

*Thrandur Arnthorsson*

**4x4**

# Off Roads

**How To TOUR Your 4x4  
And Enjoy Off Road 4 Wheeling**

**4x4**OffRoads.com

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And Enjoy Off Road 4

Wheeling

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Thrandur Arnthorsson

4x4OffRoads.com

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# **TOUR Your 4x4 Off Roads**

## **THINK**

**Select Your 4x4**

**Modify At Will**

**Equip Your Rig**

## **ORGANIZE**

**Get Ready**

**Basic Strategy**

**Plan Your Tour**

## **USE**

**Off Road Handling**

**Tires and Traction**

**Enjoy the Ride**

## **RECOVER**

**Recovery**

**Repair**

**First Aid**

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# 1. INTRODUCTION

## BACKGROUND

I have been around 4x4s almost as long as I can remember. My dad had a Jeep and then a Land Rover and I remember first learning to drive the Land Rover the day before my 9th birthday!

Since I started the website 4x4OffRoads.com I have always had the thought of writing an informative book about the subject of 4x4 usage and off road driving.

There are not too many books about this subject and I think I have something of value to offer the world by making it. This book is for all those who want to spend more time 4 wheeling and enjoy the great outdoors in this unique way.

This is my first book ever and I hope to be writing many more in the years to come.

## About Me

Living in Iceland has in many ways shaped me as a person. All the mountains, some of them volcanoes, major ice caps with glaciers and magnificent canyons, wildlife with seabirds and fishing, the fresh air and water and the ever-changing weather and winter blizzards not to mention the rough highland roads. Roads that are best traveled in a well equipped 4x4.

Since I graduated from university I have been working with large companies as a programmer and project manager. Of course that means many hours behind a desk and fighting the corporate game. Getting out and enjoying the nature is simply all-important.

Having a 4x4 and using it for interesting journeys around this island has been my primary hobby and now it is turning more and more into a lifelong passion. I want to grow this into experiencing the best 4 wheeling around the world.

Since I first began building my own website during Christmas 2003 I have now completely altered my lifestyle. Early 2006 I finally achieved complete freedom from ordinary work. Doing only what I want to do and serving the world at the same time. This is made possible by working on my web sites as my only source of income.

## **ABOUT THIS BOOK**

Before we start I would like to tell you some more about this book.

### **Why I Wrote This Book**

I know there are a handful of books about 4x4s and off roading. I have read many of them and many of them are quite good. I still felt that something is missing. So much knowledge and experience is needed in order to be a good 4 wheeler.

Nowhere have I found an e-book on this subject. And having an e-book available for 4x4OffRoads.com will add value to readers and help the site grow.

So much knowledge is stuck in the heads of 4x4ers not the least here in Iceland where many ingenious things have been tried out. This will bring a new perspective on the sport.

Most importantly I think that those that are interested in the theme of 4x4 and off road will want to get a good grip on all the things you have to keep in mind as you start you own journeys and adventures.

**This is a book to help you get going in a 4x4 and using it off road with the best results.**

## **What This Book Is**

This book is a HOW-TO book. A step-by-step process to get you started on your journey as a 4 WHEELER and 4X4 owner.

Let it be your guide in your ear and the source of friendly advice.

It shouldn't matter how much you know NOW there is always something NEW to learn.

## What This Book Is Not

Focusing more on the high level aspects of 4 wheeling and less on various brands and how to fix the transmission in your Mitsubishi or take the 302 engine apart.

This book is NOT a mechanical manual for your 4x4 - even though it will give you directions on how to acquire the needed reference material.

## Who This Book Is For

Through the years I enjoyed the light spirit and teamwork as well as making good friends with off-roaders. Since I started the 4x4OffRoads.com web site I am proud to say that I have gained friends from all over the world. From Pakistan in the East to Colorado in the West - South Africa in the South and of course Iceland in the North.

What comes as a surprise is that similar qualities are shared by so many of the wheelers.

## HELPFULNESS

When you are off the beaten track and on some remote and little traveled road. You meet a stranger going in the other direction. Stop and ask about the road ahead and give information about possible obstacles or problems from the road you just drove. Share your knowledge and learn at the same time.

## RESOURCEFULNESS

Getting by with the tools and equipment carried by you or your fellow travel companions is an art much more than science. Last weekend a friend of mine was in a trip where a radiator hose broke. Having no spare hose an improvised solution included sawing a piece of tailpipe from a Suzuki Vitara with a SWISS ARMY KNIFE! It took about an hour to saw through but the result was good for the rest of the trip.

