Introduction

Congratulations on purchasing the Spengler Pack KeepAlive Kit that allows the Hasbro HasLab Ghostbusters Plasma Series Spengler's Proton Pack to stay powered on until you turn it off!

The Pack KeepAlive Kit is designed to be permanently installed inside the pack and then provide one primary function: Keep the pack powered up so that it does not shut down automatically after 30 seconds of inactivity.

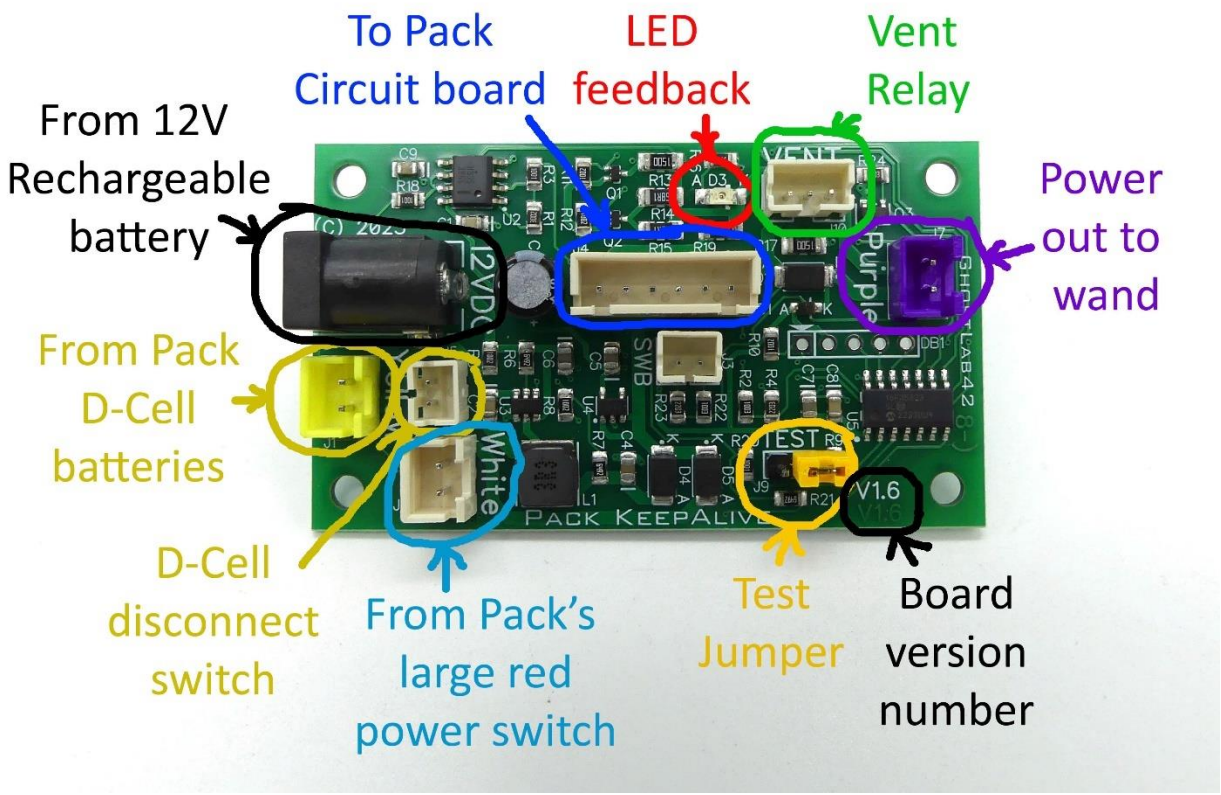
But that is not all the Pack KeepAlive kit can do. It also has these additional features:

1) A battery disconnect switch to allow you to disconnect the 4x D-cell batteries inside the pack. This is mainly intended for longer term storage of the pack without draining the batteries.
2) An on-board switching power supply to efficiently convert 12V DC to 6V DC, the same voltage as a fresh pack of D-cell batteries would provide. Now a larger capacity 12V rechargeable battery can power your pack.
3) Both batteries (4x D-cell batteries AND the 12V rechargeable) can power your pack. The Pack KeepAlive will automatically use whichever can provide more power. Even longer run times or use the D-Cells as a quick backup in case the 12V rechargeable battery runs down.
4) When combined with the Wand KeepAlive (not included in the Pack KeepAlive kit), the Pack KeepAlive board can connect to a vent relay (not included) that can control most e-cig smoke kits. The venting can be both automatically invoked as well as manually controlled to vent when you want. This is controlled by the wand, so no additional switches or controls needed.



The Pack KeepAlive board does use some additional battery current even when the pack is shut down so it is recommended that you remove use the KeepAlive toggle switch to disconnect the batteries if the pack will not be used for extended periods of time.

Connections and Settings:



There are multiple cable connections.

Here are the connections from cables already in the pack and currently connected to the Pack's main circuit board:

1) A Purple 2-pin connector for use with the Pack's Purple connector cable that goes out to the wand.
2) A White 2-pin connector for use with the Pack's White connector cable that goes to the Pack's Red toggle switch.
3) A Yellow 2-pin connector for use thie the Pack's Yellow connector cable that goes to the Pack's 4x D-cell battery compartment.

Here are the new connections (all smaller pitch so the Pack's existing cables will not fit):

4) 12V rechargeable battery connector. A 5.5x2.1mm DC power jack is used to get power from a 12V rechargeable battery.
5) A White 2-pin connector (PH style, 2.0mm pitch) to be used with the included toggle switch. This is to connect/disconnect the Pack's 4x D-cell batteries.
6) A White 6-pin connector (PH style, 2.0mm pitch) for use with the included cable to plug back into the Pack's original circuit board connectors that were moved to the connectors listed above.
7) A White 3-pin connector (PH style, 2.0mm pitch) for a vent relay (vent relay not included)

Test Selection.

There is a single jumper that can be used to select test mode:

TEST	Description
Off	Normal operation: bypass all timeouts that turn off the pack or wand.
ON	Test mode

The above image shows the “KeepAlive” feature that is the normal operating mode since the jumper is not shorting the two “TEST” pins.

A jumper is considered “ON” when the small shorting part is connected to both pins. A jumper is considered “off” when it is not connected to both pins. Yes, you could just remove the shorting part completely, but I like to keep it on one pin just so you can find it later.

LED Feedback

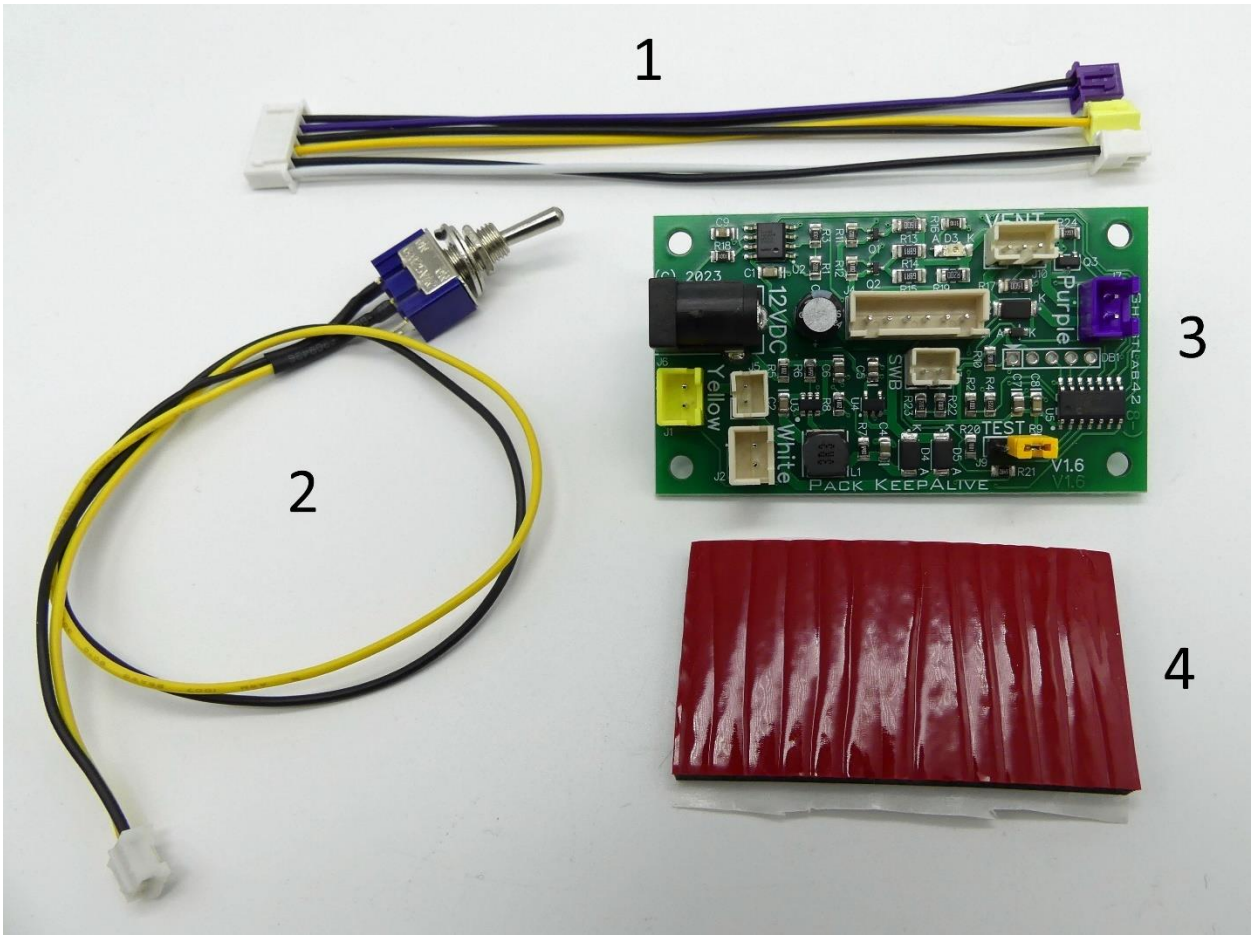
The Test mode will display the firmware version and then have you go through a is a sequence of steps you need to perform to make. During the test mode, the RED LED will provide feedback so you know that each step has been completed. See the Test Mode section towards the end of this document for additional details and troubleshooting information.

