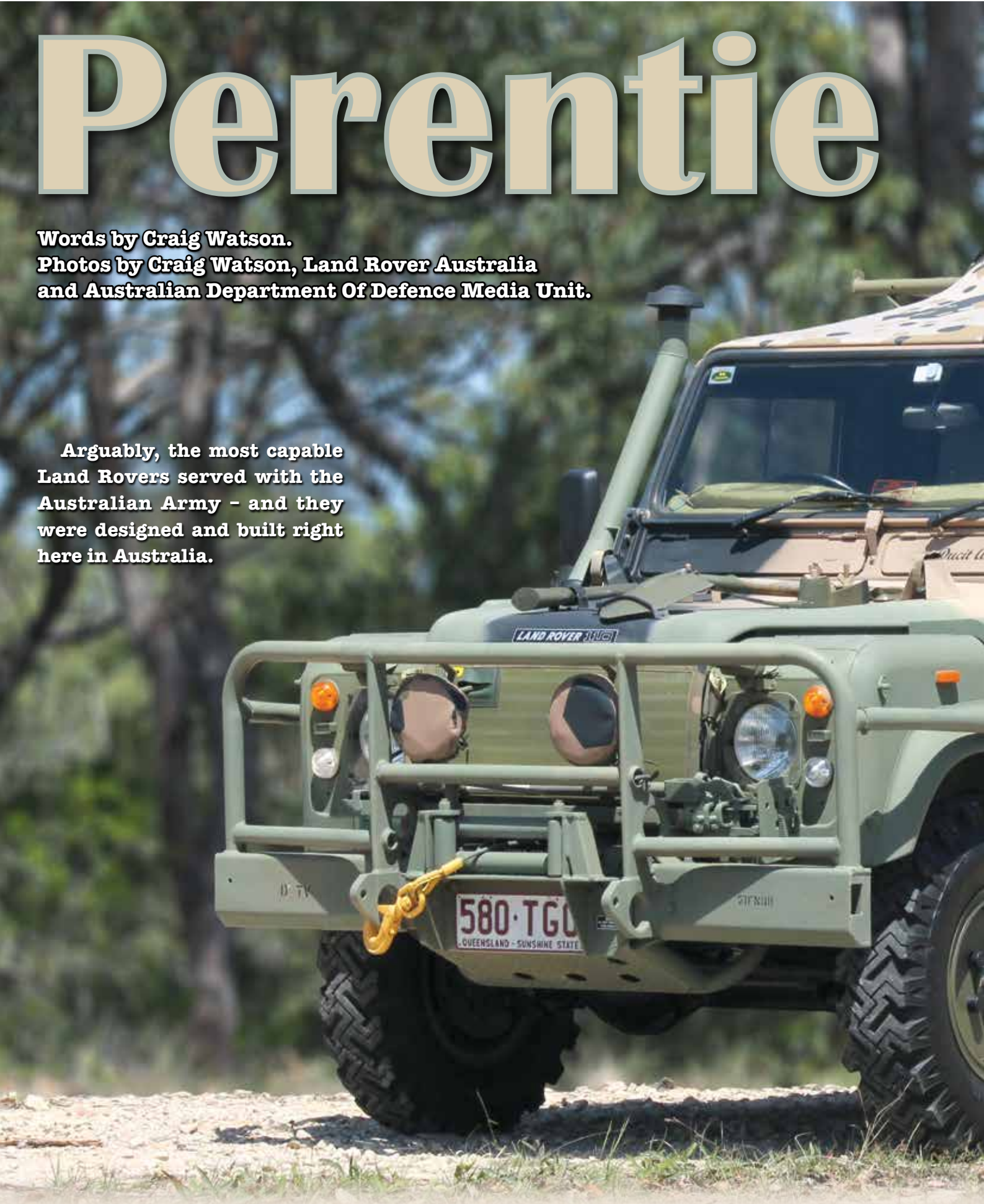
Perentie

Words by Craig Watson.
Photos by Craig Watson, Land Rover Australia and Australian Department Of Defence Media Unit.

Arguably, the most capable Land Rovers served with the Australian Army – and they were designed and built right here in Australia.



The Australian Army is currently replacing its ageing fleet of Land Rovers, some of which are now starting to find their way into private ownership. But there's much more to these very special, Australian designed and built, Land Rovers than meets the eye.

Land Rover has been a major supplier of vehicles to the Australian Army since 1958, but those supplied from 1987 under Project Perentie, and the later Project Bushranger, are unique to this country and in many ways superior to what was on offer from the UK.

Early Days

The first Land Rovers supplied to the Australian Army (which for the most part I will refer to simply as Army) were Series II in March 1959. Although assembled in Australia, at Pressed Metal Corporation (PMC) in Enfield, Sydney, they were pretty

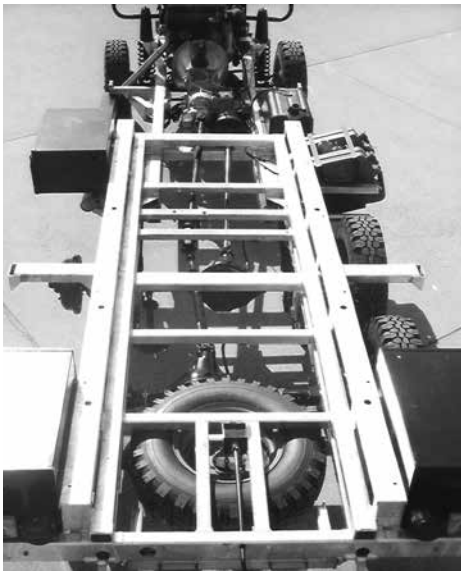
much the same as their English cousins – with some alterations to suit Australian requirements.

In fact, the vehicle used for the initial evaluation trials in 1958, the "Army appraisal unit" was the very first RHD Export Land Rover Series II (chassis number 142800001) to be assembled at Solihull.

Some 1,841 Series II, 4,776 Series IIA and 2,303 Series III Land Rovers were supplied to the Army between 1959 and 1981. The vast majority were 109" long-wheelbase versions; Series II and IIA with four-cylinder petrol engines, Series III with six-cylinder.

These were essentially the same as the civilian version, with some modifications to meet Army requirements, and were assembled at PMC.

There was a range of specialist vehicles, including 184 ambulances, with special bodies; Fitted For Radio (FFR) mobile radio



6x6 chassis, clearly showing the tailshafts to the two rear differentials, the rear-most being two shafts joined with universal joints. Also visible are the well in the centre of the chassis, the rear storage boxes and twin jerry can holders.

