

CAMPING GEAR

HEAD TORCHES

We've evaluated 15 examples from a range that grows almost daily and with RRP's from \$28 up to \$200. As often happens, price is a poor guide to the right head torch choice for camping.

As LED development has progressed we've seen more applications for these tiny electronic wonders: because an LED reacts instantly to electrical power it makes an ideal strobe; LEDs can be multi-coloured, including red for night vision and emergency purposes; light intensity varies with current draw, so boost, dimming and stepped light settings are easily achieved; and programmable power-down to preserve battery life can be incorporated. Some makers are building in focussing systems, using lenses in conjunction with reflectors.



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We restricted our test headtorches to those most suitable for camping and related activities, but there are specific units available, for pursuits such as caving, where an LED light can be combined with an acetylene one, or night running, where a powerful LED is used with extended life batteries installed in a harness. There are even emergency headtorches that are packed with long-life batteries, good for up to 10 years' shelf-life and able to operate with red or white light in continuous or blinking mode. The ideal headtorch for camping needs to have an area beam that lights up a wide scene without excessive intensity, such as when you're illuminating your dinner plate. Controls need to be easily reached, to alter beam type and strength, and they must be sealed against dust and water entry.

A spot beam, for checking out your surroundings in detail is useful, if you don't want to carry a flashlight for that purpose. A strobe or flashing function may be useful, should you need to attract help in an emergency, but a personal locator beacon or a satellite phone are much more certain!. Some headtorches come with multi-function operations, such as different coloured LEDs and you have to judge whether you really need those features – great for kids to play with!

The headband needs to be flexible enough to fit around a hat or thick beanie. Many units have a top or crown strap as standard or an option. A top strap can reduce the amount of tension you need in the headband.

Some headtorches have their batteries located in the head unit and others have a separate pack at the back of the headband. Generally, a separate pack holds more power, extending battery life between charges or replacement, but the downsides are more bulk and the need for a cable between the pack and the lamp. Battery changes need to be easy, because quite often you're doing that, literally, in the dark. It's important that the battery case opens, shuts and seals without effort. Headtorches can run on replacement or rechargeable batteries and some have inbuilt jacks for mains charging their battery packs.

All but one of the test lights are water resistant – rain shower or water splash - and one is waterproof, to one-metre depth.

Make	Model	LEDs #	Crown Strap	Batteries #	Integrated Battery Box	Separate Battery Box	Recharge Jack	Lumens Spot	Lumens Spread	Test Ranking Spot
Photon Pump	LED	6	Yes	3xAAA	No	Yes	No	n/a	56	n/a
LED Lenser	H7	1	No	3xAAA	No	Yes	No	140	n/a	***
LED Lenser	H7R	1	No	3xAAA Rechargeable	No	Yes	Yes	140	n/a	***
LED Lenser	H14R	1	Yes	3xAA Rechargeable	No	Yes	Yes	n/a	n/a	****
Petzl	Tikka	4	No	3xAAA	Yes	No	No	n/a	40	n/a
Petzl	Tikka +	2	No	3xAAA	Yes	No	No	n/a	50	n/a
Petzl	MYO XP	1	Option	3xAA	No	Yes	No	85 (150 boost)	85 (150 boost)	* (** boost)
Primus	0.5 Watt	1	Yes	3xAAA	Yes	No	No	n/a	n/a	**
Primus	Focus +	4	Yes	3xAA	No	Yes	No	85	n/a	**
Princeton Tec	Quad	4	No	3xAAA	Yes	No	No	n/a	45	*
Princeton Tec	Remix	4	No	3xAAA	Yes	No	No	45	n/a	*
Princeton Tec	Corona	8	Yes	3xAA	No	Yes	No	90	n/a	*
Spotlight	n/a	1	No	NiMH Rechargeable	Yes	No	Yes	n/a	n/a	*
Black Diamond	Cosmo	3	No	3xAAA	Yes	No	No	n/a	n/a	*
Black Diamond	Spot	4	No	3xAAA	Yes	No	No	n/a	n/a	**

LEDs Under the Microscope

As with any diode, an LED allows current to flow from its p-side (anode) to the n-side (cathode), but not in the reverse direction. When no battery power runs to an LED the electrons of the light diode circle their nuclei. However, when voltage is applied the electrons disengage from their atomic union and join a foreign atom. This 'jump' generates energy that is released in small 'packets' of light, called photons.

LEDs (Light Emitting Diodes) are electronic light sources based on semiconductors that are made typically of gallium, silicon and arsenic. A razor-thin semiconductor base wafer is put in a vacuum chamber and covered with a molecular coating in a process called molecular beam epitaxy. After impurity atoms have been deliberately implanted into the pure crystalline structures, to create p-n junctions, the wafer is cut into microscopically small units.

Unlike traditional vacuum or gas-filled globes, LEDs are microstructure solids that are far more durable and shock resistant. They last around a thousand times longer than conventional light bulbs, emit little heat and no ultraviolet light, consume less power and contain no detrimental filling gases.