It also turns on during certain operations, so can be ignored during normal operating mode.

Board Version

Separate from the firmware version is a board version number that is part of the copper on the top side of the board.

Pack KeepAlive Kit Contents:



The Pack KeepAlive contains several parts to complete the installation into your pack.

1) Pack Connections 6-wire cable (internal connections to the pack's circuit board)
   Has 3 separate 2-pin connections to the main circuit board. These connections are color coded: Purple, Yellow and White for simple identification of which connector on the Pack's circuit board they plug into.
2) Battery disconnect cable. Only affects the Pack's 4x D-cell battery pack. Not needed if you are only going to use a 12V rechargeable battery and not use the D-cell batteries pack.
3) Pack KeepAlive board
4) Double faced sticky tape. Fairly aggressive sticky stuff – do not expect to be able to remove and place it somewhere else. It will stay where you place it and will be somewhat destroyed when removing it. It is not permanent, so can be removed. I used my fingernails to scrape it off and not much residue remained.

Pack KeepAlive Kit Operation

Pack KeepAlive Features:

- The Pack will no longer have the 3 minute ON idle shutdown - The pack can stay on as long as your batteries allow.
- The Pack will no longer disable the wand after 5 minutes of being powered down - The wand will always be able to powerup the pack.
- Does not need a wand attached to keep the pack alive - as soon as a wand with the Wand KeepAlive is attached it will control the pack.
- Enable a Sound Board to power up/down the pack. This would allow a Spengler Sound Board / Spengler Link combo to turn the pack on and off.
- Support for replacing the D batteries with a 12V rechargeable battery pack. I use a 9800mAH blue brick style battery to power the Pack and the Spengler wand.
- The pack can automatically receive power from either the D cells or a 12V rechargeable battery or BOTH of them!
- Additional feature if the Spengler wand has the Wand KeepAlive board installed.
    - Support for a vent relay so you can add some e-cig smoke kit and control it from the Spengler Wand.
    - The Pack can start the shutdown sound as soon as the wand starts to shut down. The pack no longer needs to wait for the wand to completely shutdown before it can start its own shutdown sound.

Use cases:

- Red power switch OFF and an un modified wand
    - The wand can always power up the pack
    - When the wand is on, the pack will power up and when the wand powers off (and it does so a lot!) the pack will power down
- Red power switch ON with an unmodified wand (or no wand!)
    - The pack stays on as long as the batteries will allow.
    - The wand (if present) cannot shut down the pack
    - To shut down the pack, the red power switch will need to be switched to the OFF position
- Red power switch OFF and a wand with the Wand KeepAlive kit installed
    - The wand can always power up the pack
    - When the wand is on the pack will power up and when the wand powers off the pack will power down
- Red power switch ON and a wand with the Wand KeepAlive kit installed
    - The wand can control the powerup status of the pack. When the wand is on, the pack is on.
    - When the wand powers off, the pack will also power down
    - The Pack will know when the wand starts to powerdown so can power down earlier than with an unmodified wand.
    - Support for a vent relay to allow some e-cig smoke kit to provide smoke. Both a manual selection (wand on, vent light on and the rumble motor off: press the ear

button to initiate a manual venting sequence) and the automatic venting after the wand overheats from a long fire sequence are supported.

Battery connection options:

4x D-cell Batteries:
Make sure the included toggle switch is in the ON position when you want to use the pack and the 4x D-cell batteries. Only turn the KeepAlive toggle switch to the OFF position when you want to disconnect the 4x D-cell batteries for longer storage life of the batteries.

12V rechargeable battery pack:
Just plug into the DC power connector on the board and when the 12V battery is on, the pack will be powered. The 12V is not affected by the KeepAlive toggle switch position.

Both 4x D-cell and 12V rechargeable batteries installed:
The Pack KeepAlive board gets to use both as long as the KeepAlive toggle switch is in the ON position, otherwise it will use the 12V battery.

Installation into the HasLab Pack

Getting started:
The first step is to remove the batteries from the pack to make sure no voltage is available inside the pack when working on it.

***** ZAP WARNING RANT *****
A note of caution about static electricity. That zap you can give to someone or something when you rub you shuffle across carpet on a dry day and then feel and hear when you come in contact with someone or something like a doorknob is an ESD event (Electro-Static Discharge). This can be annoying or fun or both but can be very damaging to electronics.

It is best to discharge yourself before touch any of the internal electronics or any of the electronics you are going to put in the pack, like the Pack KeepAlive board. You can do this by touching something that is metal and is plugged into a 3 prong (grounded) output. If this is not practical, try not to walk around much when working on the electronics and do go touch those doorknobs before you start working on this.

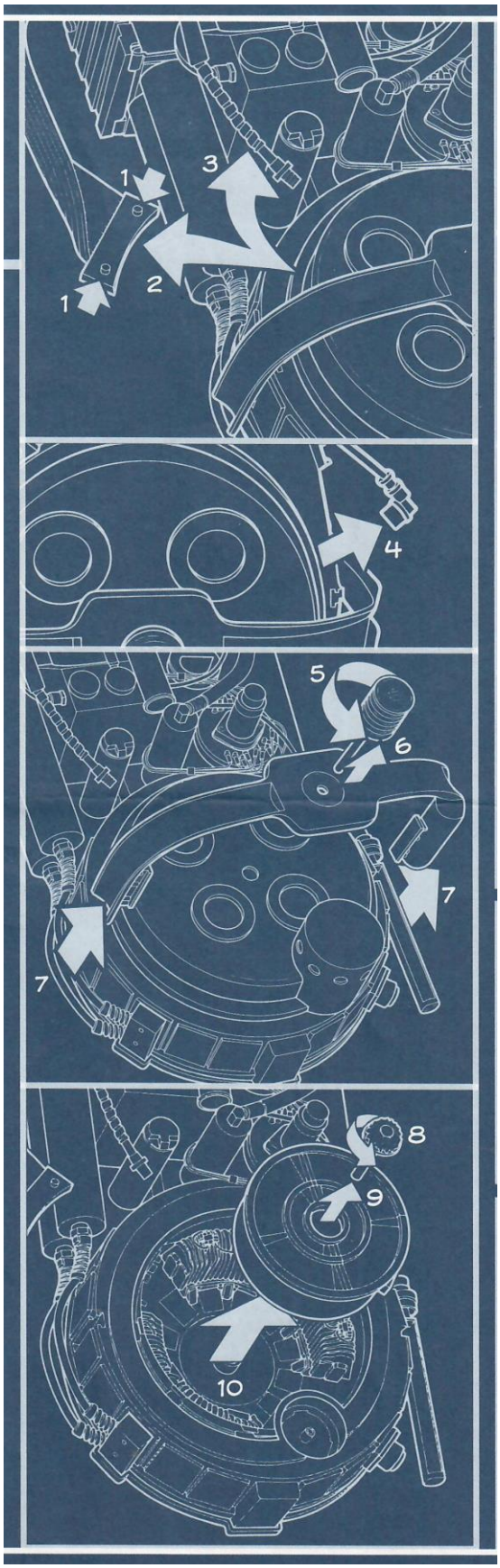
Also be careful others that may try and zap you while you are working, either intentionally or unintentionally! Just walking up and touching you while you are touching the electronics may cause problems.
***** END OF ZAP WARNING RANT *****

Open the pack up:
Before removing the back, you need to remove a couple of the cyclotron parts since they are also holding the back onto the pack. See the Instructions that came with the Pack for details on the "normal" removal of these parts. But basically do this:

1) Remove the shock mount
2) Remove the bumper
3) Remove all removable cables from the cyclotron lid
4) Remove the cyclotron lid
5) Unscrew the nut (#8) that holds the center unit (#9) in place
6) Remove the center unit (#9)

I also popped off the copper ion arm and cap since I did not want to bend the copper ion arm since the pack will be flipped over and a good portion of the pack weight will be supported by the rod if it is left in.

From the Pack's included instruction sheet:


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Now the pack can be opened up by removing a lot of Phillips head screws. You do not need to remove the straps, but it did to make it easier to show you the screw locations.