From this view can be seen the exhaust, which is line with the wheels.

stations; Maintenance Vehicles (mobile workshops), fire tenders and "gun buggies": which carried 106mm recoiless rifles.

58 fully-imported 101 Forward Control models were supplied by British Aerospace, as complete packages with the Rapier mobile anti-aircraft surface to air missiles (SAMs), between 1976 and 1978.

Apparently, the first Land Rover Australia knew about the 101 being in Australia was when the Army started to order parts for them.

It is not known how many Land Rovers were used by RAAF or Navy units, but the number would be very small.

Diesel Engines

Through the 1970s 4WD sales in Australia began to grow exponentially as the civilian leisure vehicle market became mainstream. Vehicles from Japanese manufacturers, especially Nissan and Toyota, began to dominate the market, particularly due to their powerful four-litre six-cylinder engines.

Land Rovers, by comparison, were seen as sturdy and reliable, but lacking in comfort and highway performance.

A diesel engine had been on offer from Land Rover (UK) since 1957 but even by the late 1970s, with diesel power gaining in popularity following the second fuel crisis of 1979, diesel Land Rovers were considered under-powered for Australian conditions.

One 1981 report on the 2.3lt diesel Land Rover, with 45.6 kW, described it as producing "modest performance but with good economy." By this time, Nissan Patrol was available with a 60kW 3.3lt diesel and Toyota Land Cruiser with a 77kW 4.0lt.

Land Rover (UK) was already planning to combat the issue of insufficient power by fitting the 3.5lt V8 from the Range Rover to its Land Rover models. However, by this time the Australian Army was moving toward an all-diesel fleet and Land Rover Australia knew that to remain a supplier to the Army it would need to offer a more suitable diesel engine.

In his thesis, *Australian Development of the Land Rover One Ten for the Civilian and Military Market*, then Engineering Manager for Land Rover Australia, Ray Habgood, wrote; "An extensive survey of available diesel engines was undertaken, and the 3.9 litre four cylinder Isuzu 4BD1 diesel engine was selected as the most suitable for our application."

Four main reasons for the selection of the Isuzu diesel were identified.

• It was of similar size and performance to the Rover 3.5lt V8 petrol engine, meaning there would be little modification required on the vehicle for the diesel engine.

• Being an engine derived for heavy truck usage, it had a proven track record of market acceptance, reliability and durability, and would be un-stressed in the application to such a relatively light vehicle as the Land Rover.

• With its direct fuel injection system it provided very good fuel consumption with consistently high torque throughout the rev range.

• Future high-performance variants, particularly through turbo charging, were expected in the near future – which proved to be true.

A further consideration was that Isuzu were happy to accommodate Land Rover's requirements and supply engines in sufficient numbers. "Isuzu and their trading company, C. Itoh, proved most enthusiastic partners, assembling special 4BD1 engines for our Land Rover applications", Habgood explained.

Isuzu developed a noise reduction package for Land Rover's application, which featured a double-skinned rocker cover and front engine cover, rubber mounted sump and modified pistons – as well as a special sump and flywheel housing.

Aluminium trays and 6x6

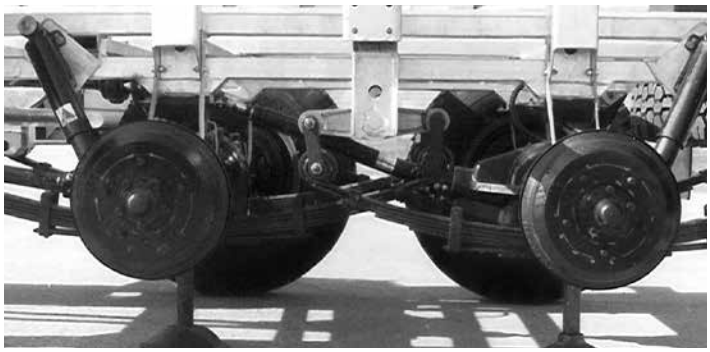
Another uniquely Australian requirement for Land Rover was the fitting of an aluminium flat tray with drop down sides. Other markets specified a pick-up body with fixed sides and a drop-down tailgate.

The 1.8m x 2.5m aluminium tray was developed and supplied by Hockney Alcan in Sydney. All locally-assembled cab-chassis Land Rovers had their wheelbase extended by 246mm, to 3040mm to accept the tray bodies, and the rear springs were uprated to increase the gross vehicle mass (GVM) to 3,200kg.

Land Rover, and other manufacturers, were aware that the Australian Army was in the process of evaluating its needs for replacing its road fleet, thanks to the Army Staff Requirement for lightweight and light trucks being released by the Department of Defence in February 1981. Of particular interest to Land Rover were its current in-service fleet of lightweight (1 tonne payload) vehicles, as well as an anticipated need for a light cross country vehicle with 2 tonne payload.

Civilian 6x6 Land Rovers

Esso fire tender at JRA Moorebank.



Rear suspension set-up. Production models had disc brakes.

6x6 chassis with one of the original Trials vehicles.

However, one of the Army requirements, due to Commonwealth Government stipulation as well as the need for local supply and support, was that the vehicles had to be assembled in Australia, with as much local content as possible. It was also necessary that the vehicles be based on those currently available to the civilian market, rather than purpose-built military "prototypes".

"A detailed market survey identified a small but definite requirement for a specialized cross country vehicle with a payload of around 3 tonnes, and a tray area of around 7 m2", Habgood explained.

A number of options were examined, including: reviving the British military 101 forward control; using the Spanish-built Santana forward control; adopting one of the available third-party British 6x6 conversions; marketing a specialized 4x4 vehicle of non-Land Rover origin; locally developing a forward control version of the up-coming Land Rover 110; or local development of a 6x6 version of the 110.

"The results of this evaluation clearly favoured locally developing a 6x6 version of the Land Rover 110", Habgood wrote.

This was largely decided on the understanding of the military requirements, such as they were at the time, which would be the largest potential market.

As part of the evaluation process, a Sandringham 6x6 was imported by Land Rover Australia. The Sandringham was a privately developed conversion by Hotspur Cars (UK) and, while recognized and approved by Land Rover does not appear in any company literature.

"It had been suggested that a six-wheel-drive version of a Land Rover might be one way to do it", Habgood recalled in a recent interview with this writer. "I went over to UK and we brought in one from Sandringham, to just have a look at."

The vehicle brought in was in fact the first Sandringham with coil-sprung suspension, but still with the Series III cab.

"We found that the coil-sprung suspension had a lot of body roll", Habgood reported. "That could have been developed out. We had a look at whether we would use the coil springs or leaf springs and decided that the load-sharing leaf springs would be probably the best way to do it."

