

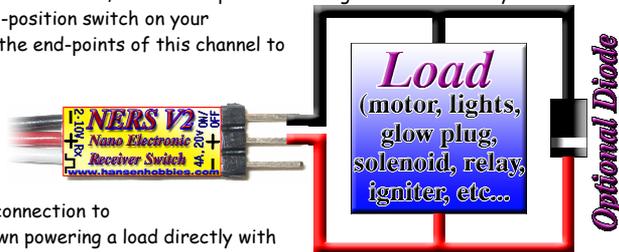
Thanks for purchasing this Hansen Hobbies Nano Electronic Receiver Switch (NERS)! The NERS is designed to allow ON/OFF control of onboard devices like lights, glow plug drivers, motors, smoke systems, rocket igniters, solenoids, relays, and whatever else you can think up. The NERS is not proportional, which means it is either fully-ON or fully-OFF. The NERS performs the operation equivalent to a servo moving a mechanical switch back and forth, but in a much smaller package, and with no moving parts.

- 1.00mm (AR6400)
- 1.25mm (R616FFM)
- 1.50mm (AR6300)
- 0.1" (JR/Universal)
- 0.1" (Integrated)

Using the NERS, you can safely power any load using power from your receiver battery (2-10V) or a separate battery (up to 20V) at up to 4A (up to 5A for short periods <5s). Switching more current than recommended could overheat and damage the NERS.

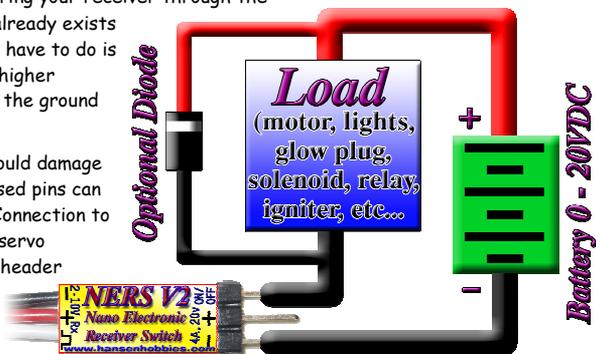
**Theory:** All modern RC systems send 1-2ms pulses at 50Hz to the servos to send positional data. The NERS switches from OFF to ON at 1.5ms (mid-stick), so that it is always OFF below 1.5ms, and always ON above 1.5ms. The NERS can be used on any receiver channel, but is best placed on the gear channel or any other auxiliary channel that allows you to flip a 2-position switch on your transmitter to control the NERS. Adjust the end-points of this channel to their full minimum and maximum positions.

**Hook up:** The NERS has three output pins that connect to the device you want to power. The "+" and "-" pins give you direct access to your receiver voltage, and the "ON/OFF" pin optionally makes a connection to ground/". To the right the NERS is shown powering a load directly with Rx power - when ON, the NERS will permit current to flow through your load. In this diagram, if the black wire were connected to the "-" pin instead of the "ON/OFF" pin, the load would be permanently powered ON.



You can also use the NERS with a separate battery as shown to the right. In this case the center pin from the NERS is ignored and a ground connection is made between your battery and NERS/Rx. If the separate power source you want to use is already powering your receiver through the ESC/BEC, then the ground connection likely already exists through the ESC>Rx>NERS and all you would have to do is tap into the positive end of the battery (for higher current applications you may consider making the ground connection anyways).

Be considerate of the output pins - a short could damage the NERS and/or your receiver system. Unused pins can be clipped off or covered with heat shrink. Connection to the output pins can be made with a standard servo connector. You can also remove the included header and solder wires directly to the NERS. The diode shown is required only if you have an inductive load like a motor or solenoid (see notes).



**Operation:** The small red LED on the NERS lights up when the NERS turns the output ON. If the NERS stops receiving a good signal from the receiver (occurs if there is any radio interference or if you turn off your transmitter) it will hold the last state (ON/OFF) indefinitely until it sees a valid signal again. If your radio system has a failsafe setting, then you can use that to set what the NERS will do in case of a lost signal.