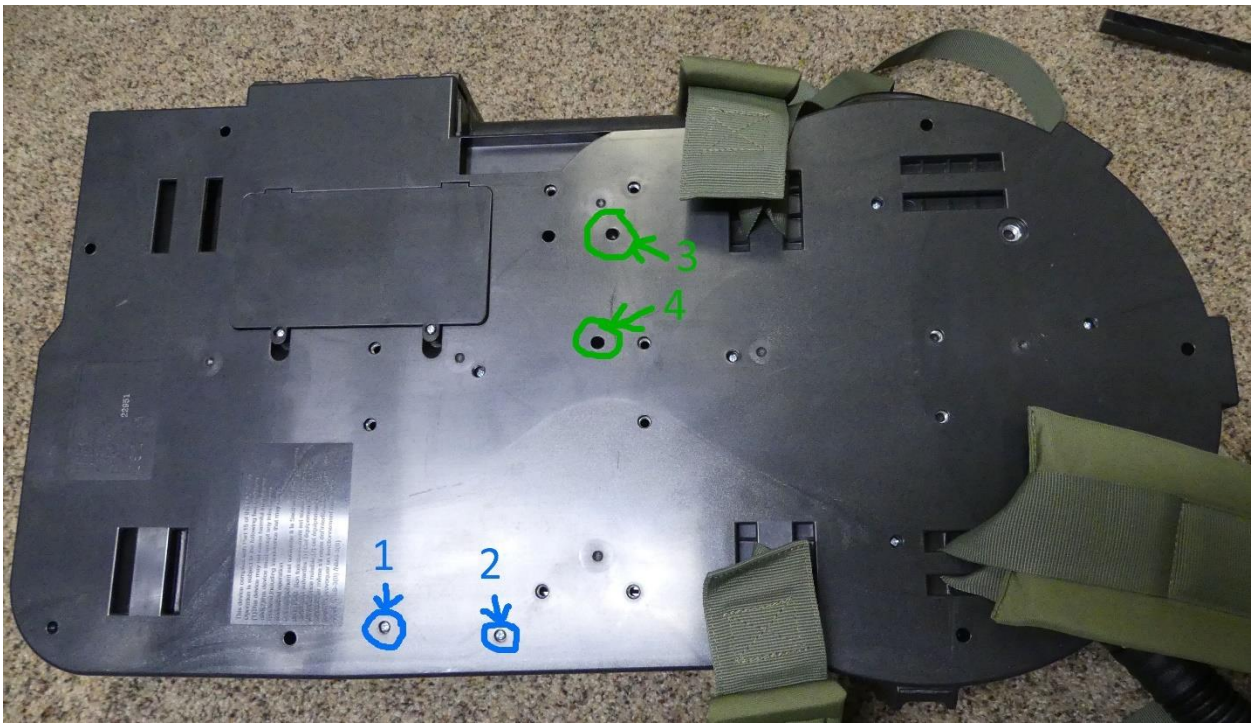
Tools Needed:

- Small-Medium Philips head screwdriver

In case you also remove the straps, here are a couple of images to show you how they should look when put back on the pack:



Next, remove the two shorter screws (#1 and #2). Keep these separate so you can easily identify them when putting the pack back together. All of the other screws were the same length in my packs, but you should be careful to make sure they are all the same or if there are some other lengths in your pack.

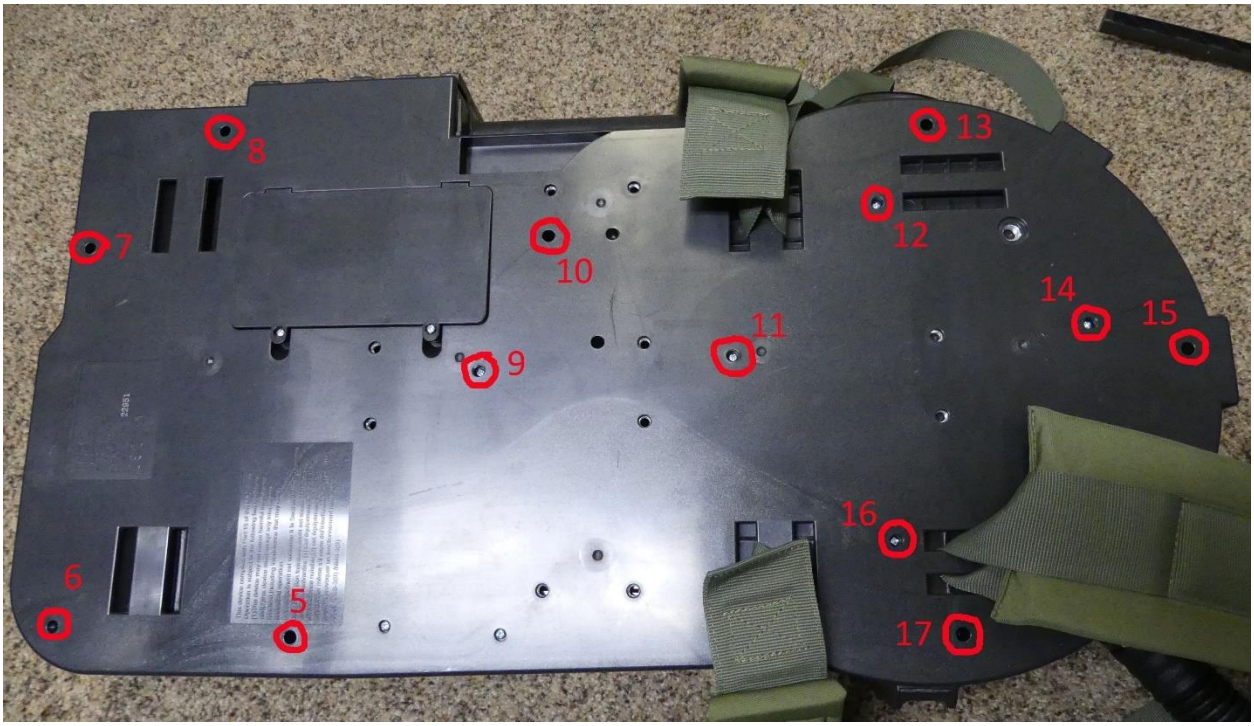


There are two screws (#3 and #4) that hold posts on the other side of the pack. Remove these screws and also move the pack parts that are no longer attached out from under the pack.

Here is what has been removed so far:



Now there are just a bunch of Philips screws to be removed (another 13 of them). On my packs all of these screws are the same length, and longer than the first two screws removed (#1 and #2).

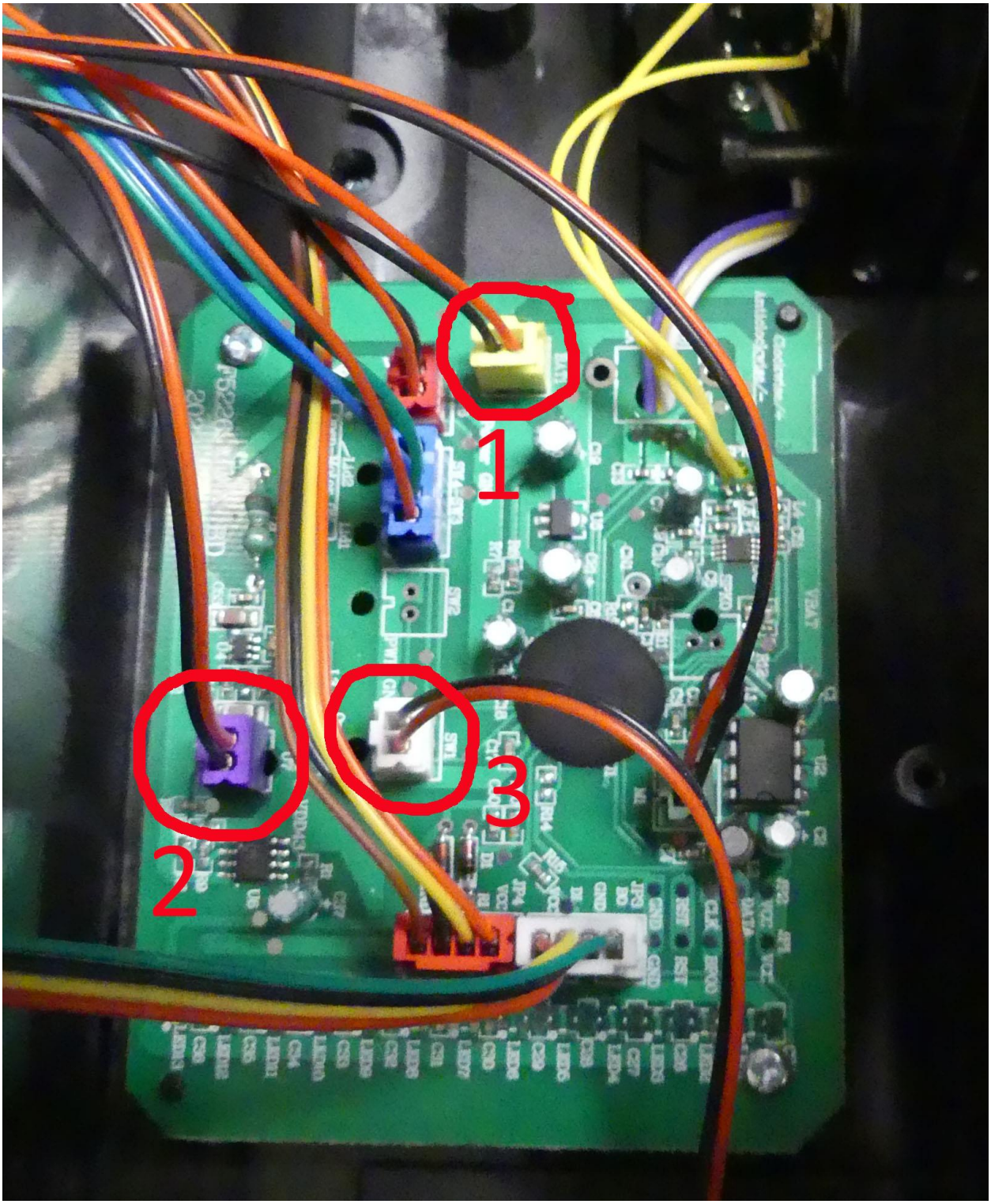


That will enable you to now gently lift off the back of the pack. It may take a bit of force to get it started, but do not pull too hard. If it does not appear to budge, count your screws and make sure all 17 have been removed. A flashlight can help look into the deeper holes if your lighting is not ideal.

