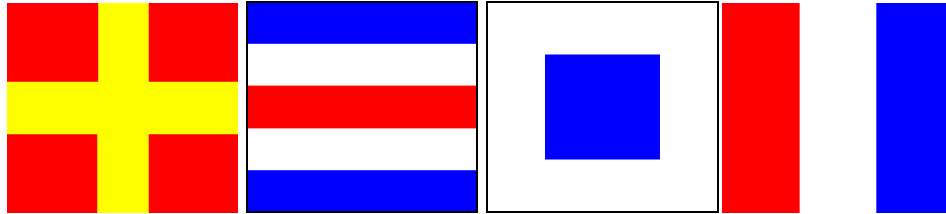


# Race Committee Start Timer Users Manual



Thank you for purchasing the R/C Start Timer!

The purpose of the R/C Start Timer is to simplify the duties of the Race Committee. It accomplishes this by automating horns, displaying current sequence time, and by replacing the time-sensitive flag signals with automated lights.

This timer has been born from a proposal we made to the US Sailing organization for a lighted start sequence. That proposal can be seen below, as well as in the Sequences appendix of this user's manual.

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## LIGHTED START SEQUENCE PROPOSAL

The worldwide governing body of sailboat racing prescribes a sequence of flags and horns that competitors use to determine their start time. Competitors set stopwatches or other devices based up these flags and to position themselves to cross a start line at exactly the designated time. It is crucial for competitors to start precisely because a: an early start means disqualification, and b: a late start hinders their ability to compete in the race. Skilled sailors regularly start within one second of their start time.

The start sequences are run by persons called the Race Committee. Often, these individuals are volunteers who rarely perform these duties. Clubs with dedicated Race Officers also have volunteers to address common tasks such as raising flags. Those volunteers do not always understand the importance of split-second accuracy when raising or lowering flags. Boat movements can throw the person off. Equipment setup can slow flag raising or lowering. Flag timing and technique can vary from person to person, or club to club. The spectacle of being surrounded by sailboats often distracts even skilled officers.

The envisioned sequence will only replace those aspects of the sequence which require flag changes at specific moments in time. In the case of the RRS 26 sequence, this would be the Warning, Preparatory, One-minute, and Start signals. In those cases, two flags are raised or lowered at specific times, and can be replaced with automated lights. Some other flags (OCS, 1st Substitute, etc) can be handled as they are now. Some flags affiliated with timing (Class & Penalties) can be removed from timing concerns easily.

In summary: Skilled sailors can time their start within one second. GPS technology makes accurate starts possible for additional skill levels. Race Committees should be at least as accurate as their sailors. By automating all timed-aspects of the start sequence, sailboat racing will become more fair for everyone, and give the Race Committee the time to focus on more important tasks.

Submitted to US Sailing in the Fall of 2019.

