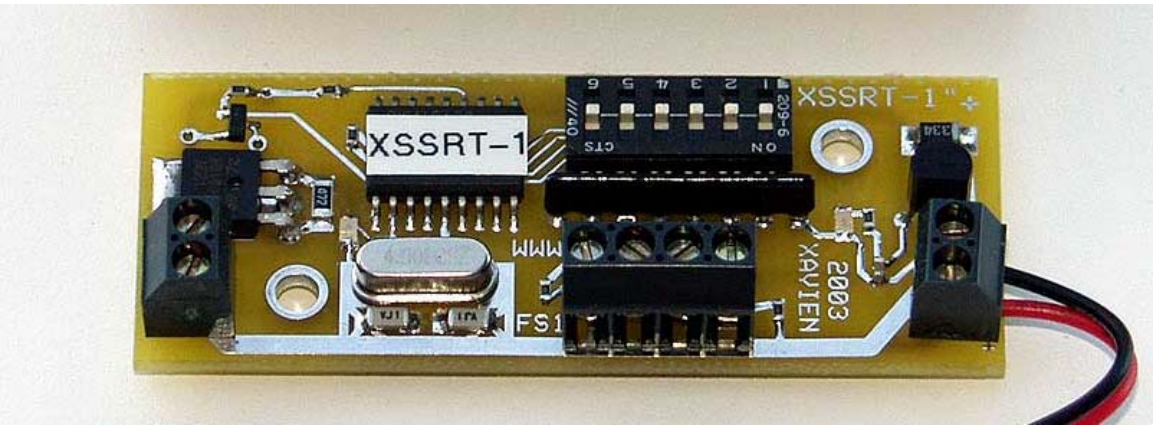
“XSSRT-1” - Xavien Single Stage Rocket Timer

User Manual and Instructions



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System Overview

The “XSSRT-1” is a precise 1 second to 63 seconds single stage timing system used to control the ignition system in a rocket. Time settings are set using a 6-position DIP switch that eases programming. It runs off of an external DC power supply ranging from +7V to +15V, a 9V alkaline battery is ideal for powering the “XSSRT-1”. Various igniters / electric matches may be used because of the versatility and design of the “XSSRT-1”.

Specifications

Battery	external 7-15 VDC
Dimensions	0.95” (+/- 0.05”) W x 2.5” (+/- 0.02”) L
Weight	14.2 grams
Nominal Battery Load	15mA
Delay Settings	1 second to 63 seconds (in 1 sec. increments)

Operational Overview

Figure 1 depicts the component layout of the “XSSRT-1”. The switches are labeled 1 through 6 accordingly. The ON position for the switches are labeled at the top of each DIP switch pack.

Figure 1. “XSSRT-1” Assembly.

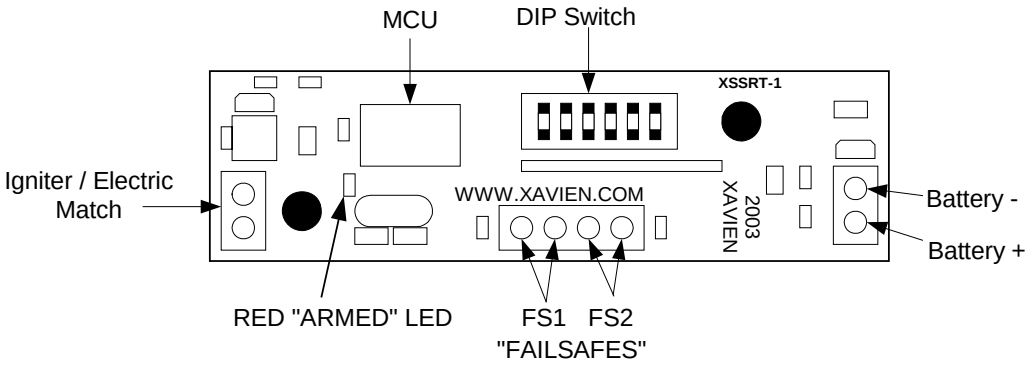
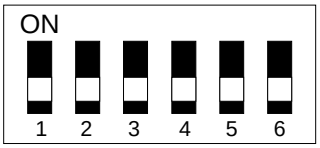


Figure 2 gives a close look at the DIP switches and explains time value of each switch. Table 1 gives examples of various time settings. For example, to get a delay of 10 seconds you would turn ON switch 2 and switch 4 (2 seconds + 8 seconds = 10 seconds), rest would be OFF. The timing begins counting down as soon as **BOTH** failsafes are “OPEN” (disabled). If the unit is powered up with both failsafes “OPEN”, the unit begins counting down immediately. Make sure failsafes are in place **BEFORE** applying power to the unit.

