The Impakt Personal Launch Controller

DISCLAIMER: This circuit comes with no guarantees or warranties whatsoever be they explicit or implied. You construct this circuit entirely at your own risk! I cannot be held responsible for your workmanship or ability to follow instructions or make rational judgements. I cannot be held responsible for injury or death resulting from the use of this circuit. I cannot be held responsible for damage to property caused by the use of this circuit. If you do not agree with this statement, then DO NOT attempt to construct this circuit.

There was some talk about making launch controllers for the rocket club as the one currently being used by PARC is somewhat unreliable.

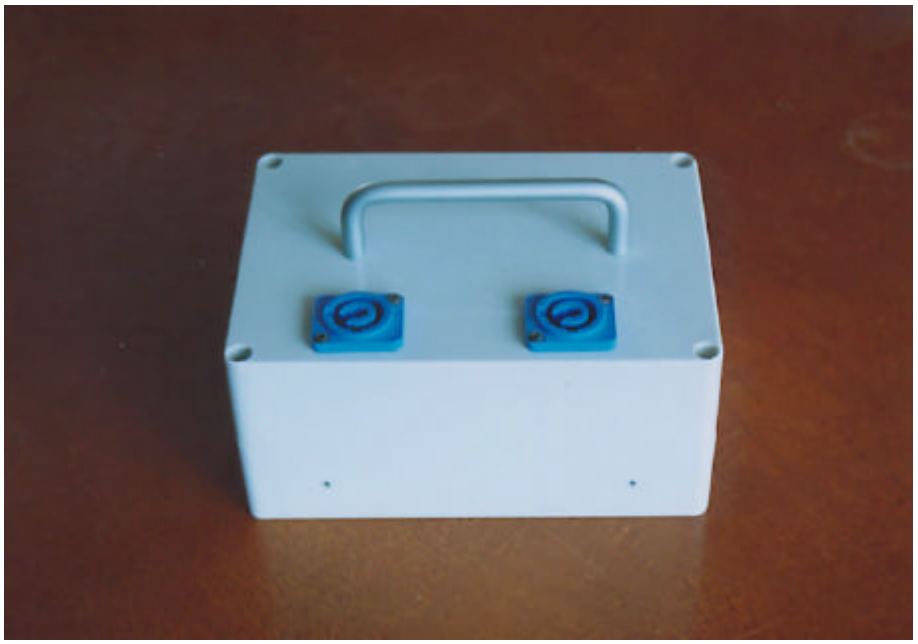
This is how to build the launch controller that I built myself for use with my LOC/Precision Viper III cluster rocket. This unit works great and can be built by just about anyone but it lacks a continuity circuit. There are no circuit boards used and almost every component is connected via spade terminals - which is handy if you need to replace a part. This cost me about $100 total, but I used some expensive parts that you could substitute for a cheaper equivalent part. I got all of this stuff from either RS Components in Osborne Park, or Dick Smith Electronics.

I can not stress enough about the importance of insulating all of your connections! And doing a good job of it at that! A short in the circuit could possibly cause the ignitor lead clips to become live – thus putting you and everyone else in serious danger. Heat Shrink everything! There should be ZERO risk of a short in your hand unit. I'm not going to tell you to solder this and crimp that – use your brains and common sense.

Features

- ?? Modular Power supply - 12v standard and can be mated with another unit
- ?? for 24 volts.
- ?? Power supply is separate from hand unit = power without the weight.
- ?? All cables are connected via sockets, which makes storage easier.
- ?? 4 ignitor clips
- ?? Hand unit has a master power switch, a key operated arm switch, and a 24 volt LED and buzzer for visual/audible 'unit armed' warnings. Momentary action launch button.

The Power Supply & Recharge Leads



This power supply has been designed so that it can be easily recharged from a car or mains battery charger and it can be connected in series with another unit to provide the hand unit and ignitor leads with 24 volts instead of 12 volts.

DS = Disk Smith
RS = RS Components

Parts List

1 x 12v Gel Cell battery (DS)
1 x Plastic electronics enclosure (DS)
1 x Cheap steel cupboard handle (Bunnings)
2 x Sockets (female)(RS)
1 x Plug to suit socket (male)(RS)
2 x Large crocodile clips (Need to fit around a car battery)(RS)
1 x Screw terminal block with two holes (DS)
Some twin core automotive electrical wire suitable for 24volts and 2 – 5 amps
Some spade terminals(DS)

Method

You don't have to do exactly as I do – use your common sense throughout this document. You can use any parts you like provided that they can work at 12 or 24 volts and do the required job. It's a good idea to use heatshrink insulation on all connections to prevent any chance of a short circuit.