## LAYOUT

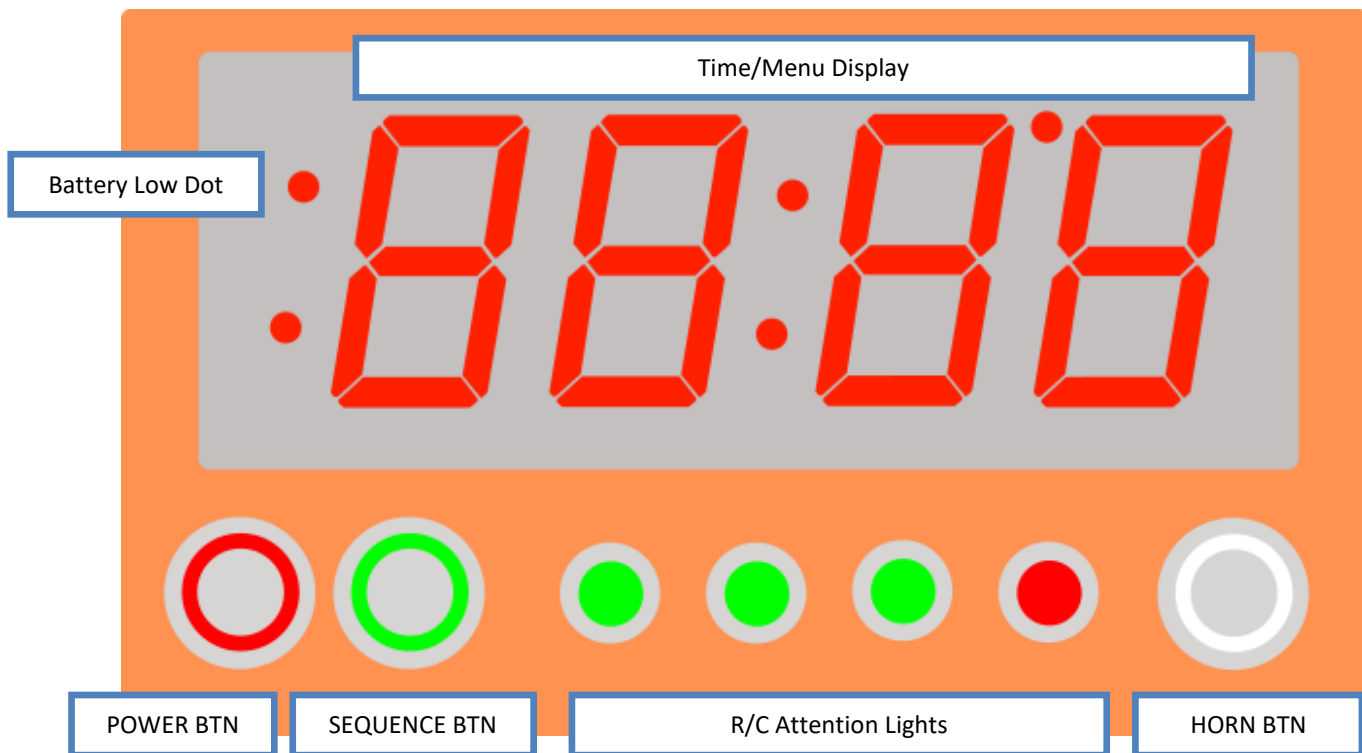


Figure 1 - Front Panel Photo



Figure 2 - Right Side Connectors



Figure 3 - Inside the box

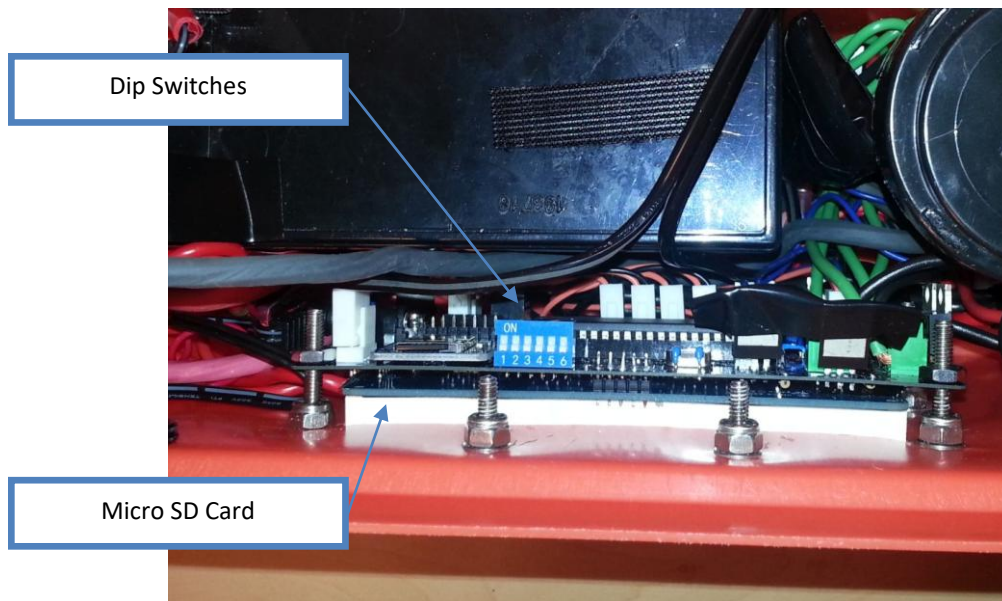


Figure 4 - Inside the Box - Configuration Items

To Be Added:

[Horn Photos]

[Lamp Photos]

## BASIC USAGE

### POWER

Press the POWER BUTTON to turn the start timer on.

The timer will initially display the current voltage and selected sequence, as well as blink all the lights, horns and speakers as a test. The screen displays the voltage on the left, and the sequence on the right. For example:

**[12: 1]**      Indicates 12V, and sequence 1 selected

The timer will then display a 5 second count-down and will wait for you to start the sequence.

**[-0:05]**

### START THE SEQUENCE

Press and release the SEQUENCE BTN. The start timer will start counting down from 5 seconds to the start of the selected sequence.

Depending on the sequence, the R/C Attention lights and the onboard speaker will indicate when Race Committee needs to pay attention. IE: Flag change, upcoming start, etc... See the Sequences section below for details.

