

## **Changing Nicad batteries to Li ion in Dewalt drill**



This instructable goes over changing Nicad batteries to Li ion in a Dewalt 12 volt drill Model DW9071.

Bill of materials:

Item	Qty	Price	Extend price	Make quantity	
Batteries	3	\$8.95	\$26.85		<a href="https://www.orbtronic.com/30a-18650-3120mah-battery-high-drain-rechargeable-flat-top">https://www.orbtronic.com/30a-18650-3120mah-battery-high-drain-rechargeable-flat-top</a>
BMS	1	\$4.20	\$4.20		<a href="https://usa.banggood.com/3S-40A-Li-ion-Lithium-Battery-Charger-Protection-Board-PCB-BMS-With-Balance-p-1394450.html?&amp;ID=511646&amp;cur_warehouse=CN">https://usa.banggood.com/3S-40A-Li-ion-Lithium-Battery-Charger-Protection-Board-PCB-BMS-With-Balance-p-1394450.html?&amp;ID=511646&amp;cur_warehouse=CN</a>
18 awg wire	1	\$6.98	\$6.98	Make multiple units	<a href="https://www.amazon.com/Electrical-Gauge-Silicone-Cable-Black/dp/B0746HMTPP/ref=sr_1_4?ie=UTF8&amp;qid=1549369684&amp;sr=8-4&amp;keywords=18+awg+stranded+wire">https://www.amazon.com/Electrical-Gauge-Silicone-Cable-Black/dp/B0746HMTPP/ref=sr_1_4?ie=UTF8&amp;qid=1549369684&amp;sr=8-4&amp;keywords=18+awg+stranded+wire</a>
Wood dowel	1	\$6.26	\$6.26	Make multiple units	<a href="https://www.homedepot.com/p/Waddell-3-4-in-x-72-in-Hardwood-Rou">https://www.homedepot.com/p/Waddell-3-4-in-x-72-in-Hardwood-Rou</a>

					<a href="https://www.digikey.com/product-detail/en/nd-Dowel-6440U/204397063">nd-Dowel-6440U/204397063</a>
Battery charger	1	\$29.62	\$29.62	Make multiple units	<a href="https://www.digikey.com/product-detail/en/globtek-inc/GTM91128LI3C1000XFX9/1939-1085-ND/8597888">https://www.digikey.com/product-detail/en/globtek-inc/GTM91128LI3C1000XFX9/1939-1085-ND/8597888</a>
Connector panel mount Jack	1	\$2.21	\$2.21		<a href="https://www.digikey.com/product-detail/en/tensility-international-corp/54-00064/839-1292-ND/6206245">https://www.digikey.com/product-detail/en/tensility-international-corp/54-00064/839-1292-ND/6206245</a>
Connector Plug	1	\$1.04	\$1.04		<a href="https://www.digikey.com/product-detail/en/cui-inc/PP3-002B/CP3-1001-ND/992137">https://www.digikey.com/product-detail/en/cui-inc/PP3-002B/CP3-1001-ND/992137</a>
Power cord for charger	1	\$1.86	\$1.86	Make multiple units	<a href="https://www.digikey.com/product-detail/en/phi-hong-usa/AC15WNA/993-1035-ND/2384466">https://www.digikey.com/product-detail/en/phi-hong-usa/AC15WNA/993-1035-ND/2384466</a>
#4 screw	1				
Total cost			\$79.02		
Total cost of one battery pack			\$36.32		
Tools needed					
5 minute epoxy					
Solder					
Soldering iron					
Flux					

Wire cutters					
Wire strippers					
Hot glue gun					
Drill					
Drill bits					
Phillip screw drivers					

Start by removing the screws from the battery pack and remove the batteries.