"We had a 109" Land Rover, which we had converted to six-wheel-drive ourselves. We did some comparisons between the leaf-sprung Land Rover and the Sandringham and the leaf-sprung Land Rover gave the best results."

The ingenious rear suspension set-up features conventional leaf springs, with a central, pivoting hanger, or cross-over beam, that shares the load of the rear of the vehicle between the two rear axles.

This is done by mounting the front of the rear spring to the front of the hanger, and the rear of the front spring to the rear of the hanger, so they cross over. The added advantage is that it brings the two axles closer together, and reduces the overall wheelbase, without adversely affecting the off-road capability of the vehicle.

"We decided there were going to be so many modifications to the chassis itself that we wouldn't use any of the Land Rover chassis, so we built up a tubular steel chassis that we could hot-dip galvanize", Habgood explained.

The chassis, built of RHS tube for ease of manufacture and cost, also featured a "well" down the centre, between the wheels, which would be pivotal to the success of the vehicle, as will be explained.

Drive for the two rear axles was achieved easily and very cost effectively. The heavy-duty LT95 gearbox with integral transfer box from the 101 forward control, and used in the Range Rover, featured an output for the 101's power-drive trailer. That is, a trailer that had its wheels driven from the Land Rover, which in effect gave six-wheel-drive when the trailer was in use.

"It was, therefore, only logical to utilize separate prop shafts from the transfer box to drive the front, centre, and rear axles", Habgood detailed. The vehicle could then be driven in permanent four-wheel-drive for on-road and high-speed use, and in six-wheel-drive for off-road or cross-country applications.

Rear of 4x4 chassis showing spare wheel location and route of exhaust tailpipe.

Land Rover put its vehicles through extreme durability testing even before they went to the Army trials. This is the Sandringham being tested after the chassis modifications.


Photo courtesy Rover Australia

Three 6x6 trials vehicles & JRA's Reference Vehicle: Moorebank.


Photo courtesy Rover Australia

Delivering the Trials vehicles to the Army.

While the Sandringham utilised standard Rover rear axles, the Australian 6x6 used two Salisbury hypoid bevel rear axles, with increased track width (from 1486mm to 1660mm) and thicker axle tubes. The two axles used common long and short half-shafts, with the differential on the centre axle being offset to the right and the diff on the rear axle offset to the left.

The width of the chassis also accommodates the spare wheel, slung underneath on a winch-down cable, as it was required for the spare to not intrude into the load area. As this would normally be the position of the fuel tank, twin tanks were mounted under the seats.

The front of the chassis, and therefore the cab, remained the standard width and used a standard front axle.

The six-wheel-drive civilian Land Rover was released in the mid-1980s, before supply to the Army had commenced. At least one of these was suplied to Esso oil company as a fire tender. The fire tender is listed on Perentie brochures, but none were built for the Army.

At least 33 civilian 6x6 Land Rovers were built at Moorebank, but the exact figure is not known. Some sources suggest the number could be as many as 100. Some, but it is not known how many, were also air-conditioned. Ray Habgood wasn't able to shed any light on the numbers, but recalled it was most likely there were at least two packs (24 vehicles) built prior to awarding of the Army contract.

Project Perentie

Army's detailed requirements for Project Perentie – named after Australia's largest monitor lizard, or goanna, for its cross-country adaptability, strength and speed over rough terrain – were released at an industry briefing in June 1982.

Seven vehicles were tendered for each of the light and lightweight categories. From these, in the lightweight (1 tonne) class those chosen for trials were the Land Rover 110 4x4, Jeep M10 and Mercedes-Benz 300GD – usually referred to as the G-wagon. In the 2-tonne category, only the Land Rover 110 6x6 and the Mercedes-Benz Unimog U1300 were selected.

To ensure the Land Rover 6x6 would be competitive in terms of performance with its rival, it was fitted with the turbo version of the Isuzu engine.

Three of each vehicle were delivered to the Army in September 1983, with Land Rover retaining one of each as a reference vehicle. One of each vehicle was subjected to accelerated durability testing at the Army's Trials and Proving Wing, at Monegeetta, near Lancefield north of Melbourne. The other two were subjected to a comprehensive series of User Studies, including Hot Dry trials at Woomera in SA, Hot Wet at Tully in Qld and cold weather trials at Khancoban in the Snowy Mountains.

They also spent a fair bit of time with various Army units around Australia. The trials lasted about a year, after which time tenders were called for the delivery of production volumes, commencing in May 1986, for a limited number of Initial Production Vehicles (IPVs) and full production to commence in May 1987.

Initially, 2,500 4x4 and 400 6x6 vehicles were to be delivered over a three to four year term. This was later increased to a total of around 3,700 by the end of September 1992, with more than a dozen variants.

While Ray Habgood was in charge of the engineering side of things, it was Land Rover Australia's Managing Director (and Deputy MD for JRA) Jack Heaven who was the real driving force behind the company's push to win the Project Perentie contract, as Habgood recalled.

"Prior to (Perentie) we had tendered some trucks to the Australian Army, but we weren't successful with that because we hadn't put enough emphasis onto it right from the start. We didn't concentrate enough on it, and relied too much on UK producing the vehicle that we tendered. So, this time we were quite keen to put our best foot forward, which is why we transferred the assembly of Land Rovers to Moorebank."

"We felt that it was our contract, because we had been supplying Land Rovers to the Australian Army for 30 years before that. Jack (Heaven) was quite keen that we retained it and he was I suppose instrumental in making sure we did."

Photo courtesy Rover Australia

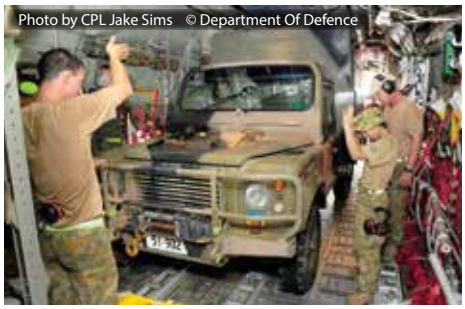
Photo courtesy Rover Australia

One of the 4x4 Trials vehicles undergoing accelorated testing at Army's Trials and Proving Ground at Monegeetta, near Melbourne.

FFR - Fitted For Radio

Perentie is hoisted aboard HMAS Choules by crane, during Exercise SQUADEX 2012.

Perentie being hitched under helicopter during an external lift trial.



6x6 will fit in Hercules with its module.

Width of the 6x6 cab is easy to see on this Cargo Initial Production Variant.

