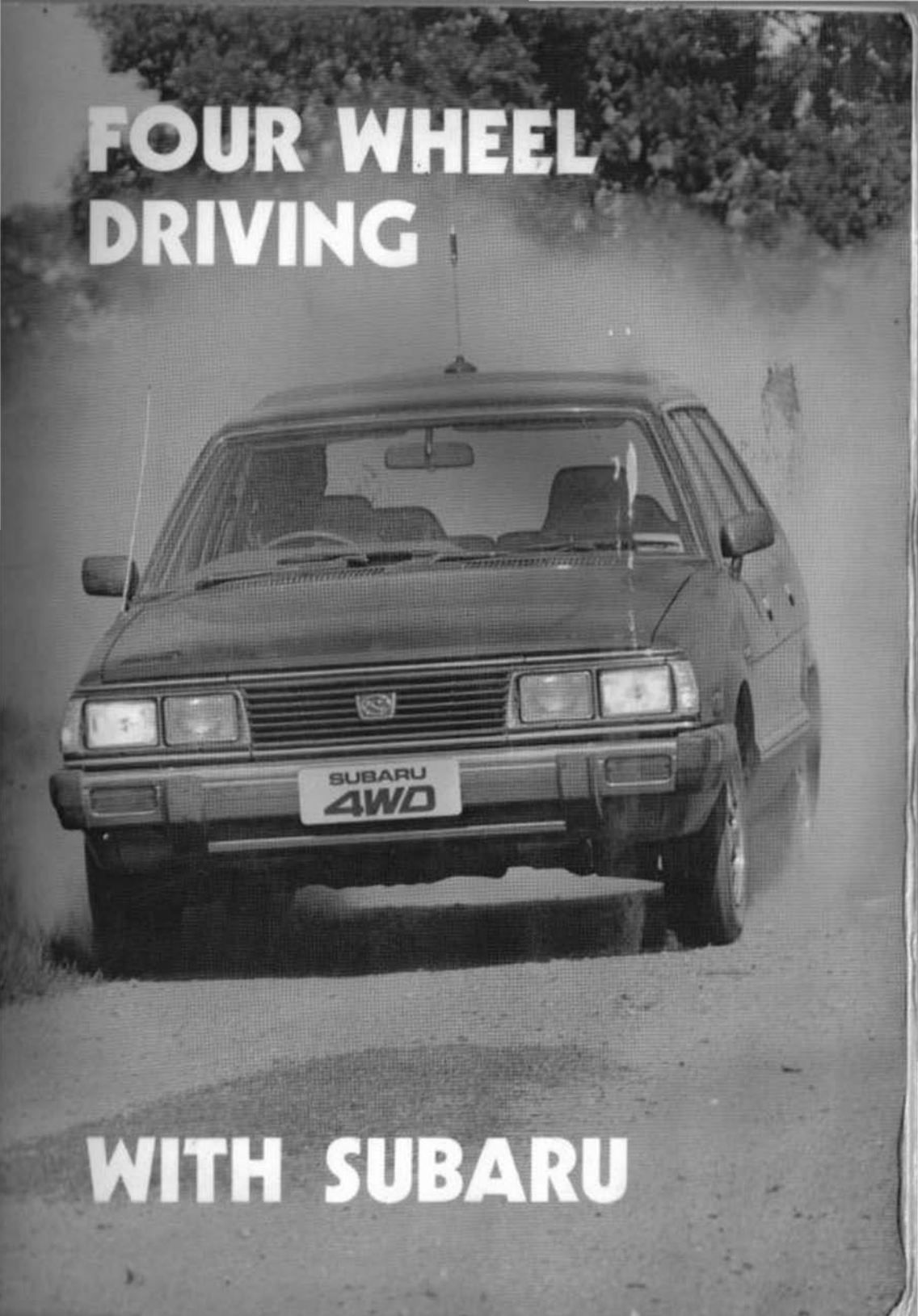
FOUR WHEEL DRIVING



WITH SUBARU

Acknowledgments

Subaru Australia would like to thank the following people and organisations for their valued assistance in the production of this book:

Mr. J. G. (Jack) Williamson and staff at Western Motor Company, the Western Australian distributors of Subaru vehicles.

Officers of the Western Australian departments of National Parks, Conservation and Environment, and Forestry, the Swan River Authority, and the Subaru 4WD Club of Western Australia.

Four wheel drive extras by courtesy of Off Road Equipment, Perth, Western Australia.

Extracts from the following publications were used in the book and Subaru Australia would like to thank those concerned for permitting their inclusion:

"Off-Road Handbook" by Bob Waar, © 1975 Fisher Publishing Co. distributed by HP Books.

Excerpts reprinted (or extracted) from "Getting Dirty". Copyright 1981, Subaru of America, Inc., Author Tom Madigan.

Preface

Congratulations on the purchase of your Subaru four-wheel-drive (4WD) vehicle.

Since 1975, about 35,000 Subaru 4WDs have been delivered to Australian owners. As well as being extremely popular with recreational users, Subarus are widely used by Federal, State and Local Governments. Subaru four-wheel-drives are common sights in Australia's forests, survey trails, along oil and gas pipelines and in research stations. Subarus are used in mineral exploration, to transport the sick and to carry mail in some of Australia's outlying areas. And, of special note is the fact that more than fifty per cent of all Subaru four-wheel-drive sales are in rural areas.

Because of the Subaru's on demand four-wheel-drive facility, you will be able to enjoy a lot of the Australian countryside which is out of the reach of motorists in conventional vehicles.

For those of you living in areas regularly covered in snow and ice, mud and slush, or sand and dirt, the Subaru will enable you to traverse these areas in added comfort and safety.

Whatever the reason for the purchase of your new Subaru, you'll find a whole new world will open up. To make this adjustment a little easier, safer and less expensive, Subaru Australia has produced this book. If you are an inexperienced four-wheel driver, please take the time to read it, and we suggest that it be carried in the glovebox of your vehicle at all times.

Please take care, not only of yourselves, but of the Australian countryside, and the best of luck in your coming adventures.

SUBARU AUSTRALIA PTY. LIMITED
July 1983

contents

Introduction

We decided to produce this handbook for the benefit of our growing family of Subaru four-wheel-drive owners throughout Australia, many of whom may have never previously contemplated buying a vehicle with ALL ROAD CAPABILITIES, and are now perhaps wondering how to derive the most enjoyment and long service life from it.

The Subaru 4WD range is unique in offering saloon car comfort in both on- and off-road situations and yet when wisely driven is capable of quite outstanding performances over more difficult land surfaces that would defeat a normal two-wheel-drive vehicle.

We have set out in this publication to provide these owners with the basic facts and recommendations on sound, safe, four-wheel-driving techniques presented in its simplest non-technical form, and adapted to meet most of the hazards which might be encountered.

A sound basic knowledge of the rudimentary and common sense approach to venturing onto fire trails and seldom-used tracks throughout our beautiful Australian bushland will bring with it a most wonderful enjoyment to those seeking the pleasures and solitude away from our cities and crowded pavements.

Our presentation will discuss the limitations of your Subaru and how best to operate it to avoid both inconvenience and possible expense to you. Remember that you too have limitations, but above all else, it is important that we awaken within the spirit of every four-wheel driver of our product, an awareness of an undeclared duty.

Once the bitumen road ends and your adventures begin, the off-road driver has a responsibility to take particular care of the surrounding environment. Public or private lands, National Parks and Reserves, be they bushlands or deserts, will never grow any larger than they are today, and may possibly decrease over the years as civilization encroaches.

Each off-road enthusiast must do his part to preserve what is left for us all to enjoy.

Our admonition to you is to be safe, be sane and have fun out there. Take nothing but photos . . . leave nothing but footprints.

SUBARU AUSTRALIA P

KNOW YOUR SUBARU

It is important that Subaru 4WD owners never forget that their vehicle, no matter the model, whether it is manual or auto, single or dual range, station wagon or utility, has a normal two wheel (front) drive with a four wheel (all) drive capability designed specifically to operate as an "all road vehicle" (ARV) and off-road where surface conditions permit.

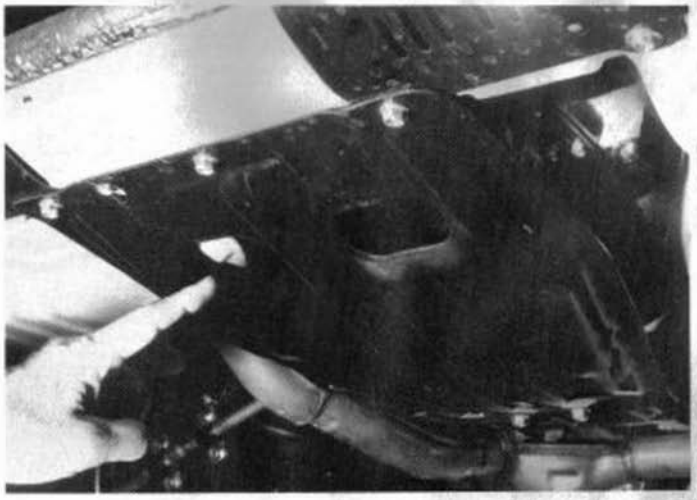
Fuji Heavy Industries of Japan, the designers and manufacturers of Subaru, do not, as yet, produce "all terrain" (go anywhere) vehicles (ATV) nor do they claim that their Subaru 4WD models can match the performance of conventional, high clearance, heavily constructed 4WD "Jeep"-type commercial vehicles.