If your application requires more security (like an igniter for a booster rocket), then it is suggested that you power on your receiver and check the NERS for correct operation before flight by observing its LED, and then plug your device into the NERS right before takeoff. If the NERS isn't easily accessible, then you can achieve the same effect by putting a mechanical switch in series with your load.

**Modifications:** There are two built-in modifications that can be made to the **NERS** which require soldering. The heat shrink and label must be removed to access the back of the circuit board. If you're unsure of your soldering skills please enlist the help of someone more experienced with this kind of work. The images to the right can be viewed in high resolution on our website.

1) The **ON/OFF** operation described above can be reversed (so that it is **ON** below **1.5ms** and **OFF** above **1.5ms**) by bridging two pads as shown. The **NERS** actually turns on above **1.54ms** and when reversed, below **1.46ms**. This allows for a dead space so two **NERS**'s can be plugged into the same channel and the user can toggle back and forth or have both **OFF**.

2) The failsafe setting can be changed so that if the **NERS** loses the signal it will default to **ON** or **OFF** instead of keeping the last state.

Only the combinations shown in the chart to the right are valid. Any other modification could cause damage to the **NERS** and/or your receiver system. After modification the **NERS** should be protected with heat shrink. **1/4"** clear heat shrink is available on our website in lengths as short as **1ft.**

**Notes:**

- If your device is a motor, relay, solenoid, electromagnet, etc... a diode (included) should be connected across its terminals as shown in the connection diagram (pay special attention to its orientation). This will give protection from the reverse high-voltage spikes associated with inductive devices. For motors, you should also place **.01uF** capacitors between each of the motor leads and the motor casing (many motors come with these caps installed). All mentioned parts are available on our website and any electronics store.
- If your receiver has a failsafe option you will want to take advantage of this with the **NERS**.
- Make sure that your receiver battery can safely supply enough current for the device you're switching. Don't forget that the battery also needs to power your receiver and servos.
- When connecting your device, consider the wire gauge and length, as well as the connector types for determining safe current draw. It may not be advisable to run **4A** through your receiver system.
- The **NERS** current limits were tested in open air at room temperature. Enclosed spaces and/or hot environments may restrict the safe current ceiling. A good test is to feel the temperature of the **NERS** - a little warm after extended use is acceptable, very hot is not acceptable.
- If using the **NERS** for a rocket igniter you need to make sure the current is limited to reasonable levels. Many rocket igniters can draw over **10A** at **5-6V**. Adding a **1ohm** resistor in series with the igniter would work.
- The **NERS** is available with several different receiver connector types. Whichever type you're using, please be careful about unplugging the connector from the receiver. Some of these small connectors can take a lot of force to unplug and if the wires are pulled on too hard they could pull out of the connector housing. For the micro connectors we recommend pulling on the plastic connector housing itself (this may require pliers) to keep the connector in good shape. This is especially true the first few plug/unplug cycles when the connection force is very high.
- The **NERS** with integrated connector needs some special care. The circuit board for this version is very thin and has some flexibility. Too much force from plugging in the **NERS** or from wire strain could cause it to bend and be damaged. Please see the tips to the right.

Have fun, and fly safe!

	<b>Normal Operation</b> Output is <b>ON</b> above <b>1.5ms</b> and holds last state in case of lost signal.
	<b>Reverse Operation</b> Output is <b>ON</b> below <b>1.5ms</b> and holds last state in case of lost signal.
	<b>Failsafe ON Operation</b> Output is <b>ON</b> above <b>1.5ms</b> and turns <b>ON</b> in case of lost signal.
	<b>Failsafe OFF Operation</b> Output is <b>ON</b> above <b>1.5ms</b> and turns <b>OFF</b> in case of lost signal.
	<b>Reverse + Failsafe ON</b> Output is <b>ON</b> below <b>1.5ms</b> and turns <b>ON</b> in case of lost signal.
	<b>Reverse + Failsafe OFF</b> Output is <b>ON</b> below <b>1.5ms</b> and turns <b>OFF</b> in case of lost signal.