In another trip the front main leaf spring leaf broke and was welded together using two batteries a welding wire and two pairs of SUNGLASSES for eye protection.

## CAREFUL EVALUATION OF SITUATION

Driving in traffic on the highway it is important to think ahead. Thinking ahead while driving on a trail or off-road is even more important. Going uphill you must be certain that you and your vehicle can get up and if not - a plan B to get the vehicle safely back down without rolling over and possibly hurting you, your passengers or stander-by's. Crossing a river is another such situation where careful evaluation could include wading the river to check if it is passable by your 4x4.

## OUTDOOR LIVING

Outsiders might think that driving off-road is like staying inside the truck at all times. As you probably know this is NOT TRUE. Most go wheeling to enjoy nature, discover new places and breathe in some fresh air. Occasional problems,

like getting out of a stuck or examining the route ahead also involves outdoor activities.

I know some hiking enthusiasts who walk for days in beautiful scenic landscape and NEVER look left or right.

ENJOY the trip and everything around it - plan on spending some time outdoors and you will fare well.

### **RESPECTING NATURE**

I think most wheelers respect and feast on nature just the way it is. They would like to keep nature as untouched by the works of man as possible. This preserves our territory - our playfield. Be responsible – it helps. Drive only on the trail and not doing any damage to the vegetation and geological formations.

What I find most rewarding is the...

### **CONSTANT LEARNING**

...Every trip seems to bring new sources of solutions to problems and new people to know and although the trip is sometimes to the same place I have visited before - the weather and season and other environmental factors somehow always seems to make it special.

# THINK

**Select Your 4x4**

**Modify At Will**

**Equip Your Rig**

## 2. SELECT YOUR 4X4

*The biggest mistake people make in life is NOT making a living at doing what the most enjoy.*

- Malcolm S. Forbes (1919-1990)

I tend to look at vehicles primarily from this angle. A-B cars are used to take you and your passengers from point A to point B. They can be equipped with various features to make the ride easier, more comfortable and even entertaining. A 4x4 can of course also be used to take you on the same route. On the other hand they can also be used to get to locations where it would be difficult or impossible to reach on an A-B car.

A 4x4 is used for supporting various activities. Some use it to go fishing in the weekends, others go skiing in the mountains and a number of people use it just to get to remote and little traveled places. Only a few use it almost exclusively to take on extremely rough tracks and sometimes competitions.

Apart from this - 4x4s are often higher and therefore easier for elderly and disabled people to board.

All these uses are good reasons to own and operate a 4x4.

You may as well ask - Is 4 wheeling then a way of life? That may be true - but the fact is most individuals have there own reasons.

In recent years the trend has been growing on marketing various levels of in-between cars. Subaru have from the beginning offered cars with drive on all four wheels. The recent Subaru Forrester is almost comparable to the Ford Escape. We have also seen the expensive luxury SUVs like the BMW X5, Porsche Cayenne and the Mercedes ML. I am not sure I would be comfortable with taking one of them on some Icelandic tracks I know!

Of note are also recent developments in diesel engines. They are growing fast in fuel efficiency and power. Take VW Touareg as an example. It has the most powerful diesel engine in mass produced vehicles. The V10 TDI with its 10 cylinders that produce 313 hp and 750 Nm of torque - high speed of 225 km/h and going from 0-100 in 7.8 seconds - sure sounds impressive. Call me harsh but for me this is still an A-B car.

What worries me most though - is that recent vehicles have more gadgets that can break down and are also becoming more and more difficult to fix out in the field - given you use only minimal knowledge and primitive tools.

As always the choice is up to you to select a vehicle that fits your needs and lifestyle.

The types of 4x4 vehicles available are ever increasing. You will have to make your own decision based on your intended use and how much money you want to spend on this particular part of your life. Will your 4x4 be used for the occasional fishing or hunting trip? Or will it be used daily in extreme and demanding terrain?

Like anything made by humans - 4x4 are a compromise. There is no such thing as the perfect off road vehicle. Make it fit all your family and still be able to take it wherever you want to go can be challenging. A great rock crawler would be slow

and uncomfortable for long journeys. A luxurious SUV with lots of space gives a great riding experience for long rides but might run into problems doing some serious river crossing or mudding.

Use what you got - try it out in various terrains. Enjoy the ride! Observe what can be improved and where you want to go. Minor things can be modified to make them function better and for major issues you may consider buying a new rig rather than performing some expensive modifications.

## CATEGORIES OF 4X4 VEHICLES

4x4 means a vehicle with 4 wheels with 4 of them connected to the engine by a driveline.