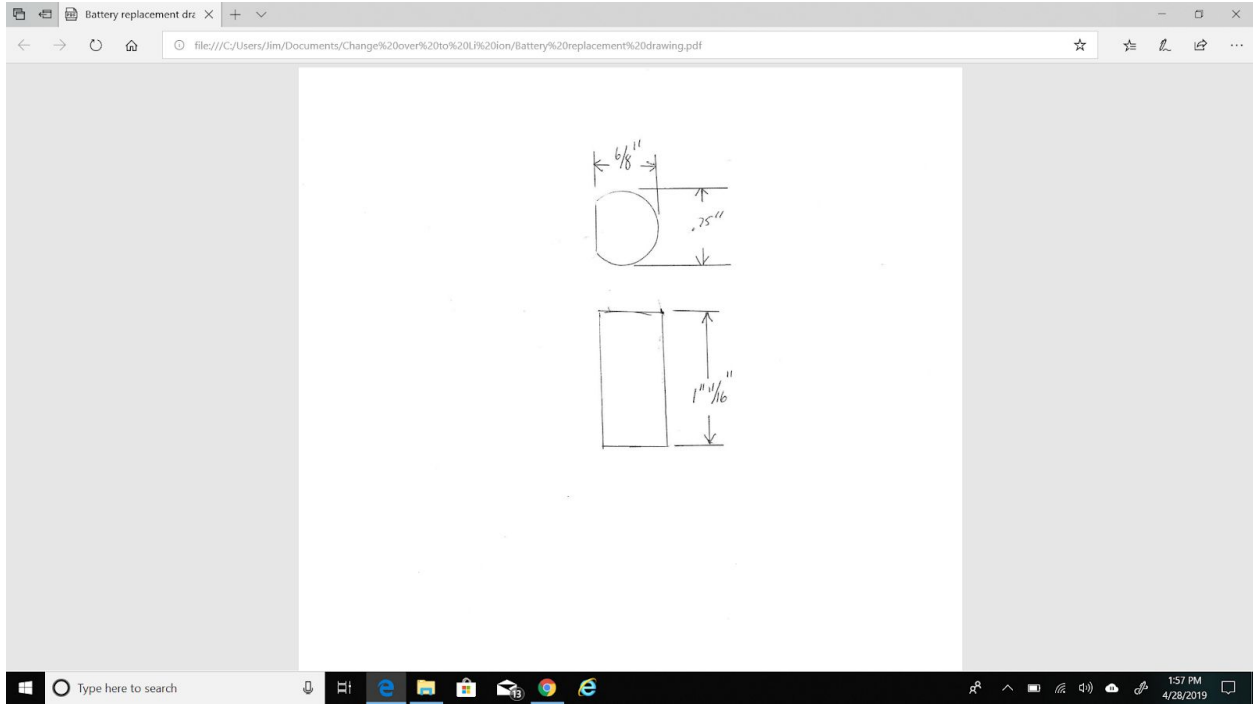


Cut the top battery off the battery pack and cut the drill connector from the top of that battery. Keep the connector from the top of the last battery. Insure that you keep enough of the metal that was attached to the battery as you will need to solder wire to the negative and positive terminals of the connector.





Take the wood dowel and cut a piece off to match the drawing below.

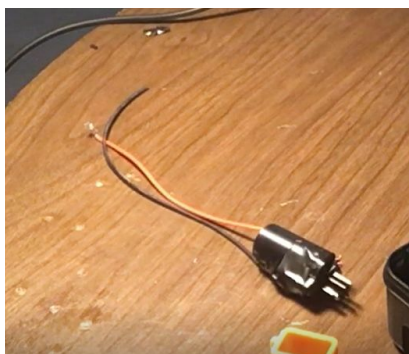


Use the 5 minute epoxy and glue the connector that was removed from the last battery to the top of the dowel. Keeping the positive terminal over the flat of the dowel.





Next solder wires to the positive and negative posts of the connector.



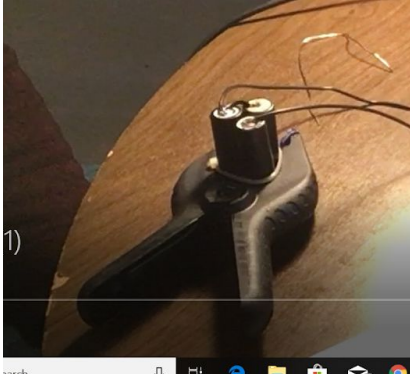
Next you will attach wires to the batteries. Search youtube for how to solder wires to 18650 batteries. You need to connect the 3 batteries in

series. Bundle the 3 batteries together and use a tie wrap to hold them together.