### SOUND THE HORN

You may press the HORN button at any time. The horn will sound for as long as you hold the button.

### AFTER SEQUENCE COMPLETED

Timer will revert to the starting state, with a 5-second countdown. (unless rolling is configured)  
You may run another sequence, or turn the unit off.

### CANCEL THE SEQUENCE

If you need to cancel the sequence (ie: Postpone), turn the device off (press and release the POWER BUTTON).



## HORNS

The included horns are extremely loud and can be easily heard up to one mile in strong winds.

It is important that the horns not be located close to personnel on the Race Committee boat. A 15-ft air hose has been included with the start timer, and the horns should be placed as far away from personnel as possible.

While the horns are basically omnidirectional, they are slightly louder in the direction they are pointed, so aim them toward or behind the start line.

If extra length is required, the hose is standard vinyl tubing and requires a 1/4" inner diameter.

## SIGNAL LAMPS

## WATERPROOFNESS

The entire unit is rain/splash proof while the cover is closed and horns are connected. Buttons may be used when wet. Lamps need not be connected.

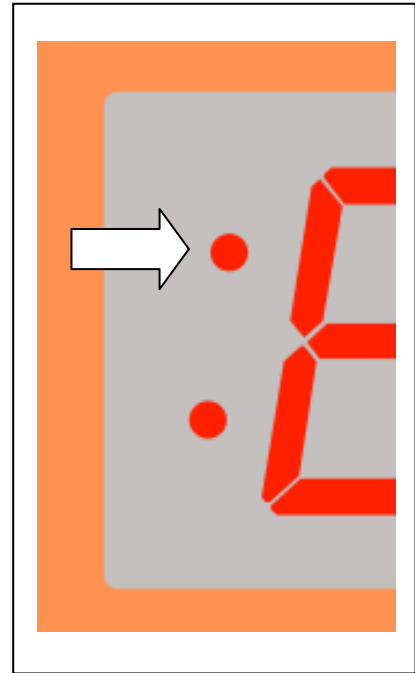
There are small holes on the back to allow airflow for the onboard compressor (air horns). If those holes are sitting in water when the horn is sounded, a small amount of water may be pulled into the case. This is not generally a concern if it is fresh water. At the end of the day, you should open the cover and let the device dry out.

## LOW BATTERY / CHARGING

The start timer will blink the top-left light slowly when the battery should be charged. You may use the unit for many sequences in this state, but horns may become slightly quieter and sequence lights may become dim.

When the battery becomes critically low, the top-left light will blink rapidly. Horns may or may not work in this state, and sequence lights will become very dim. Charge the unit before the next sequence.

To charge the start timer, open the box and plug the charger into any 120v outlet. Full charge can take up to 12 hours.