A magnetized screw driver was also helpful in removing the screws from the deeper locations.

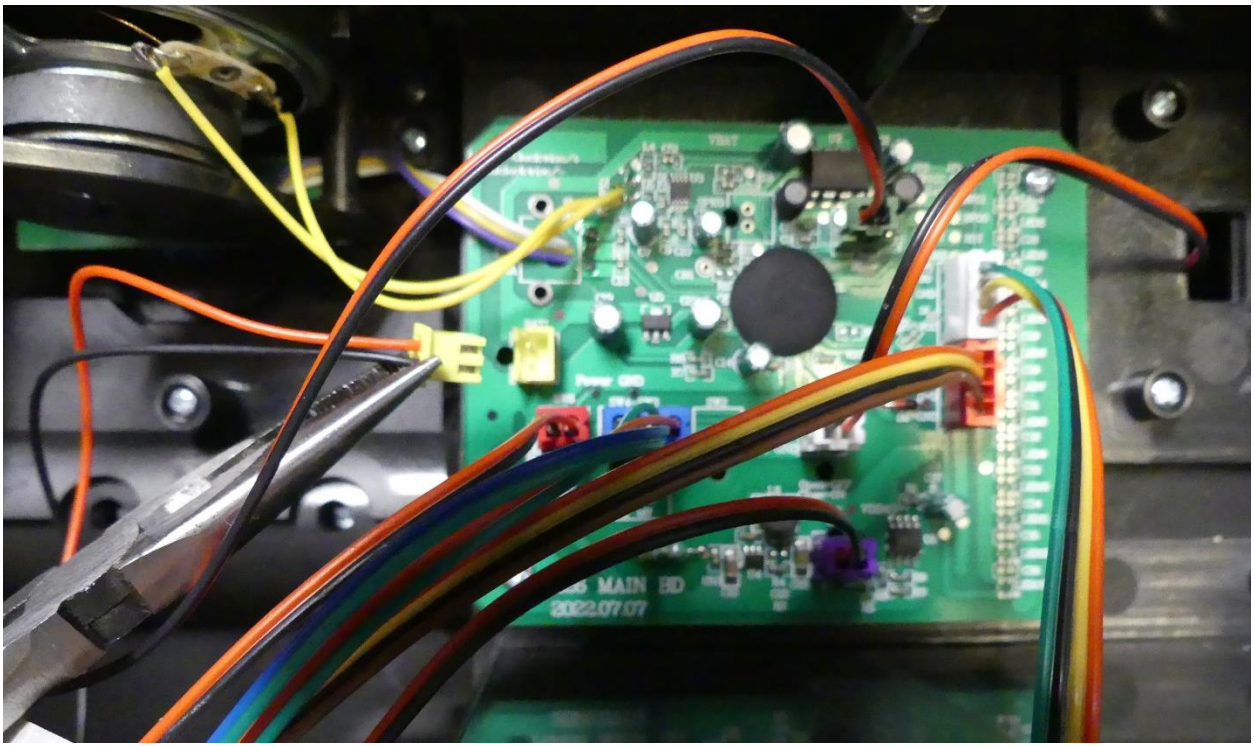
Preparing for the new addition:

In this step we need to unplug three of the cables that are connected to the Pack's circuit board.

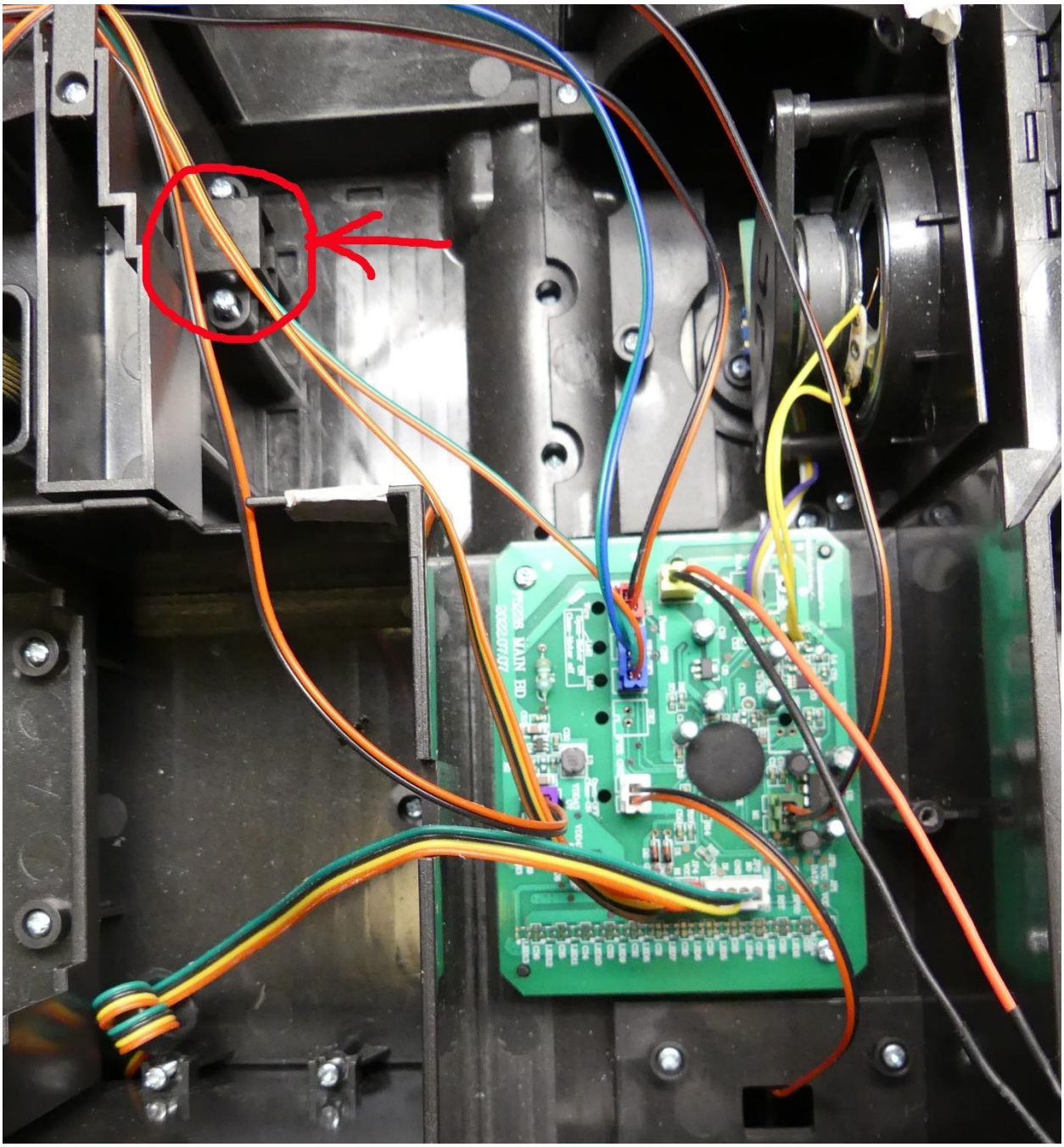


Three cables from inside the pack need to be unplugged from the main circuit board. They are all 2 wire connectors and have color coded plugs:
#1 – Yellow, wires come from the 4x D-cell battery compartment on the back panel of the pack
#2 – Purple, wires go out to the wand connection at the loom
#3 – White, wires go down to the Red power switch that is used to power up and down the pack

When plugging and unplugging wires, only grab the connector on the wires at the lip around the top of the plug. Do not pull on the wires themselves, as that can damage the connector or wire or both. Shown here is using a set of needle nose pliers to grab the connector and disengage the cable from the board. Notice where the pliers are gripping the plug:

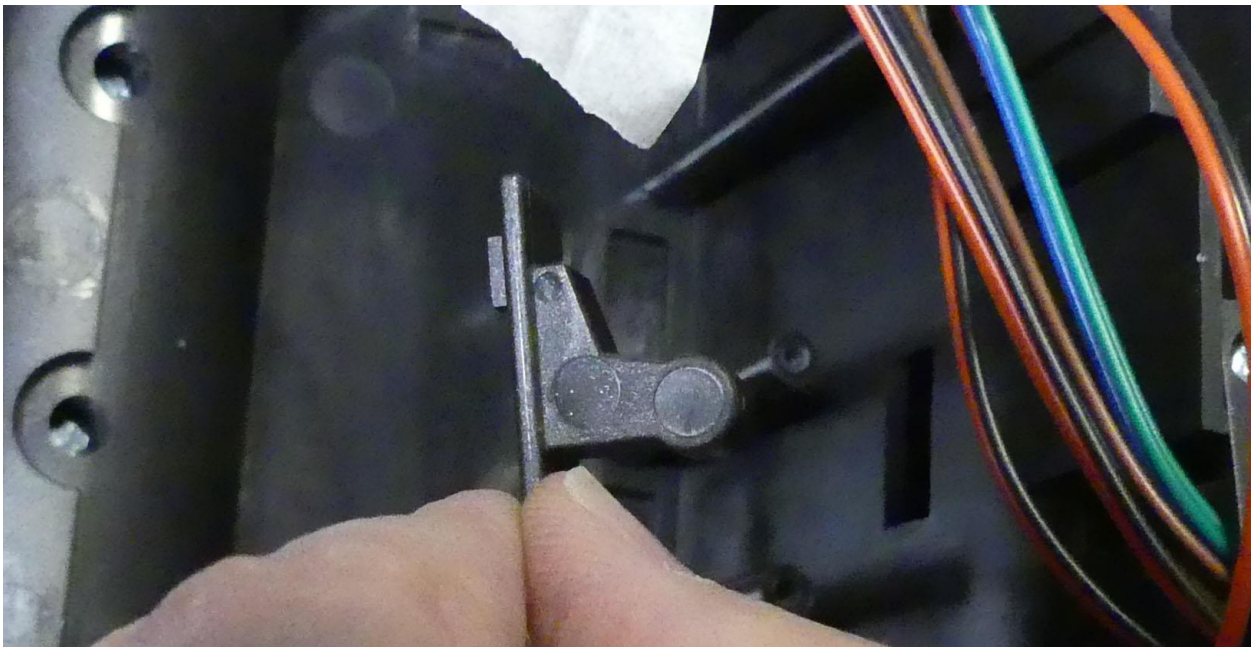


Next, the KeepAlive Battery disconnect toggle switch cable (item #2 in the kit) needs to be installed. Start by removing the two screws of the black slide switch in the pack:

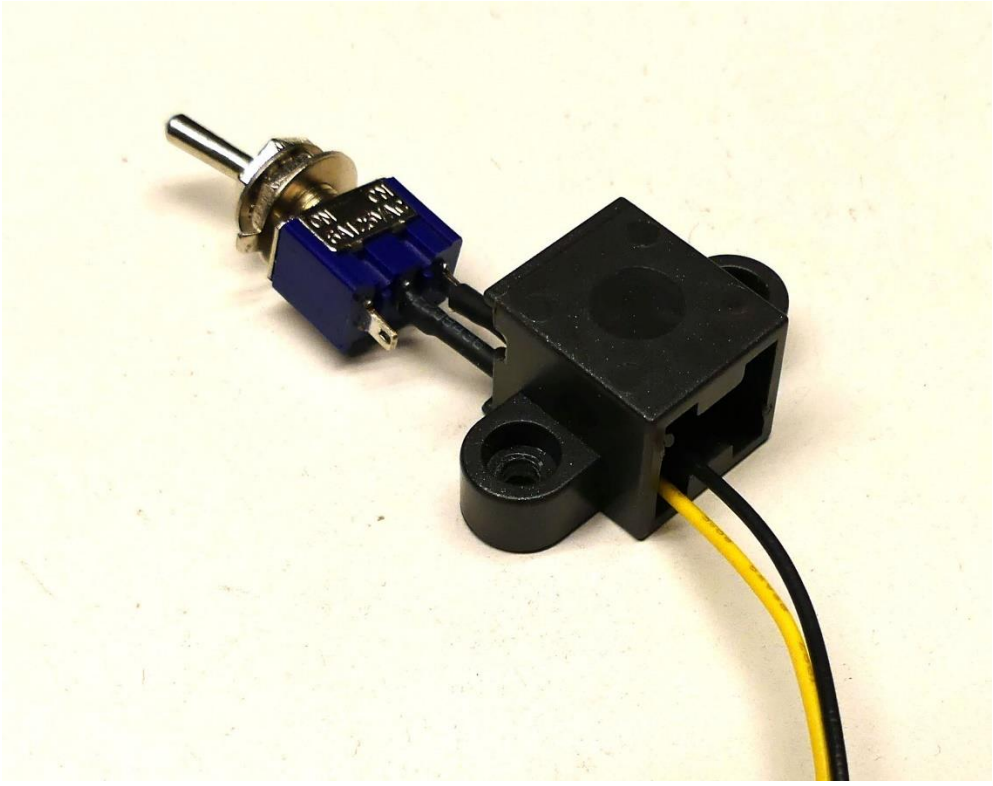


The part consists of a housing that has the two screws holding it in place and a simulated black toggle switch that is actually a cover that slides back and forth and is located between the hosing and the pack wall.

Here is the cover and orientation of how it goes when placed in the rectangular hole seen just to the right of the cover in this image:

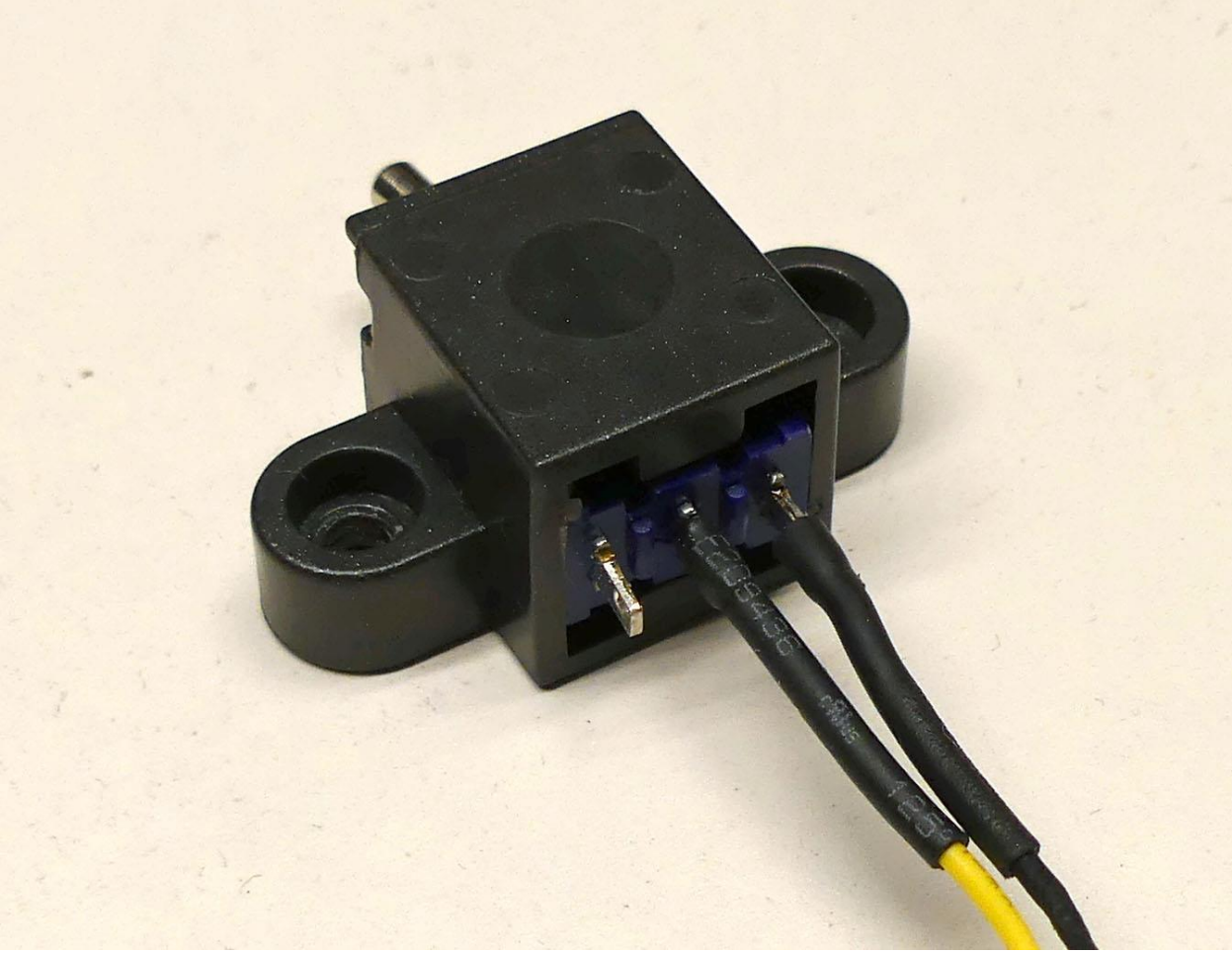


It worked out well for me to put the caver back in place and leave it there waiting for the switch assembly. Next, Take the battery disconnect toggle switch cable (item # 2 in the kit) and slide the connector end of the cable into the housing from the side that faces the pack wall:

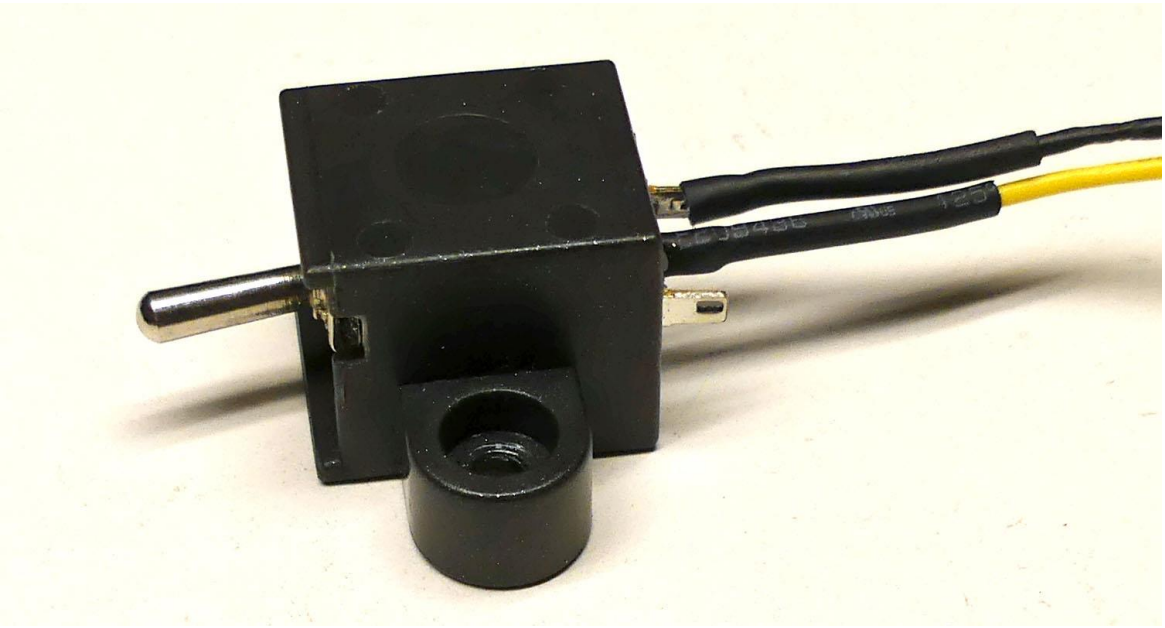


Orient the switch as shown with the two wire leads at the top of the switch and the bottom connector without a wire. This orientation makes the most sense to me so that the “ON” direction of the switch is the same as the red power switch on the pack.

Push the switch into the housing such that the bottom of the switch body nearly exits the housing. On the packs I have installed this, the two tabs on the housing will stop the switch from exiting the housing. The washer on the switch is also large enough to cause friction that can hold the switch in place. Add some hot glue to the bottom of the switch at the edge of the housing to hold the switch in place. Do not add any glue on the side of the switch with the toggle portion since that has to be able to have the cover fit tightly over the toggle and the housing.

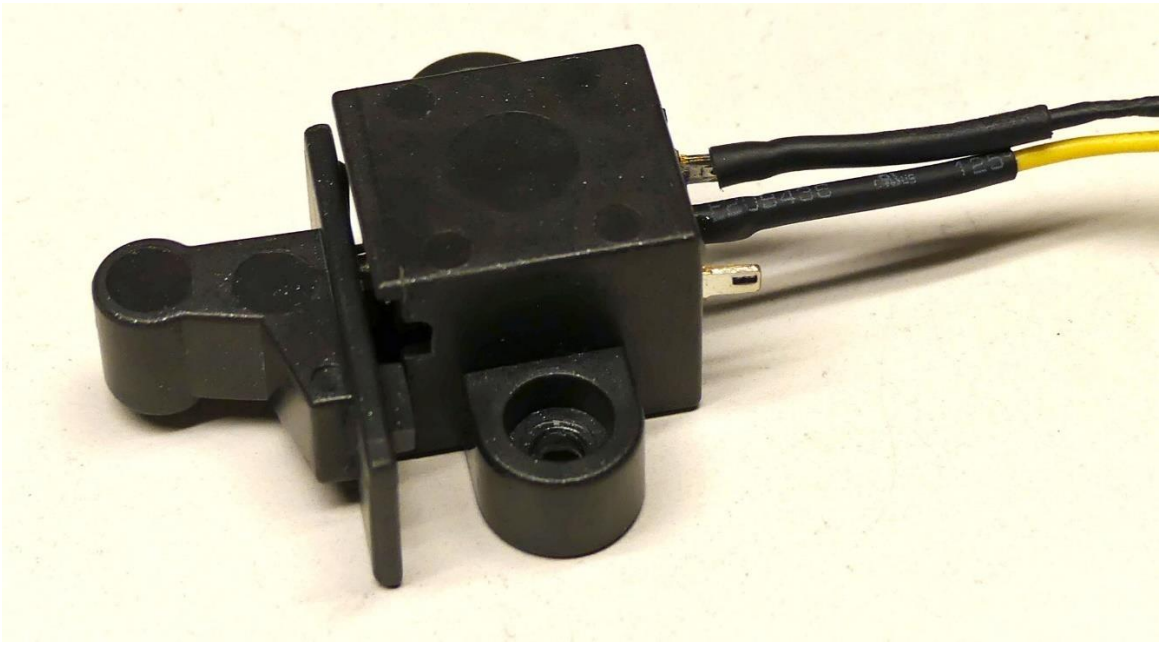


Only the toggle portion of the switch should stick out. THe nut and washers should be inside the housing:



Leave the toggle switch in the ON position (as shown) and put the housing with toggle switch back in the spot you removed the housing from. The housing should snap down onto the two posts. Hold the part in place and reach around the pack and verify you can slide the switch up and back down and you should be able to hear/feel the toggle switch toggle.

The orientation of the cap and housing is like this, though the cap should still be in place in the rectangular hole in the wall of the pack.



Connecting the Pack KeepAlive board:

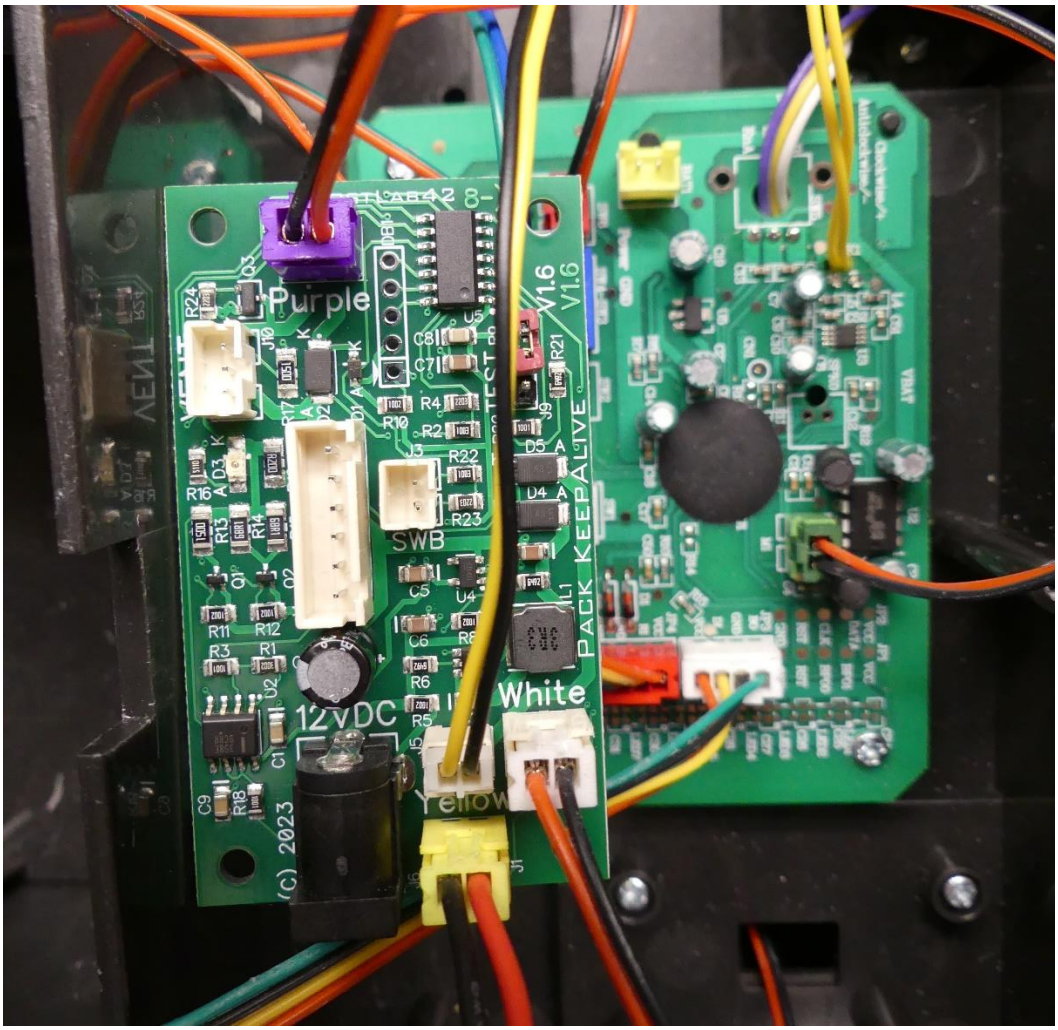
Remove the Pack KeepAlive circuit board (item #3 in the kit) from the ESD bag (I use scissors to cut the end of the bag off.).

Orient the board with the 12V DC poser jack facing towards the powercell side of the pack and then plug in the 3 2-wire cables that were unplugged from the Pack's circuit board (Yellow, White and Purple cable plugs go to the matching Yellow, White and Purple connectors on the Pack KeepAlive board. Also plug in the toggle switch cable to the connector next to the Yellow connector.