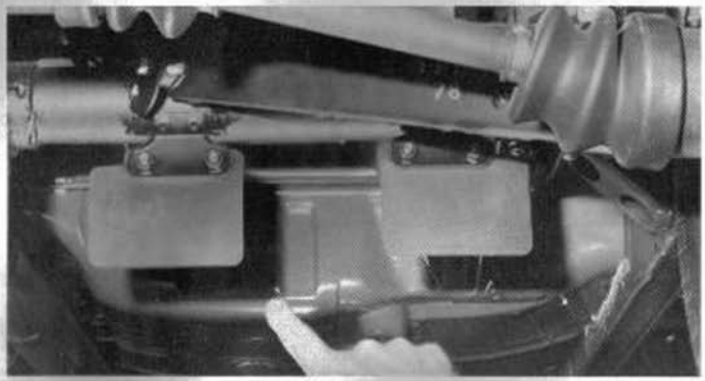
Notwithstanding, any reasonable and observant driver with due attention to land surface conditions can take a Subaru to most places without harming the vehicle in the process.

In broad terms the basic limitations of Subaru vehicles when compared with conventional ATV units, is their difference in ground clearance and the lower approach and departure angles.

This particular subject is covered more fully in following chapters. In recognition of these limitations the manufacturer of Subaru has inbuilt as standard, a series of safeguards to minimise damage from unexpected surface obstructions.

The pressed steel sump guard protects the aluminium engine components against damage from flying stones, acts as a "skid" plate over larger objects and more importantly deflects water away from ignition cables, etc., whilst driving in rain or fording water crossings.





Rubber deflectors, two on the right and one on the left, are fitted under each vehicle immediately ahead of the rear axle. These protect each of the concertina-type rubber covers on the drive shaft against damage from gravel, stakes or small tree stumps.

Owners driving through native grassland for any distance should regularly check around the rear gearbox mounting bracket and exhaust muffler (floor recess) and remove accumulations of grass stalks which tend to build up in these areas and constitute a fire hazard.

A similar, but much more robust, rubber deflector is mounted on each front steering link to protect the drive shaft rubber cover from direct contact with grounded objects that might otherwise penetrate the rubber, thus releasing the special grease lubricating the double-jointed bearings within.

Owners should get into the habit of checking both front and rear drive joint covers (four front — four rear) for damage or lubricant leakage after returning from each off-road journey.

These bearing joints are expensive and must remain well lubricated to fulfil a long service life. Cuts or splits in the rubber cover will allow the entry of road grit, which mixes with the grease and soon ruins the bearing surfaces.

Know your Subaru

As a further precaution, Subaru has added an extra rubber ring to the inboard end of each cover to doubly prevent the ingress of road dirt.

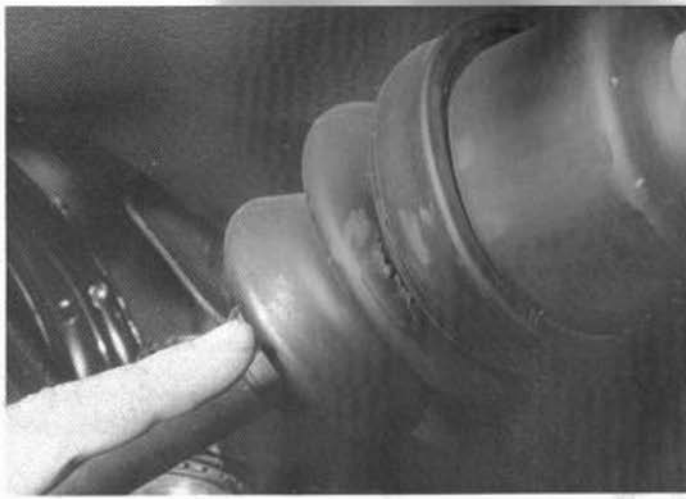
However, if travelling through spinifex grass, take care, for its spines are razor sharp and make short work of soft materials.

One final caution — repacked or new joints require a special lithium based lubricant usually available only from your authorised Subaru dealer. Any substitute will just not stand up to the tremendous work loads under which these bearings are required to operate, so do not take the gamble.

FUJI HEAVY INDUSTRIES (FH
is regarded as Japan's most innovati
vehicle manufacturer and, true
their reputation, has provided you
Subaru with adjustable suspensio
enabling you, for that especiall
arduous journey over more tha
usually difficult terrain, to gain u
to an extra 30mm (1¼") of groun
clearance.

Experienced Subaru owners usuall
adjust only the front suspension
their vehicles to full height for adde
clearance over particular obstacles,
the front half of the vehicle is mo
vulnerable than the rear.

These owners then adjust the re
suspension only enough to compensat
for the amount of clearance lost
a result of the particular load bein
carried.

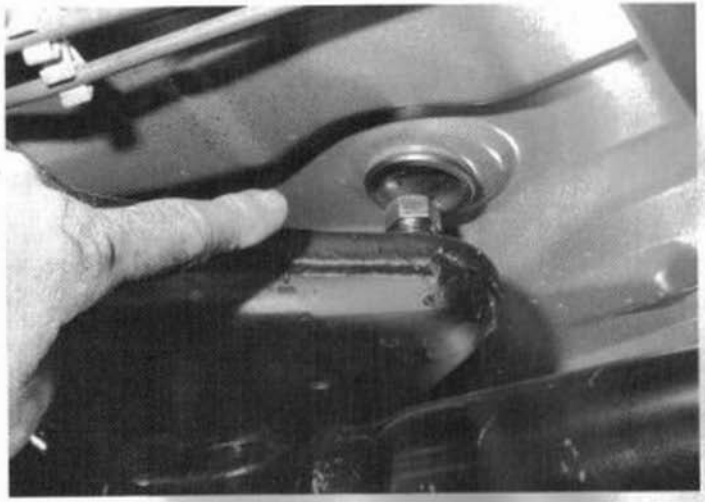


The front suspension shown here incorporates two hexagon nuts (size 21mm) with which to accomplish this adjustment when needed, using an open ended set spanner to turn each nut anti-clockwise to increase height and clockwise to return to normal.

Some words of caution here. Before attempting this exercise you must (repeat MUST) take the full weight of the vehicle off the suspension pylons — in other words, place the car jack beneath the jacking position and lift the vehicle until the particular wheel assembly you wish to adjust is just clear of the ground.

Repeat the same procedure on the opposite front suspension assembly, but remember to jack up the vehicle beforehand.

NOTE: Prior to raising the front suspension, clean and lubricate the four threads (two on each strut as shown in picture) with WD-40 or similar lubricant. TO PREVENT STRIPPING OF THE THREADS WIND NUTS ONE TURN AT A TIME. For example, if you start with the right hand front wheel, wind the two nuts one turn each until the desired height is reached, then do the same with the left hand front wheel.



Increasing the height of the rear suspension is slightly less complicated than the front adjustment.

However, as before, your task will be made easier if you first jack up one side of the body and rest it on a block, then remove the jack and raise the opposite side so that the rear suspension hangs free of the body weight whilst the adjustment is in progress.

There is only one adjusting nut (size 19mm) and your vehicle wheel brace fits this snugly.

The easiest access to this adjustment is through a special hole provided in the floor panel (above).

Remove the rear seat cushion (Station Wagon models).

NOTE: TWA (Auto) models have two screws holding the cushion in position. On other wagons the cushion lifts straight out.

This exposes a rubber plug in the floor beneath which is the adjusting screw.

Access to the rear suspension adjustment on the Brumby 4WD utility is done from under the vehicle. Turn clockwise to increase height and anti-clockwise to return to normal.

A few words of advice here might save you a heck of a lot of work for little reward. Please make sure that you really need to increase your ground clearance this way before you go ahead with the adjustment. Can you cover the land surface you contemplate without more clearance by just being a little more careful and taking things more slowly?

You should ask yourself these questions, because having made the adjustment and completed your journey you are going to have to return the suspension height back to normal again.

Your Subaru **MUST NOT** be driven for longer periods than are absolutely necessary with the suspension raised to full height, because

(a) The increase in height changes the angle of deflection of the front and rear axle drive shafts, placing severe additionally loads on the double offset joints (DOJ) and constant velocity (CV) joints.

The service life of these components would be considerably shortened were they to be operated this way for extended periods.

(b) The increased body height varies the angles of the front wheels causing minor but additional tyre wear and erratic steering on bitumen sealed surfaces.

Don't get us wrong — the suspension height adjustment is a most useful and indispensable aid to getting you through a tight situation where the added clearance is essential to forward progress.

However, these situations are rarely, if ever, encountered.

Our warnings are aimed at owners who might be tempted to raise their suspension heights for no real reason and leave it there because they may not realise the possible consequences.

Something needs to be said about four-wheel-drive — how to use, it, when to use it and when not to use it.

The "How" bit will be covered in later chapters so we'll deal here with the "When" and "When Not".

With the exception of one or two special circumstances which we will cover specifically later in this handbook, four-wheel-drive should only be engaged when forward (or backward) progress can no longer be made in normal two-wheel-drive.

Unlike practically all other makes of vehicles with 4WD capability, Subaru four-wheel drive can be engaged whilst the vehicle is in motion. This is Subaru's most important feature, especially on soft surfaces like sand or mud where having to come to a stop to engage 4WD (as do most others) could render the vehicle liable to bog down.