Wide Cabs

Although the rear had been widened with the new chassis, the vehicles in the trials used the same, standard width, cab as the 4x4, with the standard length axles. This proved quite satisfactory in the trials, but Habgood realised they could improve on the 6x6 vehicles further.

"We knew that the Army were trying to accommodate three people in the front in the cabin and that it really wasn't very satisfactory to try and squeeze three people into a Land Rover – you just can't fit them", he admitted.

"So, we made up a spaceframe cab, which we were able to hot-dip galvanize. It used some of the components from the Land Rover. It used the doors and both the A post and the B post for the doors were Land Rover components. It used the Land Rover wing panels and a fiberglass bonnet and fiberglass grille panel and a flat glass windscreen. So, we were able to produce those quite cost effectively, using quite a few Land Rover components."

The cabin was widened 200mm, with a corresponding increase in the axle length – the same increase as the rear track. The increase was 70mm on the driver's side and 130mm on the passenger side. "The Land Rovers particularly had a very, very small foot well area on the passenger side", Habgood continued. "That then gave us accommodation to fit three full-size seats in the front, with a bit of a gap between the centre seat and the driver's seat. We did that because the Army needed it, but it wasn't at the Army's request. They were quite surprised, I think, when we put the final tender in, after the trials, that we would offer a wider version of the cab."

If that wasn't enough to secure the contract – which it almost certainly was – the design of the rear of the vehicles would not only make the Perentie 6x6 Land Rover a truly World-class vehicle, but would allow variants not previously considered during the initial trials.

Shelters v Modules

The Army's original plan had been for Land Rover to supply a basic 6x6 cargo carrier, with the flat aluminium tray, onto which could be fitted a range of "shelters". These shelters would accommodate either a general maintenance or electronics repair unit, or ambulance body, etc. The shelters were to be removable so they could be changed according to need.

"They wanted to be able to stand up in the back, so by the time you have a flat tray, which has to clear the rear wheels, and then put a shelter on top of that, with some clearance for the structure of the shelter meant it was extremely high", Habgood said. "You couldn't fit it in the Hercules, without dismantling the shelter. You had all the extra weight, because you had the full weight of the tray, plus the weight of the shelter and it really wasn't very feasible."

"The best field ambulance in the world".

ERV - Electronic Repair Vehicle

GMV - General Maintenance Vehicle.

Testing the suspension on the Ambulance at Monegeetta.

Utilising the well between the main chassis rails, Habgood came up with a greatly improved concept, using fiberglass modules. These were designed to replace the cargo tray and fit directly to the chassis, which gave the internal height for standing in the centre, while reducing the overall height and weight considerably.

The construction of the modules was sub-contracted out to Jakab Industries in Tamworth, a company that already built ambulance bodies for the NSW ambulance service.

The modules are removable, but are low enough, and light enough, for the 6x6 vehicle to go into the load area of the Hercules without being dismantled. Apparently, apart from during maintenance, the modules have not needed to be removed from any of the vehicles in service.

6x6 variants

It was originally planned that six variants of 4x4 would be supplied, but only the basic Cargo flat tray version of the 6x6. However, once various units saw the versatility of the 6x6 Landie, six variants were eventually ordered, with Land Rover developing other potential versions.

Some of the more specialized variants included the tractor unit for the Rapier SAM air defence system, mobile radio station, crew-cab utility, troop carrier, assault pioneer vehicle and, later on, the Parakeet satellite communications system.

One of the true glamour vehicles of the range was the field ambulance, of which 92 were built with the first delivered in January 1989. Following two weeks of field testing the ambulance received a glowing report in *Paulatim*, the official journal for the Royal Australian Army Medical Corps; much of which is worth quoting.

"State of the art technology, medical equipment, passengers, fuel, etc give the vehicle an all up weight of 5.6 tonnes… Patient comfort is excellent due to the stability of the six wheel design and the module construction…The module is air conditioned and has superb lighting… The vehicle is a pleasure to drive, handling extremely well in all conditions encountered so far…"

Of the interior height they said; "There is enough room for the medical assistant to stand upright (unless you're like Corporal Dwyer who is 2.3m – 7ft 2in tall)."

Loading of the upper stretcher litters also came in for praise. "A brilliant innovation…seems to have solved the whole problem of loading and unloading. (Jakab) have designed a loading assist tray, which slides out and down from the top litter rails, so that the litter starts its load journey at shoulder height…This innovation means that most casualties can be loaded by two people."

In summary they said; "the vehicle is a vastly superior ambulance to any in Australia, and perhaps the best field ambulance in the world."

Ambulance deployed at Timor-Leste: 2006

Parakeet satellite coms - HMAS Stirling.

Inside the ambulance module.

Special Forces LRPV and SRV

Prior to Project Perentie the Special Air Service Regiment (SASR), Australia's most elite fighting unit, had used Series IIA-based 4x4 Long Range Patrol Vehicles (LRPVs). Having witnessed the capabilities of the 6x6 Perenties, they requested Land Rover to provide a mock-up 6x6 LRPV, to their specifications, for evaluation.

"They looked at the Unimog initially, then they came back to us and asked what would we suggest?", Habgood explained "So, we sketched up a Long Range Patrol Vehicle based on their requirements. We made a few modifications once they had a look at it. At one stage we had the fuel tanks inside but then decided to put the spare wheels in the sides, with the large fuel tank underneath the floor. That basically then met their requirement of carrying three occupants, two in the front and one facing rearwards in the back."

One of the Cargo IPVs was stripped down and converted to LRPV specification, using it to develop the final vehicle. That vehicle was later used for other prototype mock-ups and has since been dismantled.

Two IPV variants were then built and supplied to the Army for verification and validation trials. These two vehicles still exist – one is on display in the SASR museum at Scarborough Beach, WA, while the other is used as a training vehicle; which allowed another that was a training vehicle to be redeploed for a combat role..

The LRPV uses a semi-stripped down body with a mounting for twin or single machine guns for the front passenger and a cannon or heavy machine gun on a pedestal in the rear.

Rapier SAM Air Defence tractor.

LRPV deployment in Agfhanistan: 2005
Photographer unknown. © Department Of Defence

Commandos on exercise with SRV in S.A.
Photo by CPL Chris Moore. © Department Of Defence

A convoy of LRPVs cross a desert in Afghanistan: 2009
Photo by LS Paul Berry. © Department Of Defence

Unusually, there was a motorcycle mount on the rear, and the vehicles were supplied with 250cc motorcycles – for individual patrol duties.

