

# Buying a Winch

Many people see a winch as a means of increasing the off-road ability of a 4WD. It's an impression that's easily gained by seeing how off-road competition blokes and gals go about conquering seemingly impossible obstacles, but that's not how you should look at a recreational vehicle winch.

In the case of competition vehicles a winch is a means of getting the vehicle somewhere it can't otherwise go, but competition vehicles are quite different from recreational 4x4s and so are their winches.

A normal 4WD's winch is a recovery device that enables you to (hopefully) extract your vehicle from a stranding or a bogging, or to pull a mate's vehicle out of a similar situation. Think of a winch as a last resort recovery aid, not as a climbing tool and you'll be on safer ground (literally).

With that in mind it's pretty obvious that there's not much point buying an incapable 4WD and thinking that a winch will give it wings. The starting point should be with an inherently capable machine that has low range gearing, high ground clearance and above average traction capabilities.

## Power Winches

Power winches are the most popular means of self-recovery and of these the electric winch is more popular and lower priced than the hydraulic alternative.

Electric winches dominate the market, because they're relatively inexpensive and easy to fit to popular heavy duty bull bars.

Buying the winch is only half the job, because you'll need reserve battery power. A hard-working winch can flatten a small petrol engine starting battery in a few minutes and if that battery is your starting battery you're out of the bogging, but have probably done irreparable damage to the battery. Diesels generally have much bigger starting batteries that can withstand winching current drains better.

The rule for winching power is to fit the largest starting battery you can fit under-bonnet. We used a heavy duty battery for starting and winching, replacing it every two years as a matter of policy.

Your winch supplier has comprehensive recovery kits to accompany the electro/mechanical hardware. The normal kit includes a snatch block, shackles, a winch extension strap (for reaching that elusive anchor point), a tree sling (to protect trees from damage) and heavy gloves. To that kit, we'd add a test light, a spare solenoid or two, cable clamps and/or a spare cable. The test light is handy when trouble shooting the electrical system, because solenoids can be damaged by water. Cable clamps allow you to join two parts of a broken cable - not an ideal practice, but it may get you out of trouble.



## How Big a Winch

Winch makers rate their units' line pull capacities based on the first layer of cable on the drum. The cable is spooled out, with only a full bottom layer rolled onto the drum. By the time you've winched in three layers of cable on top, your 8000lb rated (3600kg) winch's capacity is only 2350kg or 5200lb, and that's without the effect of current drain out of the battery, or loss of winch motor efficiency through heat build-up.

The drop in winch capacity as cable fills the drum is purely a mechanical factor: as the effective diameter of the drum increases, the gearing gets less beneficial, or a bit like putting enormous tyres on your 4WD and then wondering why it won't lift off as readily from a standing start or brake as effectively.

Another rating factor you need to consider is the effect of an uphill pull. It's obvious that you need very little effort to push or pull a 4x4 along a smooth flat surface, but getting it up a ramp isn't so easy.

The effort reaches its maximum - the total weight of the vehicle, plus an allowance for friction in the lifting gear - with a vertical lift.

Side pulls, where the winch can't be lined up directly to a tree or other anchor point, also add load to the winch, because some of the winching power is wasted in dragging the vehicle sideways as it moves forward.



Yet another influence is the nature of the vehicle's stranding. If you're up to your axles in deep, sticky mud, you're pushing a bow wave of heavy goo in front of your tyres, chassis and axles.

Finally, there are the twin effects of battery drain and heat build-up on the winch's electrical system. The winch motor is at its best when cold, with maximum battery power flowing into it. Within a minute or two, battery power has fallen and heat has started to reduce motor efficiency. That's why hard pulls are done best using a snatch block, to halve the load on the winch. With less demand on it, the battery drains less quickly, while the motor stays cooler.

The foregoing makes it sound like you need the biggest winch you can get, but large winches are heavy, more expensive and have higher current draws than smaller ones. Don't forget that the winch, its cable and the additional battery power are going to be sitting out in front of your vehicle, with an adverse effect on handling and tyre wear.

The optimum sized winch keeps this weight to a tolerable level. The following table lists popular 4x4s with ARB's recommended maximum winch rating for each.

Toyota LandCruiser	10,000lb	Holden Rodeo	9000lb
Toyota Prado	9000lb	Land Rover Discovery	10,000lb
Toyota HiLux	9000lb	Land Rover Defender	10,000lb
Mitsubishi Pajero	9000lb	Range Rover	10,000lb
Mitsubishi Triton	9000lb	Jeep Cherokee	9000lb
Nissan Patrol	10,000lb	Jeep Wrangler	9000lb
Nissan Pathfinder	9000lb	Suzuki Vitara & Sierra	6000lb
Nissan Navara	9000lb	Kia Sportage	6000lb

## Fitting a Winch

With some appreciation of the forces involved when winching, it's obvious that a winch must be securely mounted to the vehicle it's intended to move.

You wouldn't use cheap attachments when fitting an engine into your vehicle and the winch fastenings are just as important. Unless you know exactly what you're doing, it's best to leave bar and winch fitting to the experts.



Used 4WDs often come with winch-compatible bars in place, but it's unwise to rely on an existing bar installation. Russell Coight has illustrated only too clearly what happens when a poorly mounted winch bar comes under load.

