

# Tech-Tip 012

## **Range Box Relay:**

Dedicated to the dissemination of detailed model building methods and techniques.

Materials and methods presented here are not intended as the best or only solutions to the modeling challenge(s) discussed, rather as methods and procedures which have a proven record of success in actual use. Please keep experimenting with new materials and techniques as this is the only way to expand the fields of knowledge.

Written by: John E. McCoy Sr. NAR-15731 - 08-04-2010, Rev. 04-22-2016

This Tech-Tip has been a long time coming: The Project was first built, tested and put into use in January of 1996. Since that time I've built more than 2-dozen units, 8 for the club, the remainder for other folks from sea to shining sea. Within the last month a Corel Drawing has been done with updated and refined details including an option not envisioned in the original design. With a little extra wiring and a few more components it's possible to make this unit completely **Flashbulb and E-Match safe** while allowing at the pad continuity check with a positive relay coil lockout that makes it impossible for the controller to activate the relay while someone is hooking motors.

All components have been checked to ensure they are current Radio Shack part numbers and are still available locally. I must however suggest you'd be better served to purchase your electronic supplies from one of the on-line electronics houses [www.alliedelec.com](http://www.alliedelec.com) being one of my favorites. Even with the added shipping charge you'll certainly save yourself a few dollars buying on-line.

To start we need an enclosure that will allow room for the 10amp DPDT relay and plug in socket. Why bother with a socket when we are not going to be hard mounting it inside the box? It's for ease of service and replacement feature that could save a good bit of unnecessary soldering should we have an unfortunate Relay contact welding incident. In the decade plus that we've been using these little 10amp relays I've only seen one Welded Contact Relay Failure in several hundred launches. Contact welding can take place if the contacts are over-powered by too many amps flowing for too long a period, or a dead short circuit occurs across the contacts. The one failure we've had was during a rainy cluster altitude ECRM where our NOT SO weather proof relay units were caught out in a heavy thunderstorm. The unit in question was discovered to be about half full of water when activated destroying the Relay. A quick on the field relay replacement had the launcher back in service using the same socket.

The new enclosure chosen is a bit larger than the original but still small enough to be stored in our range boxes. Current cat no. 270-1803 is a 5" x 2.5" x 2" project box with an aluminum screw mounted cover. To this we will need to add 2- 2-56" x 1/2" Round head brass Machine screws, one on each lower side a little above the corner cover screw tubes. While drilling holes in the sides of the box we also need 2 - 9/64" holes in the bottom side for our two #14 Stranded copper battery drop leads. At the top short edge we need 2- 1/4" holes to accept the metal lead strips from our 2-screw terminal to which our 16gauge micro clip leads will later be attached. The final two small holes will be along one side for the very fine 24 or 26gauge wire if the "At Pad Continuity AA battery holder" option is used.

A word about Micro Clips: Whatever you purchase be sure to use "SMOOTH JAW" micro clips rather than Alligator clips as they make much better contact with the igniter leads than the ragged edge alligator jaws. I suggest the purchase of six 1-1/8" smooth jaw Stainless Steel Micro Clips through our NAR NARTS store. At about \$1.05 each they may seem like a lot of money but they will out last all available plated steel micro clips by a factor of 10 or better. My various personal launchers all have been using these clips for 11 years now and I have yet to replace one. Our club has changed nearly all our igniter clip leads to these Stainless Steel wonders with outstanding results as well. They do require a bit more heat and roughing up the surface with a needle file before soldering with 50/50 solder and a Stainless steel liquid flux.

Once all the holes have been drilled, thread the heavy 14ga stranded copper wires into the box from the bottom and soldered leads for our terminal strip down from the top. In other builds I mounted the terminal strips with two 1/8" stainless steel pop-rivets but a couple small machine screws will do the job. After threading the Battery leads into the bottom of the box tie a tight overhand knot in each to serve as strain relief, leaving a few inches of extra wire inside for soldering to the Relay Socket. Either 30amp battery clips or alligator clips can be used for connection the drop leads to our "At Pad" relay battery.