The LRPV, of which 26 were built (plus the V8 LHD and the development vehicle), entered service in 1991.

One of the LRPVs was damaged by an Improvised Explosive Device (IED), sadly killing the driver. It is now at the National War Memorial, Canberra, on display in its damaged state.

The other 23 remain in service, but they are due to be replaved in the near future (see later - Replacing the Perentie)

It is a highly capable vehicle, with the ability to carry a considerable amount of equipment and fuel, making it ideal for extended patrols in harsh conditions.

It also has a reasonalby low profile, making it suitable for use in a combat role with the SASR, being deployed successfully in Afghanistan and Iraq, among other combat zones.

A 4x4 vehicle of a similar concept has also been deployed since the late 1990s with the Commando Regiment.

Built under the Bushranger or follow-on contract, known as the Surveillance Reconnaissance Vehicle Special Forces (SRV SF), it is a highly modified and heavily armed vehicle with a number of unique and interesting features.

Most notable are the door-mounted spare wheels. As the normal positions for the spares in the 4x4 Perenties are either under the rear of the chassis or in the rear cargo area, neither location was considered suitable for the SRV.

Rover Australia developed lightweight frames to support the spare wheels, mounted to the body using the original door frames and supports, which swing out like normal doors. Although not providing any sort of armour protection, they do provide a limited amount of protection from small arms fire.

The SRVs variously also have a forward mounted machine gun for the front passenger, a rotating heavy machine gun mount in the back, a rear platform for carrying extra equipment or personnel, and the capability to carry three or four seated crew.

4x4 Perentie

While there is no doubt the 6x6 Perentie was a unique concept, of which the people at JRA had every reason to be proud, the 4x4 Perentie also underwent an enormous amount of development away from the standard civilian Land Rover.

The chassis was modified at the rear to accept the under-slung spare wheel and the entire chassis was hot-dipped galvanized for rust protection. Like the 6x6, the fuel tanks are under the seats and on the surveillance patrol versions there are two spare wheels mounted in the cargo area.

All Perentie Land Rovers, regardless of configuration, were painted with a highly durable polyurethane paint.

The 4x4 Perentie uses the non-turbo version of the Isuzu 4BD1 with improved air intake system and the above mentioned noise reduction modifications. The gearbox is from the Range Rover and there have been some changes internally.

As with the 6x6, the exhaust is routed along the side of the chassis in line with the wheels, before bending around and above the rear wheel and exiting behind the rear wheel. This is to reduce the risk of fire, as the front wheel will flatten long grass so it doesn't touch the hot exhaust.

The 110's coil spring suspension is retained in the rear of the vehicle, but is beefed up for the Army's requirements. A sturdy rear bar supports holders for four jerry cans and the "pintle" tow hitch.

All the usual blackout and convoy lights are fitted, as well a simple but ingenious system for night convoy driving – the back plate of the rear differential is painted white onto which a small light under the chassis is shone, the body of the vehicle preventing it being seen from above.

The body has come in for plenty of

Rain cover for dashboard in LRPV.

Instrumentation in LRPV.

Rear facing seat in LRPV.

243 Regional Force Surveillance Vehicles were built, mostly for use by Australia's northern coastal defence units: Norforce, and the Pilbara and Far North Qld Regiments.

modification as well, with numerous storage lockers let into the sides. Although the battery is usually under the passenger seat, for the RFSV and FFR models two batteries are housed in a locker on the passenger side, on a sliding tray for easy access. Similarly the forward locker on the driver's side has a lockable storage box that also slides out.

One of the Army requirements was that the Land Rovers had to be air-transportable: in the case of the 4x4 that included being able to be transported slung under a Chinook helicopter. They also have to be able to be easily hoisted on and off ships by crane. Therefore, all Perenties have lifting hooks front and rear and the Centre of Gravity (CG) is identified on both sides.

"In terms of the whole development, we put as much effort into the four-wheel-drive vehicles as we did to the six-wheel-drive", Habgood explains. "Even though the six-wheel-drive is seen as sort of the Australian development, but so is the four-wheel-drive, because we certainly wouldn't have won the contract with the basic UK Land Rover."

Building Army Land Rovers

Land Rovers, including the earlier Series military units, had been assembled at PMC in Enfield since about 1956. With the closure of Leyland's main factory at Waterloo (see elsewhere in this magazine) production of Mini and Moke was moved to Enfield and Land Rover relocated to the rear of the factory. National busses were also being assembled there.

With the end of Moke production in early 1982, Leyland bus production was transferred from Footscray in Victoria to Enfield, and assembly of some Peugeot models taken on as well.

By this time, the last of the Series III military Land Rovers had been supplied to the Army and Land Rover production had slowed down to only a few a day. Shortly afterwards, Leyland Australia was once again in financial problems, and was the subject of a buy-out by Australian management, forming an independent company, Jaguar Rover Australia (JRA).

In March 1983 the Enfield site and all of Leyland Australia's assets, including the Engineering Services and Spare Parts buildings in Moorebank (Liverpool) were transferred to JRA.

Later that year the plant at Enfield was closed, with JRA and the Vehicle Builders Employees' Federation both blaming the closure on the Federal Government's plan to increase the duty on imported CKD packs for assembly.

Peugeot and Range Rover assembly ceased, while Land Rover production was moved over to the Engineering Services building, and continued, prior to the awarding of the Army contract, at an average of only about two vehicles per day.

There is no doubt that had Land Rover not won the Project Perentie contract, Land Rover production in Australia would have ceased altogether.

"The only real reason that we continued to locally assemble any Land Rovers after the closure of the Enfield assembly plant was to maintain the capability to locally

Non-turbo Isuzu 4BD1 engine in 4x4.

Photo courtesy Rover Australia

Turbo Isuzu 4BD1T engine in 6x6.