With Subaru, the change from two to four-wheel-drive can be made without loss of momentum provided the front wheels (on manual transmission models) are in the approximate straight ahead position. This ability to keep moving greatly reduces the likelihood of the vehicle becoming stranded.

We repeat, four-wheel-drive should never be engaged whilst ever normal two-wheel-drive is adequate to the occasion.

For reasons unknown, some owners will persist in engaging 4WD on bitumen or gravel roads and other hard surfaces and appear to be unaware that this practice can cause serious transmission failures through a condition called "Axle wind-up". This is not peculiar to Subaru but possible in most other vehicle brands using manual transmission.

Put simply, axle wind-up occurs whilst both front and rear axles are each propelling the vehicle (4WD) when there is a tendency for one to outspeed the other when travelling forward.

This is due mainly to one or a combination of the following —

(a) Slight differences in tyre circumferences front to rear or widely varying tyre pressures. Owners should not, for example, fit differing size tyres to the front or rear axles. All four must be the same.

(b) A winding road surface where the wheels on the outside of the turn must travel further than

those on the inside. The distance of wheel travel also varies from front to rear axle even where all four tyres are the same.

c) Tyre adhesion on the hard road surfaces will not permit wheel slippage and thus allow the "wound-up" axle to release it's accumulated torsional stresses.

Many 4WD manufacurers (including FHI) ecommend that where ircumstances dictate hat the use of four-wheel-drive cannot be voided on hard surfaces, he driver should at short ntervals carry out the ollowing procedures —

Stop the vehicle and reverse the direction of travel for a short distance.

or more preferably

Drive the vehicle onto a soft surface which will allow the wheels to spin and "slip" freely thereby relieving the pent up torsional stresses in each axle assembly.

IOTE: Owners who in-st on driving in 4WD hen they should not nd who fail to observe ese simple safety pre-sutions will find it very xpensive.

Quite frankly our ew is that owners

should only ever use 4WD on hard surfaces for towing purposes (boat ramps, etc.) or other short distance hauling when extra traction is needed.

For all other occasions the surface should be such that the axles can "outspin" one another if the wind-up condition is imminent.

The likelihood of severe axle wind-up in our Automatic 4WD Touring Wagon (TWA) is lessened somewhat due to this model being fitted with a transfer clutch which releases torsional transmission stresses automatically.

Needless to say, it would be wisest if owners of these models observed the same prohibitions we have outlined to manual transmission drivers regarding the use of 4WD on other than soft "wheel spin" type surfaces.

IMPORTANT:

Drivers with manual transmission models only. When operating in 4WD and wishing to reverse their direction of travel, should do so only by making a "THREE-POINT-TURN".

To attempt to do so by making a "U" turn (and therefore have the front wheels on full lock) will create an acute "Axle wind-up" condition with a short distance.

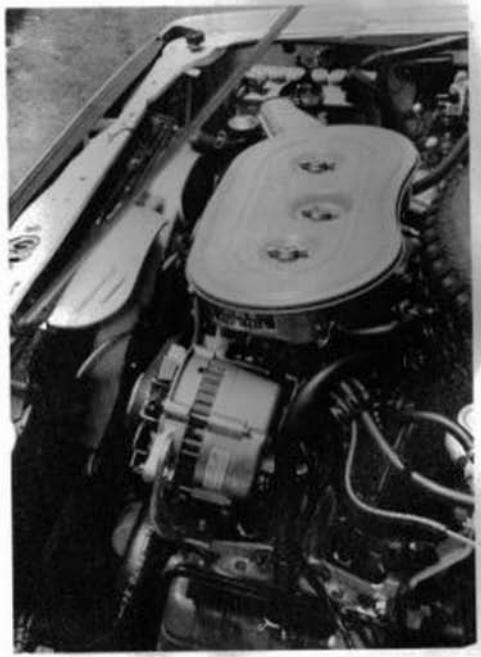
This is especially so when attempting "U" turns on sand and will lead to the vehicle becoming bogged before the manoeuvre can be completed.

REMEMBER — make only three points turns when using 4WD.

The 1800cc Subaru engine will give you superlative trouble-free service. It has no mysteries or vices and performs equally as well in two or four-wheel-drive even though it will consume more fuel in the latter mode.

We recommend regular servicing in accordance with your booklet on maintenances, performed by an authorised Subaru dealer who employs auto engineers who know the product intimately.

There is no substitute for expertise.



WHAT EXTRAS WILL I NEED?

Your Subaru dealer has most likely already spoken with you about this, but just in case we'll run through some of the essentials usually carried by experienced off-road enthusiasts.

It's surprising to note the number of motorists who carry First Aid Kits in their vehicles that are more suited to attend domestic accident patients, rather than the types of injuries usually associated with automobile or outdoor accidents.

The St. John Ambulance Association recently announced the availability of their latest first aid kit designed specifically for automobile and boating accidents where it is usually essential to control bleeding as rapidly as possible.

The soft denim pack which can also serve as a headrest, contains four separate hermetically-sealed plastic envelopes with a quick reference, pocket-sized "flip chart" categorised into the types of injury with precise instructions on the first aid method most suited.

The kit's more important inventory consists of universal accident dressings for use on major wounds in conjunction with large open weave bandages.

The whole package is most comprehensive and at $25 (July '83) is well worth the investment.

In collisions between motor vehicles, fire is an ever-present risk and as fuel is present, rapid action is needed to quench the outbreak.

Our photograph includes a 2.25kg B.C.F. fire extinguisher which retails for around $80 (July '83). This type is ideally suited for both fuel or electrical fires which are smothered by this extinguisher's vapourising chemical liquid as it increases 300% in volume upon contact with air.

A pair of canvas/leather-faced gloves will come in mighty handy if there's ever any de-ditching to be done. They also constitute a negligible weight and space factor.

A good torch or lightweight 12V trouble light with lead should always be with you.

Our tool kit is probably more comprehensive than most would really need but should at least provide for vice grips, adjustable spanner, screwdriver and hammer as a bare minimum.

Remember if you do decide to buy sockets or spanners for Subaru, they should be metric sizes, preferably in the following eight (8) combinations —

8 mm	14 mm	21 mm
10 mm	17 mm	22 mm
12 mm	19 mm	

What extras will I need?

Once again, you may feel that we are being over-dramatic about "extras" — it depends on just how much you intend to do with your leisure hours and where!

Those who have not driven on sand will find it pretty treacherous stuff in strange territory. If you've prepared your vehicle properly, and we'll discuss this further on, there is no need to do much else, but if not, a spade becomes a mighty useful friend.

The three shown here had a retail price in July 1983 as follows:

Right hand side	$4.73
Left hand side (with pick)	$5.99
Foldaway type	$9.94
Axe	$16.00
or	
Bow Saw (not pictured)	$4.50

We show three types of water containers.

The top "jerry can" type is $13.00 and the carrying frame $24.00 extra. This type is difficult to mount and too heavy for rough roads. Smaller and lighter cans are available and fit within your vehicle.

The canvas water bag (lower right) retails for $10.50 and must be kept continuously wet between use to prevent deterioration. The canvas is also prone to damage from flying stones and those who use this type of carrier usually fit a protective outer casing (leather) along the base of the bag.

The metal water flask with shoulder strap at $9.00 is a good buy and will prove most useful and versatile.

N.B. — Retail prices as at July 1983.

Our design engineers in conjunction with overseas and local manufacturers have perfected a limited group of functional, quality accessories, exclusively for your Subaru. Insist on factory-approved replacement parts and accessories for guaranteed satisfaction.

The optional front mudflaps shown here are made of heavy-duty materials and aside from their stylish appearance will protect your vehicle's paint finish from flying stone chips and mud.

Our new 1983 4WD vehicle range is now equipped as standard with Bridgestone 175/70 SF 13 steel-belted, tubeless radial tyres. These are wider than those fitted to earlier models. A less aggressive "MUD AND SNOW" tread pattern is now being employed for improved traction over sandy surfaces and to reduce tyre noise on bitumen. Results so far indicate that these wider tyres are also giving improved tread life.

If you elect for a "ROO BAR", go for strength but lightness to keep weight low over the front suspension.

The unit shown here features a heavy gauge tubular aluminium main frame supported on deep H section uprights to withstand high impact loads.

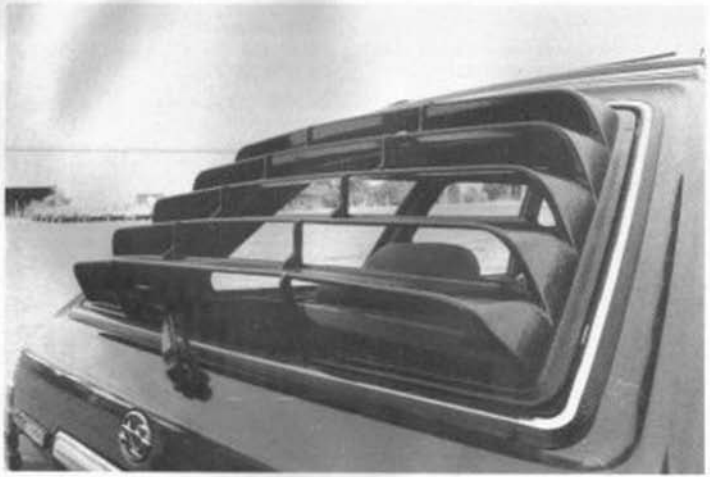
Our designers have purposely titled and braced the whole unit forward at the top to minimise the chances of the bars coming into contact with the vehicle's bodywork in the event of unintentional collision with one of these marsupials (or another vehicle?).