Before doing any soldering you'll want to closely examine your 10amp Relay to ensure which socket and relay leads go to the NORMALLY OPEN side of the relay and which are the coil activation leads. From this point you should refer to the attached wiring diagram to complete the soldering operations.

The included alternative to the "at pad continuity check circuit and it's additional AA battery" makes the job a little quicker eliminating a few components but also means it is imperative that the launcher system leads NOT be connection to the 2-56" relay coil activation screws until you are satisfied your model, motors & igniters are correctly attached and you are ready for the model to launch should someone happen to push the launch button when you attaching the final clip.

Happy Clustering. Hope this little relay helps.

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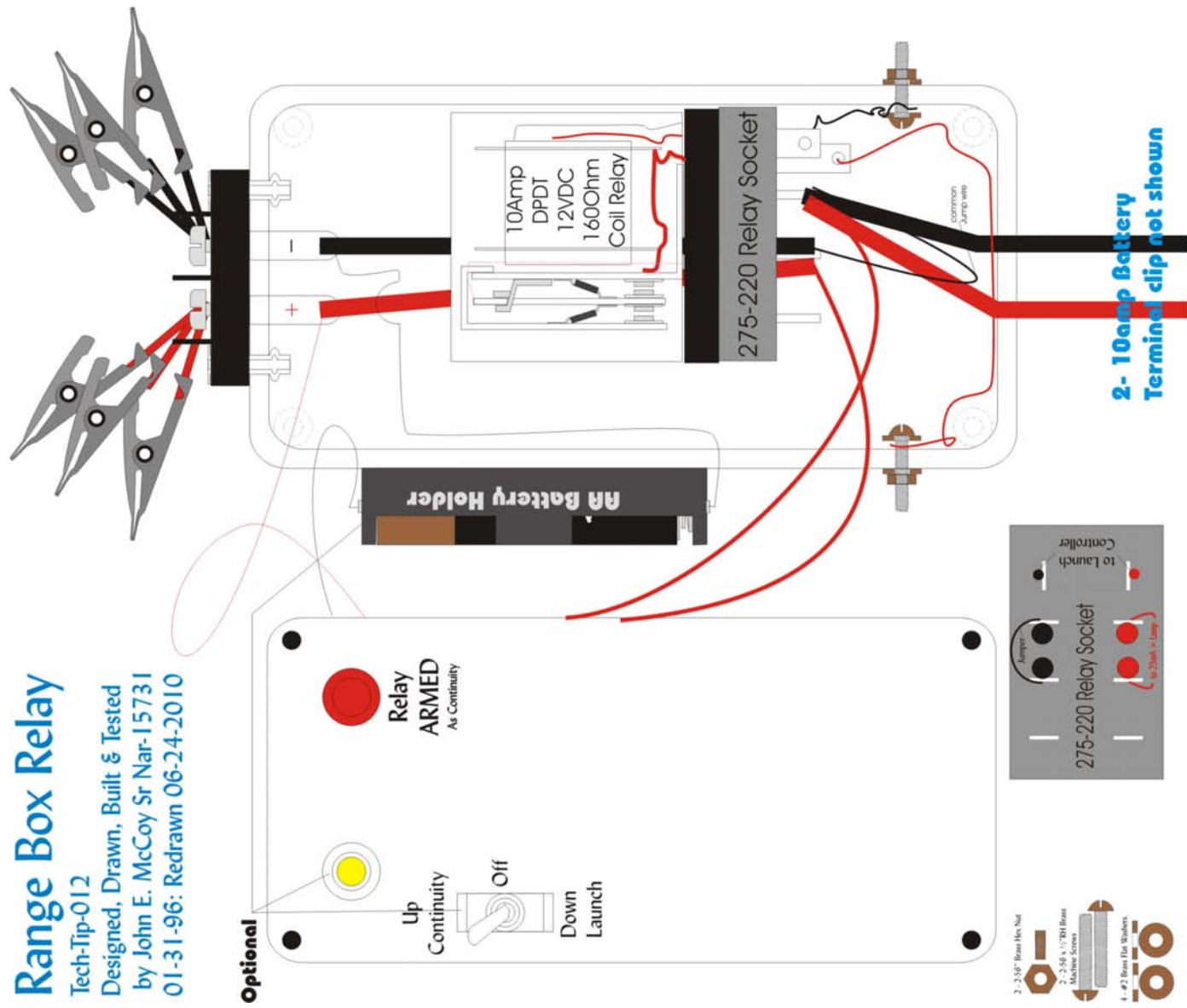