Figure 2. DIP Switch with all switches in the OFF position.



Switch	Time Value
1	1 second
2	2 seconds
3	4 seconds
4	8 seconds
5	16 seconds
6	32 seconds

<u> IMPORTANT**:</u> Switches *MUST* be set prior to turning power on to "XSSRT-1". The MCU *ONLY* reads the switch settings on power up. If changes need to be made, turn unit OFF, set switches and cycle power back ON.**

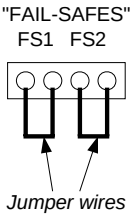
Table 1 (Example of delay settings)

Switch Setting [1, 2, 3, 4, 5, 6]	Time Delay
Off-Off-Off-Off-Off-Off	Delay = 1 second (default)
On-Off-Off-Off-Off-Off	Delay = 1 second
Off-On-Off-Off-Off-Off	Delay = 2 seconds
On-On-Off-Off-Off-Off	Delay = 3 seconds
Off-On-Off-On-Off-Off	Delay = 10 seconds
Off-Off-Off-Off-On-Off	Delay = 16 seconds
Off-On-On-Off-On-Off	Delay = 22 seconds
On-On-Off-Off-Off-On	Delay = 35 seconds
Off-Off-Off-On-Off-On	Delay = 40 seconds
On-On-On-On-Off-On	Delay = 47 seconds
On-On-Off-Off-On-On	Delay = 51 seconds
Off-Off-On-On-On-On	Delay = 60 seconds
On-On-On-On-On-On	Delay = 63 seconds

“XSSRT-1” FAILSAFES:

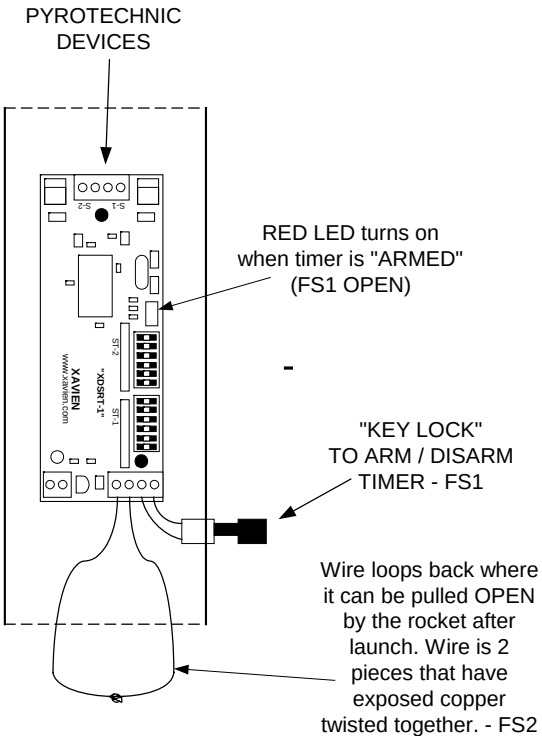
The “XSSRT-1” has two failsafes to protect against accidental timer countdowns. The failsafes are “ENABLED” when “FS1” and “FS2” are connected together as in figure 3. The unit will NOT begin countdown until BOTH failsafes have been “DISABLED” (OPENED). When FS1 is OPENED after power-up, assuming BOTH failsafes are connected, the RED “ARMED” LED will come on letting the user know it is “ARMED”.

Figure 3. FAILSAFES “ENABLED”.



Once a failsafe has been “DISABLED” (opened), the only way to reset the failsafe is to turn the power off. Once this is done you can “ENABLE” the failsafe and turn the power back on. We at XAVIEN have had good luck using “solder” as the jumper wires for the failsafes. Place the length of solder directly under the engine, when it ignites it will melt the solder and countdown will begin. You can also use the “pull pin” technique or “break wire” technique. Figure 4 shows an “XDSRT-1” set-up using both failsafes with the “pull pin” and “break wire” technique. To “ARM” the timers you turn the key lock switch “OFF”, once this is done the RED “ARMED” LED should activate assuming you have the power from the battery connected and turned on. Once the rocket takes off the FS2 connection will be broken (OPENED) and countdown will begin. *Make sure you remove the “key” of the key lock switch before the rocket is launched.*

Figure 4. Basic timer configuration.