Make sure the batteries will fit in the plastic battery container.



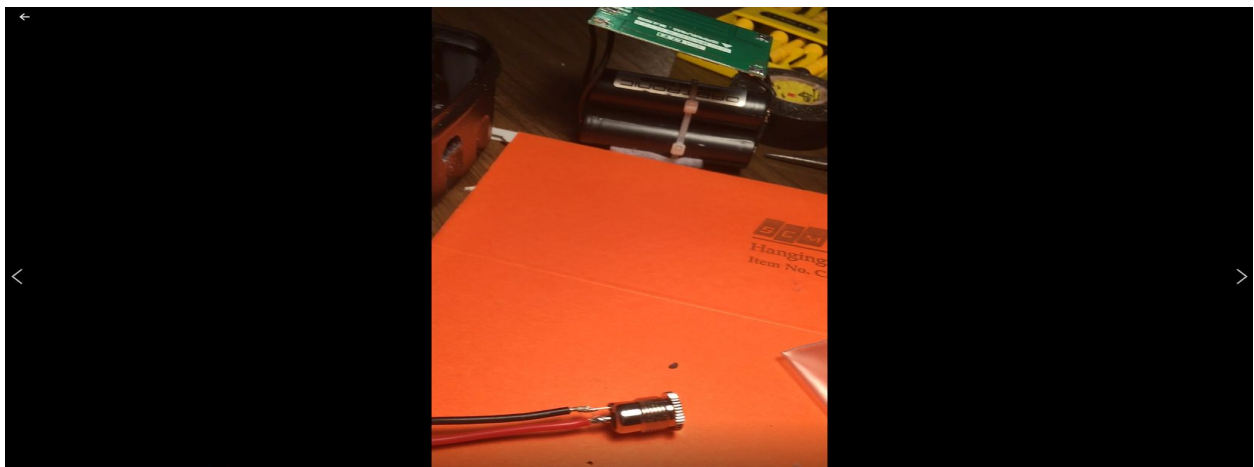


Use a clamp to hold the batteries while you solder the wires onto the batteries. Use flux and do the soldering very quickly as the Li ion batteries do not like heat and can explode.

Once you have all the wires soldered to the batteries. Then you need to cut the wires to a length that you can connect wires to the BMS but not have too much wire. Keep in mind that all the wire you end up with needs to be packaged inside the plastic battery container.

Next you need to make the charge connector cable for inside the battery compartment. The male post in the center of the connector will be the +battery wire. The outside post of the connector will be the -battery wire. Drill a hole in the battery compartment to accept the charge connector

