

Stroboscope (ME-6978)



Included PASCO Equipment

- ❶ Strobe Control Box
- ❷ Strobe Lamp (ME-6982)
- ❸ AC to 15VDC 6.4A Power Adapter (not shown)
- ❹ Power Cord (not shown)

Compatible PASCO Equipment

- Strobe Lamp (ME-6982)
- Photogate Head (ME-9498A)

Introduction

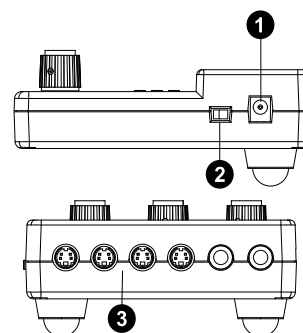
When used with a ME-6982 Strobe Lamp (included), the PASCO ME-6978 Stroboscope produces intense, short-duration flashes of white light suitable for strobe photography, and for "stopping the motion" during laboratory experiments. The flash rate is adjustable from 1 to 500 flashes per second (1 to 500 Hz or 60 to 30,000 RPM), and the flash brightness is adjustable from 1 (dimpest) to 25 (brightest).

The Strobe Control Box can control up to four Strobe Lamps at one time. The Strobe Control Box can also be used to trigger a second Stroboscope, or it can be triggered by an external device such as a PASCO Photogate Head. The ability of the Stroboscope to respond to a trigger from an external device allows strobe flashes to be synchronized with an external event. This can be used to ensure that a strobe photograph is taken at a critical instant.

Basic Operation

The power supply comes with a power cord. Connect the power adapter to the POWER port on the side of the Stroboscope. Connect the power cord between the power adapter and an appropriate electrical outlet. Connect the included Strobe Lamp to one of the four Strobe Lamp ports on the top end of the Strobe Control Box. Connect up to three additional Strobe Lamps to the Strobe Lamp ports.

Slide the OFF/ON switch on the right side of the Strobe Control Box to the ON position. The green light-emitting diode (LED) next to HZ on the top panel will begin to slowly flash. The digital display will show 10.0. The Stroboscope is active, but the attached Strobe Lamp(s) will not flash yet.



- ❶ POWER Port
- ❷ OFF/ON Switch
- ❸ Strobe Lamp ports

To make the Strobe Lamp start flashing, press the LAMP button on the front panel. The green LED next to HZ on the front panel will shine continuously, and the strobe lamp(s) will flash. Adjust the flash rate with the COARSE and FINE knobs and adjust the brightness with the BRIGHTNESS knob.

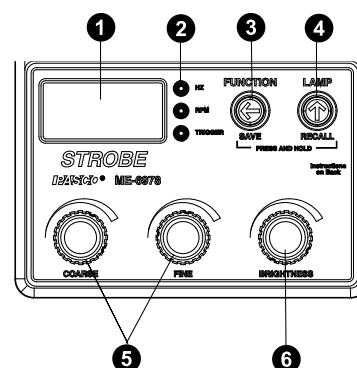


CAUTION: Do not look directly into the Strobe Lamp when the LEDs are flashing!

To make the Strobe Lamp stop flashing, press the LAMP button again. The green LED next to HZ on the front panel will slowly flash.

Front Panel

The front panel has the Digital Display, FUNCTION LEDs, FUNCTION button, LAMP button, COARSE and FINE control knobs, and BRIGHTNESS knob.



- ❶ Digital Display
- ❷ FUNCTION LEDs: HZ, RPM, and TRIGGER
- ❸ FUNCTION button
- ❹ LAMP button
- ❺ COARSE and FINE controls
- ❻ BRIGHTNESS control

FUNCTION Button and LEDs

The FUNCTION button cycles through three functions: HZ, RPM, and TRIGGER. Each function is indicated by its respective LED. The button cycles endlessly through the three functions.

Whenever you select a new function, a green LED flashes slowly. This indicates that the function's controls are active, but the Strobe Lamp does not flash. You can change the flash rate and brightness without actually flashing the lamp.

The HZ and RPM modes are identical except for the displayed units. Note that the Stroboscope **defaults to 10.0 Hz or 600 RPM** when turned on. The maximum flash rate is 500 Hz or 30,000 RPM. The minimum flash rate is 1 Hz or 60 RPM.