There are two areas of accessory selection that need special care and attention — towing and air-conditioning. A failure of these accessories in either case could, on the one hand, send your new boat and trailer off on a journey of its own into a culvert or, on the other hand, cause expensive repairs to your engine.

Our Subaru towbar has been built to do the right job and is of the finest materials. Its mounting points have been chosen for maximum protection of the vehicle and for the safety of the articulated vehicle.

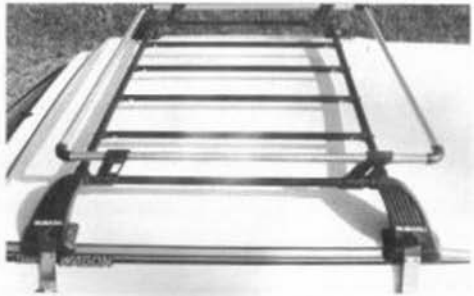
We use only Hitachi air-conditioners — made expressly for Subaru. These can be quickly installed, offer exceptional comfort and long service life. They enjoy the same warranty as your car.

If you opt for air-conditioning you should consider either a rear window louvre as shown here or alternatively reflective glass tinting treatment to reduce outside glare and thermal radiation.



The roof rack shown at right, is an approved Subaru accessory suitable for the Touring Wagon models. Other approved roof racks are available for the entire Subaru range. The type of roof rack pictured is the most suitable for people using their vehicles in rugged four-wheel-drive conditions as your equipment can be tied down and there is little likelihood of damage to the roof.

A special section on winching appears later in this handbook. However, if you are planning on being adventurous it will pay you to consider purchasing a few extra items that



represent negligible weight, yet will prove to be essential to assist yourself or others in certain off-road situations.

Our photo shows three wire ropes with loops each end — two 1-metre long and the other 10-metres overall.

As adjuncts to the ropes we suggest you include a snatch block, two shackles and a 2-metre length of nylon webbing which should, for preference, have each end tapered, turned back into loops and securely stitched. The uses of these extras will be explained shortly.

THE BASIC PRINCIPLES OF ...FOUR WHEEL DRIVING

This chapter is not intended to convert novice drivers into 4WD experts, but to set down a few handy hints to help you make it safely through most off-road situations that could likely occur, no matter which part of Australia you may venture into with your Subaru.

Whilst reading through this section, keep in mind our earlier comment that aside from some special circumstances, four-wheel-drive should only be engaged when forward (or backward) progress can no longer be made in normal two-wheel-drive.

Most Subaru drivers will be surprised to find just how many off-road surfaces they can travel over in normal two-wheel (front) drive. The vehicle's relative lightness when compared with the 4WD commercial heavyweights is, for example, of significant assistance over sand. Let us deal with this type of surface first.

Sand

If you're really serious about attempting a crossing over any reasonable distance of sand, take a couple of precautions beforehand. The prime essential is overall lightness to keep the vehicle "floating" as near as possible on the surface. If this is hard packed — no worries, but if loose, the tyre pressure should be reduced from normal (196 KPa or 28 p.s.i.) down to approximately 18 p.s.i. on all four wheels.

This will offer a wider tread surface to minimise digging into the sand. If you find that the surface is deteriorating into more "powdery" sand, keep reducing your pressure 1 lb. at a time for better traction, but do not lower the pressures below 12 p.s.i., and do not use your brakes at any time whilst on sand.

Remember that your standard tyres are "tubeless" and are subject to allowing air to escape from between the tyre bead and wheel rim at reduced pressures. Those contemplating a lot of sand driving should have tubes installed in all tyres beforehand. Please note, however, that these tubes tend to increase operating temperatures of tyres on bitumen.

Engage 4WD and select a gear, say 1st high or 2nd low (if two-speed) that will keep you moving forward at a steady (but not fast) pace without the engine exceeding normal "comfortable" revs.

Don't attempt to change gears or stop unless the sand surface is hard enough to permit you doing so without sinking down.

If you decide to stop — don't use brakes — let the sand resistance stop the vehicle. It's well worthwhile to reverse back a few feet just to pack the sand down a bit and give you a good re-starting pad to launch from.

Otherwise, keep going on steadily, adjusting your engine speed to ensure that the wheels are maintaining traction over the sand not "spinning" (turning at a speed in excess of the speed of the vehicle).

Travelling on sand is heavy work for your engine and transmission. Watch your temperature gauges, also your transmission oil warning light if driving a TWA (Automatic) model. If you have signs of overheating, pull up at the earliest opportunity and let things cool down — including yourself. When you get moving again, if for any reason the vehicle's forward progress ceases (and it starts to go down) don't panic — switch off and take another spell. To do anything else is just going to dig you down deeper, and perhaps burn out a few transmission components in the process.

Provided you haven't buried yourself in too deep, all you'll usually need to do is dig out the sand **from the front and rear of each wheel to achieve a level and unobstructed exit,** either forwards (for preference) or backwards (only if you must).

Those who have really dug themselves in will need to dig out the sand from under the body to allow clearance. It may even be necessary to jack up the vehicle to gain working space.

Regular sand drivers take along a 25cm square of 2cm thick plywood to use as a base for the lifting jack, which will otherwise bury into the sand when under load.

If you have some tree branches handy to lay along the outwards track, or pieces of cardboard, floor mats or even dry newspapers to assist with "flotation", so much the better — but whatever happens, once you get mobile keep going and don't stop until on a firmer surface.

Don't fail, upon returning to hard ground, to re-inflate all four tyres to the correct pressures.

The handy portable compressor shown here, which operates off the 12V car battery, is just the trick for regular sand driving. Shrader or Menzel brands are popular and reliable but all use a great deal of battery power and your engine should be run continuously whilst pumping up tyres.

Many owners prefer using the adaptor which screws into one of the engine spark plug holes, which they say is much cheaper to buy and quicker in completing re-inflation.

CAUTION: Regular drivers on sand report that when travelling over very "powdery" surfaces, fine particles can be blown into the air intake (heat riser tube) and might be ingested into the air cleaner. Please read the comment under the "Driving through Water" section suggesting this tube be disconnected. It would be wise to take this precaution for both sand and water crossings.

One last tip about driving along the seashore — give it a miss . . . . All you'll get is a rusty Subaru and if you're unlucky enough to bog down near the shore line you could finish up having that gorgeous vehicle of yours half buried in waves at high tide.

Mud

Traversing muddy sections of roads or tracks calls for slow and steady speed, probably 2nd (low or high) to ensure that traction is constantly maintained without over-revving the engine and causing wheel spin.

This stuff is always slippery and treacherous, at times making your vehicle almost uncontrollable. Sticky mud indicates a high clay content.

Keep to used wheel tracks from preceding vehicles — it's a fairly safe bet that if they made it, you will too.

However, be alert to the possibility that the vehicles ahead might be trucks or 4WD heavyweights, either of which may have left deeper wheel tracks than your Subaru can handle. If so, you will need to "straddle" one of these tracks (with a pair of your wheels each side) — tricky, but necessary.

Don't be tempted to break new ground. Don't think that the spoon drain just off the shoulder of the road looks easier going.

You'll usually find it's more apt to be a skating rink surface down there and getting back might require a winch or a passer-by with a tow rope.

Keep to the road always and if necessary, get out and walk ahead to check what's best to do.

What your vehicle really needs is a firm base to run on, beneath that goo on top; and the most likely place for a hard surface is on the crown of the road itself — not virgin bushland.

There are places, the North Western Plains of N.S.W. comes to mind, where the infamous black soil country abounds. If you get caught out there in the rain, forget going anywhere unless you're prepared to stop regularly and unclog the wheel arches to allow the wheels to turn. Best really to park some place safe and wait until things dry out a bit.

But no matter where you find mud — the only sure way is — slow and steady. If you stick to that, you'll make it . . . eventually.

Rocks

The track pictured below is real mountain goat territory and should be avoided if you have a choice.

If not, get out and take a look first to select a path on the basis of sticking to the road, which should not be diverted from for any reason.

