

# Practical 4x4 and automatic gear basics



## Car driving in the mountains

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april 30th 2010

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## Practical 4x4 and automatic gear basics

One of the problems from tough guys driving a 4x4 is that they can't confess they actually don't know how to drive it and they just do something.

Driving a car in the mountains, especially in areas with non paved roads is not as easy as it looks like. In the Usambara mountains in Tanzania, where we live, we have experienced some serious accidents even from experienced drivers. Accidents which would have been prevented if the driver would have better understood the art of driving and the behavior of their car.

However car driving is not ecological founded also for us as eco-lodge in a remote area having a car is essential. To compensate we want to share our experience and knowledge if only because because of the astonishing number of drivers we met who are driving in a four wheel car or an automatic car without even knowing how it really works.

No, we don't want to promote fun driving but we have to be honest. If there is a heaven for 4x4 drivers it would look like the Usambara Mountains. At the same time however it contains dangerous circumstances for car driving. In heaven you can't die anymore. Unfortunately in the Usambaras you can, often professional help is far away and the medical facilities are poor. Keep that in mind!

So, fasten your seatbelts and here we go!

### Why you have a 4x4

However it sounds not logical using four wheel drive most the time is not because you have to drive with four wheels but because something else is happening: Your 4x4 car can also switch to an even lower gear than the first gear in two wheel drive. This causes that you produce a lot more power with the same speed but with more revolutions of your engine. So in this way your car has more power and can ascend a slope easily (in low speed) which would not be possible if you drive with 2 wheels. Additional, having 4 driving wheels gives you more control and less chance for slipping away.

#### What we learned from driving a 4x4

- Realize that you probably don't fully understand how to drive it.
- Using 4x4 often is not because of driving with 4 wheels but because of having an even lower gear than the first gear in normal 2 wheel drive cars.

## 4x4 basics

For using 4x4 you have a special gear-handle. Remind that you can switch to another position only when the normal gear is in neutral. Like the normal gear it's important to think in advance and don't try to change when you are half way a slope.

Below you find in which circumstances you should use which position:

### 2H (2 wheels, high gear)

Normally the 4x4 gear handle has to be in the "2H" position which means that your car acts like a normal 2 wheel drive car. However your car will have the advantage that it's high in the springs and can pass rough roads more easy. So in general there is no need to do something special.

### 4H (4 wheels high gear)

Here you put the car in 4 wheel drive to divert the power among 4 wheels.

#### *When to use 4H:*

- for traction when the area isn't steep
- when stuck in sand or mud
- extremely slippery conditions
- snow
- ice
- rocky, gravel roads
- extremely muddy areas
- ridges



### 4L (4 wheels low gear)

In this position you have the fully advantage of your 4x4.

4L is for creeping along at slow speeds. It reduces the strain on your vehicle. Just remember to stay below 30 km/hr in low range. While it does not provide more traction, it does provide 2-3 times more torque at about 1/2 or 1/3 of the speeds in high range. Low range gear ratios are approximately half that of high range.

When you drive in 4L there is no need to switch from 1 to 5 during increasing the speed. You just put it in the right gear and off you go. If you don't have a heavy load your engine is strong enough to start in a higher gear.

#### *When to use 4L:*

- on wet, slippery surfaces
- passing through sandy areas
- on rough trails
- through shallow water
- rock-climbing
- climbing steep hills
- through mud
- descending steep hills

### **What we learned from 4x4 basics**

- In 2H your car is like a normal 2 wheel driving car.
- In 4H you have more control which is useful on slippery roads.
- In 4L you have more control and more power with a lower speed.

### **Diff lock**

Every car has a “differential” (so called “diff” among us) which is the part that makes 2 wheels rotate from one rotating engine. This diff system has one disadvantage and that’s if one wheel is slipping there is no power anymore on the other one, the other one is not rotating anymore and you are stuck. In normal car’s the only thing you can do is trying to stop the slipping wheel by putting a stone or something under it.

In a 4x4 you can “lock” the front-diff so both wheels are always turning at the same speed.

In modern 4x4 cars this goes automatically but in older models you have to get out and lock the diff by hand on each frontwheel.

In difficult circumstances it is wise to lock the diff every time you use 4x4. In cases of different use you can keep the wheels locked, even if you drive in 2H. Remind that steering in this case is more difficult.

With automatic diff locks the car can make a “bonky” sound a while after you switched back from 4x4 to 2WD. This indicates that the diff lock unlocks and is nothing to worry about.

### **What we learned from the diff lock**

- The diff locks prevents your front wheels from slipping.
- There are automatic diff locks and manual diff locks

After the basics we can jump in and off we go:

## Driving upwards

In general your car has the optimal power when the number of revolutions has a fair amount.

If the power is not enough to get uphill the number of revolutions drops, the power drops and the revolutions drop further till you stop. If you drive upwards it can happen that your car runs out of power and you have to switch to a lower gear.

Here you have a fair chance to fail: If you make a mistake during changing gear on a slope you take the risk that the car stops and goes backwards while it is still in its neutral. Once it starts rolling backwards it is very hard to stop again, especially when it is a bit slippery or you have a heavy load.

*Here you go:*

- Always take a low gear before you start to climb a slope and never half way.
- If you make a wrong estimation don't switch the gear but let the car and the engine stop while it is in the gear. If everything stops the car can be controlled because it is in its gear with no running engine and you can push the brake. After that ensure that's not rolling back by pressing the brakes or with heavy cars even let your co-driver put a block behind the wheels, switch to the first gear, start and continue in the first gear.