The chassis needs to be checked for integrity and the attachment bolts replaced, just in case.

It's pretty much the same deal with any winch equipment that comes with a used 4WD. We wouldn't trust the previous owner to have maintained the winch correctly. Your local winch supplier can check the winch and its electrical equipment, and we'd also suggest junking the cable, because you don't know what it's done.

## Portable Winches

If you've ever used a hand winch you'll know the definition of hard work. Even with a snatch block to halve the winching effort a hand winch is bloody hard yakka – on the flat. If you've got a strong crew and you don't plan to be in a hurry to get out of a bogging then by all means rely on a hand winch. However, there is a portable winching alternative: the portable power winch.

Most winches are fitted to bull bars, but portable ones are available, to allow front or rear recovery.



Janus was the Roman god of doorways, gates and beginnings, and was represented with two faces, so that he could look both ways at the same time. When it comes to recovery operations a portable power winch can make your 4WD a veritable Janus, with the ability to winch itself or other vehicles forwards or backwards.

The key to the fore and aft recovery system is a cradle-mounted winch. We used such an arrangement on our HiLux for two years and loved it. ARB Sydney provided the winch and wired the HiLux with heavy duty cables running to Anderson terminals on the front and rear bars. ARB also welded a tow bar tube to the standard front bar. The tinny Toyota rear bumper went into the Sims bin at Kaymar, in Melbourne, to be replaced by a swing-away rear towbar.



The Warn winch cradle included a tow bar tongue that slid into the tubes at the front and the back of the HiLux, and was held in place by a normal tow bar tongue locking pin. The winch power leads were connected to the front or rear terminals.

When not in use, the winch was clipped to a fabricated bracket in the back of the HiLux.

Winch maintenance was much lower than normal because the control box and the cable weren't out in the weather, or being dunked in creeks from time to time. Weight distribution was also better, with the winch stowed in the tray, rather than out front.

The winch remained portable, so it could be used on another vehicle, by pinning it to a tow bar, using battery power via jumper leads.



## Synthetic Rope or Wire Rope

Those of us who spend their leisure time on boats - if you can call clinging to a fat piece of string in the teeth of a rain-lashed gale 'leisure' - are familiar with synthetic rope.



Synthetic rope initially replaced natural fibres, by offering lighter weight, increased strength and rot-resistance. Another advantage of synthetic rope is the fact that when cut it can be 'finished off' by simply melting the ends with a match, rather than having to 'whip' it to prevent fraying.

Synthetic rope didn't replace any of the wire rigging on boats until low-stretch fibres were developed, but now many of the loads that used to be borne by wire are now handled by synthetic rope.

As with any product synthetic rope has some downsides: if you let synthetic rope run rapidly through your un-gloved hands it'll tear at least the skin off and many a sailor has had his fingers taken down to the bone. Synthetic rope has no fire resistance and will melt at quite low flame temperatures - not much use to bush fire brigades. So what's the appeal of synthetic rope for 4WD owners?

### Pros

As with most innovations synthetic rope was proved in competition, such as the Outback Challenge, before being made available to the general user. In competitive conditions synthetic rope offers easier cable handling, because it's lighter and can be carried up a steep hillside with less effort.

Competitors reckon that in the event of a 'bird's nest' tangle in the cable synthetic rope is easier to unravel than a wire rope snarl.

It's also possible to stow more cable length on a winch drum with less weight over the front axle of the vehicle. Typical weight saving is 7kg, which is a lot of weight out in front of the grille.

Other advantages that apply to competition and general 4WD work include more elasticity - kinetic energy storage - than wire rope and no danger of injuries from broken wire strands.

Synthetic rope needs no maintenance, unlike wire rope that should be cleaned and lubricated regularly, and doesn't develop kinks.

Spare synthetic winch rope is much lighter than spare wire cable and far easier to stow.

### Cons

Synthetic rope disadvantages that have shown up in 4WD competitions include a propensity to slip between rope layers on the winch drum and between the fairlead rollers and the bracket. Synthetic rope should be used with a plain, 'hawse' fairlead, not rollers.

Synthetic rope doesn't seem to have the same shock resistance as wire cable when lowering a vehicle down a steep slope. It also lacks wire rope's abrasion resistance when required to work over stone shelves. Synthetic rope is also very expensive - at least twice the price of wire cable.

We all know desert burrs stick to any 'furry' material, so they love synthetic winch rope and that can make cable relaying a painful exercise, because some burr spikes can punch through normal gloves.

## The Winch Maker's View

Warn's concern with synthetic rope has more to do with its insulating qualities than its tensile properties. Because synthetic rope is a fibre it doesn't dissipate heat as readily as does wire cable.

Warn says that in the case of low-mount winches - the most popular recreational winches - there can be overheating of the rope layers when powering-out. Low-mount winches have a cone brake inside the winch drum and it can get very hot. In extreme circumstances the heat build-up could contribute to overheating of the electric winch motor, but that isn't the principal issue.

Warn's worry is that while steel wire cable strength isn't affected by the heat radiating from the drum, synthetic rope tensile strength certainly could be. Warn sees no such problem when powering-in with low-mount winches.

Most 4WD competitors use high-mount winches with external, rather than internal brakes, so powering out isn't a drum-heat issue.