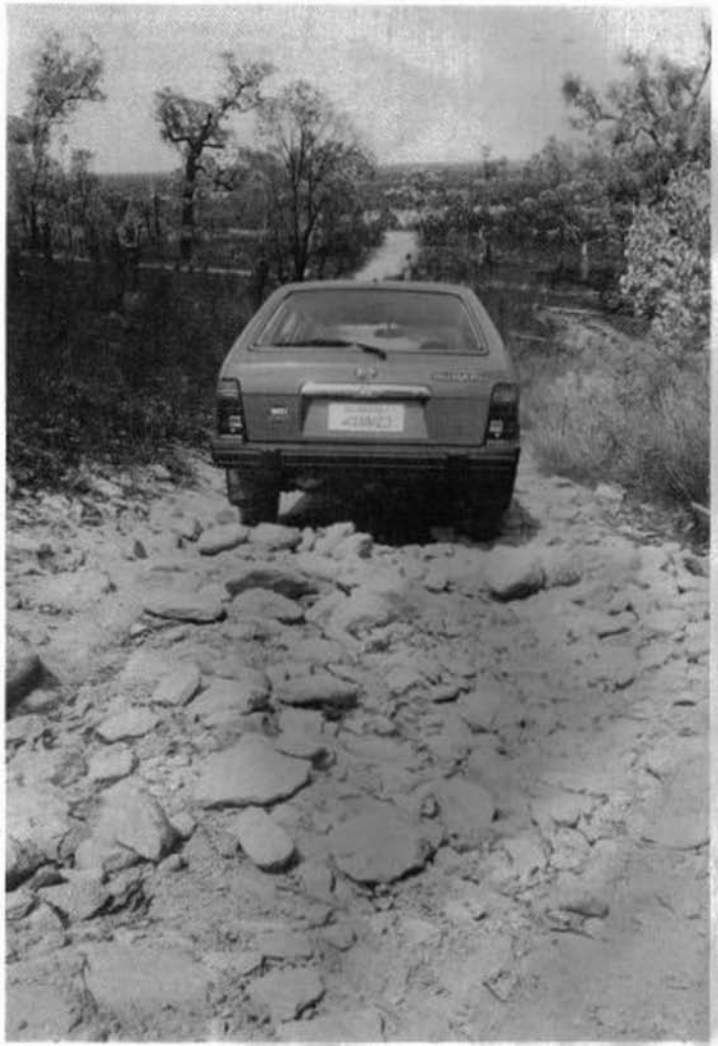
If you can't get through you should not be there!

Keep your tyres fully inflated, which will offer less opportunities for fracturing a tyre side wall.

This is punishment with a capital "P" for tyres, vehicle and the owner/driver. It calls for extreme care and attention to navigate your way in spots like this.

In his magnificently researched and presented "Off-Road Handbook" the American Bob Waar used the words "High — Center" to describe the situation. "When your vehicle with ten inches of clearance between differential and ground comes to rest on a 14 inch diameter log.".

"Rocky roading" offers equal opportunities to the unwary and with its clearance at eight inches, Subaru owners will need to look sharply and take avoiding action when negotiating surfaces such as that shown in the photograph on the next page.



With rocks this size, one must not only judge whether they will clear the undercarriage, but also whether a wheel having passed over a rock might bring the outer edges of the bodywork below the doors (rocker panel) down into contact with the same stone. If you have a passenger, then you'll have a second set of eyes doing some work from **outside the vehicle.**

Not to worry folks, most of the heavyweights in 4WD Commercials, with their cart springs and bone jarring suspensions, have clearance only one to two inches higher! We all have to proceed with caution and take things easy at moments like this — even the experts!

Those driving manual transmissions should be in low/low over these stretches, crawling along over almost one gibber at a time, trying like crazy **"not to be riding the clutch"** and mounting the obstruction (if possible) with the full face of the tyre tread, which has the ability to withstand this type of isolated compression.

This is the sort of situation where our TWA (automatic) transmission comes into it's own. The driver just idles up to the rock, hesitates and then slowly depresses the accelerator, climbs over gently and gives a light touch on the brake pedal to ease down the other side. Simple — no clutch — no hassles!

Just a reminder to those driving manual transmission models over bad surface like this — **keep off that clutch pedal until you have no alternative but to use it.**

Practice will demonstrate that before long you'll get accustomed to the rhythm of the "Ups and Downs" and the art of using only the accelerator pedal in order to keep moving forward at snails' pace. You'll find that with the throttle closed, the engine's compression will provide sufficient retardation to act as a brake after the wheels have passed over the apex of larger boulders along your chosen line of travel.

If you are ever confronted with a narrowing downhill rock strewn defile that offers no chance of an about-turn, (and therefore might mean an exit in reverse) we suggest you stop and walk down first and see for yourself what really lies ahead. Reversing out of situations like this is well worth avoiding.

Going Uphill

Uphill

This is one of the special occasions we mentioned earlier where the grade of the hill to be negotiated may be steep enough, not only to require the prior engagement of 4WD, but also the probable adoption of some particular techniques in order to finally make the top.

In practice you'll find it rare that 4WD enthusiasts who have regard for their vehicle and their own continuing good health, would attempt to climb a grade in excess of 60%. This would represent an attitude change of, say, 30 feet in 58.3 feet travelled and an angle en route of about 30 degrees.

Any grade steeper than that (if not a bitumen surface) should be avoided, and if less than 60% — so much the easier. For example, a 30% grade means the advancing vehicle's angle of ascent would only be around 17 degrees.

If your chosen line of travel is over broken ground, take time beforehand to select the best and easiest track, as close as possible to straight up the slope (90 degrees), free from sideways detours if possible.

Set a steady engine speed consistent with near maximum engine power, engage 4WD, 1st gear (low or high) and away you go. Keep only enough power on to sustain upwards travel without losing traction at the wheels.

If you break traction and the vehicle starts to slow down, don't apply more power as this will only increase wheelspin. Try easing off the throttle in an attempt to regain traction. If you manage this but the wheels are tending to slip over the surface, try wrenching the steering wheel from left to right. This sometimes offers a new surface for the tyres to bite into and could get you to the top.

If your attempt fails — don't panic. Declutch, slap on the brakes and engage reverse. Let the clutch out and start backing straight down the hill (the way you came).

Don't attempt to declutch on the way down for the engine compression will help retard your slow descent backwards, with a minimum of assistance from the footbrake.

If you must apply brakes, do so lightly, for front wheels prevented from revolving cannot be expect to steer the vehicle properly.

Whatever you do, **don't attempt to turn the vehicle around or to change course radically.** Any vehicle offering a sideways attitude to a slope is more liable to overturn.

If after returning to the start point you are still determined to have another go, that's OK. Do all the same things again but increase your approach speed to gain the extra distance.

Remember, straight up is the easiest and safest way to go.

Going Downhill

The lower centre of gravity in Subaru with the higher weight percentage (low between the front wheels) forward of the centre point of the wheelbase, gives it exceptional handling qualities during downhill descents.

Our 4WD models can be driven down slopes that are far too steep to climb. The advice we gave earlier, on pre-selecting a straight line for ascent still holds true for a downhill journey. Take time out (in advance) to choose a path that avoids detours around trees or rocks if it means a side-on or angled-across attitude over loose surfaces; for our lower centre of gravity will count for much less in a sideways slide down a mountain slope.

As for the climb up, select 1st (low) and idle over the edge with the clutch engaged, for the climb down.

Keep your foot away from that clutch pedal and keep applying just sufficient pressure to the brake pedal to keep the wheels turning slowly, but without them locking up.

Remember that a locked front wheel will not steer the vehicle.

Depending on the grade, there should be no need for any acceleration, as the weight of the vehicle will provide sufficient forward momentum automatically and to some extent controllable by engine braking.

TWA owners in a similar situation will find that due to having a torque converter with some slip (and not a positively engaging clutch), engine braking is not as great as with manual transmission models.

This will oblige the auto driver to use his brakes more heavily and regularly during the downhill passage.

Contrary to what you might think, however, in the event that the wheels do lose traction, due either to a loose surface or a sudden increase in the angle of descent, it is most important that you do not attempt to arrest the slide by exerting higher pressure on the brakes.

Take your foot off the brake pedal and let engine compression and the transmission take over. This will probably increase your downhill speed but even so you'll be able to steer and the engine and gearing will be able to do their job as and when the wheels finally recover their full contact with the ground.

Once traction is restored, light braking can be resumed if you con-

Going Downhill

sider the engine speed is building up too high in it's "over running" mode. (Closed throttle.)

However, be careful once again of the brakes locking up. Listen for the sounds of the wheels "sliding" instead of "rotating". If you detect this, release pressure off the brake pedal until the wheels are rolling freely again.

Approach & Departure Techniques

In an earlier chapter we made brief mention of Subaru's limitations in respect to ground clearance and its reduced approach and departure angles when compared with most of the conventional heavy-duty 4WD Commercial ("Jeep" style) vehicles like Landcruiser, Nissan Patrol and Landrover.

Ground clearance has already been covered with our caution for Subaru drivers to be alert to the presence of ground obstacles that appear to exceed 7 inches (180mm) in height. Drivers of the 4WD "heavyweights" having a clearance advantage of up to an extra 1½ inches (35mm on average) can afford to be less cautious, but the degree is only marginal.

The major difference between the two types of vehicles is with their approach, departure and breakover angles. Let's explain —

Approach & Departure Angles

A visual examination of the side view profile of "Jeep" type vehicles will show a similarity in that the distance measured from the point of ground contact made by the front tyres to the furthest point forward on the bodywork (usually front bumper bar) is as short as possible.

The angle formed by a line drawn between these two points and another line at ground level is called the "approach angle".

Similarly, measurements taken from the point of ground contact of the rear tyres to the furthest point rearwards of the bodywork is also the shortest possible and the angle formed between lines drawn as previously described is called the "departure angle".

Both of these angles are enhanced not only because of the shorter distances from tyre contact points to the front and rear extremities of the body, but because of the added height of the bodywork from the ground due to the use of semi-elliptic (leaf) springs.

The combination of these factors provides these types of "Jeep" units with average approach and departure angles of between 40 and 30 degrees depending on the make, and the type of bodywork.

By comparison, the longer body overhangs front and rear of the Subaru Station Wagon, it's lower centre of gravity using independent (McPherson Strut) suspension, reduces the angles to about 27 degrees (approach and departure).