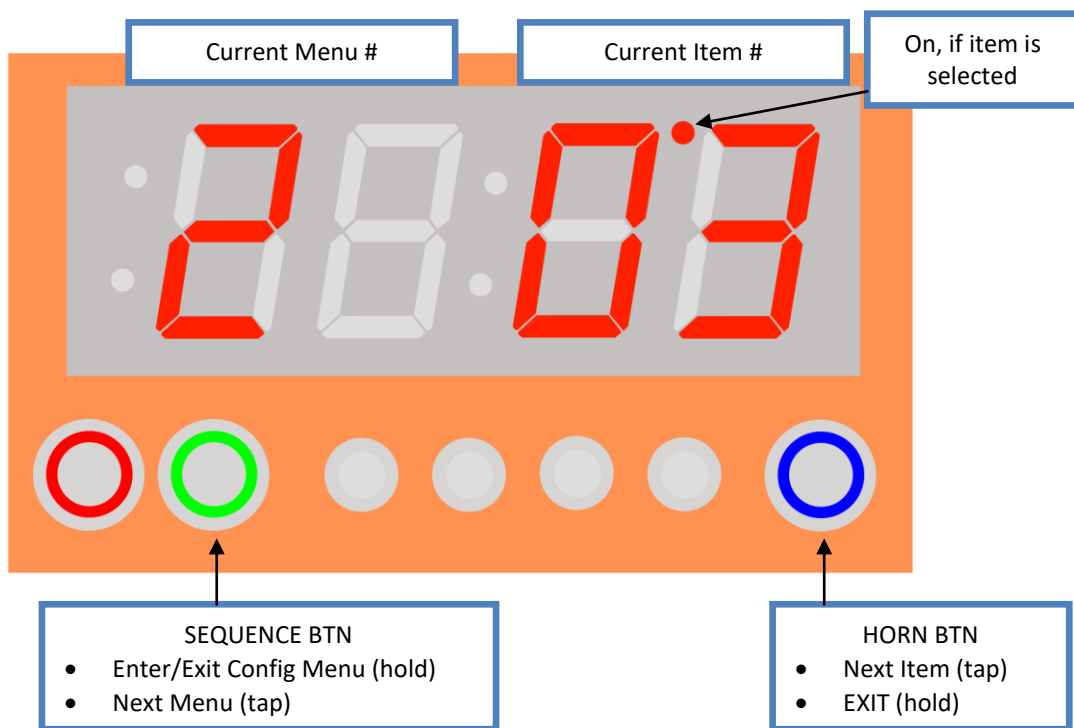


## CONFIGURATION

To access the menu, ensure that the timer is ON, and a sequence is not running.

Press and hold the SEQUENCE button.

The first menu and selected menu item will be shown.



Tap the SEQUENCE button to cycle through configuration menus, and the HORN button to cycle through menu items.

Hold the HORN button to make a selection. (red dot will turn on when item is selected)

Hold the SEQUENCE button to exit the menu.

The currently selected menu item is marked with a red dot at the top-right of the display.

Menus:

Menu Number	Menu Name	Version Supported
0	Sequence Selection	4.1
1	Rolling Configuration	4.1
2	Rolling Repeat Count	4.1
3	Internal Speaker Configuration	4.1
4	Lamp Blink	4.2

See the sections below for menu item details.

## SEQUENCES (MENU 0)

### Configuration Menu #0

The R/C Start Timer supports all major sequences and many variations of them. The software was designed to accommodate enhancements, so if you do not see your sequence listed, we would be happy to add it!

See document Appendix A (Sequences) for detailed explanations of these sequences.

Menu Item	Sequence	Version Supported
0*	RRS 26	4.1
1	RRS 26 (4-Minute)	4.1
2	RRS Appx U (Sound Signal)	4.1
3	RRS Appx C (Match Racing)	4.1
4	(for testing)	4.1
5	ICSA Appx C	4.1

\* default

## ROLLING CONFIGURATIONS (MENU 1)

### Configuration Menu #1

Rolling is the automatic repeat of a sequence. The following menu allows you to enable rolling, and choose a delay.

Timer will reset to the default start screen when rolling is complete.

Note that some sequences may be truncated to avoid attention or warning signals when they roll (see Appendix A for sequence-specific details).

Menu Item	Sequence	Version Supported
0*	Rolling Disabled	4.1
1	Rolling is Immediate	4.1
2	On, with 1-minute delay	4.1
3	On, with 2-minute delay	4.1
4	On, with 3-minute delay	4.1
5	On, with 4-minute delay	4.1
6	On, with 5-minute delay	4.1
7	On, with 10-minute delay	4.4

\* default

## ROLLING REPEAT COUNT (MENU 2)

### Configuration Menu #2

Maximum number of times a sequence rolls (repeats).

Menu Item	Sequence	Version Supported
0	Unlimited	4.1
1	1 repeat	4.1
2	2 repeats	4.1
...	Etc	4.1
...		4.1
20	20 repeats (max)	4.1

## INTERNAL BUZZER (MENU 3)

### Configuration Menu #3

The on-board speaker can be customized. This speaker is meant as an auditory cue to R/C personnel. It helps them to avoid looking at the timer during transitions when they need to focus on other things (such as watching for OCS boats).

Menu Item	Sequence	Version Supported
0*	Enables the speaker	4.1
1	Disables the speaker	4.1

\* default

## LAMP BLINK SETTINGS (MENU 4)

### Configuration Menu #4

Lamps can be configured to blink to draw attention to them. When this menu is selected, all lamps will be turned on so you can preview the effect.

Menu Item	Sequence	Version Supported
0*	Solid ON (blinking disabled)	4.2
1	Alternating blink (fast)	4.2
2	...	4.2
3	...	4.2
4	...	4.2
5	Alternating blink (slow)	4.2
6	Simultaneous Blink (continuous)	4.3
7	Simultaneous Blink (medium)	4.3
8	Simultaneous Blink (slow)	4.3

\* default

Current recommendation for daytime use: #7 or #8

## CONFIGURATION - DIP SWITCH GUIDE

The "Dip Switches" are tiny switches inside the case of the Start Timer, and are for additional configuration settings. Unlike the Configuration menu, dip switch settings usually take effect immediately without the need for a restart.