Ok, buy your gel cell then find an electronics enclosure that it will fit inside.
Your electronics enclosure also needs to have enough room to support 2 x sockets (if you want the 24 volt option – you only need 1 socket if you are only going to use 12 volts).

The sockets can be just about anything – provided they have at least two points of contact – one point for positive power, one point for negative power.
I've used these lovely blue Neutriks sockets and their plug counterparts. These are big solid plugs/sockets which lock into place with a twist.

Assuming you've got all your parts, drill some small holes around the bottom of the electronic enclosure for vent holes – this is just a safety thing.

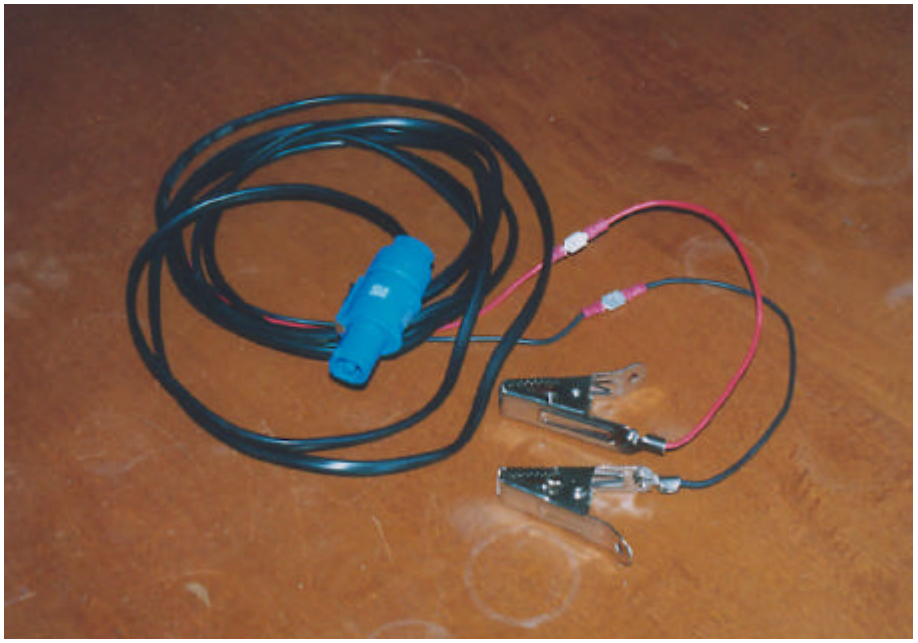
Mark and drill holes in the lid for your handle, then attach the handle with the supplied screws.

Mark and drill whatever holes are required for your sockets.

Now connect your get cell to the sockets. I have a red wire with a spade connector which connects to the positive terminal on the battery, a black wire with a spade terminal connects to the negative side of the battery. Now attach your screw terminal block to these wires – red in one hole, black in the other. Connect one contact of your socket to the positive side of the terminal block and the other to the negative side.

That's the battery enclosure finished.

The recharge leads



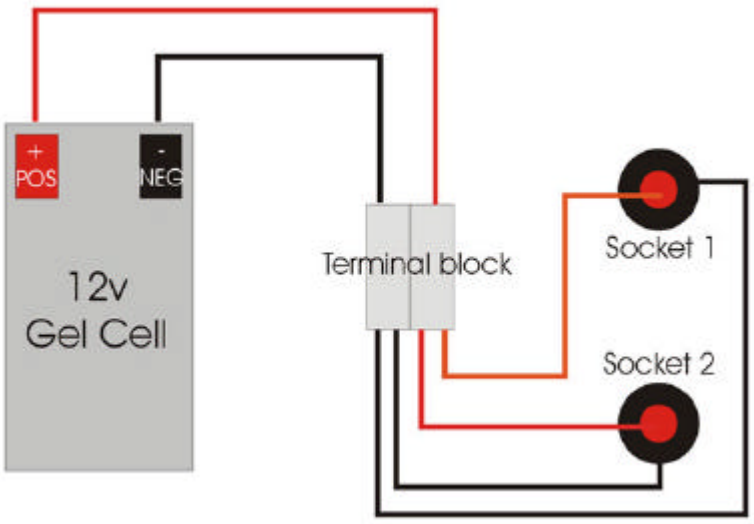
Get a few meters of your automotive wire – say, 3 meters and connect a crocodile clip to each wire. Connect a plug to the other end. Make sure you keep the poles on all plugs the same, ie: sock/plug centre pole = positive. If you plug this into the socket on the battery box and connect the crocodile clips to a car or mains charger, you can charge the battery without taking it out of the box.