These reduced angles on Subaru calls for care whilst crossing over ground depressions (dry creek beds, culverts, etc.) with steep banks. Drivers should avoid, if possible, a frontal (straight across 90 degree) approach and opt for an angled (45 degree) crossing if the terrain permits. This will minimise the chances of either the nose or tail digging into the bank, both going in and coming out.

The same set of rules applies when passing over a high point which

angles away sharply on each side of the ridge you wish to traverse. A straight over passage might have you "high centred" on the mid section of the undercarriage.

Again the 45 degree crossover path will keep the front and rear wheels closer to the centre point of the ridge and thus increase the (breakover) angle — perhaps sufficiently to clear?

DRIVING THRU' WATER

By now you'll have grown accustomed to our repeated use of words STEADY SPEED and KEEP TRACTION which are both essential ingredients to trouble-free four-wheel-driving.

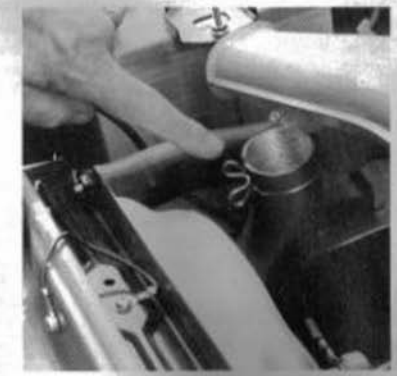
This is most certainly so when driving through water and might best be described by the well-known quotation "HE WHO HESITATES IS LOST".

The art of successful water crossing is bound up in preparation of your vehicle, prior examination of your intended crossing point and then the cool calculated execution of the driving techniques.

Let's deal with each in turn —

PREPARATION

The front mounted flat (boxer type) horizontal four-cylinder Subaru engine sits fairly low in the vehicle. However, the designers have thoughtfully mounted the spark plugs, high tension leads and distributor on top of the engine, which affords quite adequate protection against water short-circuiting the



ignition system.

Additionally, the presence of a sump guard and a splash-plate each side of it makes Subaru a fairly safe proposition in water of reasonable depths, over a short, sharp distance — creek crossings, for example.

The only compulsory precaution you **must take, no matter the water depth, is to disconnect the flexible heat riser tube from the engine air cleaner** (see photo). This can be done by merely squeezing the clip and pulling the tube downwards.

Failure to do this could result in water passing up the tube and being ingested into the engine combustion chambers with nasty and expensive consequences.

Driving Thru' Water

Depending on water depths to be negotiated, a number of owners also remove the blades from their belt driven radiator cooling fans.

NOTE: This is not necessary if air-conditioning is installed, as dual electric fans are used and these do not need disconnecting for water crossings.

If you contemplate wider waters — say a flooded river causeway 30 metres (or more) across, it will pay dividends to apply a coating of silicone spray (available in aerosol cans), over the distributor, ignition wires and spark plugs before making the attempt. With this applied, any splashes of water that get that far will be ineffectual. The two brands of spray most commonly used are "ROCOL" and "WYNNS", although there are many more to choose from.

If the water to be crossed is bumper-bar height, we suggest you also use a "radiator blind", which can be anything from an old potato sack up to a metre square of canvas, with eyelets in each corner, to tie to the underside of the front bumper bar, then folded back over the radiator grille and bonnet front and tied to the outside rear view mirrors (or similar) to hold it in position.

This blind prevents water being forced through the front grille, then the radiator core behind it, and flooding the engine compartment. The displaced water is either forced sideways, downwards or upwards, where it will do no harm. Remember to remove the blind and re-connect the heat riser tube immediately after completing the crossing.

These suggestions are for the occasional water crossing. Any owner faced with permanent water on a regular basis should consult his Subaru dealer about further and more effectual long-term modification to his vehicle.

SELECTING YOUR CROSSING POINT

We have dealt so far with water over public roads and secondary tracks which these days are usually provided with a smooth concrete fording ramp.

There are still fords along river and creek beds where your path will most likely be strewn with river-worn stones and gravel which change location with the surge of water passing over. Rocks that weren't there last week could be there today and water that was a fordable depth at dawn could be over your headlights by dusk. Don't assume anything, go in and find out.

Having been stranded twice with wet ignition and having once been badly shaken when my vehicle actually started floating downstream, I would strongly recommend that you **always cross a strange ford on foot before venturing in there with your vehicle.** It's mighty cold for your legs and rough on your feet (if you haven't taken sandshoes) but it pays dividends in the long run.

If necessary, run a rope line from bank to bank to define the line of travel and then pick out or move the bigger stones for the best possible passage across. If you don't do this first, you'll run the risk of stalling the engine midstream and that's trouble, especially if you have to come out on the winch or someone's tow-strap. If there is a someone — that is!

CROSSING TECHNIQUES

Engage 4WD — select 1st (high if rocky surface or 2nd low if smooth under wheels) engine revs and/or gear selection should be set to maintain the equivalent of a fast walking speed.

The essence of the contract is maintaining that same steady pace without surging lower or higher throughout the trip, because by holding a steady momentum, a "bow wave" is created and can be maintained. This momentum creates a void under and at the rear of the vehicle thus reducing the height of water in exactly the right places, around the engine and exhaust outlet.

If you hesitate or slow down, that water will rush in and — bingo — you're going to get wet feet again. In summary — GET GOING AND KEEP GOING.

CAUTION: After long or repeated water crossing, check your transmission oil in the rear differential housing for evidence of water entry. If water is present the oil will be emulsified — e.g. have a creamy, frothy appearance.

Ensure also that the breather valve (on top) of the rear differential housing has not become blocked with sand or mud after each journey through these types of country.

Driving in Snow

An extract from Bob Waar's "OFF-ROAD HANDBOOK"

"The key to forward progress in the snow is called momentum. Get moving and keep moving. Select one of the lower gears to allow the engine to work comfortably in the power range without screaming along at high RPM. You may have to experiment with low-range/second gear and with high-range/second gear. Just which gear is the right one depends on depth of snow, how fast you want to travel, etc. The point is to select the gear that feels comfortable to you and the vehicle and stay in it. Move steadily. Slipping and sliding just means you are not making progress and could be headed for trouble.

Limit your snow driving to back roads or terrain you are familiar with. Snow has a neat way of drifting around and hiding items like a three-foot hole or a frozen creek. More than one four-wheeler has had to hike out and leave his rig stuck until the snow melted or he could talk someone into pulling him out.

Drive the crown of the road. Stay away from ditches. Take the high side on a banked road. Don't just slam on the brakes; make sure you can get moving again from wherever you stop. Pick a bare place on the road or at the top of a rise. Do more than just a little thinking before starting a downhill charge in fresh snow.

If you are plowing through deep drifts, stop every mile or so and open the hood. Snow has a way of packing up and it can create some problems like melting and shorting out wiring. After a while you'll be able to tell how you are doing not only by the progress you are making but by the sounds the snow makes against the vehicle. If you are running through the deep stuff listen or "feel" for anything that might tell you the wheels are breaking through but the frame is not — which could lead to a high-centred situation. This is the sort of thing that comes with experience so you might as well start working on it.

Never set a parking brake in freezing weather. It might just stay that way when water in and around the cable freezes. If you are headed uphill and start slipping, turn the wheels — first to the left and then to the right as you continue to apply the power. This helps give you a new bite up front. This works pretty good with 4WD. Drive down a hill; never coast down. Make slow, deliberate moves on ice.

If you are driving on an ice and snow covered road, remember snow has a great deal of resistance and will require some amount of throttle to get through. Ice, on the other hand, offers little resistance. If you are driving from a drift onto a sheet of ice on an asphalt or concrete road, get off the power in a hurry. When driving on ice, don't attempt the impossible. If you don't have studded tyres or chains, ice on a road can just be impossible for even 4WD to negotiate.

Give even more thought to your snow driving when the sun has been out for several days and melting is obviously under way. If you are on a road that hugs the side of a northward facing slope the road could give way in a mud slide or you could be surprised by falling into a deep crack cut in the mud by running water under the snow.

When you are running through slush in freezing temperatures, check under the vehicle for ice build-up. It can put a steering arm or tie rod in a bind when the build-up is severe.

If you don't have a winch, pack a flat-necked shovel to get between the vehicle and a low spot. Also bring along an axe. With an axe you can cut enough brush and small trees to get under the tyres if you get stuck — so pack one for a run in the snow if you don't have a winch.

One closing thought on all of this just before you slam the door and take mama and the kiddos for a ride in the snow. If you got stuck up there in the afternoon and couldn't get help — do you have enough warm clothing, sandwiches and hot chocolate to keep everyone comfortable until tomorrow noon? Give it some thought. This sort of thing can lead to terrible discomforts and outright sorrow if you haven't kept your head straight about the possible dangers and problems you could get into."

N.B. Our sincere thanks to the editors of H.P. Books of Tucson, Arizona, U.S.A., for their kind permission to use this material.

Towing

The laws in most Australian States are fairly specific about one vehicle towing another on public thoroughfares. In most places the towing medium must be a tubular rigid "tow-bar" designed to prevent the towed vehicle over-running the prime mover in front, which is a hazard when using a flexible tow line.

For the purposes of this paper we'll presume the towing described is being carried out off public roads and concerns only short pulls to extract another vehicle out of a trouble spot.