You can tell the difference between a real 4x4 and a 4x4 car or light SUV by a few important points:

- A 4x4 has a **transfer case** with **high** and **low** gear selection.
- A 4x4 has a **stronger driveline**.
- A 4x4 has a relatively **high articulation**.
- A 4x4 is in most cases **built on a frame**.

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Here is a table with a simple system for categorizing the different types available on the market:

<b>Type</b>	<b>Example</b>
4x4 car	Subaru Legacy
4x4 light	Land Rover Freelander, Honda CR-V, Toyota RAV4
4x4	Ford Explorer, Toyota Land Cruiser, Dodge Ram, Chevy Blazer, Jeep Cherokee
4x4 truck	Any modified 4x4 with larger tires than original
4x4 extreme	4x4 taken to the extreme and used primarily for competition or show.



A Dream 4x4

## YOUR NEEDS

Your selection should of course be based on your real needs but also and no less on your dreams. How many passengers will be with you? Where will you travel? Will your family fit into it?

Unfortunately talking with many 4 wheelers is not helpful. They tend to fall in love with a certain brand and tell you everything else is crap. Remember to take all

advice with a grain of salt – try to read between the lines. All brands have their weak spots and all have some good things.

Here are a few features to look for in your selection process:

- § **Engine** - The best engine for a 4x4 has lots of torque and is strong and durable. Simple design would also mean that it is easy to fix and is therefore an advantage.
- § **4x4** - Not every trip requires a real 4x4. If you can do with a 4x4 car consider that an option. Else you should select a 4x4 with high and low gears. That makes future modifications easier.
- § **Driveline** - Newer 4x4s are unfortunately often equipped with weak drivelines. They may work OK for easy trips but will break under heavy use. Changing these parts can be done, but is least expensive to get in the final 4x4. Take a moment to inspect the underside of the vehicle – a weak driveline is usually quite obvious.
- § **Modifiability** – If you have ANY dreams of future modifications remember that simple to modify is more economical in the long run. In extreme modification projects this will however matter less.
- § **Built on a chassis** – All trucks and many SUVs are built on a chassis. Unibody designed vehicles like the Grand Cherokee limits your choice in modifications.

- § **Weight** – It is easier to get a light 4x4 unstuck than a heavy rig. Lighter weight also means less fuel consumption and smaller tires will do the job. Too light may get you into trouble in river crossing.
- § **Doors** – Two doors are enough if you travel alone or with one co-driver. Else I would recommend you go with four or more doors to ensure safe access for all passengers.
- § **Price** – Consider both the initial investment as well as the cost of running the 4x4. Cost of running is both the fuel it will use as well as the cost of spare parts, repairs and taxes.

## Street vs. trail properties

The design of most manufactured 4x4s today is a compromise between highway driving, comfort and off road capabilities. American manufacturers are making 4x4s with independent front suspension (IFS) the norm. This makes for a better highway handling but is often weak in the off road scene and tends to mean less articulation and in some cases the IFS system works as a snow plough when you are in deep snow or mud. This may get your truck stuck in some ugly situations.

The best IFS systems are perhaps in the Hummer.

## SUV – pickup

A pickup in most cases is a pretty basic design. It is built to carry heavy stuff and take it to some nasty places. The load varies so it has leaf springs at the rear in most cases. As you may know I am no fan of leafs. A pickup is a good choice for modifications - especially if you want to keep your wallet safe.

SUVs are made to carry people and do it in some level of comfort. Early SUVs where simply made by small design modifications to a pickup but today they are designed from the ground up.

## Short wheel base – Long

The traditional Jeep has a short wheel base. Having the small size along with light weight meant that it was easy to take to places that were narrow and a Jeep is not easily high-centered. Unfortunately the suspension works against the short wheel base in high speed off-roading. Making the vehicle unstable and taking on all small obstacles with a bad rhythm for driving. Taking on steep slopes either up or down can result in a rollover backwards or forwards.

As the wheel base gets longer the ride will be better for the suspension. To keep save of getting high-centered you may have to consider larger tires and some lift also.

This is a matter of much debate among 4 wheelers. I tend to lean towards the longer wheel base vehicles.

Another rule of thumb is to keep the wheels as close to the corners of the vehicle as possible.

## Size and weight

Generally speaking it is best to have a light 4x4. It will need smaller tires and consume less fuel. The major drawback comes when crossing deep rivers where the danger of floating up is higher. Too heavy and nobody is going to be able to pull you up – except for a bulldozer or something similar.

Another problem with heavy vehicles is the fact that wheel size needs to increase more than you might think. The need will grow squared to achieve the same character.