*You don't manage to drive up because of a lack of power?*

Just turn backwards, put the gear in its reverse and off you go. Since the reverse gear has a very low speed, even lower than your first gear this can work!

### What we learned driving uphill

- Think in advance and put your car in the right gear before you start to climb the slope.
- If you fail don't switch gear halfway the slope but just stop and try again in the lowest gear.



*A landrover in trouble after changing gear on a slope*

## Driving downwards

In general also use low gears if you are going down in the same way as you would use it if you are going up. If your gear is too high, the car is not braking on the engine anymore and your car can go out of control.

Driving downwards from a slope is even more scary than driving upwards, since you can't stop that easily. Especially on slippery slopes you easily slip sideways. The trick is not to brake and not to accelerate too quickly but let your car gently go down in a low gear and just use the handbrake. This will brake on your back wheels only and the car will go straight or straight again if you slipped away.

### What we learned driving downhill

- Don't accelerate or brake and use a low gear
- Use the handbrake to straighten the car if it's slipping away.

## Driving through mud or slippery roads

If the road is slippery, f.e. because of rainfall there is a fair chance that you slip away to the lower side or get stuck in the mud. Pushing the accelerator pedal does not help because it just spins the wheels and brings you even in more trouble.

Here is the trick: Because your car is in low gear (especially in 4L) it gives too much power on your wheels and that's why they start to spin. In these circumstances it's better to switch to a high gear (2, 3 or even 4, for automatic cars 2 or D) and slowly accelerate. You will see you move again!

### What we learned driving on slippery roads

- In a low gear your wheels easily can spin.
- Use a high gear and drive slowly

## The secret of an automatic car

For the "real stuff" and from the maintenance point of view an automatic gearbox is inferior of course but from the easy and especially safety point of view it's tremendous! you hardly can do it wrong..... if you understand the basics.

However the gear is called automatic, it's far from that. Indeed you miss the clutch but for the rest you have to put handles and push buttons in all kinds of different circumstances, nothing automatic on that.

### The basics of an automatic gear

#### P (Park)

In this position the wheels are locked; you can't move and it's even a nice way to park without need to use





your hand break.

What nobody is telling you if you drive the first time in a car like that is that you have to press the brake before you can change gear. Remind this to prevent getting a red head. This makes sense since you are in P and the car can't roll forwards or backwards if you change gear.

Once you drive you always can change gear! This is very handy, f.e. if you are on a slope and you don't manage to reach the top.

I never did it, but in circumstances of emergency you can even push it to the P position for an emergency break. Keep this in mind, it can save your life.

### **R (Reverse)**

For driving reverse, nothing special

### **D (forward)**

This is the normal position which lets you drive from zero to the maximum speed.

Nothing special.

### **2 (lower gear)**

Here your car gives more power since the engine makes less speed with the same amount of revolutions.

Use it on a slope or in heavy conditions. Remind that the maximum speed is reduced.

### **L (low gear)**

In this position your car slows down but has way more power. Use it on steep hills.

Remind that if you make a wrong estimation with a steep hill here the automatic gearbox gives you a great advantage since you simply switch back from D to 2 or even L without putting the gear in it's free. No change for rolling back like you have in a hand switched car!

### **Overdrive**

Some cars have also an "overdrive" This is a button most the time is on the gear handle. Push this one at high speed at flat roads to reduce the number of revolutions to save fuel, drive even faster or more quit.

On our car it gives a strange sign on the dashboard which say's OD OFF, so the light is burning when it is off where you expect it to burn if it is on.

Remind never to use the overdrive in the mountains. It reduces the number of revolutions and with that also the power of the car.

### **Using 4x4 in an automatic car.**

To switch to 4x4 just put the gear in N (Neutral), choose the right 4H or 4L and off you go. It's as easy as that!

#### **What we learned driving with an automatic gear**

- Push the brake to switch gear from P to another gear.
- During driving you always can change gear even to P for a emergency brake.
- Use 2 or even L to climb steep hills
- Don't use the overdrive in the mountains.

## Seatbelts

Seatbelts are obliged by law and can save your life. In the mountains it's the question if they do. If you fail and your car starts rolling down you better can be free to jump off. The choice is up to you of course.

## Learn from accidents

In several cases it appeared that the car rolled backwards from an ascending slope and went out of control. There were two main causes:

*Case 1:* The driver had the car in the wrong gear and tried to switch gear on the slope. He failed and the car rolled backwards in its free. In the mountains you have general two options, or you manage to put the car to the mountain side, which is the best or into the valley side. If you have a pickup or truck both can harm your passengers seriously.



*Photo: another case of wrong gear on a slope*

*Case 2:* The driver had the car not in 4x4 yet and tried to ascend a steep slope in 2 wheel drive. Unfortunately the road was a bit slippery with huge rocks and the wheels started to slip and the car got out of control and went backwards off into the valley. Lucky wise most passengers could jump out and only one had to go to hospital.

In another case it appeared that it can be dangerous to drive close along the valley side of a road.

*Case 3:* Short after rain the driver tried to avoid potholes. On one spot he did not go to the mountain side but to the valley side. Because the soil was not solid anymore it gave way and the front wheel went down and the car rolled down in the valley.

### What we learned from some accidents

- Never change gear on a steep slope.
- Be prepared and use your 4x4 better too early than too late.
- With steep valleys stay as much as possible at the mountain side.

## Postscript:

However this document contains very basic, almost logical instructions we hope it opened an eye for the problems which you did not understand or even not realize driving a 4x4.

If you have some comments or additional tips, please let us know so we can improve this document.