**Tech-Tip-012**

Designed, Drawn, Built &amp; Tested

01-31-96: Redrawn 06-24-2010

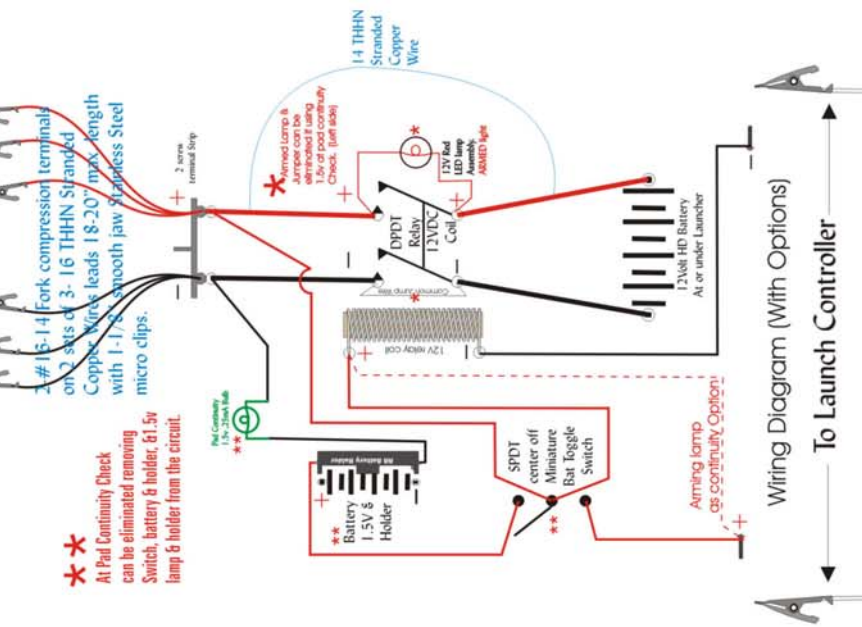
01-31-96: Redrawn 06-24-2010



- Parts List: (2010 Radio Shack Cat. numbers)
- 1-270-1803\_5" x2.5" x2" Project Box.
- 1-274-656\_2 position Terminal Strip (2row).
- 1-275-218\_10amp DPDT 12vdc coil plug-in Relay.
- 1-275-220\_10amp plug-in Relay socket.
- 1-272-345\_12v Red LED lamp assembly.
- 6ft- #14 Stranded copper THHN Wire (1-3ft pc-2 colors)
- 9ft- #16 Stranded copper THHN Wire (3-18"pc-2colors)
- 2ft- #24 or 26 Stranded copper Hook-up wire(2-12"pc-2 colors)
- 6-1/8" Stainless Steel Smooth Jaw Micro Clips (from NARTS)
- 2-256" x 1/2" RH Brass Machine Screws.
- 2-256" Brass Hex Nuts.
- 4- #2 Brass Flat Washers.
- 2-73b orange wire nuts.
- 2-71b grey wire nuts.
- Optional:
- 1-270-401\_1 AA Battery Holder.
- 1-AA duracell or better 1.5v Battery
- 1-272-1139\_1.5v 25ma. miniature Lamp
- 1-276-080\_Chrome LED/Lamp Holder
- 2-275-620\_3amp Subminiature DPDT center off toggle Switch.

**Optional:**

- I- 270-401 1 AA Battery Holder.
- I- AA duracell or better 1.5v Battery
- I- 272-1139 1.5v 25ma. miniature Lamp
- I- 276-080 Chrome LED/Lamp Holder
- I- 275-620 3amp Subminiature DPDT cen



### Wiring Diagram (With Options)

## To Launch Controller