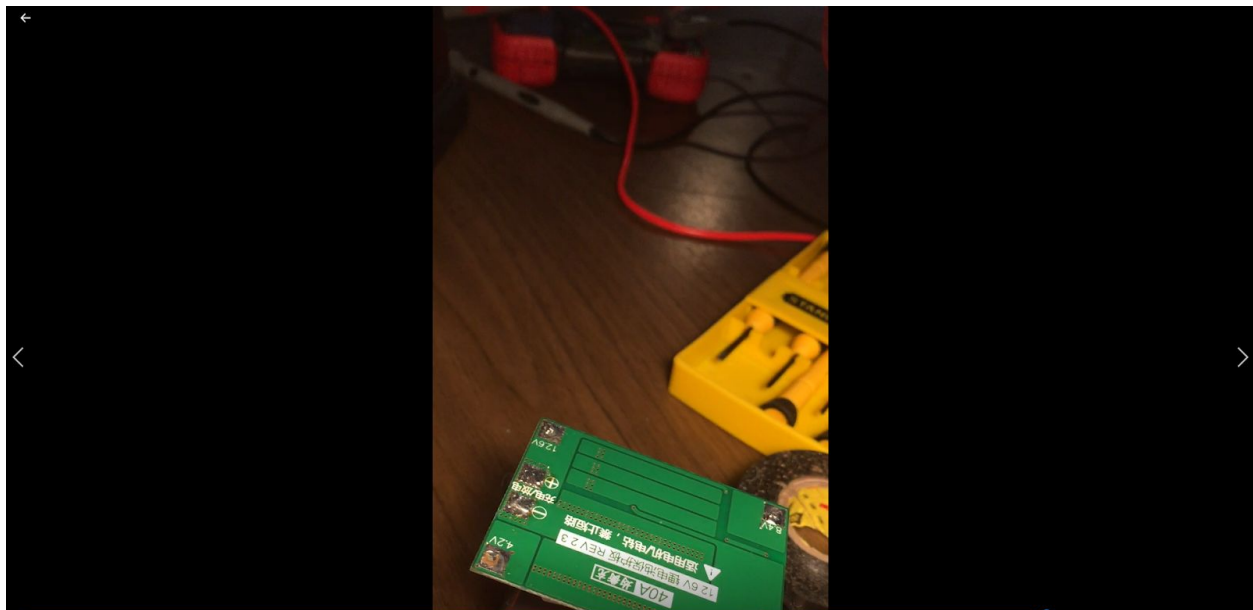
Charge connector



Hole location in the battery compartment.