However, while LEDs are around 13 times more efficient than incandescent torch bulbs, that's an improvement on a very low base, because an incandescent bulb produces only one percent of the battery energy as light and the remaining 99 percent as heat. LEDs are much more efficient, but that still means only 13 percent of battery energy is emitted as light.

Evaluating Light Output

When checking out old-fashioned incandescent-globe torches you'd check the wattage of the globe for an idea of its brightness, but LEDs are different. You'll encounter several different measurements of light output when evaluating LED headtorches: lumen, lux, candela and distance.

Lumens are the most popular criteria quoted on headtorch packaging. A 'lumen' is a unit of measurement of the amount of light energy that is actually radiated from a light source. The ideal way in this should be a measured is with a spectrometer that records the light on the output side of the lens and reflector, using power from new alkaline batteries. However, some makers' lumen counts are done using naked LEDs without energy losses in the lamp head that can be as high as 30 percent.

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Lux measurement takes into account the area over which the lumens must spread. An output of 100 lumens, concentrated on a one square metre circle, lights up that square metre with 100 lux. However, the same 100 lumens, spread out over five square metres, produces a dimmer light of only 20 lux. Too much lux glares off a map; too little lux on a rocky path reduces vision.

Candela is a measurement of the strength, or luminous intensity, of the beam and depends on the amount of light and the angle of the beam of light.

For example, five-millimetre LEDs can have different beam angles, from 10 to 120 degrees. Despite having the same light energy of five lumens, a 10-degree diode has a luminous intensity that is 12 times higher than the 120-degree diode. From a distance of 10 meters, a 10-degree diode only looks bright at a 10 degree angle, while the 120-degree diode looks just as bright at a 120 degree angle.

Distance is the extent of the headtorch beam that exceeds 0.25 lux. Ideally this measurement should be given with new batteries, after around 30 minutes of use, then after 10 hours and after 30 hours.

The Test

We checked each headtorch for quality and for ease of use: controls, headband adjustment and battery fitment. We evaluated the beam options of each headtorch, using fresh alkaline batteries, or a full charge in the case of rechargeable ones.

In our test ranking table we've rated each light in terms of its beam penetration and intensity in 'spot' and 'spread' modes. For typical close-up work around a campsite – putting up a tent, cooking, searching for stuff in a vehicle or trailer – spread is more important than spot. Spot value is more important if you need to walk away from the campsite and want to check out the surroundings in detail, or to 'spotlight' the local fauna.

Our test rankings of beam strength in different modes are a useful guide to the strengths and weaknesses of each headtorch: if you want 'spot' priority choose one that scores higher in that mode

and if it's area coverage you want, choose a light that ranks higher in this mode. For a combination of spot and spread ability you need to choose a light that scores reasonably well in both areas.

Photon Pump H5

This single-beam headtorch comes with a standard top strap and a remote battery case. The head swivels on a light-duty hinges and there are no beam change options. The on-off switch works with little pressure and the head and battery case are water resistant.

We liked this light so much we bought two of them.

RRP: \$39.95

Weight: 155g

Contact: zen@zenimports.com.au



LED Lenser H7

This single-LED headtorch features a swivel head with medium-duty hinge and a barrel that telescopes to vary the beam progressively from spot to spread. In addition, the remote battery case is fitted with a switch that varies light output from dim to bright. The on-off switch and the focus knob work with little pressure. The head and battery case are water resistant.

RRP: \$89.95

Weight: 117g

Contact: zen@zenimports.com.au



LED Lenser H7R

This headtorch is identical to the H7, except for battery case that's fitted with rechargeable batteries and a charger input jack on the headband. The H7R comes with a mains battery charger unit. The head and battery case are water resistant.

RRP: \$129.95

Weight: 120g

Contact: zen@zenimports.com.au

LED Lenser H14R

This professional grade headtorch has a single LED in a barrel that telescopes to vary beam from spot to spread. The on-off switch on the remote battery case is held down to vary light intensity. A charger input jack is fitted to the battery case.

In addition, the H14R has microprocessor controlled functions that allow it to be operated in different energy consumption modes. In Constant Current mode the batteries provide full power until they run down; in Energy Saving mode the output gradually reduces in brightness to extend battery life.

As well, the H14R can be set to operate in high beam, low beam, seamless dimming, fast strobe, slow strobe, programmed SOS and tactical defence disorientation mode. The head and battery case are water resistant.

Light control is done by pressing a fat button on the battery case.

RRP: \$199.95 (\$139.95 for non-rechargeable H14)

Weight: 222g

Contact: zen@zenimports.com.au



Petzi Tikka

This headtorch has its three-AAA battery case in the swivel head that's fitted with a medium-duty hinge. Opening and closing the battery case is very easy. There's no provision for a top band. Lighting modes are bright, economy and flashing. The head and battery case are water resistant. A low battery charge warning light comes on when the beam length is limited to five metres.

The Tikka is water resistant. Switching is done via a top-mounted membrane-covered button.