To change their setting:

1. Turn the Start Timer OFF
2. Open the case
3. Use a pen or other small object to move the switches.

Switch Number	Setting	Function	Version
1	OFF (default)	Internal Horns are used	4.1
	ON	External Horns	4.1
2	OFF (default)		
	ON		
3	OFF (default)		
	ON		
4	OFF (default)		
	ON		
5	OFF (default)		
	ON		
6	OFF (default)		
	ON		

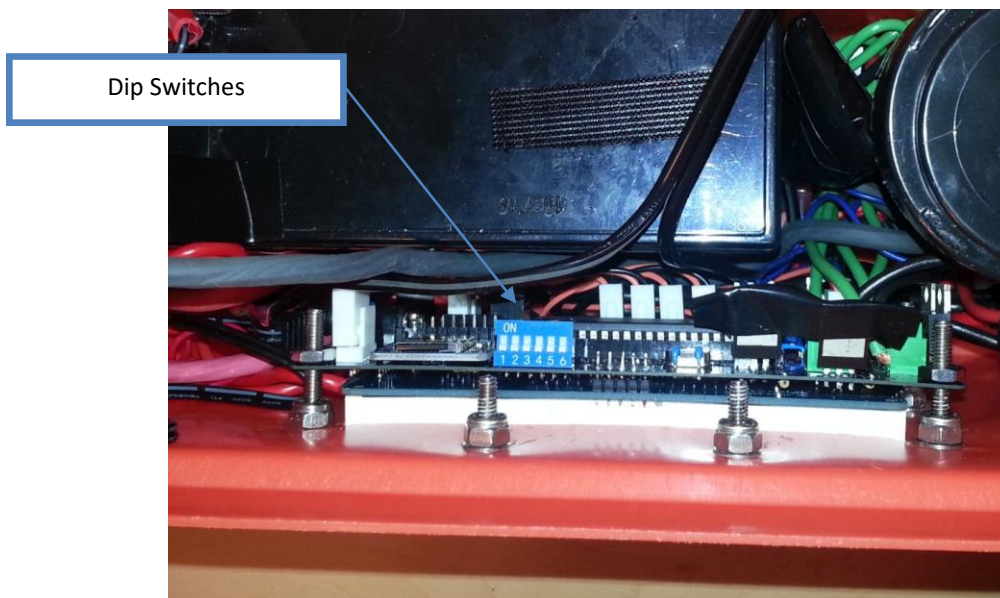


Figure 5 - Dip Switch Location

## SOFTWARE UPDATES

The start timer has an onboard Micro SD card reader which can receive software updates. Updates may be made at any time by downloading the latest version of the software and copying it to that card.

To update the software, you need a computer and memory card reader capable of supporting Micro-SD flash cards.

To update:

1. Go to the website and download the latest version of the software:  
<https://stcroixsailing.com/category/racing/start-timer/>
2. With the Start Timer turned off, open the top and remove the SD Card.  
(Push the card in and it will pop out.)
3. Place the memory card in an SD Card reader and copy the new software to it. The file should be called FIRMWARE.BIN (case sensitive). Be sure to overwrite the existing file.
4. Place the card back in the Start Timer. Turn on the power - it will start using the new software automatically.

If you have any issues, contact information is on the website above.