If You're Going For 24 volts
If you want 24 volts, then make another battery box as above, but you only need one socket for this box. Now take 500mm or so of cable and put a plug on each end – this

is a patch cable that joins both battery box's and results with 24 volts output from the second unit, provided you connect it in series. If you connect it in parallel, you will still only get 12 volts (but it will last longer).

The Power Lead

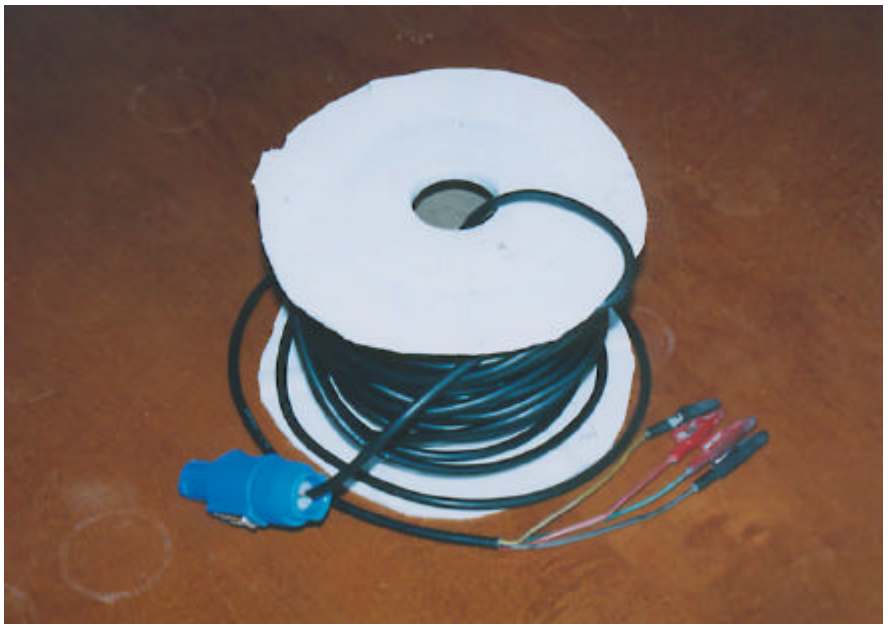
This is the same as the patch lead, mentioned above. 3 meters of cable is enough – just put a plug on each end. One end will connect to the battery box and the other end connects to the hand controller. It doesn't matter which socket you connect to if you follow the diagram below (Note: You might need to change the circuit below if you are going for 24 volts).



Power Supply Schematic

Since we're in lead making mode…

The Ignitor Leads



Parts List:

- 4 x small crocodile clips (2x black, 2 x red) without teeth (RS – nice insulated clips)
- X meters of 4 core automotive cable.
- 1 x Plug

Method

Connect one clip to each wire in your cable. This is the business end of your controller – the ignitor clips should be insulated to avoid shorts at the pad. The clips I used as you can see from the photos, are fully insulated.

Now, I told you to buy two red clips and two black clips, so, at the other end of your cable, connect both wires with red clips to the centre contact of your plug, and both wires with the black clips to the outer contact of your plug.

The Launch Controller Hand Unit

Parts List:

- 1 x Plastic electronics enclosure (DS)
- 2 x Sockets (DS/RS)
- 1 x Momentary action switch (DS)
- 1 x Switch (SPDT) (DS)
- 1 x Key Switch (RS)
- 1 x 12v or 24v LED (DS/RS)
- 1 x 12v or 24v Buzzer (DS/RS)
- 2 x Common Blocks (DS/RS)