The TRIGGER mode indicates that one of two things may happen. The first is that the Strobe Lamp(s) will flash when the Stroboscope receives a valid external signal, such as a pulse from a Photogate Head connected to the IN port on the end of the Stroboscope. The second is that an external Stroboscope attached to the OUT port will be activated. When the Stroboscope is in TRIGGER mode, the Digital Display shows the amount of delay time between the valid external signal and the lamp flash. The display ranges from 0 to 1000 milliseconds. The default delay is 100 milliseconds (0.1 seconds).

LAMP Button

The LAMP button controls the Strobe Lamps attached to the Stroboscope when the Stroboscope is in the HZ or RPM mode. Press the LAMP button once to start the flashing. The HZ or RPM LED will shine continuously.

Press the LAMP button again to stop the flashing. The FUNCTION LED will return to a slow flashing mode. Note that pressing the FUNCTION button when the lamp is flashing *turns off the lamp* and also advances the function to the next selection.

COARSE and FINE Control Knobs

The COARSE and FINE control knobs adjust the flash rate when the Stroboscope is in HZ or RPM mode, and they adjust the delay time between a valid external signal and the lamp flash when the Stroboscope is in TRIGGER mode. Table 1 shows how much a single slow 'click' of the COARSE or FINE control knobs will change the displayed flash rate or delay time. Maximum and minimum settings are also shown.

Table 1. COARSE and FINE

	COARSE	FINE	Maximum	Minimum
HZ	1.0 Hz	0.1 Hz	500.0 Hz	1.0 Hz
RPM	10 RPM	1 RPM	30,000 RPM	60 RPM
TRIGGER	10 ms	1 ms	1000 ms	0 ms

Each control knob incorporates a "speed-up" function that gives the user the option of high resolution or rapid changes in the Digits Display. As an example, the combination of COARSE/FINE and speed-up means that the RPM display can be changed anywhere from 1 RPM (FINE knob moved slowly) up to 100 RPM (COARSE knob moved quickly) per "click" of the control.

BRIGHTNESS Control Knob

The BRIGHTNESS Control Knob operates similarly to the flash rate controls, except that it controls the brightness of the lamp while flashing by setting the duration of each flash. The longer the duration, the brighter the flash and *vice versa*. The control operates using a relative scale of 1 to 25 in brightness for all three functions (HZ, RPM, and TRIGGER), with "1" being the dimmest and "25" being the brightest.

For TRIGGER mode with an external device connected to the TRIGGER - IN port, the brightness control range of 1 to 25 arbitrarily maps to a lamp on-time range of 50 to 400 microseconds, since we don't know the flash repetition rate. In other words, when the brightness control is at "1", each triggered flash of the strobe lamp lasts 50 microseconds, and when the brightness control is at "25", each flash of the strobe lamp lasts 400 microseconds.

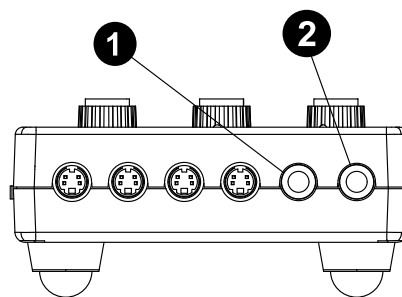
Whenever the brightness control knob is moved while in HZ, RPM, or TRIGGER mode, the seven-segment display will *automatically* switch to display relative brightness. You can easily differentiate this display from the other displays by noticing that the brightness is *left justified*, while all the other displays are *right justified*. Three seconds after the brightness control knob becomes stationary, the display will revert to displaying Hz or RPM.

SAVE and RECALL

SAVE: If the FUNCTION button is held down for more than one second, all of the LEDs light up momentarily and the Stroboscope saves almost all of the setup information to non-volatile memory. This includes frequency in Hz, RPM, and TRIGGER delay settings. The brightness setting is not saved. Only one group of settings is saved, and any previously saved setups are overwritten.

RECALL: If the LAMP button is held down for more than one second, all of the LEDs light up momentarily, and the Stroboscope recalls the setup information from memory. This includes frequency in Hz, RPM, and TRIGGER delay settings. The brightness setting is not recalled.

TRIGGER IN and TRIGGER OUT



- ① TRIGGER - OUT
- ② TRIGGER - IN

The TRIGGER - IN and TRIGGER - OUT ports at the end of the Stroboscope will accept 1/4 inch diameter stereo phone plugs (also known as "tip-ring-sleeve" plugs).



