

A powerful Headlamp

For under 50 pounds

It has to be said, underground headlamps are expensive and regardless of our financial status, many of us have partners at home venomously against us spending (sorry, 'wasting') any money on such a strange hobby as exploring disused mines. We therefore have to very resourceful and imaginative in our kit, and saving money is never a bad thing.

That said, if you can afford a proper lamp, buy one. A properly made lamp built for purpose is always going to be better than a DIY job, and your lamp failing underground can be a serious situation. But proper lamps are expensive.

This document is my experiment to put together the best lamp possible for a budget of 50 pounds. Off the shelf, this money doesn't buy very much at all. Perhaps a Petzl MYO5, or maybe an Myo XP. But these lamps run off uneconomical disposable batteries and don't offer a lot of brightness/burn time for the money (in my opinion).

The Headset

For the actual headset I've chosen a standard Oldham unit. There is no use trying to reinvent the wheel and build one from scratch. The Oldham headsets are proven worldwide and totally bomb-proof. I've cheated a little bit here and brought a 2nd hand one from eBay, but they are so tough however this poses no problem and even a 40 year old one will be tougher and last longer than many new other lamps off the shelves today. They are easily obtainable and a very good example can be had easily within 15 pounds.

Oldham produced headsets using MES (screw) fitting main bulbs, and also headsets using PF (screwless, push-fit) main bulbs. I've used one based on MES (screw) fitting, because I intended to replace the reflector with a better metal one (described later) but these only work with MES headsets. So if you intend copying my lamp exactly, buy one based on MES fitting, otherwise you'll have to stick with the original plastic Oldham reflector (and therefore bulbs not exceeding 4 watts).

The Battery

Of course the obvious choice to match the headset is a genuine Oldham battery but there is little point buying a 2nd hand one. The batteries don't last forever and any 2nd hand one is likely to be either knackered or well on the way. A brand new Oldham battery would wipe out the whole 50 pounds budget in one go. Chargers for Oldham batteries are also very expensive, with a genuine single-lamp charger being about 100 pounds.



So I've opted for a generic Sealed Lead Battery, which are popular for use in such things as CCTV, children's ride-on toys, computer backup power supplies and so forth. They can be had from eBay or electronic stores such as Maplin.co.uk. They are large, square and plastic but pretty tough. Many options on capacity and voltage are available, but for this project I've chosen a 6 volt, 12 Amp-Hour unit,

costing me 12 pounds brand new. This is a similar shape to, but slightly smaller than, a house brick.

Being Sealed Lead Acid, the acid contained within will not spill if the battery is inverted or shaken. The build quality of these units is very good and they are unlikely to break unless dropped off a cliff. The chargers are also very cheap and can be had easily off eBay or elsewhere for less than 10 pounds new.

A 6 Volt, 12 Amp-Hour battery like this one will hold 72 watt-hours ($6 \times 12 = 72$). This means it would power a 1w lamp for 72 hours, a 2w lamp for 36 hours, a 4w lamp for 17 hours, and so forth. A new Oldham battery, despite being larger and 4 times the price, holds about 64 watt-hours (4 volts, 16ah). Hence, this general-purpose battery from Maplin.co.uk gives us excellent value for money.

The Bulb

The bulb in the Oldham headset is either a 3w or a 4w bulb which is functional for general underground use, but it won't be cooking any chickens. In fact, the bulbs in a factory-standard Oldham are pants - but we have the budget left to improve upon it. Actually, as the original bulbs are all 4 volts, we can't use it with the new 6 volt battery anyway. So a new bulb it has to be.

I opted to push the boat out and get a whopping 10 watt, frosted halogen bulb from www.reflectalite.com (who I recommend as an excellent supplier of small low-voltage bulbs), product number GH44F at £4.50 plus postage. The 'Frosted' option cost an extra 50p and means that the glass has been sand-blasted. This gives a much more diffused, wide and even light which personally I much prefer. Many other people prefer the opposite – a tight, bright beam which carries much further. If you're one of those people, don't get the frosted version. The chosen bulb throws out a blinding 201 lumens of light, the standard 4w Oldham bulb produces only 48 lumens.