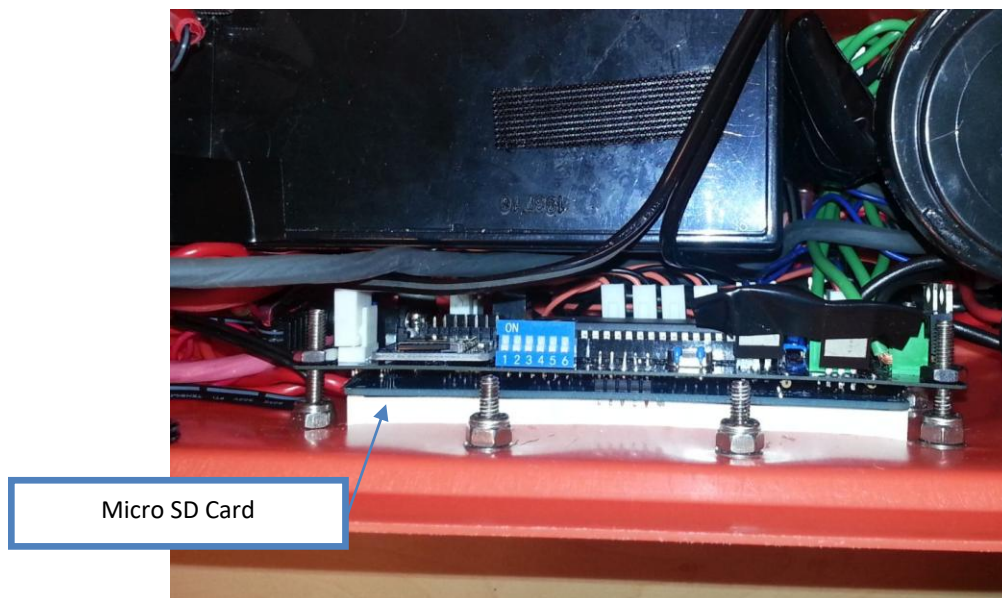


Figure 6 - Micro SD Card Location

## EXTERNAL LAMP CONNECTION

Custom lights may be used if you'd prefer a different configuration than what is offered.

Use of these circuits is at your own risk. Improper wiring may damage your R/C Start Timer. Warranties will not be honored if improper wiring damages circuitry.

There are three lamp connections (as of version 4.1) contained in one plug. Each connection runs at 12 volts and supports up to 5 Amps of power. Exceeding this capacity may result in overheating, damage to circuit board, or damage to internal wiring.

If extra power is required, use the outputs to drive a relay or other circuit running from a separate battery.

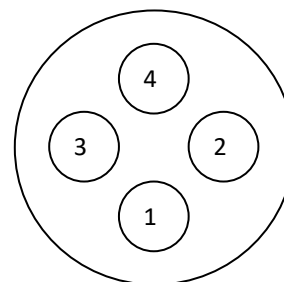
PIN	SIGNAL LAMP #	PURPOSE
1	1	GND
2	2	GND
3	3	GND
4		Pin +12v/5A

If an external relay is used, it must contain a flyback diode or resistor.

The power line is not switched and is always on.

### R/C Start Timer 4-pin Signal Light Connector

Pin locations are approximate, follow pin numbers (embossed on connector)



External connector supports up to 12-14ga wire. Solder connection.

To ensure waterproof connections, external wire should be round and fit snugly into compression cap.



