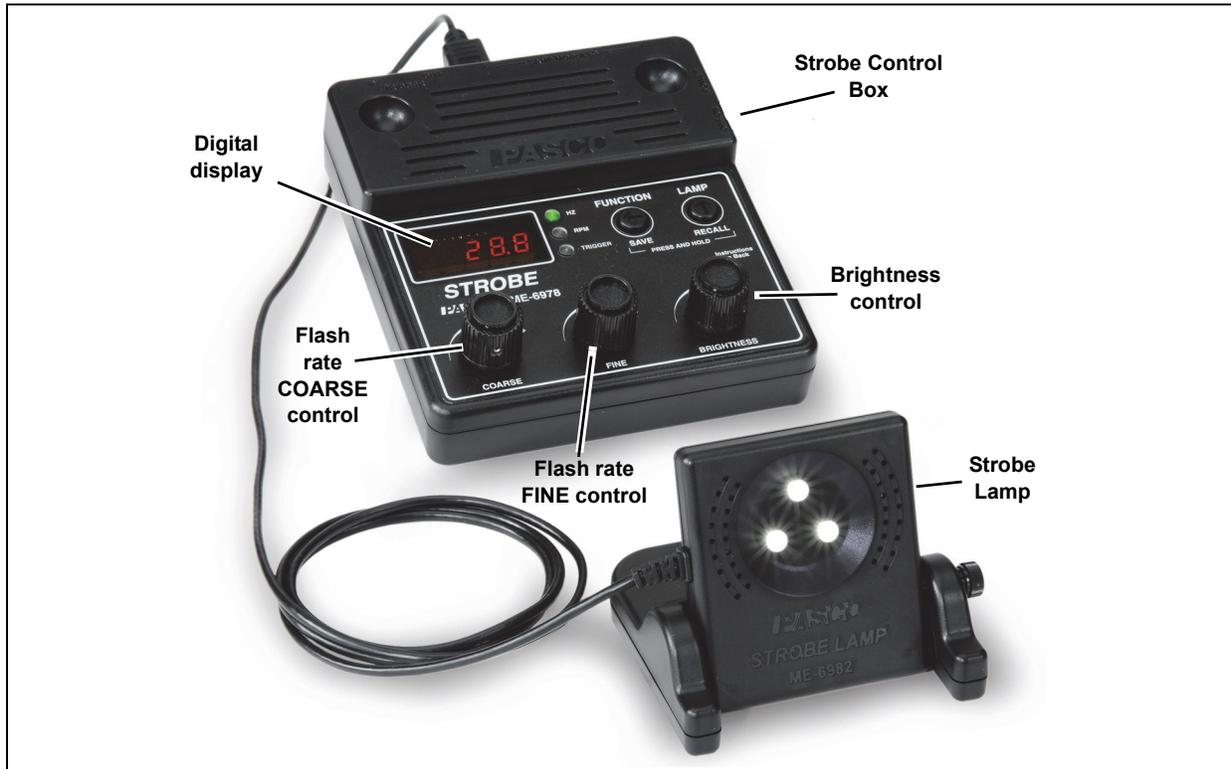




Stroboscope

ME-6978



Included Equipment

Strobe Control Box

Strobe Lamp (ME-6982)

Compatible PASCO Equipment*

Strobe Lamp (ME-6982)

Included Equipment

AC to 15VDC 6.4A Power Adapter (not shown)

Power Cord (not shown)

Compatible PASCO Equipment*

Photogate Head (ME-9498A or ME-9204B)

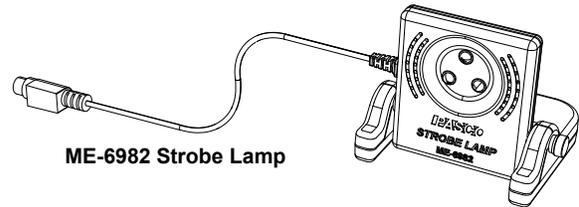
*See the PASCO Web site at www.pasco.com for more information.

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 also adjustable from 1 (dimkest) 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

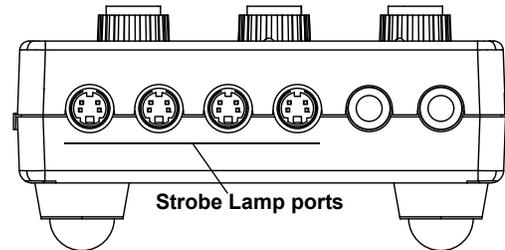
Head. The ability of the Stroboscope to respond to a trigger from an external device allows strobe flashes to be synchronized with an external event. This can be used to insure that a strobe photograph is taken at a critical instant.



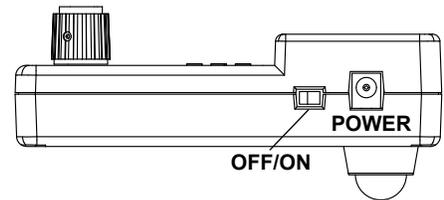
ME-6982 Strobe Lamp

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.