## Room for passengers

All your passengers should have a safe and comfortable ride. Getting everybody out of the vehicle when you are stuck in the middle of a river is your responsibility. Enough doors are therefore more than a luxury.

Seat belts for everyone is highly recommended and a legal requirement in most countries.

“Cushy” is a word that many 4 wheelers hate. However for longer trips it is just so much easier to keep everybody happy if they are comfortable. Think about your kids and how irritated they may get.

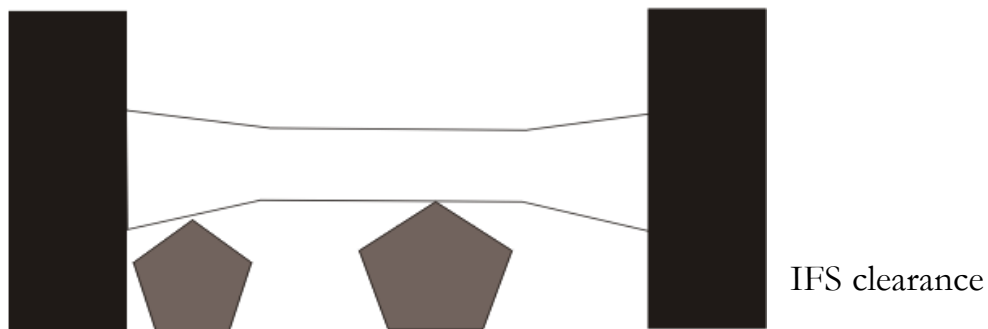
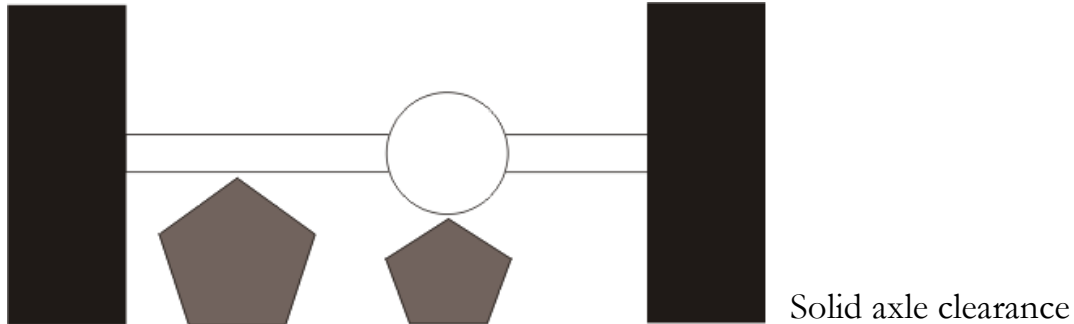
## MODIFICATION POTENTIALS

“Real 4x4s are built” is often said. Most 4x4s that make it to the manufacturing stage are better on the street than off road. Exceptions are perhaps the Jeep Rubicon and the Hummer.

A modified 4x4 is in part a statement of who you are. It is more than a status symbol. If you want to go the modification route make sure you have a clear picture in your mind of your finished vehicle.

Every 4x4 – and in fact every car – can be modified for various off roading purposes. What differs most is the cost of modifications and how much you can stick with the original driving characteristics.

## Clearance



Imagine driving on a rocky road with boulders standing up once in a while. In order to stay clear from a rock hitting your rigs undercarriage you need clearance. The more clearance the higher a boulder you can straddle.

Clearance is the height under the lowest point under your 4x4 (excluding the wheels of course). Clearance of your vehicle is something you will have to know instinctively. Take a look underneath your 4x4 and see what parts are closest to the

ground. Most important is to know if you can drive with the boulder between your wheels, straddle it or if you have to make other plans of attack.