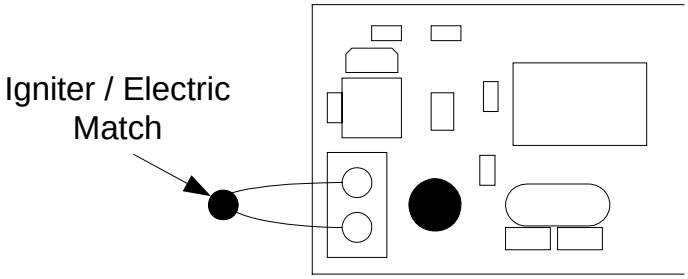


<u> IMPORTANT**:</u> All connections (FAILSAFE settings and switch position) must be set *BEFORE* you apply power to the "XSSRT-1".**

Pyrotechnic Installation:

The "XSSRT-1" has been tested using various igniters and electric matches. To install a pyrotechnic device onto the "XSSRT-1" you simply unscrew the terminals located as in figure 5. The terminals are screw based terminal blocks for easy access and reliability. *User does not need to worry about which terminal goes to which leg of the igniter / electric match.* Make sure you **hand tighten** screw terminals after igniter / electric match has been installed.

Figure 5. Pyrotechnic device install location.



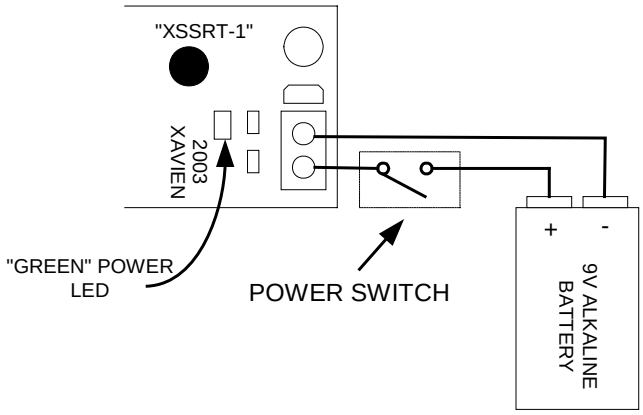
Recommended igniter / electric matches:

The "XSSRT-1" has been tested using the Daveyfire 28B, 28BR and OXRAL igniters / electric matches. It is recommended that you test the model you are using to insure proper ignition occurs. We here at XAVIEN have used igniters / electric matches that are easily available to us for testing. If you are using something different than what is listed and want to make sure it will work before buying a "XSSRT-1" email us, and we will look into testing a unit using your model of igniter / electric match. ***Our time is limited so no guarantees on how fast we can do this.***

Battery Connections:

The “XSSRT-1” was designed to operate using a 9V alkaline battery. We here at XAVIEN recommend using a switch (3A MAX CURRENT) to insure ease of use when powering the unit up and down. We have equipped the unit with a small green power indicator so the user can easily identify when the unit has power applied. It is recommended that the user do tests using their igniter / electric match configurations before “assuming” anything will work. This will help to insure that the “XSSRT-1” and your configuration will work to your expectations. In figure 6 we have a basic diagram of the battery connections that are recommended by us. **It is always a good idea to insure you have a fresh (new) battery before any launches occur. After all, the cost of a battery is nothing compared to the time and money spent on many of our users rockets.**

Figure 6. Recommended battery connections.



Setup Sequence:

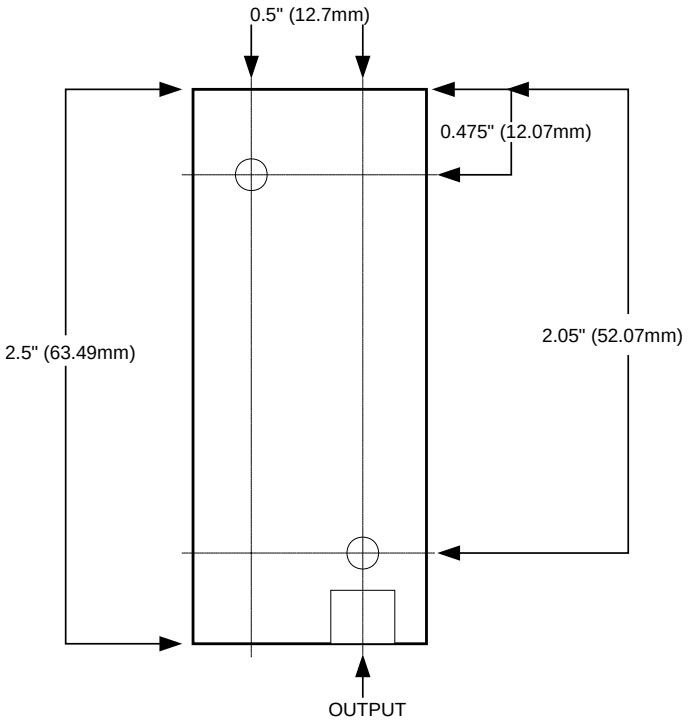
This is the recommended sequence for setting up the “XSSRT-1”.

1. Make sure unit is **NOT** powered up, if it is turn it OFF,
2. Set DIP switches to desired time delay.
3. Install failsafes, making sure screw terminals are not loose, hand tighten only.
4. Install igniter / electric match, making sure screw terminals are not loose, hand tighten only.
5. Install a fresh 9V battery, making sure screw terminals are not loose, hand tighten only. Reversing the polarity of the battery can damage the “XSSRT-1”, when installing the battery refer to **figure 1** for the correct polarity.
6. If green LED is ON, turn switch to OFF position if you will not be immediately launching your rocket. This saves on the life of the battery. When you are ready to launch, turn switch to ON position, the “XSSRT-1” is ready to go.

Mounting / Installation

The “XSSRT-1” must be installed securely to prevent the unit from being damaged during use. Since this unit does not depend on a “g-switch”, orientation of the unit is very flexible. The mounting holes are 0.125”; this allows various size screws to be used. Just verify the clearance of both the screw and the head to insure a proper fit without damaging the unit.

XSSRT-1



URGENT: *The “XSSRT-1” MUST be protected from ejection charge and motor residue. These are corrosive and over time can damage the “XSSRT-1”. If this occurs, the warranty does not cover this type of damage.*

Igniter / Electric Match Sources:

Manufacturers:

- Daveyfire
  7311 Greenhaven Drive, Suite 100
  Sacramento, CA 95831
  www.daveyfire.com

- Luna Tech / OXRAL
  148 Moon Drive
  Owens Cross Roads, AL 35763
  www.oxral.com
  www.pyropak.com

** Handling Precautions **

These units are sensitive to damage from ESD and should always be handled in a properly grounded environment; damage from ESD is not covered under the warranty. Never transport or handle a rocket with an “XSSRT-1” that is powered up and connected to live pyrotechnic charges. When installing an “XSSRT-1” to igniters, make sure unit is powered off. Before cycling power ON verify that both failsafes are ARMED to prevent accidental discharge.

!! Product Disclaimer and Limit of Liability !!

Since the use and application of this equipment are beyond our control, the purchaser or user agrees to hold “XAVIEN” and their agents from any and all legal claims, demands, actions, debts, liabilities, judgments, costs and attorney fees arising out of, claimed on account of, or in any manner predicted upon loss or damage to property of, or injuries to or death of, any and all persons arising out of the use of this equipment. Due to the nature of electronic devices, the application and environments for these devices, the possibility of failure can never be completely ruled out. It is the responsibility of the purchaser or user of this equipment to properly test and simulate the actual conditions under which the device is intended to be used to ensure the highest degree of reliability, safety and success.

!! Product Warranty !!

The “XSSRT-1” has a warranty of 1 year starting from date of purchase as long as all the guidelines have been followed that are outlined is this document. Any improper use or carelessness on the part of user will void the warranty. If your unit has problems send an email to:

RMA@XAVIEN.COM

Once this has been done, XAVIEN will send you a return material authorization (RMA) number that you need to include with your unit. **DO NOT send any units back to XAVIEN without this RMA number, if we receive product with no RMA it will NOT be accepted and mailed back unrepaired.**

Revision History

PCB REV: 1.00A	DATE: 08/15/2003
FW REV: 1.00A	DATE: 08/15/2003
DOC REV: 1.01A	DATE: 08/09/2005 [UPDATED LOGO]