We picture at right a nylon tow strap that is ideal for this purpose. It is sufficiently "elastic" to absorb shock loading in the event that slack in the tow-strap is taken up too quickly, and it is light enough in weight not to cause overloading

considerations. Each end is looped and bound to minimise damage to vehicles or fraying the nylon strands.

The two drivers involved should first get rid of any onlookers (or at least get them well out of the way), before deciding on a set of basic signals so that each fully understands the other's intentions during the tow.

The easiest method of keeping the strap taut is for the driver being towed to apply his brakes "lightly" going downhill, just to keep the towline under slight tension. The uphill section will automatically keep the line taut.

The correct towing point will be found at the right rear of the vehicle, where a rounded semi-circular and plastic-coated bracket is bolted to the bodywork.

Always use shackles to connect tow lines to or from your vehicle.

Towing Trailers or Caravans

The following trailer weights must never be exceeded. They have been determined by carrying out intensive trials in accordance with accurately established criteria. If these values are exceeded, it will lead to excessive wear and can also endanger the safety of the vehicle/trailer combination.

The maximum permissable weight limits are:—

	Transmission	
Trailer	Manual	Automatic
with brakes	1000 kg	800 kg
without brakes	450 kg	400 kg

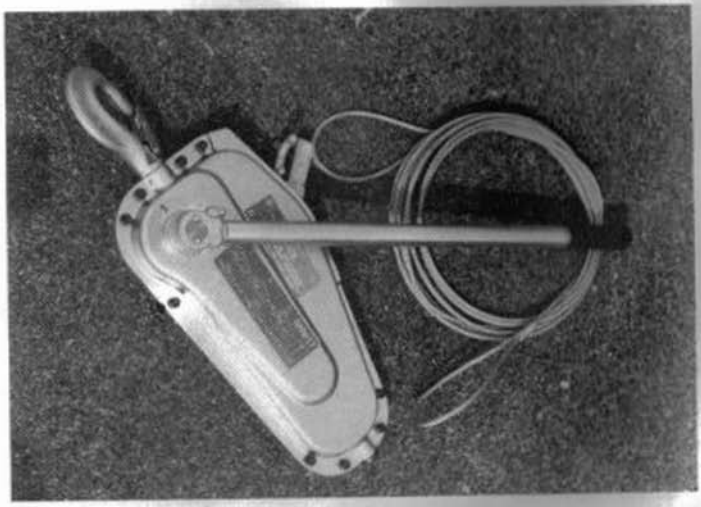
Winches

A mechanical or electrical powered drum or capstan winch is considered essential equipment on most 4WD (Jeep type) heavy duty Commercial vehicles operating in the mountainous forest areas of our Australian Great Dividing Range, the south-western areas of Tasmania and Western Australia and northern Queensland.

These mechanical winches are powered by drive shafts from the gearbox transfer case running either to the front or rear of the vehicle. This type of winch is favoured for commercial use as the electrically-driven model's usefulness is limited to the capacity of the vehicle's battery; which has to be recharged almost continuously by the vehicle's engine whilst the winch is in use.

The design of the Subaru gearbox drive train precludes the use of a similarly designed mechanical winch and the only alternative is either electrically-driven or a hand operated type.

Subaru owners need to give "WILL I, or WON'T I buy an electric winch?" a deal of thought for they are (at $400) an expensive option to have in (or on) the vehicle just in case of need.

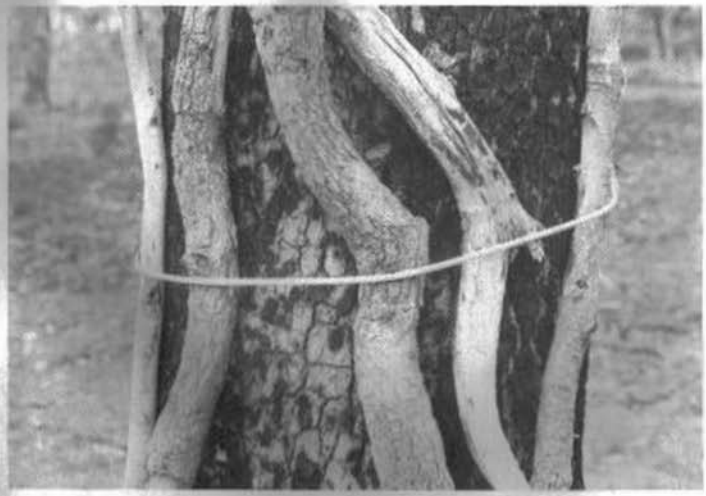


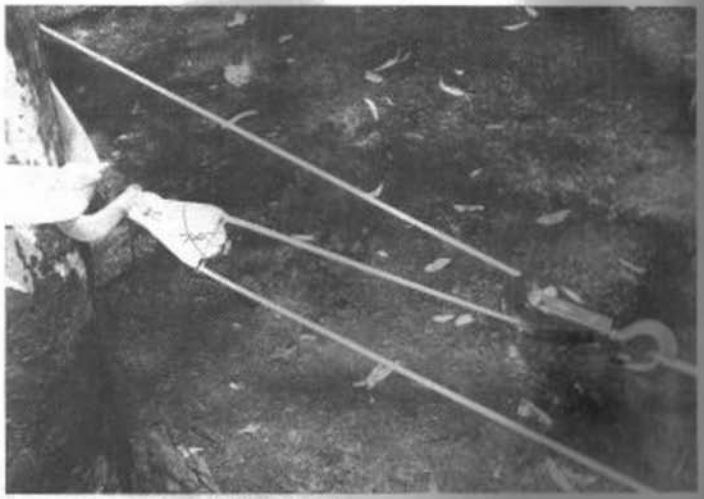
The problem is that **when the need does arise — it is a real NEED.**

For versatility, our vote would go to the hand-operated type which is less expensive and being portable can be mounted in any position (for 360 degress around your vehicle) to winch out in the desired direction. If later you decide to update your vehicle, the hand winch need not be included in the sales contract but retained as future insurance.

Whichever of the two you finally select, the operating principles are much the same and can be summarised as follows —

- If your most convenient anchor point is a rock or dead tree stump (and you do not have a nylon anchor strap) run your winch wire around the point. **If the tree is "alive" please protect the outer bark** in the manner depicted in the photograph. You'll find the nylon strap is the best and easiest to use no matter the anchor point.
- Use only the special towing points on your Subaru to mount extra snatch blocks or hand winch shackles. Attaching them elsewhere might damage the vehicle.
- Keep onlookers well out of the way. If or when winch cables part company under strain the loose ends fly like a whiplash and could inflict serious injury. A jacket or floor mat thrown over the winch cable will help stop these loose ends from flying if a break occurs.
- The winch operator should keep in mind that he/she is in the direct line of fire too, so **make sure that all fastenings are secure before winching commences**, as it is usually these and not the cable that parts company. If the vehicle is deeply bogged or the de-ditching operation appears such that the



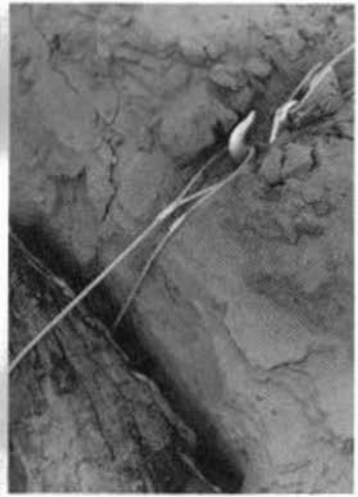


WINCHES (continued)

anticipated total load exceeds the winch capacity, snatch blocks should be employed. One block will double and two blocks will treble the winch's capacity to handle any given load. Remember, however, that you will need considerably more winch cable to incorporate winch blocks into the system and winching speed will be slowed accordingly.

GROUND ANCHORS

In the event that natural anchor points (trees, rocks, etc.) are not within cable distance from the stranded vehicle, here are a few suggested alternatives —

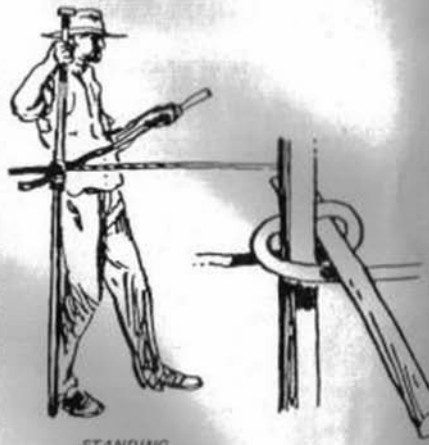


• Dig a trench and use either a log or the spare wheel as the anchor (see photos).

• SPANISH WINDLASS

Don't laugh now, but I have actually seen a wheeled tractor **assisted** out of a bog by an old bushman acquaintance of mine, who (having nothing as high falutin' as a hand winch) made up a Standing Spanish Windlass with a crowbar and rope.

The crowbar is driven about 25cm into the ground **directly in line** with a rope stretched between the ground anchor and the tractor. The tip of a metre-long sapling was put through a loop in the rope at the crowbar (see drawing) and then gradually wound in a circular (clockwise motion) to revolve the crowbar which acted as a fulcrum and "winch drum". It was mighty slow but also mighty effective and worthy of remembering if you're ever caught alone with just a rope, a tree, and a bogged vehicle. I guess that a strong straight sapling could be made into a respectable substitute for the crowbar.