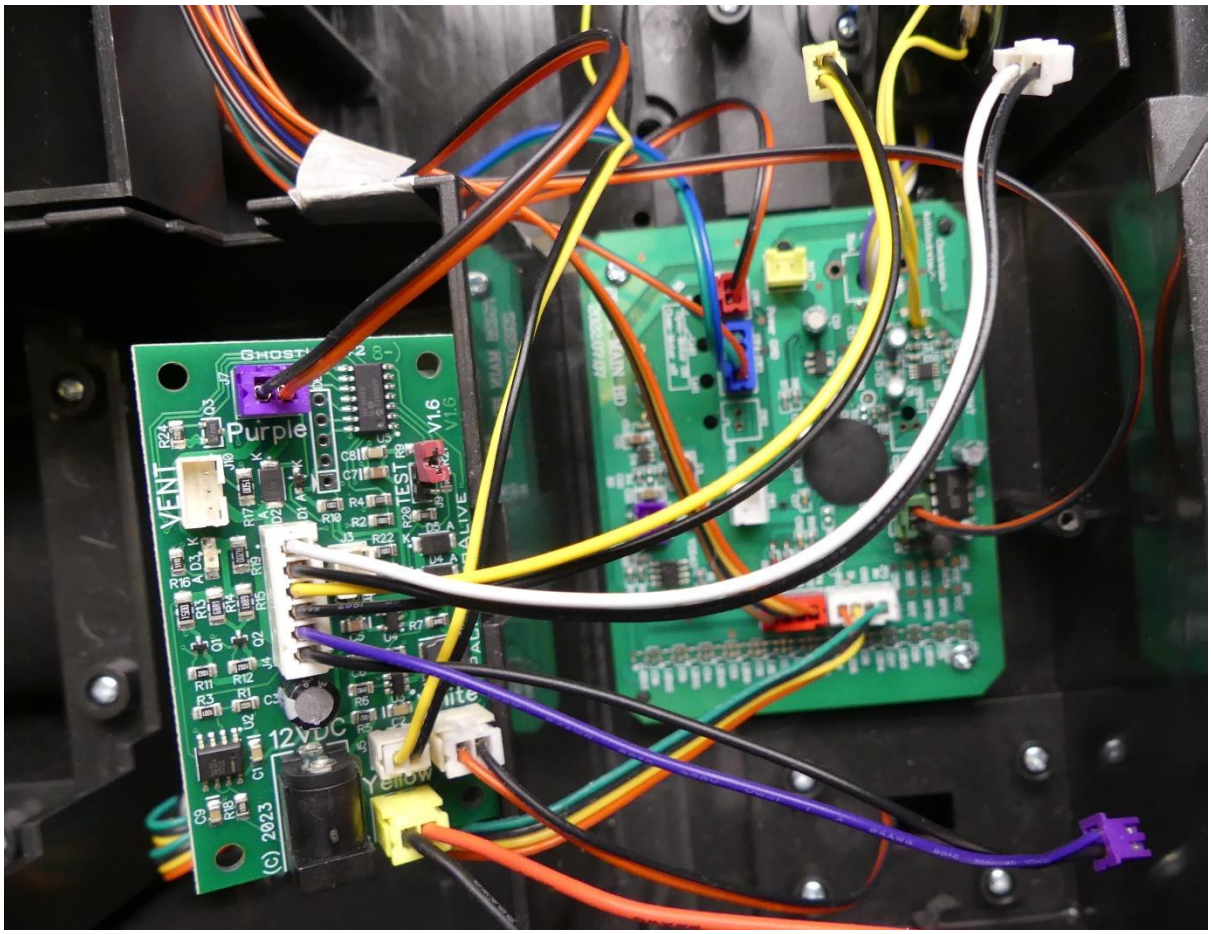
The Pack's cable connections are all larger than the KeepAlive provided cables, so you should not be able to plug into the wrong place.

Orient the cable connectors properly: the connector and socket both have alignment features so they should only fit in the proper orientation.

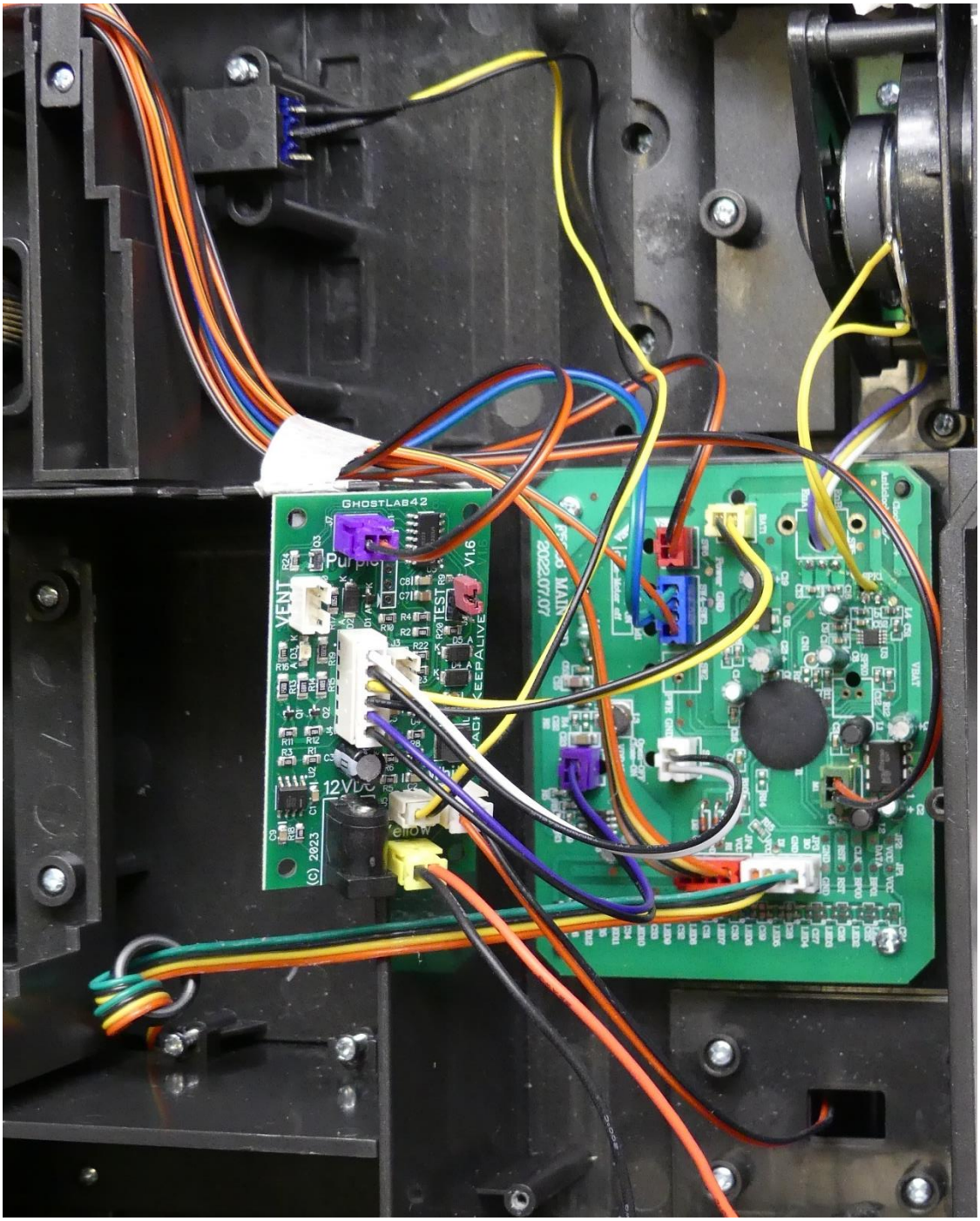
Here is what it should look like when those 4 cables are connected to the KeepAlive board:



Now remove the new 6 wire cable (item #1 in the kit) and plug that into the KeepAlive board. The cable is keyed so should only go in one way:

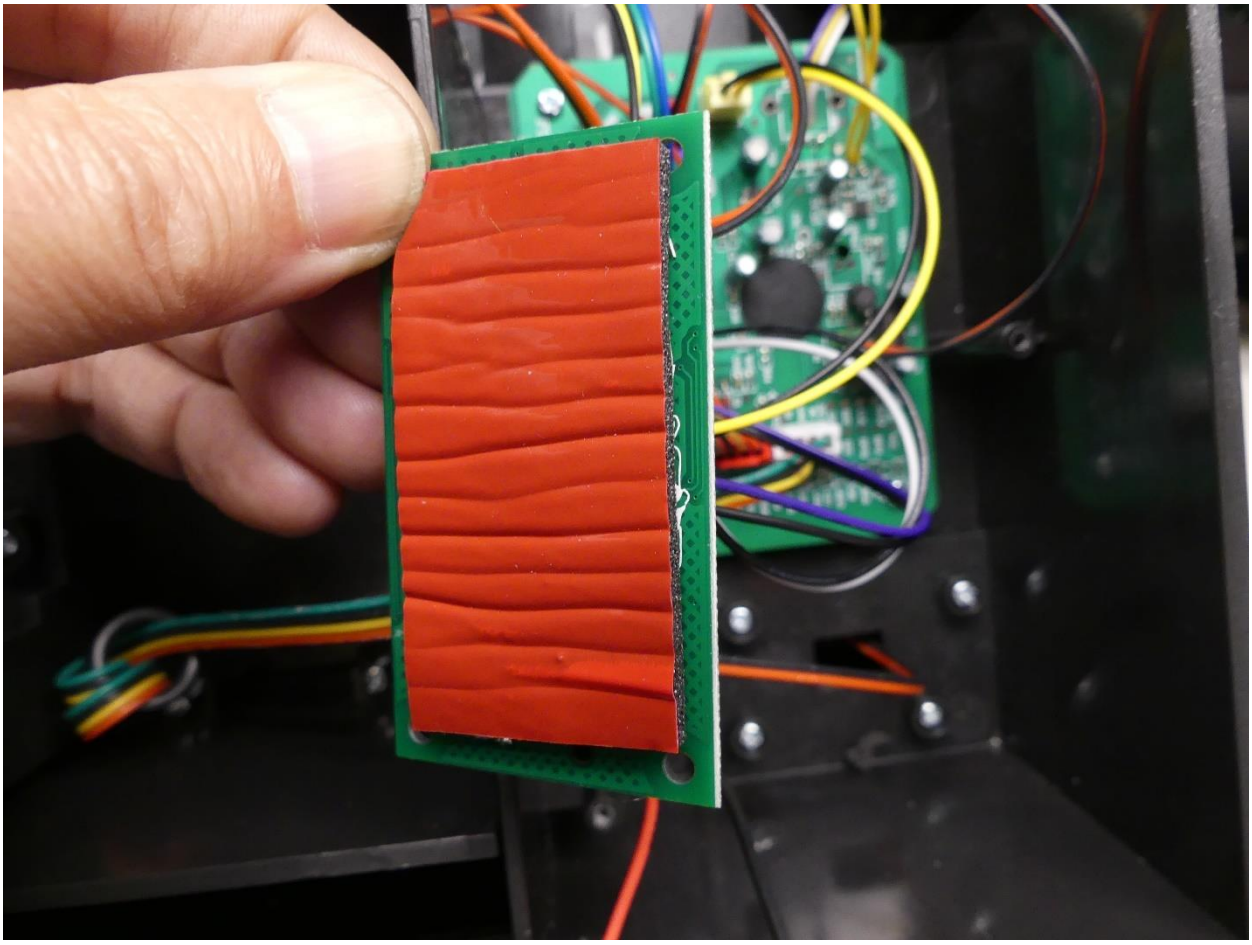


Now plug the 3 color coded connectors on the end of this cable into the matching color connectors on the packs main circuit board. The main circuit board should now have all of the connectors filled with matching cables:

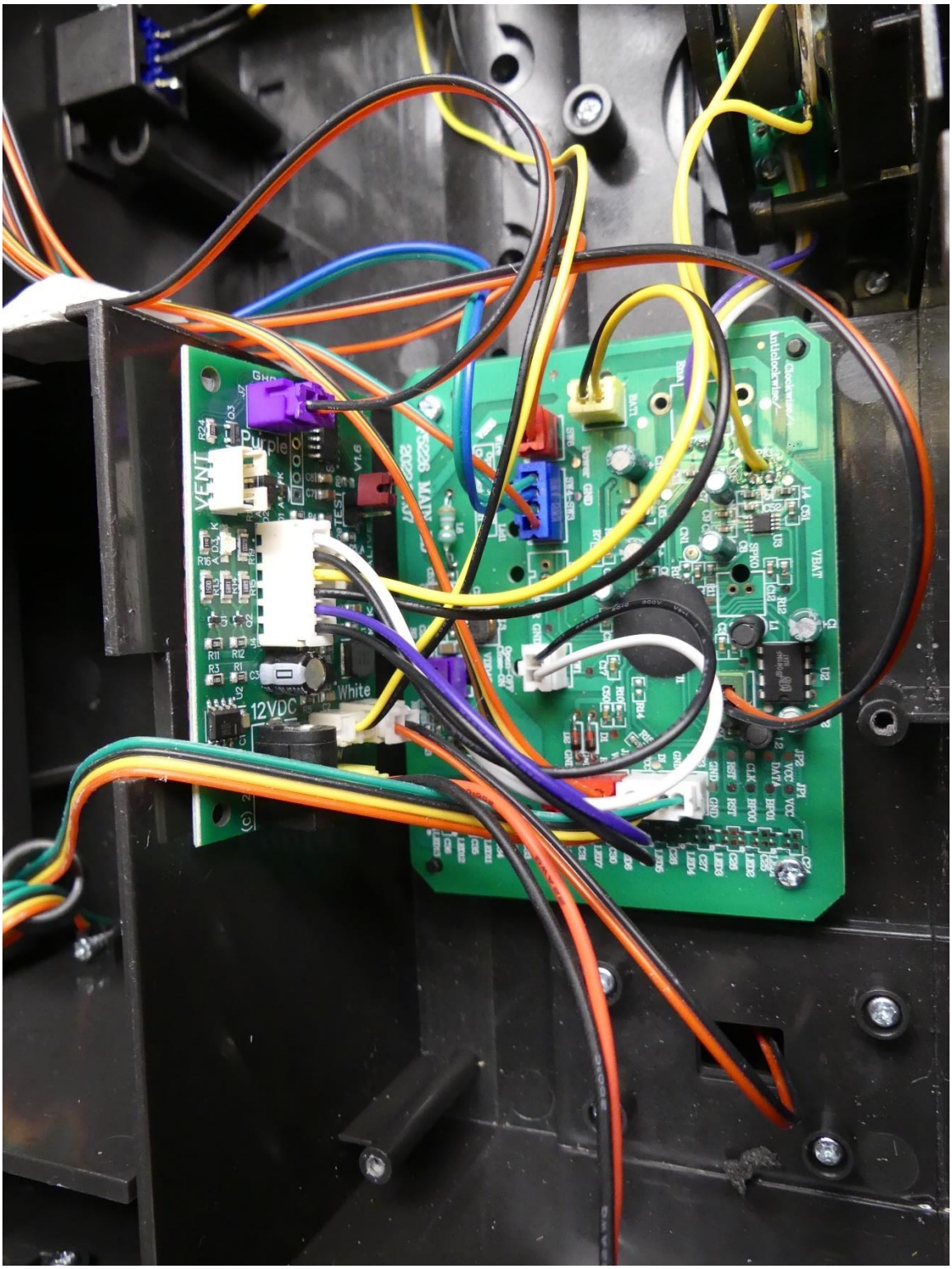


You can mount the KeepAlive board with the included double sided tape or use some spacers and screws with the 4 mounting holes in the KeepAlive board. The double sided foam tape has a fairly aggressive adhesive, so you will not be able to reposition the tape once it has come in contact with the board or the pack wall. The adhesive can be removed (I scraped it off with my fingernails), but the foam was destroyed and it took a while to clean it of the board and the pack wall.

Peel off one side of the tap and stick it on the KeepAlive board:



Then peel off the other side and press the board in place. Leave the notch clear so cable can be routed through the notch and I like it as high as possible to leave more room to plug in the 12V DC power jack. Below is a picture of the fully installed board.



Testing the Pack to see if power is connected

Normally I would say try testing the board before you put the pack back together, but that is a bit problematic here. The Pack's board will not powerup the pack if the cyclotron cover is missing.

With the help of a friend or some beefy straps, the cyclotron cover can be held in place, but it is marginal at best and not very reliable. If you can get the contacts on the cyclotron to mate, then with 4x D-ce3ll batteries loaded and the KeepAlive battery connection toggle switch in the ON position, the Pack's Red power switch should be able to power the pack on and off.

But without the cyclotron installed, you can still do a quick test to see if power is at least available:

1) Put in the batteries
2) Toggle the configuration switches in the cyclotron area, the pack should make noises each time the switch is toggled if the pack boards are getting power.

For a better test but not a full pack reassembly, you do not have to put any of the screws back in, but you do need the back panel on the pack and the cyclotron back together. The bumper and shock mount need to be securely attached and that should allow the cyclotron contacts to be held in place. Now the pack's red switch should be able to power up and then power off the pack. If that works then it is time to put back in all of the screws!

Testing the Pack KeepAlive Board

Not sure this will be very helpful since there is not an easy way to test the KeepAlive board with the back removed. The Pack will only operate if it thinks the cyclotron is connected.

I will fill this out later if there is a nice way to do this.

Just for your information, I made a dummy plug that makes the Pack's circuit board think the cyclotron is connected for ease of testing. No cyclotron lights, but that is not really needed for the work I was doing or to test all of the connections between the boards and the pack.

Putting the test jumper across the two TEST pins will start the internal test, but it does require the cyclotron attached or gets very confused since the pack will not send power to the switches…

Put the pack back together

In this step you will be putting the pack back together. Basically putting the pieces you took apart back together now that you have verified that the pack is working properly (hopefully you were able to determine this.)

Parts needed

- Small-medium Philips screwdriver

Make sure all the wires are tucked away and routed away from any edges of the pack and are routed in channels between the walls.

The back should snap in place if lowered parallel to the back (not tilted by putting one end in first. Then just put all of the screws back in in the reverse order. Remember that screws #1 and #2 are the shorter screws and that screws #3 and #4 secure components on the other side of the pack.

Then put the cyclotron back together and reattach cables.

Put back in the batteries and now your pack should be able to be turned on for a as long as the batteries can last.

Have fun and keep on Bustin!