The Reflector

The reflector in a standard Oldham headset is plastic and just about copes with the heat from a 4w bulb. Put a 10w bulb in there and it'll turn to soup very quickly (I know, I tried it) so we need a better reflector.

Youle produce one that fits the Oldham, which is made from polished stainless steel. I obtained one from www.caving-supplies.co.uk for £4.80 (ref 29014). Bear in mind these only fit Oldham headsets with the MES (screw) fitting bulbs. Oldham also produced headsets based on PF (Push-Fit) based bulbs (no screw thread) which is not compatible with this reflector.

I've been told than an Oldham with the metal Youle reflector will stand up to a 20w bulb (beyond which the case of the Oldham starts to melt) but that's getting a bit silly anyway, 10w is pretty dazzling as it is.

The Wiring

The cable as part of the Oldham Headset is meant to fit an Oldham battery at the end, so either cut this off and crimp on terminals to fit the new battery, or make a new cable. I opted for the latter so I could keep the original cable intact, and used a length of normal 240v household cable (a computer power-supply lead, as it happens). This cable was thick, strong and round and being a similar dimension to the original it fit into the headset well. If you don't have a crimping tool, you can just wrap the bare wires around the new battery terminals, but this is not so strong.

The Finished Setup



The weak point in this setup as any hardened mine-explorer will immediately notice, is the cable joining the battery. Normally on a Caplamp, the battery has loops so that it can be safely hung from a belt, and the cable is held very securely to prevent it from being pulled off the battery in the event of a snag.



I opted to better secure the cable to the battery using self-adhesive cable-grips (not shown) available for pennies from most electronic shops, but that's optional of course. If you want to waist-mount the battery on a belt, like a traditional Caplamp, you'll have to think of some creative way of doing so. Personally I'm happy to carry the battery in my coat pocket, but that won't suit everyone.

For general walk-about mines, carrying the battery in your pocket or in your backpack is perfectly adequate, but for tougher ground involving squeezing, crawling or SRT then use something stronger like a standard Oldham setup.

Light Output

The 10 watt frosted bulb gives out an incredibly powerful light that is very even and clear to see by, with over four times the lumens of the bog-standard Oldham. The battery I've paired it with drives this monster of a light for over seven hours, certainly enough for an average trip and a smaller spare battery can be carried if needs be. Or install a 6 watt bulb (still very bright) instead and enjoy 12 hours of light per charge.

The only commercially available underground lamp that I know of to use 10w bulbs is the mighty FX5 from Speleo Technics, with a price-of-ownership around 230 pounds including a charger. The FX5 manages only 4 hours per charge, verses our DIY lamps almost double 7.2 hours.

Conclusion

Having tested this lamp underground on a number of trips, I would have to say it gives the most pleasant and brightest light to see by I've ever used, totally thrashing a standard Oldham or FX2 / FX3. There is no 'ringing' to the light at all thanks to the bulb's frosting and the angle of the beam is wider than the human eye, so whichever way I look is lit. The battery is slightly cumbersome in a coat pocket, and this lamp is therefore not really suited for very difficult ground.

Another weak point is that there is no pilot bulb, so if the main bulb blows you're in the darkness and will have to activate another light to see again. Not having a pilot light is also not very power efficient, as for instance whilst you're eating your lunch you don't need 10 watts burning away and toasting your sandwiches. The Oldham headset does have a socket for a pilot bulb, so by drilling an appropriate sized hole into the new Youle reflector would permit this to be used. Ideally, install a 1 or 2 watt bulb, but make sure it's not the original Oldham one as it will be only 4 volts, you need a 6 volt one.

Total Cost

Oldham Headset (no battery), from eBay	£15
6v / 12AH universal Sealed Lead Acid Battery from www.maplin.co.uk	£12
6v universal SLA Battery Charger from eBay	£10
6v 10 watt Frosted MES Screw Fit Bulb from www.reflectalite.com	£5
Metal Youle Reflector from www.caving-supplies.co.uk	£5
Total Cost of Lamp System	£47

For just under 50 pounds this setup represents a heck of a bargain that will out-power pretty much every commercially available Caplamp costing many times this sum. If you're more into the technical sharp-end of mine-exploring, you'll need something with a sturdier battery mounting and connection, but otherwise you could do much worse than carry this lamp with you.

By Miles, March 2007