STANDING SPANISH WINDLASS

• Three saplings (or fence (star) pickets) are driven **deeply into the ground**, each behind the other and 40cm apart — then lashed together at the top. Attach the winch cable to the base of the post nearest the vehicle (see photo).

GOING BUSH

It's not our intention here to say more than necessary about everyone's responsibility in protecting the environment.

There're very few moments as peaceful in life than to be woken just after dawn somewhere in the Australian bushland by the call of a native bird and to get out into that crisp morning air and to "hear" the silence of our bush — it's beaut, and everyone should help keep it so.

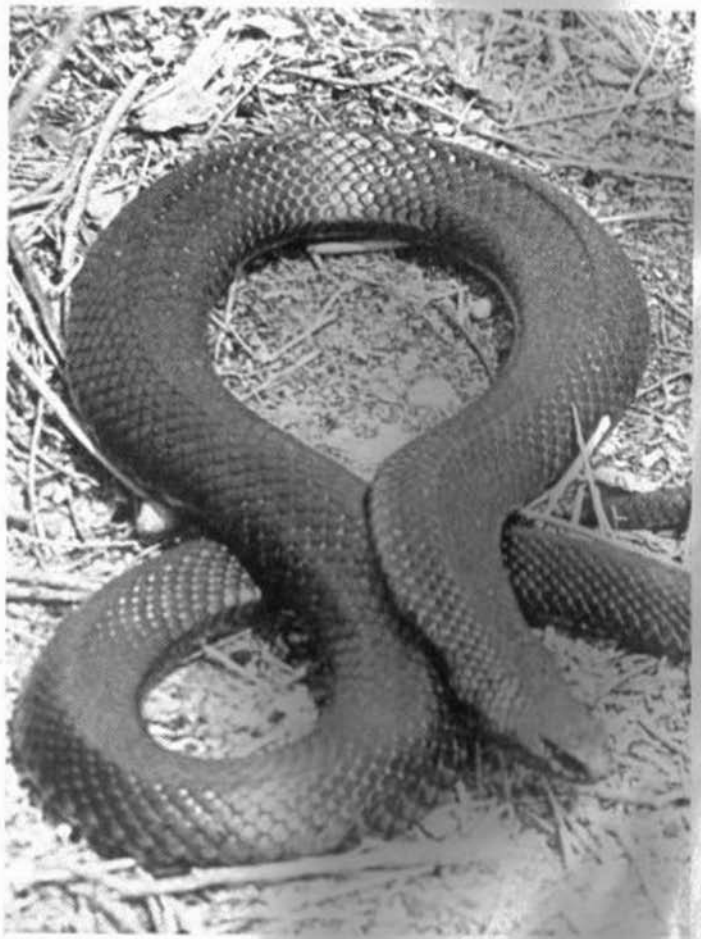
YOU CAN ASSIST IN THESE WAYS:

- If you take full food packages and cans or bottles in there with you — bring out the empties with you. Leave nothing but footprints.
- If the only ground anchor point near enough to attach your winch cable to is a live tree — protect its outer surface from becoming "ring barked" (see photo page 46).
- If you must go shooting, get the landowners approval first and don't use straying cattle, sheep, native fauna or roadsigns for target practice.
- Keep to the defined tracks and only break new ground when you have no other alternative.
- Set your campfire in an open space and douse it thoroughly (then cover with soil) when you've finished.
- Seek prior permission to enter or cross private or public lands and leave gates the same way you find them.

As you'll most likely be carrying this handbook in your vehicle, a few words about reptiles might be worthwhile.

WHAT TO DO ABOUT SNAKE BITE?

1. Don't get bitten. In the bush, wear protective clothing, good footwear, thick socks and jeans.
2. Be alert all the time, watch especially when stepping over logs and rocks or from a vehicle into grass or scrub.
3. Don't set your camp across a snake's track to water. You could have a midnight visitor, either a Death Adder or a Tiger Snake.
4. Don't walk around your camp at night in bare feet, unless you have a torch.
5. Don't try to out-Butler Harry Butler by putting your hands up hollow logs or under rock ledges. Mostly there will be nothing, but should you get bitten, your foolhardiness could result in real danger to yourself and a great deal of worry and inconvenience to the friends with you.
6. Don't let young children have or play with toy snakes. They could pick up a real one.
7. Clear piles of rocks, timber and long grass from around your house. Bury rubbish so that it will not attract rodents, which attract snakes.
8. Don't attempt to kill a snake, unless it is near a house or is a danger to children and animals. If you must, use a spade or, rather than a rigid stick, several pliable strands of heavy fencing wire twisted together.



RED-BELLIED BLACK SNAKE
(Also called common black snake)

9. When in the bush, walk heavily so that the snakes will be aware of your presence in their territory, in most cases all they will want to do is escape into hiding.

NEW METHODS OF FIRST-AID FOR VENOMOUS BITES

A venomous snake needs to get a good bite to inject venom. However, in all cases, transport of the patient to hospital and possibly an injection of antivenene is essential. In the meantime, first-aid and subsequent care of the patient while awaiting transport can be a lifesaver.

The old method of "wash, cut the wound, suck and apply a tourniquet" is right out — in fact the sale of the old snakebite kits we used to buy have been banned.

Do not wash the wound. Venom remaining on the skin can be tested to identify the snake. Otherwise, a snake testing kit developed by the Commonwealth Serum Laboratories enables the hospital to identify the type of venom from a sample of the victim's blood.

Reassure the patient to guard against shock. Immediately apply a broad pressure bandage (elastic, towelling, or torn up clothing) to the wound, with another beginning at the TOP of the limb (nearest the heart) and working down the limb, firmly but not too tightly. The aim is to decrease and slow down lymphatic movement. An arm or leg should be splinted to ensure immobility, the arm placed in a sling.

If a bite occurs on the body, apply a broad, firm bandage but not so tight as to restrict breathing. Keep the patient still.

Give no alcohol, food or drugs likely to depress respiration. The reasons for this are obvious — early affects of a bite may be nausea, vomiting, sweating, headache, low blood pressure, difficulties in swallowing and breathing.

Lie the patient down and raise his legs to improve pressure and circulation. If necessary, apply mouth-to-mouth breathing.

When seeking help, if possible, warn the hospital of the type of emergency and, if the snake can be positively identified, the type of antivenene they will need. It may be necessary to get a medical team with supplies of antivenene out to the patient.

It is just so much better not to get bitten.

As a guide to Australia's dangerous stinging creatures and plants, Subaru recommends the purchase of "Things that Sting", written by Eric Worrell and published by Angus and Robertson. A revised edition of the book, including the latest treatment for snake bites, will be on sale from November 1983 at a cost of about $3.95.

SUBARU CAR CLUBS

Throughout Australia, Subaru Car Clubs have been established to provide social contact between Subaru owners. Most of these clubs, although specialising in four-wheel-drive vehicles, cater for two-wheel-drive Subarus, and indeed other makes of vehicles.

Club trips, social gatherings and other events are organised on a frequent basis. Regular club meetings are also held. Some clubs also have special arrangements with Subaru dealers and trade houses for items ranging from maintenance service to air-conditioners.

If you are interested to learn more about a Subaru Car Club, or wish to join, please contact the club nearest you. Some addresses may change before this book is reprinted so if you experience difficulty contacting the club of your choice, please ring Subaru Australia Public Relations Department on (02) 888 7277 or write to the Department at P.O. Box 127, North Ryde, 2113, New South Wales.

NEW SOUTH WALES
Subaru Car Club,
P.O. Box 242,
STRAWBERRY HILLS,
NEW SOUTH WALES, 2012

VICTORIA
Subaru 4WD Club of Victoria,
10 Lachlan Court,
WERRIBEE,
VICTORIA, 3030

WESTERN AUSTRALIA
Subaru 4WD Club of Western Australia,
40 Princess Street,
GOSNELLS,
WESTERN AUSTRALIA, 6110

SOUTH AUSTRALIA
Subaru 4WD Club of South Australia,
7 Inglebrae Crescent,
SALISBURY PARK,
SOUTH AUSTRALIA, 5109

TASMANIA
Subaru Car Club,
69 Sorell Street,
DEVONPORT,
TASMANIA, 7310

QUEENSLAND
Subaru 4WD Club of Queensland,
P.O. Box 195,
PADDINGTON,
QUEENSLAND, 4064

Conclusion

We hope you've enjoyed leafing through our booklet, and more especially, that you'll carry it in your glove compartment for ready reference purposes.

We offer no guarantee that our recommendations will always be the correct answer to your particular problem, but believe that if the basic principles are observed, you will get through with a minimum of fuss and bother to yourself and passengers, plus keeping your vehicle in one piece during the process.

Vehicles referred to and photographed throughout the text were MY83 model Subarus, which incorporate modifications which were not available on earlier production. It follows next year's models and those to follow may differ again, for FHI is continuously striving to create the ultimate for their all-road vehicle enthusiasts.

We wish all of you good luck and happy motoring.

Subaru intends to update this book at regular intervals. If you, through your four-wheel-drive adventures, come across information or hints that may be useful to other Subaru owners, please put pen to paper and write to "FOUR-WHEEL-DRIVING WITH SUBARU", C/- Public Relations Department, Subaru Australia, P.O. Box 127, North Ryde, New South Wales, 2113. Information received will be considered for inclusion in our next edition.