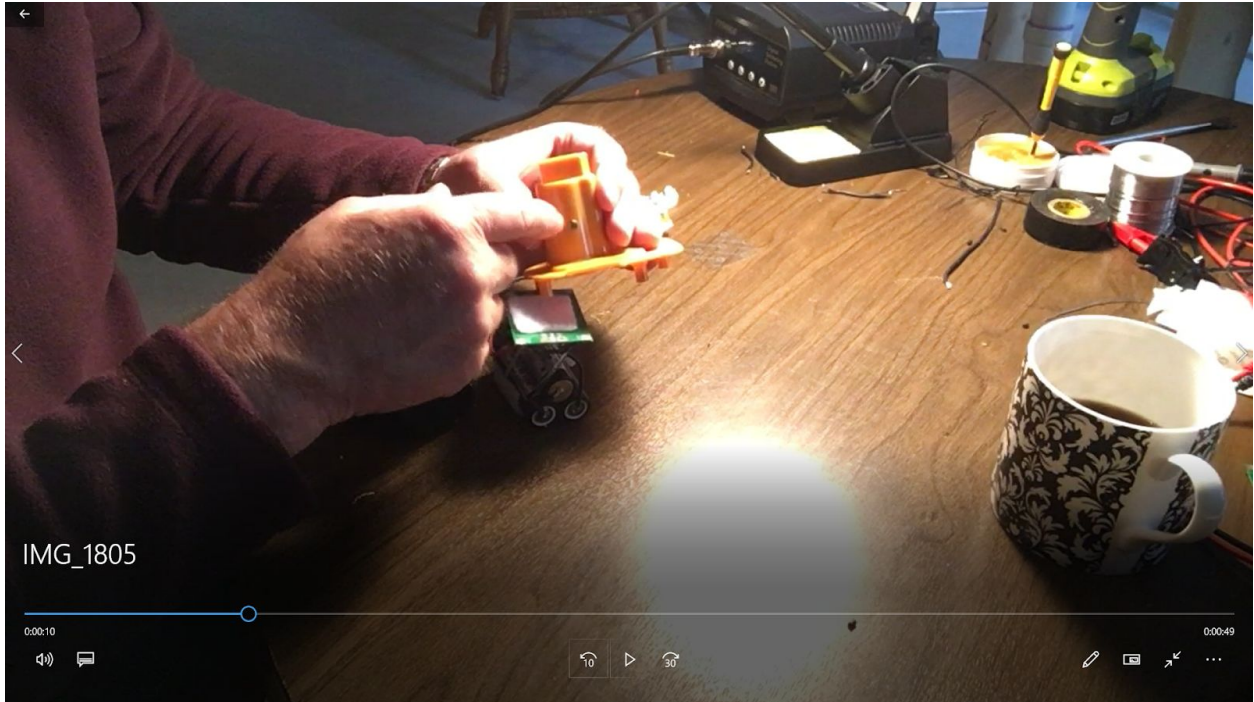


Charge connector will be attached to the +/- terminal of the BMS

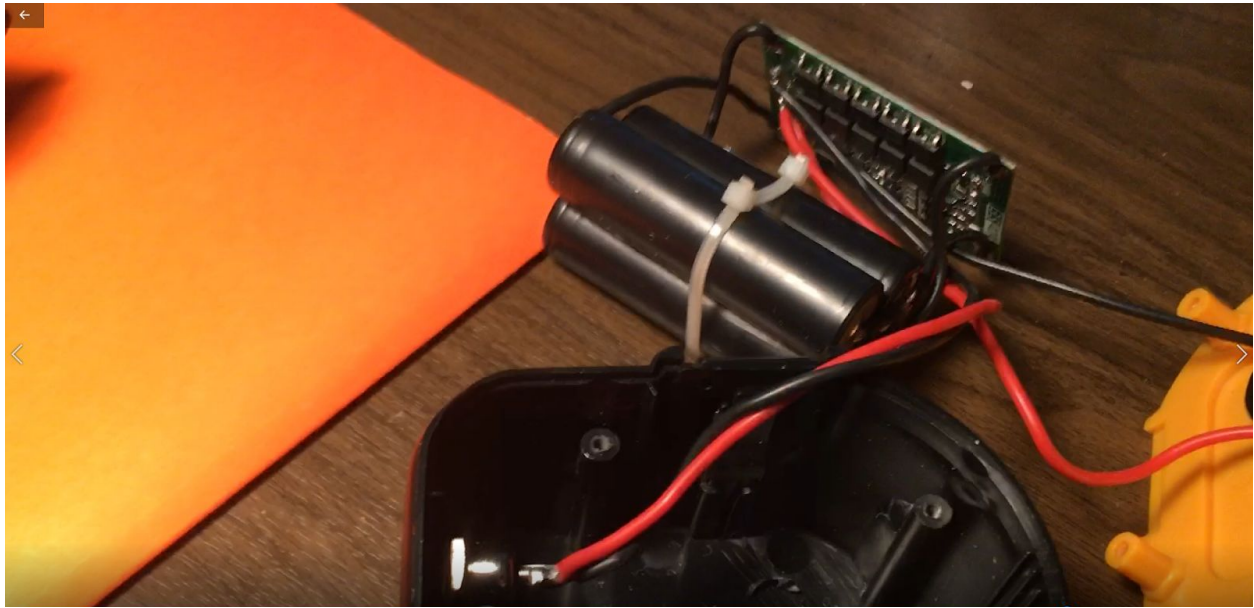


Do not strip the wires attached to the batteries yet as once the wires are stripped you can short the batteries together and that can cause the





The finger above is pointing to the #4 screw holding the dowl in place.



The above shows the positive and negative wires connected to the BMS and the BMS connected to the batteries. It also shows the positive and negative wires of the charge connector connected to the BMS.

Next you use a hot glue gun to glue each of the 3 batteries together. Once the glue has dried you need to cut the tie wrap off the batteries.



Next place all parts inside the plastic battery compartment. Being very careful not to position any wires where they can get pinched during assembly. If everything is properly placed the top tower will fit on the bottom compartment without compressing and with no force. Then tighten all the screws.





Next you need to modify the battery charger with a connector that will fit the charging connector you placed in the battery compartment.

In order to do this cut the connector off the end of the battery charge cable of the battery charger. Strip the covering back and you will find a white insulated wire and a shield. The white insulated wire is the +battery charge terminal and the shield is the -battery charge terminal. Connect the +battery charge wire to the center post of the male connector. And connect the -battery charge wire to the outside post of the male connector. Now you have a charger for the new Li ion batteries.

This completes the change over of the Nicad batteries to Li ion batteries.

Completed assembly