RRP: \$69.95

Weight: 81g

Contact: www.spelean.com.au



Petzl Tikka Plus

This head torch looks externally identical to the Tikka, except that the case is green, not blue and the LED arrangement is different. Instead of the Tikka's four-LED array the Tikka Plus has one high-output LED, one red LED and five lighting modes: bright, economy and flashing from the white LED and continuous and strobe from the red LED. The Tikka Plus is water resistant.

RRP: \$89.95

Weight: 83g

Contact: www.spelean.com.au



Petzl MYO XP

The MYO XP is a semi-professional grade headtorch with a single high output LED and a remote battery case. Distance lighting can be increased temporarily by holding down the 'boost' button.

Changing from distance lighting to spread beam is done by flipping a diffuser in front of the lens. Lighting modes are three-level, plus a strobe mode.

The MYO XP comes with single band, but there's provision for a top band. The head and battery case are water resistant and the three AAs can be changed easily after folding back the soft case cover. A battery level indicator glows when the batteries are 70-percent discharged. The MYO head and case are water resistant.

The two controls on the MYO are small buttons that are profiled for easy feel in the dark.

RRP: \$149.95

Weight: 175g

Contact: www.spelean.com.au



Primus LED

The Primus 0.5-watt unit has an integrated head and battery case that's water resistant. Three AAAs mount inside barrel chamber that has a screw-top lid.

Lighting comes from a single LED that operates as a constant fixed beam or in flashing mode and the switch is an easy push button.

A top strap is standard and the swivel head is fitted with a medium duty hinge.

RRP: \$39

Weight: 64g

Contact: 1300 555 197



Primus Focus+

This headtorch has a medium duty swivelling head and a remote battery case. A top strap is standard. Three AA batteries fit inside the case, which is opened and closed by turning the lid. The head and case are water resistant.

The main light is a single LED, housed in a barrel with a focussing lens that varies light from spot to spread. This main LED is supplemented by three coloured LEDs: green (for map reading), red (for night vision) and blue (for fluid detection). The red LED also has a flashing mode. The battery case has a red LED bar that shows to the rear and can be set to constant beam or flashing mode.

The on-off buttons are easy to push, but the lens focus lever is stiff.

RRP: \$79

Weight: 200g

Contact: 1300 555 197



Princeton Tec Quad

As its name suggests this headtorch is fitted with a four-LED head that incorporates a battery case, with knurled screw lid fastener. Triple AAA battery changing is easy. The head swivels on a medium-duty hinge and the top-mounted membrane switch is firm to operate. Light functions are bright, medium, low and flashing, and there's a low-battery light.

The Quad is waterproof to one metre.

RRP: \$69.95

Weight: 96g

Contact: www.outdooragencies.com.au



Princeton Tec Remix

The Remix features an integrated head and battery case that is water resistant. The main beam is a single large LED, supplemented by three small ones. Modes are high, medium, low and flashing. The three-LED cluster can be optioned in red or green.

The head swivel is heavy duty, but stiff in operation. Battery changing is easy, via a flip-top battery case lid.

RRP: \$99.95

Weight: 83g

Contact: www.outdooragencies.com.au

Princeton Tec Corona

The Corona has a swivelling head with heavy duty hinge and a remote battery case, containing three AA batteries. A top band is standard and head and case are water resistant.

Lighting is from eight LEDs that can be switched between one, three, five and eight operation. In each mode a high-low switch dims or brightens the LEDs, or activates flashing mode.

Swivel action is light, but the light control switches need considerable finger pressure.

RRP: \$119.95

Weight: 228g

Contact: www.outdooragencies.com.au



Spotlight

This little headtorch has a single LED and an integrated nickel metal hydride rechargeable battery. The body plugs directly into a 4x4 cigarette lighter socket and when in 'charge' mode will recharge while the vehicle is running. The LED glows red during charging, so it doubles as an in-vehicle night light.

The body clips into a headband-mounted, fixed bracket that's angled slightly downwards. LED operation is a single beam.

Other attachments include a bicycle handlebar bracket, a key ring clip and a neck lanyard.

RRP: \$28

Weight: 72g

Contact: info@mossko.com.au



Black Diamond Cosmo

This headtorch has an integrated head and battery case, with a novel opening and closing design: over-rotating the medium duty swivel clicks the battery case lid open, so replacing the three AAAs is easy. The unit is water resistant.

A headband is supplied, but there's no provision for a top strap.

The Cosmo operates in eight light settings: three levels of brightness and strobe operation in single super-bright-LED mode and the same settings in half-Watt LED mode.

Top mounted membrane switching is easy to operate.

RRP: \$64.95

Weight: 80g

Contact: sales@seatosummit.com.au



Black Diamond Spot

The Spot headtorch has a similar structure to the Cosmo, but has more power in both super bright LED mode and smaller LED mode. Spot has three small LEDs, compared with Cosmo's two.

RRP: \$89.95

Weight: 85g

Contact: sales@seatosummit.com.au