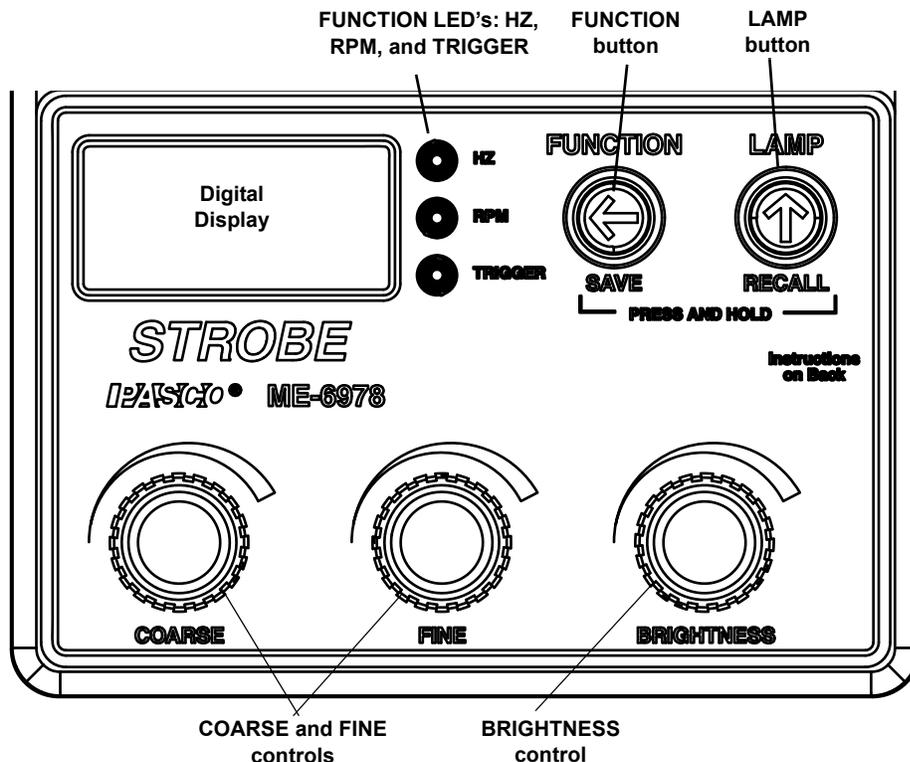
Slide the OFF/ON switch on the right side of the Strobe Control Box to the ON position. The green light-emitting diode (LED) next to HZ on the top panel will begin to slowly flash. The digital display will show 10.0. The Stroboscope is active but the attached Strobe Lamp(s) will not flash yet.



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.

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.

CAUTION: Do not look directly into the Strobe Lamp when the LED's are flashing!



Front Panel

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

FUNCTION Button and LED's

The FUNCTION button cycles through the 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, the 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 at power on. The maximum flash rate is 500 Hz or 30,000 RPM. The minimum flash rate is 1 Hz or 60 RPM.

NOTE!

The default flash rate is 10.0 Hz or 600 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. The next table 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 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	30000 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 combina-

tion 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

This 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.

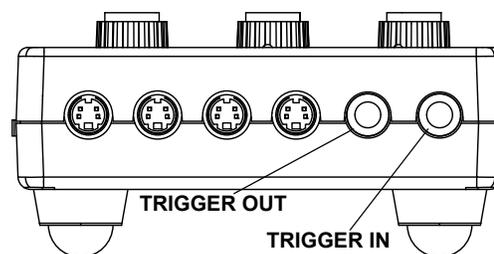
SAVE and RECALL

SAVE: If the FUNCTION button is held down for more than one second, all of the LED's 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 LED's 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

The TRIGGER - IN and TRIGGER - OUT ports on 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) delay setting. This setting defaults to zero, so there is essentially no delay between the trigger being received and the lamp turned 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.

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

Note that a stereo phone plug-to-stereo phone plug cable is needed to connect two Stroboscopes together.

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

Second, to obtain consistent brightness from the slaved lamps, the slave units will usually need to have their brightness control adjusted to where the actual levels match that of the master 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.

Last, if used, the trigger delay will have to be adjusted with care. If the slaved unit(s) delay time is set longer than the time between triggers from the master controller, the slave 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 and 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

Flash Rate, Hz	1 to 500
Flash Rate, RPM	60 to 30,000
TRIGGER - IN Delay Time	0 to 1000 milliseconds

Technical Support

For assistance with any PASCO product, contact PASCO at:

Address: PASCO scientific
10101 Foothills Blvd.
Roseville, CA 95747-7100

Phone: 916-462-8384 (worldwide)
800-772-8700 (U.S.)

Web: www.pasco.com

Email: support@pasco.com

Limited Warranty

For a description of the product warranty, see the PASCO catalog.

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