Perentie Land Rover production

Perentie 4x4 May 1986 to Sept 1992

Model	No.
Cargo soft-top	1,222
Cargo soft-top with winch	316
Fitted For Radio (FFR) soft top	984
FFR soft top with winch	169
Regional Force Surveilance Vehicle (a)	243
RFSV - FFR added	20
Survey hard-top	39
Command Post hard-top	2
Senior Commander (station wagon)	11
Personnel Carrier (station wagon)	42

Perentie 6x6 May 1986 to Sept 1992

Cargo	231
Cargo - Left-hand-drive	1
Cargo with winch	57
Cargo FFR with winch (RAAF)	7
Air Defence - Rapier	51
Air Defence - RBS70	17
Ambulance FFR with winch	76
General Maintenance Vehicle	162
Electronic Repair Vehicle	51
Crew Cab (Parakeet)	26
Long Range Patrol Vehicle (LRPV)	27(b)
Army Soft Top - Logistics (to Oman)	11
Crew Cab - Heavy Duty (to Malawi)	2
LHTV (Singapore)	1

Bushranger (& Perentie follow-on) built at BAe Wingfield, S.A. 1996 to 1998

4x4 Survey Recon Vehicle (SRV) (c)	43
4x4 FFR soft top with winch	18
6x6 Bushranger Cargo with winch	2
6x6 Ambulance FFR with winch	16
6x6 Parakeet (Satellite Comms)	37
6x6 Infantry Vehicle (IIMV)	148
6x6 General Maintenance Vehicle	23
6x6 Electronic Repair Vehicle	1
6x6 Assault Pioneer	12
6x6 Mortar Carrier	11
Total	**4,079**

a - Regional Force Surveilance Vehicle is the main surveilance vehicle used in Northern Australia for coastal protection with Pilbera Regiment, Far North Qld Regiment and Norforce (Darwin/Kimberley)

b - 26 operational LRPVs, plus the LHD V8 petrol driven unit (now at Bandiana) and the development prototype, dismantled.

c - 43 Surveillance Reconnaissance Vehciles (SRV) built under Buhranger. Most were converted to SRV (SF) - for Special Forces (Commando). Also 12 RFSV converted to SRV (SF) specification.

Production line at Moorebank was adequate for the need.

The 4x4 production line at JRA'a Moorebank HQ.

assemble/manufacture Land Rovers for the Australian Army", Ray Habgood admits. "If we had not won the Army contract we would have shut down the Moorebank assembly operation – for 4x4 as well as for 6x6 Land Rovers."

When they did win the Perentie contract, estimated in a Land Rover press release in 1988 to be worth $150 million, Engineering Services was increased in size by around 50%, at the cost of about $1 million, and staff increased, to be able to produce on average around five vehicles per day. Although a fairly primitive set-up compared with what had been at Waterloo and Enfield, with individual vehicles moved around the factory on trolleys until on their road wheels, it served the purpose for such a low volume production.

The number varied, depending on how many 6x6 were built, but the production split was usually around 70-80% in favour of 4x4. "It wasn't a very sophisticated production line", explained Habgood. "We did them in batches. It was basically to an Army schedule, which we sat down with Army and agreed to, then tried to stick to it."

In 1991, with a year left to run on the Perentie contract, JRA ran into financial trouble due to two main factors:

• The introduction of the Luxury Car Tax, which affected Jaguar, Rover and Range Rover models – ie, most of JRA's products – and resulted in a severe downturn in luxury car sales.

• The fallout from the five-month pilot's dispute of 1989 meant that busses (JRA also owned Dennings coaches at the time) sold in good numbers for a short period, but those sales soon dried up with the end of the dispute and bus sales generally over the next few years were slow.

JRA wasn't owned by Rover in the UK, but was a locally-owned distributor. JRA's assets were taken over by Rover, who wanted the Australian arm to become solely an importer of UK-built vehicles.

However, under the Perentie contract, the vehicles had to be locally-assembled and supported, so Land Rover was forced to re-establish Rover Australia Pty Ltd, as a wholly-owned subsidiary, and continue local production until the end of the contract in 1992.

At that time, after confirming that no more vehicles were required by the Army, Rover Australia closed down the assembly plant at Moorebank on 30 September 1992, stored away the jigs, sold off the hand tools and laid off the production and engineering staff, including Ray Habgood.

The only member of the team kept on was George Fowler, who transferred across to Rover Australia to head up the maintenance and support for the Army Land Rovers for the required ten years of the Perentie contract.

Follow-on and Bushranger

Ironically, three years later the Army decided to exercise its option within the Perentie contract for additional vehicles, through its follow-on clause and Project Bushranger. Bushranger was for the supply of an Infantry Mobility Vehicle (IMV), with Phase 1, beginning in 1993, being for modified Perenties to be supplied as Interim Infantry Mobility Vehicles (IIMVs).

This took Rover Australia by surprise, as they no longer had the capacity to provide the vehicles as specified by the contract. Land Rover (and the entire Austin Rover Group, and by extension Rover Australia) at that time was owned by British Aerospace (BAe), who had a military vehicles division at Wingfield in Adelaide, South Australia.

Rover Australia was directed to liaise with BAe in Adelaide for the production of the extra Perentie and Bushranger Land Rovers. This was co-ordinated by George Fowler in Sydney, with the Adelaide enterprise managed by Graham Fairhead from the UK, with a young local engineer, Tom Harris.

Reporting on this development in its May 1994 issue, *Overlander* magazine quoted Project Perentie director Lt. Col. Lee Osborne: "It made sense to us to continue with Land Rovers because of their advantageous life-cycle costs. Over the life of the vehicle in Army service – up to 20 years or more – the Land Rovers prove to be very economical."

In total, 311 additional Land Rovers were supplied, between 1996 and 1998, with 148 of those being Bushranger IIMVs. In the middle of this period, BAe sold the Rover Group and all its subsidiaries, including Rover Australia, to BMW.

In 1999 the Bushranger contract (Phase 2) was awarded to Australian Defence Industries (now wholly-owned by Thales) in Benalla for its Bushmaster IMV.

Although BAe produced Land Rovers that were essentially similar to the Perentie, numerous items had become obsolete making the vehicles quite different in many details. As a result, many components from the BAe Perentie follow-on vehicles and the Bushrangers are not compatible with the JRA or Rover Australia built vehicles.

References

The best source for information on Perentie, and all Australian military Land Rovers, is undoutedly the website **www.remlr.com** (Registry of Ex-Military Land Rovers) from where much of the information for the story has come.

Two other valuable sources were the thesis by Ray Habgood, former Engineering Manager at Land Rover Australia, for the Society of Automotive Engineers - Australia, titled: *Australian Development of the Land Rover One Ten for the Civilian and Military Market* and *Project Perentie - Phase 2*.

These were supplimented by a personal interview with Ray Habgood.

Also the books: *Combat Land Rovers Portfolio No.1* by Bob Morrison and *Land Rover File - 65 Anniversary Edition* by Eric Dymock.

Thanks are also due to Land Rover Australia for access to some of their archives and to the Media Unit of the Australian Department Of Defence.

History of Leyland, JRA and Rover Australia also came from *The BMC Experience* archives and newspaper articles sourced through the National Library of Australia, via **trove.nla.gov.au**

Photo by CPL Amanda Campbell © Copyright Department Of Defence

6 x 6 Interim Infantry Mobility Vehicle (IIMV) with Army Registration Number 202 208. This vehicle has been donated to the Australian War Memorial, Canberra.