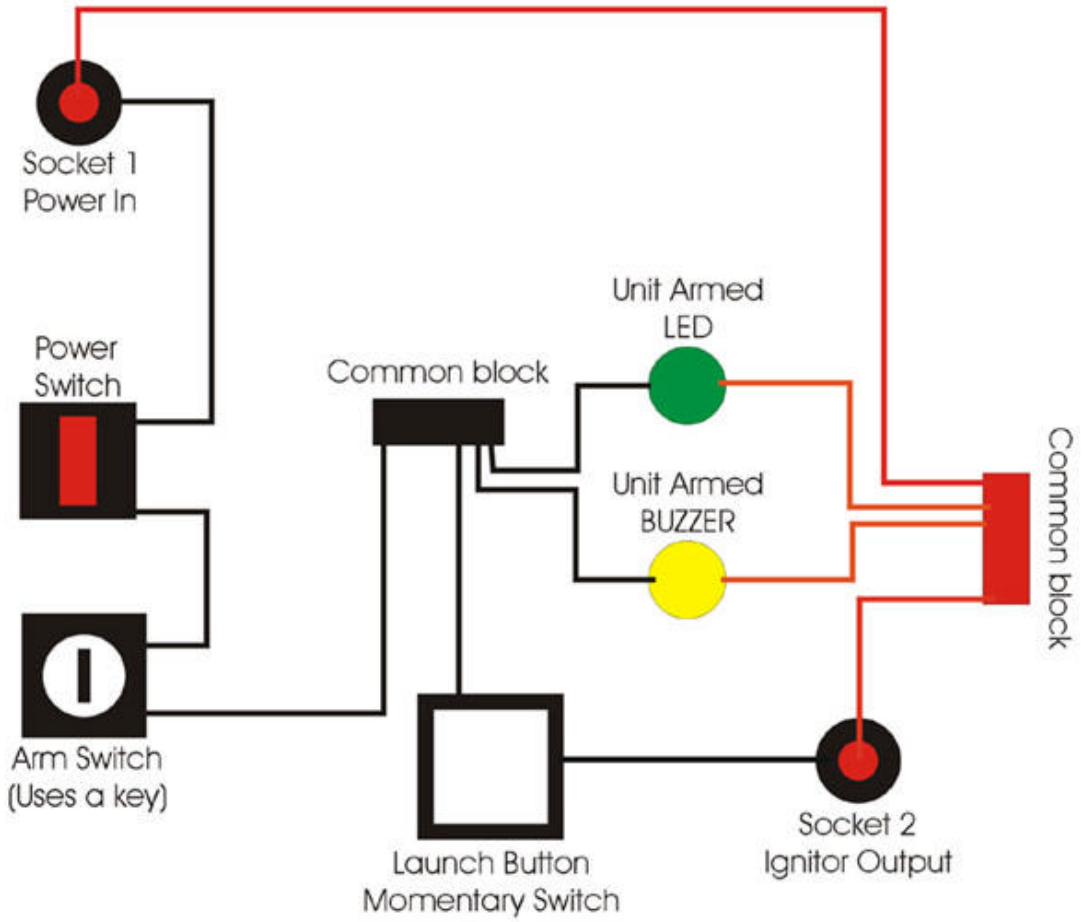
Method

Your electronics enclosure for the hand unit needs to be big enough to hold all the parts, yet small enough to be comfortable in your hands. My hand unit is 160mm long, by 95mm wide and 60mm deep.

First, decide where everything is going to go! Make it logical to use. I've put the master power switch on the top left, with the arm key switch below it. The LED for visual 'Armed' warning is in the centre and the launch button is on the right. You can put the buzzer where ever it will fit. The socket for the hand units power should be on the bottom, in the middle of the unit and towards the back (helps keep it balanced) and the socket for the ignitor leads (output) should be on the front face in the middle (again for balance reasons – it just makes the unit more comfortable to hold).

Follow the schematic to wire everything up. I think you are supposed to switch the positive side of the circuit, but I've switch the negative…Anyway, it should go together something like this:

- ?? Connect the negative lead from the power socket (socket 1) to the power switch.
- ?? Connect the positive lead from the power socket to one of the common blocks. This common block is now your positive common block.
- ?? Connect the power switch to the arm switch.
- ?? Connect the arm switch to the other common block. This is now your negative common block.
- ?? Connect the momentary action launch switch to the negative common block.
- ?? Connect the momentary action launch switch to the negative side of your ignitor lead socket.
- ?? Connect the armed LED to both common blocks – make sure you get the polarity right!
- ?? Connect the buzzer to both common blocks – again, check the polarity.
- ?? Connect the other terminal on the ignitor socket to the positive common block.



Hand Unit Schematic

Testing The Hand Unit

Ok, plug the battery into the power socket on the hand unit.
Turn on the power switch
Turn the arm key.
The arm light should now be on and the buzzer should be making a noise.
If the buzzer and light are not working you have either got the polarity wrong with the light and buzzer or there is no voltage. If you put a volt meter at both common blocks, you should get 12volts. If there is no voltage there, work your way back until you find the problem.

If the light and buzzer are working, turn the unit off. Plug in the ignitor leads and get an ignitor, attach it to the clips and put it in a safe position.
Turn the unit back on – the ignitor should NOT burn out. Double check with a volt meter to make sure there is no voltage at the ignitor clips, OR at the ignitor output socket!

If everything checks out, turn the arm switch. Again, the ignitor should NOT burn. Check everything again with the volts meter to be sure. If you are getting any voltage (even a small amount) then there is a problem! There should be 0 volts from the ignitor socket at this point but your light and buzzer should be on.

Now, press and hold the launch button. The ignitor SHOULD burn. You should be getting around 12volts from the ignitor clips and the ignitor socket on the hand unit (obviously you will need to unplug the ignitor lead to check this).

If that worked, the you’re all done!