

SH-2 Shutter Controller Card

The SH-2 shutter card allows you to control the operation of two ASI shutters. The SH-2 shutter card plugs into the PWR-ASI-6 power supply. Typically the SH-2 is used along with other modules, such as the FW1000 filter wheel controller. The SH2 takes up a single slot in the power supply.

Shutters connected to the SH-2 can be controlled with the front panel toggle switch, with TTL inputs via BNC connectors on the front panel, by a foot switch connected to the same BNC connectors, or with RS-232 commands via the FW1000 filter wheel controller (if one is installed in the same cabinet with the SH-2). The priority for *activating* a shutter follows the table below. In general, the serial interface's activation command has highest priority, followed by the TTL/Footswitch activation input, with the toggle switch having lowest priority. Deactivation or 'Not Active' commands will be overridden by any activation command or switch.



Serial Command	BNC		J5/J6 Jumpers (Default is 1-2)	Toggle Switch	Normally Open Shutter	Normally Closed Shutter
	TTL	Footswitch				
A	X	X	X	X	A = C	A = O
X	L	ON	1-2	X	A = C	A = O
N-A	H	OFF	1-2	X	N-A = O	N-A = C
N-A	L	--	2-3	X	N-A = O	N-A = C
X	H	--	2-3	X	A = C	A = O
N-A	No Input		X	Left	N-A = O	N-A = C
X	No Input		X	Right	A = C	A = O

A = Active L = TTL logic low C = Closed X = Don't Care
 N-A = Not Active H = TTL logic high O = Open -- = Don't Use

Selection of the TTL logic polarity can be made using the internal jumpers J6 and J5 for BNC triggers 0 and 1 respectively. The factory default is for the jumpers on the upper two pins (0-1). In this setting the logic is "active low." A footswitch connected to the BNC input with the jumper set in this position will activate a shutter when the switch is closed.

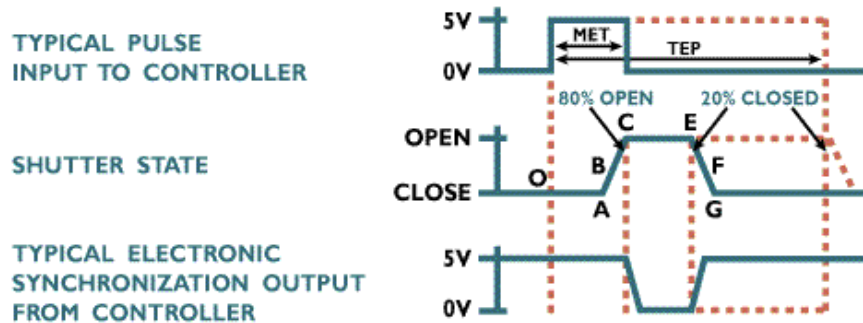
If the shutter connected to the controller has an opto-electric sensor, the front panel LED will light when the shutter is in the Open position.

SH-2 Specifications

Number of shutter channels per card	Two
Opening Time (25mm N.C. shutter)	8 ms
Closing Time (25mm N.O. shutter)	7 ms
Peak Unsustained Repetition Rate	40 Hz
Maximum Sustained Repetition Rate	5 Hz

SH-2 Shutter Timing

The following diagram illustrates timing of pulse input and synchronization output relative to shutter state.

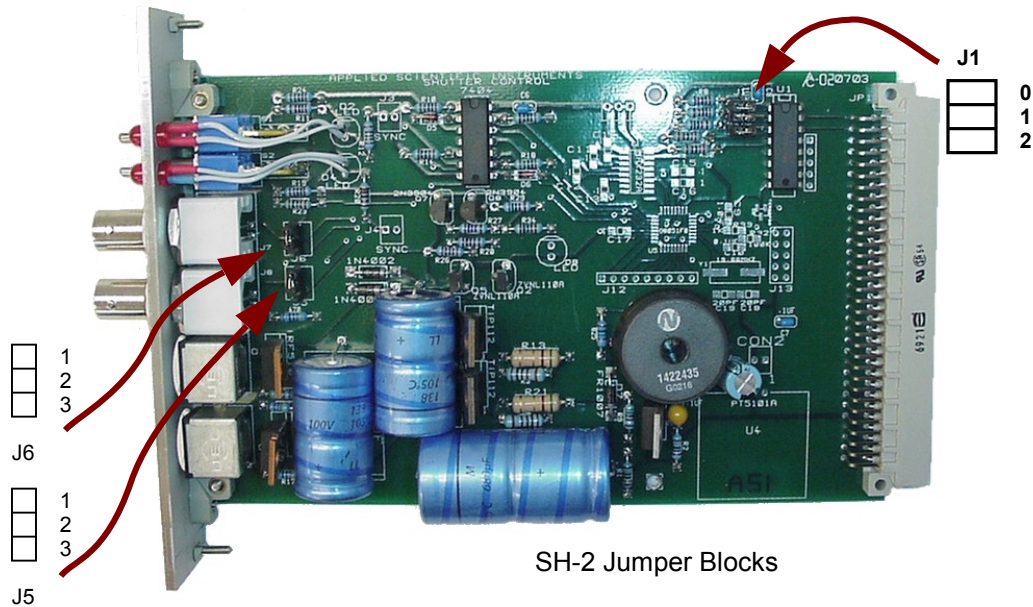


The following chart lists typical timing values (in milliseconds) using 25 mm aperture shutters equipped with standard black Teflon[®] coated shutter blades, and controlled by an SH-2 shutter controller.

Period	Description	Normally Open Shutter	Normally Closed Shutter
O-A:	Delay time on opening after current is applied	3 ms	4 ms
A-C:	Transfer time on opening	4 ms	4 ms
O-C:	Total opening time	7 ms	8 ms
C-E:	Minimum dwell time with minimum input pulse	8 ms	4 ms
B-F:	Minimum equivalent exposure time	13 ms	5 ms
E-G:	Transfer time on closing	2 ms	6 ms
A-G:	Total window time	14 ms	14 ms
MET:	Minimum exposure time	7 ms	
TEP:	Typical exposure pulse	> 8.0 ms	

The question regarding enhancement of shutter speed with the application of user-supplied lubricants has been repeatedly asked. It is the experience of the shutter manufacturer that lubricating the shutter blades will actually slow the shutter down and eventually render the shutter inoperable. Under no circumstances should any type of lubricant be applied to the shutter blade area.

SH-2 Shutter Controller Card Jumper Block J1



You need the information in this section only if you have more than one SH-2 shutter controller card in your system *and* you wish to control them using serial commands via the FW-1000 filter wheel controller card.

In order for a system with multiple SH-2 cards to work properly, no two cards may have the same arrangement of jumpers. *This is the only absolute requirement with respect to jumpers.*

<i>Jumper Block J1</i>			<i>Shutters</i>
<i>0</i>	<i>1</i>	<i>2</i>	
<i>Closed</i>	<i>Closed</i>	<i>Closed</i>	<i>0, 1</i>
<i>Open</i>	<i>Closed</i>	<i>Closed</i>	<i>2, 3</i>
<i>Closed</i>	<i>Open</i>	<i>Closed</i>	<i>4, 5</i>
<i>Open</i>	<i>Open</i>	<i>Closed</i>	<i>6, 7</i>