TRIGGER mode is indicated only by the FUNCTION LED and is designed primarily for use with PASCO Photogates. For example, connect a PASCO Photogate to the TRIGGER - IN port and set the Stroboscope to the TRIGGER mode with a Strobe Lamp attached. Press the LAMP button. The lamp will flash each time that the photogate's infrared beam is interrupted.

The 7-segment display continuously displays the external trigger (TRIGGER - IN) display setting. The setting defaults to zero, so there is essentially no delay between the trigger being received and the lamp turning on. The COARSE and FINE controls may be used to adjust the trigger delay time from 0 to 1000, with each increment equaling one millisecond. The BRIGHTNESS control is also active and may be adjusted from a relative brightness level of 1 to 25.

Multiple Stroboscopes

TRIGGER IN/OUT may also be used to connect multiple Stroboscope units when used in HZ or RPM modes. Similar to usage with a Photogate, each unit flashes along with the first or "primary" unit. There are three special considerations when using the Strobe with the primary unit in HZ or RPM.

First, configure the primary controller to operate in HZ or RPM. Configure each secondary unit to operate in TRIGGER mode. Connect the stereo patch cable from the primary controller's TRIGGER-OUT jack to the secondary unit's TRIGGER-IN jack. A large number of Strobes could be connected this way.



NOTE: A stereo phone plug-to-stereo phone plug cable is needed to connect two Stroboscopes together.

Second, to obtain consistent brightness from the secondary lamps, the secondary unit(s) will usually need to have their brightness control adjusted to where the actual levels match that of the primary Strobe controller. When equal brightness is attained, the brightness level as shown on each display may not match. Matching the light levels is best done by eye, without regard to the numerical brightness level displayed.

Lastly, if used, the trigger delay will have to be adjusted with care. If the secondary unit(s) delay time is set longer than the time between triggers from the primary controller, the secondary unit lamps will stop flashing or flash at an incorrect rate.

Proper operation using an external trigger requires that the trigger source be "debounced". Use of ordinary mechanical switches without debouncing circuitry can lead to multiple flashes, as well as flashes whenever the switch changes state.

The Stroboscope supplies a TTL level signal for the trigger output (TRIGGER - OUT) and can supply 5 volts (50 mA maximum) from the stereo plug "tip" to power external switches. The TRIGGER - OUT is designed to be connected to the TRIGGER - IN on a second Stroboscope. The advantage of being able to connect two (or more) Stroboscopes together is that the number of Strobe Lamps, and therefore the total brightness of each flash, can be increased.

Specifications and Accessories

Visit the product page at [pasco.com/product/ME-6978](https://www.pasco.com/product/ME-6978) to view the specifications and explore accessories. You can also download support documents from the product page.

Technical Support

Need more help? Our knowledgeable and friendly Technical Support staff is ready to answer your questions or walk you through any issues.

	Chat	pasco.com
	Phone	1-800-772-8700 x1004 (USA) +1 916 462 8384 (outside USA)
	Email	support@pasco.com

Limited Warranty

For a description of the product warranty, see the Warranty and Returns page at www.pasco.com/legal.

Copyright

This document is copyrighted with all rights reserved. Permission is granted to non-profit educational institutions for reproduction of any part of this manual, providing the reproductions are used only in their laboratories and classrooms, and are not sold for profit. Reproduction under any other circumstances, without the written consent of PASCO scientific, is prohibited.

Trademarks

PASCO and PASCO scientific are trademarks or registered trademarks of PASCO scientific, in the United States and in other countries. All other brands, products, or service names are or may be trademarks or service marks of, and are used to identify, products or services of, their respective owners. For more information visit www.pasco.com/legal.

Product end-of-life disposal



This electronic product is subject to disposal and recycling regulations that vary by country and region.

It is your responsibility to recycle your electronic equipment per your local environmental laws and regulations to ensure that it will be recycled in a manner that protects human health and the environment.

To find out where you can drop off your waste equipment for recycling, please contact your local waste recycle or disposal service, or the place where you purchased the product.

The European Union WEEE (Waste Electronic and Electrical Equipment) symbol on the product or its packaging indicates that this product must not be disposed of in a standard waste container.

CE statement

This device has been tested and found to comply with the essential requirements and other relevant provisions of the applicable EU Directives.

FCC statement

This device complies with part 15 of the FCC Rules.

Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.