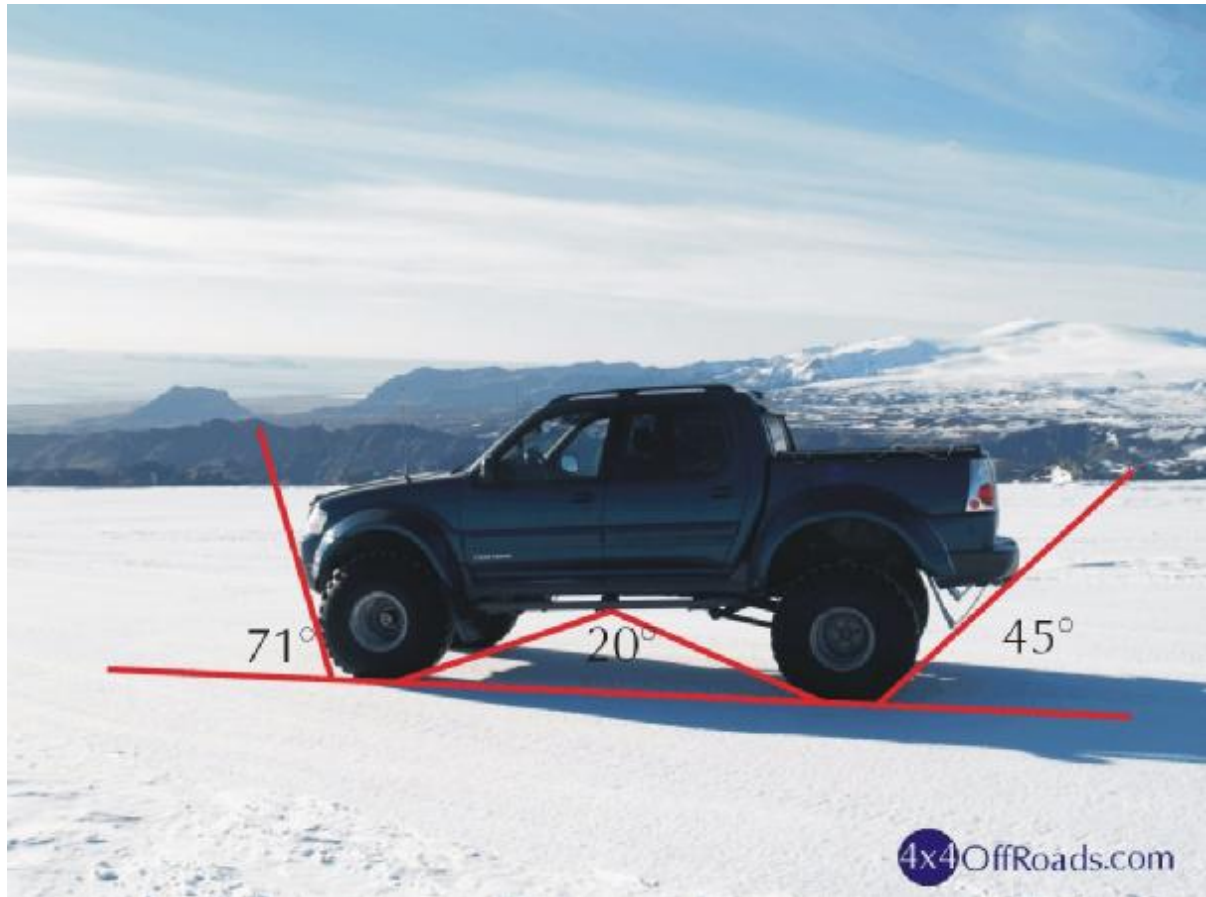
Solid axle usually allows for more clearance although you must watch out for the differential unit that is the lowest point by taking the rocks closer to the wheels.

IFS (Independent Front Suspension) can straddle slightly smaller rocks. The lowest point is also closer to the wheel so you must keep rocks close to the center. Just don't forget the rear axle that is usually solid with the differential unit in the center.

In loose ground, like snow, sand or mud the IFS tends to work like a bulldozer. Scraping the ground and finally stopping your vehicle if it gets too deep.

Clearance will be increased with larger tires and also by suspension lifting the truck.

## Approach and departure angle



Angle picture

Imagine holding a plate in front of your front tires. The plate will usually touch the front bumper. The approach angle is the angle this plate makes against the flat surface.

Off roading requires this angle to be as close to  $90^\circ$  as possible.

Departure angle is measured in a similar way.

High approach angle is in most cases more important than high departure angle. Because it is the approach angle that is usually the limiting factor when climbing up a steep slope.

## Ramp break-over angle

The ramp break-over angle is the angle formed by a triangle drawn from your front and rear wheels to the highest spot between them. This is higher for short wheel base vehicles but will always be improved with larger tires and suspension lift.

## Fording depth



Fording a river

The fording depth is the recommended maximum depth of water a particular 4x4 will cross without damage and without stalling the engine. Newer luxury 4x4s - like the Mercedes M-Class and Porsche Cayenne - have lots of electronic gadgetry on and around the underside of the vehicle and will therefore allow lower fording depth.

This is one reason I guess you don't see too many modified 4x4s of the high luxury type.

Moving the engine air intake to inside the cabin or adding a snorkel will increase the fording depth considerably. Then other factors come into play – like how well sealed the doors are.