Replacing Perentie

It has been 30 years since the first trials vehicles were delivered for Project Perentie and nearly 20 years since the final vehicles were supplied to the Army.

In 1998 two Perentie GS 4x4 Land Rovers were shipped to Longbridge, UK and fitted with TD5 engines and returned to Australia, along with a British Army-spec Wolf Land Rover, for a short evaluation trial against the in-service Perentie GS (4BD1).

It appears nothing came of the trial; the two TD5 Perenties were converted back to Isuzu engines and put back into service, while it is not known what became of the Wolf.

Although Rover Australia no longer has the facilities to manufacture the Perenties, there was a requirement from the Army for an additional number of Land Rovers in 2000.

As a special one-off purchase, after two prototypes (one Tdi, the other TD5) had been imported for trials, Army permitted Rover Australia to supply a small batch of UK production Land Rover Defender TD5 vehicles.

Although modified locally to meet some Army requirements, these are essentially standard production Defenders and do not have modified chassis (other than at the front to accept any of the three Perentie-derived bullbars) and the spare wheels are mounted on the rear doors. They all feature hard-top troop carrier bodies, but have storage lockers let into each side.

They do not have any of the unique Perentie modifications for better durability, and as such have only a ten-year service life. They are also only for general duties and are not suitable for a combat or surveillance roles, or deployment overseas.

In 2006 Project Overlander was announced, to replace all of the Army's road fleet – the medium (Unimog) and heavy (Mac trucks) being in service even longer than the Land Rovers. Replacement of the Perentie Land Rovers is Stage 3 of Overlander.

At that time, Land Rover was owned by Ford (having been bought from BMW in 2000) but Ford was in the process of selling the company to Indian car maker Tata. Ford was not prepared to allow Rover Australia to undertake the expense required to build new vehicles to tender for Overlander, on the chance that the contract may be lost to another company and the money would have been wasted.

The reality is Land Rover probably would have won the contract, worth an estimated $1.3 Billion (word is that Army would have preferred to stick with Land Rover anyway), but Rover Australia at the time was not permitted to tender for it.

It is also a reality that with Land Rover's recent focus on soft-roader vehicles and the imminent demise of the Defender, they do not currently have the capacity to produce anything of the same standard or to meet the needs of the modern army in the future.

So versatile are the Perentie Land Rovers that it is to take five different vehicles, from three different manufacturers to replace the Land Rover fleet.

Photo courtesy Rover Australia

Prototype Army Defender TD5 at Rover Australia's Sydney headquarters; 2000.

Photo courtesy Rover Australia

IPV Crew Cab ute undergoing testing. 26 were built under Project Bushranger

Some of the 6x6, including the Bushranger IIMVs, will be replaced with the Australian-built Thales Bushmaster. Most of the 4x4 GS are in the process of being replaced by the Mercedes G-wagon, while the specialized 4x4 units will be replaced by the all-Australian Thales Hawkei. Mercedes have developed a 6x6 version of the G-wagon, but instead of using the modules of the Land Rovers, have reverted to the system of shelters. Thus the Perentie ambulance, once described by the Army Medical Corps as the "best field ambulance in the world" is also being replaced.

Finally, the extremely capable Long Range Patrol Vehicle of the SAS Regiment is being replaced by the purpose-built Supacat from the UK, locally assembled and renamed the Nary.

The Project Perentie Land Rover was the biggest and most successful undertaking by Land Rover in Australia. It gave the Australian military a world-class and highly versatile fleet of vehicles, done by a small band of dedicated Australians, independently from the UK parent company.

They have every reason to be proud of what they achieved.

Mercedes G-Wagon 4x4

Mercedes G-Wagon 6x6

Thales Bushmaster

Thales Hawkei

Supacat (Nary) LRPV

The five vehicles which are replacing the Army's fleet of Perentie Land Rovers.

Rover V8 was an option but not taken up. Inset: identifying the Centre of Gravity.

This lone LHTV was built for Singapore.

11 Logisitcs Vehicles were sold to Oman.

Potential For Export

The Perentie Land Rover LRPV in the Bandiana Army Museum (above) has an interesting history, despite never having served with any Army unit.

JRA had high hopes of selling their Perentie Land Rovers and other variants overseas. As part of the export drive they offered the vehicles as an option fitted with the Rover 3.5lt V8 petrol engine, as well as left-hand-drive (LHD).

This vehicle was the only Perentie Land Rover built with the V8, and one of only a handful built LHD.

Also unusual for the time was the rear-mounted ASP 30mm cannon, a converted aircraft weapon that had not been seen on a vehicle previously.

Together with a LHD 6x6 Cargo and RHD 6x6 troop carrier, it was sent to Land Rover in the UK, for evaluation and promotion at various military shows and exhibits. Land Rover produced at least three brochures on the vehicles aimed at the export market, but there was very little interest. In the end, only 14 military Land Rovers were exported, all of them 6x6.

11 vehicles, known as Logistics Vehicles, were sold to Oman. "It was a cross between a Long Range Patrol Vehicle and a tray top", Habgood explained. "It had a steel galvanized body on the back, that had a well in the centre, and it took twelve troops in the back, facing inwards with their feet in the well in the centre, in a similar layout to a conventional Land Rover soft top. They were all diesels."

Two 6x6 heavy duty Crew Cab utes were supplied to Aid Agencies in Malawi through the Australian Government Aid Program; and believed to still be there.

Finally, a single 6x6 Light Helicopter Transportable Vehicle was built to the specifications of the Singapore Defence Force. However, a production order did not eventuate and no more were built. This vehicle still exists and is still owned by Rover Australia.

The three display vehicles eventually found their way into the British Motor Heritage Museum at Gaydon. The Cargo and Troopie were sold off, but the LRPV was returned to Australia about twelve years ago. It was recently gifted to the Army Museum at Bandiana.

Bandiana Army Museum

The Army Museum at Bandiana, near Wodonga on the Victorian-NSW border, is the largest and most diverse military museum in Australia (with the possible exception of the National War Memorial in Canberra).

Located at the Gaza Ridge Barracks on the Murray Valley Hwy, just off the Hume Freeway, the museum has an impressive array of wheeled and tracked vehicles, including a tremendous range of Land Rovers. It also houses the Army Moke that we featured back in Issue 12 of *The Mini Experience* – probably the only remaining Army Moke in original condition.