## WIRING EXAMPLES:

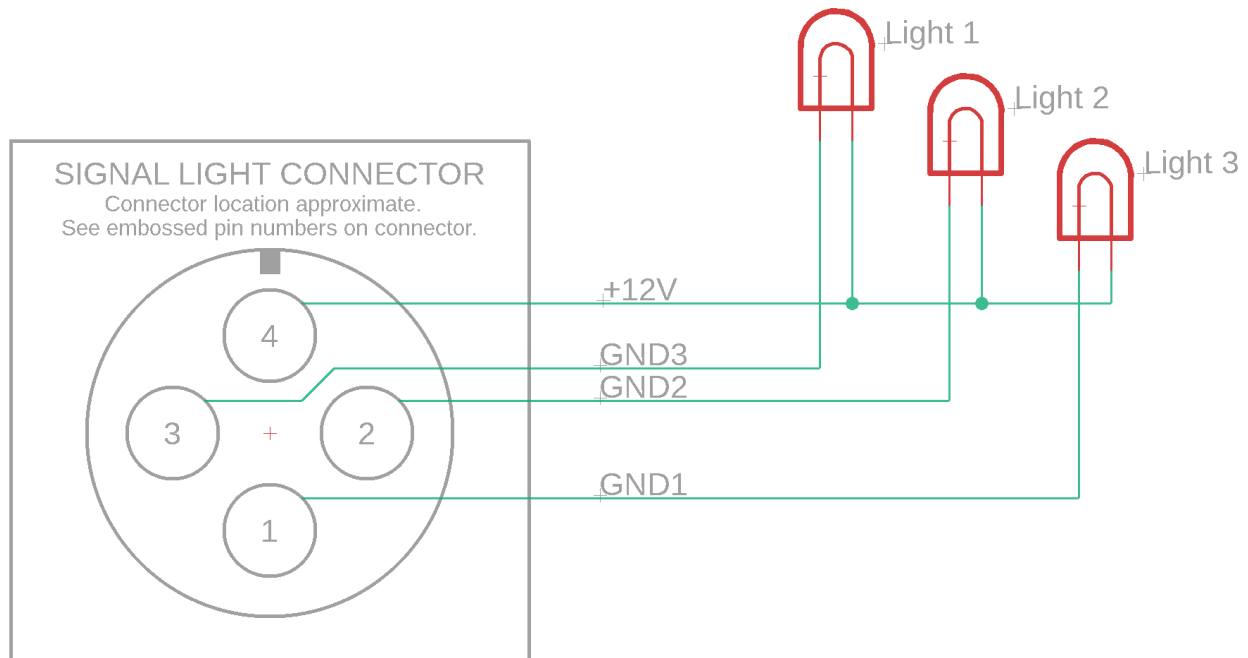


Figure 7 - Directly powering external lights

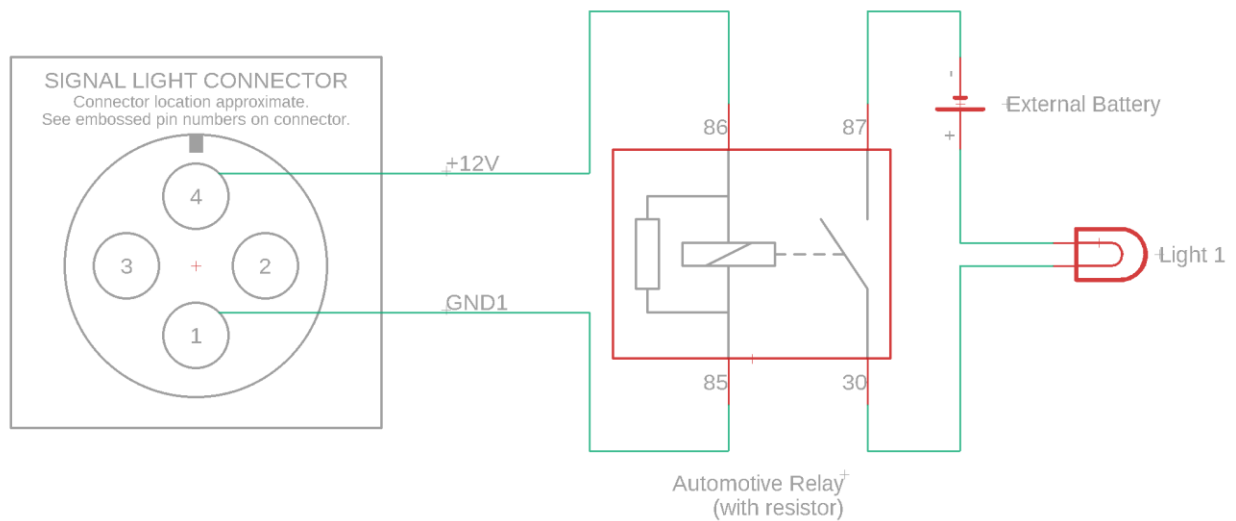


Figure 8 - Powering lights through a relay (only one wired light is shown)

The circuit in figure 2 is useful if your lights draw more than 5 Amps of current or they require a different voltage.

## EXTERNAL HORN CONNECTION

Custom horns may be used if you'd prefer an alternate set of horns. This is useful if your Race Committee Vessel already has a built-in horn system.

Use of these circuits is at your own risk. No warranties are made in regard to them. Improper wiring may damage your R/C Start Timer. Warranties will not be honored if improper wiring damages circuitry.

To switch between the on-board horns and the external connector, flip DIP SWITCH #1 to ON and restart the device.

The external horn connector supports one horn and outputs 12V at 5 Amps. Exceeding that current may result in damage to the circuit board or wiring. An external relay is usually required for horns because of the power they require.

The circuit is driven by a transistor. If a relay is used, the relay must contain a flyback diode or resistor. Standard automotive relays are sometimes configured that way. The ground wire is switched, and the +12v line is always on.

PIN	PURPOSE
2	Pin +12v/5A
1	GND

External connector supports up to 12-14ga wire. Solder connection. To ensure waterproof connections, external wire should be round and fit snugly into compression cap.

### R/C Start Timer

#### 2-pin Horn Connector

Pin locations are approximate, follow pin numbers (embossed on connector)

