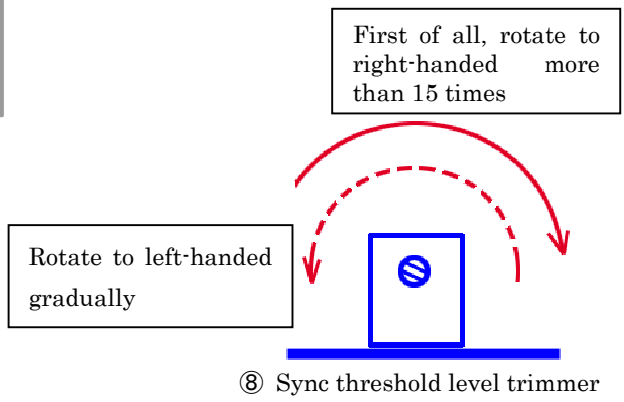
If released, it returns to "OFF".

(Recommended)

* "**ON**" is toggle. It keeps "ON".

(Step3)

Rotate "**⑧ Sync threshold level trimmer**" to right-handed more than fifteen times, and the threshold level is set to upper limit. This trimmer reaches a full scale by fifteen revolutions, because there is no stopper for upper and lower limit.



(Step4)

Rotate "**⑧ Sync threshold level trimmer**" to left-handed gradually until "**⑪ Sync LED (green)**" blink stably at 1sec cycle.

It should be easy to set the threshold level, if GHS-clock is used.

In the case phone signal is used, TIVi may respond to voice part. Therefore tilt "**⑥ Sync SW**" to "**OFF**" on finishing the synchronization which use normal tone.

Even in the case of using GHS-clock, tilt "**⑥ Sync SW**" to "**OFF**" to avoid the noise affection. Even if "⑥ Sync permission SW" is "OFF", TIVi can keep its time accuracy to be high(1ppm) using internal TCXO. In this case, the error is less than one frame of video (1/30 sec) for 10 hours (actually 50 hours).