But there is much more to the museum than vehicles. It is also home to large collections of material illustrating the history of more than a dozen Australian Army units, including the Chaplains, Medical Corps, Dental, Ordinance, Apprentices, Transport, Nursing, Catering, Psychology and the Electrical and Mechanical Engineers. It is also the official museum of the 2/23rd Australian Infantry Battalion and the Australian Women's Army Service.

The collection has material dating back to Federation and includes vehicles from both World Wars and many Peace Keeping operations and the United Nations. There are dozens of uniforms and weapons from every period, as well interesting personal histories.

It is well worth making the effort of detouring off the freeway, if you are in the area.

However, the museum is currently open only at restricted times at the moment so before you make the trip call them on **(02) 6055 2525** for more details.

Army Moke feautred in *TME* Issue 12.

Among the many Land Rovers is one of the original Perentie Trails vehicles.

De-mobbed

Although Justin Burton was born and raised in England, it wasn't until he moved to Australia seven years ago that he bought his first Land Rover, and it wasn't even his first choice. Now he is a dedicated enthusiast who recently started a business supplying Land Rover parts and accessories.

"I didn't have a Land Rover myself, but friends had them and living in the country you're always seeing Land Rovers. It's an iconic British vehicle, but I could never really justify having one over there. Unless you're a farmer or a utility company, why would you?"

"It was only when I came here I wanted to buy a double cab, so living the Aussie way I got a Hi-Lux. It was the worst car I ever got. We only kept it six months and then I got a 300 TDi Defender dual cab. I was, like, why didn't I buy this a year ago?"

Since then Justin has got seriously into the brand. He imported a rare Land Rover fire engine and partly restored it. "I did a lot of work on it here, but it was just far too much for me", he admitted. "I sold it to a guy down in Canberra, and I've not heard anything ever since about it."

He then bought an Australian-built ex-military Series IIA mobile workshop. "I fully restored that one and it went to a collector I think in South Australia", he explained.

Justin started Landy Bits in early 2012 after he identified a gap in the market for the supply of bits he needed for his cars. He now sells new OEM and after-market parts, as well as accessories for Land Rovers.

In August last year he heard about some Perentie Land Rovers coming up for sale at the ex-military auctions, so decided to buy one. "There was actually six of them in the auction and basically they were all more or less the same condition. This was about the first batch of the proper surveillance vehicles that came out. I bid on three then thought god, I hope I don't win three!"

The one he did win is a bit of a rarity, even amongst Perenties. It came with its full service history logbook, which gives an incredibly detailed history of the car. "The book has every service, everything that was replaced on the vehicle", Justin revealed. "You know, little things that you or I wouldn't bother to write down. Every little thing. If it needed a new bolt or something like that."

Bought from the auction in Townsville, this Land Rover had spent most of its active duty with the 51st Far North Queensland Regiment, based in Mt Isa.

About ten years ago most of the Army's RFSV Land Rovers went through a major rebuild and upgrade programme, performed at the Bandiana workshops by contractor Tenix Defence.

Justin's went through a major rebuild, completed on 19 September 2006, but didn't get the upgrades, as he explained. "The differences were, mine's got double twin jerry can holders on the back, so they took one of those off and put a twin spare wheel carrier on the back, they changed the ROPS, which is the Roll Over Protection System, put a shorter rack on, the storage bins inside are higher – so they're

Justin added the 51st Regiment's motto, "Ducit Amor Patriae" - which means "The Love of Country Leads Me".

"Gardening tools" on bonnet for easy access.

Snorkel for fording rivers.

Justin's still has both Jerry can holders.

Everything is rudimentary but functional.

Full set of Army technical and ID plates.

Pintle hitch for towing Army trailers.

RFSV has two extra spare wheels inside.


Justin is rapped with his Perentie.


UK-spec anti-radiation insulation canopy.


UK "Wolf" snow/sand guard.

A back-up for everything.

Blackout lights for night convoys.


LEDs are for night convoy driving


Seats are also unique to the Perentie. There was normally a third seat in the rear.

like mine but they're a higher bin – then there's another version of that which has got a gun ring on the top, so that could mount a 50 cal machine gun. So, mine is quite rare, because there's not many left in the original configuration".

Justin agreed that the Perentie is just about the ultimate Land Rover. "They're such a good vehicle. They've got power steering as standard, twin fuel tanks, spare wheel underneath, disc brakes all round, bush bars, higher ROPS, different tyres, split rims, double jerry can holders, the boat rack because they used to have a boat on the roof."

The boat racks were also removed during the Tenix upgrades and that was one item that was taken off Justin's Landie as well. "I was lucky enough to source the original boat racks, because the Army just throw a lot of things away", he said.

"I could never understand why England didn't adopt it (the chassis). Having the spare wheel underneath – what a fantastic place to put the spare wheel."

Justin said that his Perentie was in very good condition when he got it, with no dents in the panels, no structural rust and very little in the way of surface rust. "If you were scoring it out of 1 to 10, I would say it was realistically a 7 or 7 ½."

There are things on mine I have replaced – like the trim on the dash always breaks, because it gets a lot of use, so I've replaced the dash mat on the top, the handles, little switches. I'm pretty pedantic about that sort of thing."

Justin was also fortunate to track down and fit a brand new canvas canopy for his Perentie. He also touched up the paint, but hasn't repainted the whole vehicle.


High-lift jack standard equipment.


Perentie's rear chassis is unique. Note white diff cover and convoy light (arrowed).

Although this Land Rover is a good example of how they were in service, Justin has made a number of concessions for his own personal preference. Inside the canopy is a full-length UK military-spec radiation cover, which provides some level of noise reduction and thermal insulation.

Keen eyed readers may also have spotted the UK Marines-spec snow/sand splash guard on the bonnet, which he added.

Justin said that as more of the Perentie Land Rovers become available to public there will be a fair bit of demand for the specialist items and he is doing what he can to supply them.

If you need anything for your Land Rover, Perentie or civilian, check out his website – **www.landybitz.com.au** – give him a call on 0417 780 017, or email to info@landybitz.com.au

Buying a Perentie

The Australian Army has a five-year plan to replace all its Land Rovers, which began in mid-2013.

If you are interested in buying your own ex-Army Perentie Land Rover – or for that matter a Unimog, Mac truck, motorbike or trailer – then the only place to go (apart from buying one that is already privately owned) is through Australian Frontline Machinery.

That is the only company authorised by the Department of Defence, through Disposals And Sales (DAS), to handle the sale of these vehicles.

They have regular auctions, organised through Gray's on-line, in most states.

Contact AFM through their website; **australianfrontlinemachinery.com.au** or see **www.graysonline.com**