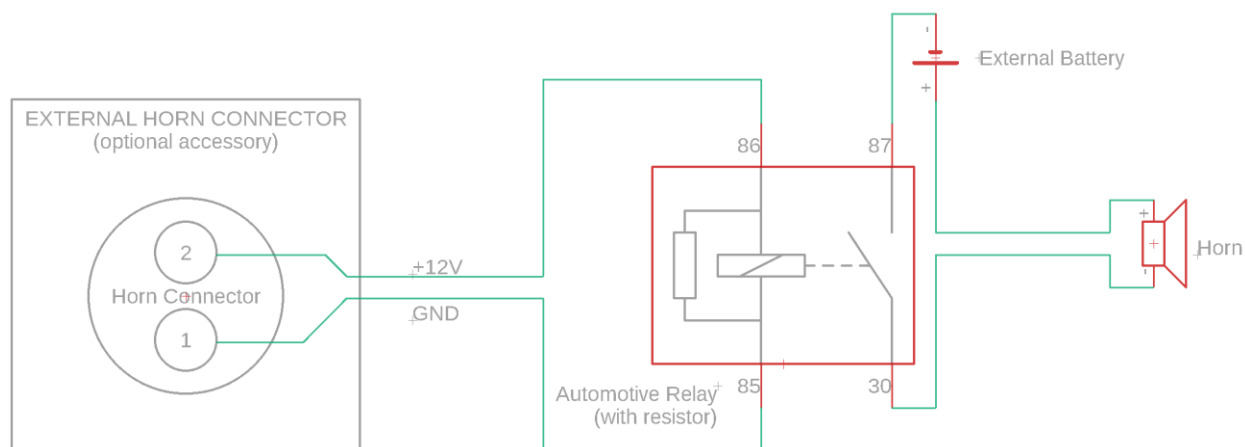
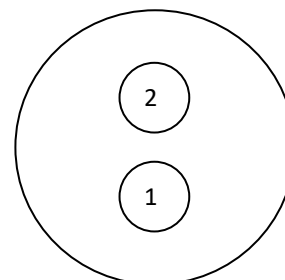


Figure 9 - External Horn Example 1

## USAGE/CONFIGURATION QUICK GUIDE

### BASIC USAGE:

Power: Left button

Run Sequence: Second Button

Manual Horn: Right Button

### CONFIGURATION MENU:

To Access: Hold Sequence Button until screen changes.

Sequence Button: Switches between menus (hold to exit)

Horn Button: Switches menu items (hold to set)

Menu Number	Menu	Item Number	Function	Version
0	Sequence Selection	0	RRS 26	4.1
		1	RRS 26 (4-Minute)	4.1
		2	RRS Appx U (Sound Signal)	4.1
		3	RRS Appx C (Match Racing)	4.1
		4	(for testing)	4.1
		5	ICSA Appx C	4.1
1	Rolling Configuration	0	Rolling Disabled	4.1
		1	Rolling is Immediate	4.1
		2	On, with 1-minute delay	4.1
		3	On, with 2-minute delay	4.1
		4	On, with 3-minute delay	4.1
		5	On, with 4-minute delay	4.1
		6	On, with 5-minute delay	4.1
		7	On, with 10-minute delay	4.4
2	Rolling Repeat Count	0	Unlimited	4.1
		1	1 repeat	4.1
		2	2 repeats	4.1
		...	...etc...	4.1
		20	20 repeats (max)	4.1
3	Internal Speaker Configuration	0	Enables the speaker	4.1
		1	Disables the speaker	4.1
4	Lamp Blinking	0	Blinking Disabled	4.2
		1	Alternating Blink (slow)	4.2
		...		4.2
		5	Alternating Blink (fast)	4.2
		6	Simultaneous Blink (continuous)	4.3
		7	Simultaneous Blink (medium)	4.3
		8	Simultaneous Blink (slow)	4.3

### DIP SWITCH GUIDE:

(Turn device OFF before adjusting)

Switch Number	Setting	Function	Version
1	OFF (default)	Internal Horns	4.1
	ON	External Horns (external horn connector)	4.1
2	OFF (default)		
	ON		
3	OFF (default)		
	ON		
4	OFF (default)		
	ON		
5	OFF (default)		
	ON		
6	OFF (default)		
	ON		

## CHANGELOG

This will list changes subsequent to the version 4.1 release.

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### VERSION 4.2

#### Added lamp blinking

- Increases visibility of lamps

- Configuration menu 4 turns lamps on while previewing blink options

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### VERSION 4.3

#### Added Simultaneous Lamp Blinking

Refined lamp blinking by adding a feature to blink both lamps simultaneously. This is preferable to the Alternating style of blinking introduced in version 4.2. Through testing, it was shown that blinking both lights simultaneously causes less confusion as to which light is currently on or off.

See configuration menu 4, items 6, 7, 8. Also renamed blink settings 1-5 to clarify them as "Alternating".

It should also be noted that through testing, it was determined that solid on lights should be avoided in bright daylight - it is difficult to differentiate between ON and OFF in bright conditions because of the relative brightness of the surroundings. Instead, the use of a blinking configuration clearly conveys which lights are ON or OFF because sailors can clearly see the blinking.

While night races have not been tested, it is believed that the blinking effect might be too dramatic. Solid on might be preferable in very dark conditions. In heavy overcast evening conditions, blinking has shown to be quite visible from well over one mile away.

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### VERSION 4.4

Added a 10-minute delay to the rolling menu.