



Basic Off-Roading



Basics

- Don't go alone
- Always wear your seatbelt including all passengers
- Keep your body parts inside the vehicle
- Know your vehicle, its limitations, and yours
- Examine and analyze each obstacle before attempting a difficult situation
- If you need help, ask for it
- Always drive as slow as possible; it's not a race
- Thumbs up! If you don't have power steering, this will save your hands
- Look in all directions when you drive, not just in front of you



4-Wheel Drive Systems

- Part-time 4-Wheel Drive
 - May be used in high/med/low traction surfaces
- Full-time 4-Wheel Drive
 - Only for med/low traction surfaces
- All Wheel Drive
 - No low range



Components of 4-Wheel Drive

- Engine
- Transmission (manual or automatic)
- Transfer Case
 - Splits power between front/rear axles
 - High and/or low range
- Front/Rear Axles
 - Traction devices



Axle Traction Devices

- Open Differential
 - Power goes to wheel with the least resistance
- Limited Slip
 - Limited means limited
- Automatic Lockers
 - No need to think
 - There are quirks
- On-demand Lockers
 - Turn them on when needed
 - Turn them off when not needed



Traction

- Traction is key on any surface to continue moving, whether it be on a residential street, highway, dirt road or off-road
- Vehicle components affect traction; tire width, tread pattern, transmission, etc.
- Condition such as wetness, dryness, snow covered, etc. of the driving surface affects traction of the vehicle
- Your driving technique affects traction
- The combination of the terrain, vehicle, and driving technique ultimately determines what kind of traction the vehicle will have



Traction: Terrain

- Dry terrain
- Wet or Snow covered terrain
- Flat Ground
- Uphill
- Downhill
- Side hill
- Mud
- Rocks
- Logs
- Loose Dirt, Rocks, and/or gravel
- Different Combinations of the Above



Traction: Clearance

- Low hanging parts of vehicle
 - Front/Rear Diff
 - Shock mounts
 - Lower control arm mounts
 - Skid plates
 - etc
- Approach Angle
 - Angle the vehicle can go up hill from a flat surface without being stopped by the front bumper on the way up
- Departure Angle
 - Angle the vehicle can go from a downhill slope to a flat surface without getting the bumper stuck on the hill
- Break-over Angle
 - The steepest hilltop the vehicle can go over without getting high-centered at the top



Traction: Vehicle Components

- 4-Wheel Drive System
- Axle Traction Devices (lockers)
- Tires
 - Tire Pressure
 - Bias Ply vs. Radials
 - Tread Pattern
- Suspension
- Gearing
 - Transmission
 - Transfer Case
 - Axle



Traction: Driving Technique

- Ultimate motto is “As slow as possible and as fast as necessary”
- Keep the underside of the vehicle as high off the ground as possible
- Use the gas peddle
- Use the brakes
- Gear selection / Engine braking
- Momentum
- Picking a line (over it, around it, left side, right side, which angle, etc.)
- If spinning tires, stop as you could be digging a deep hole especially in mud, sand or snow
- With lockers, if front or rear starts to bounce on an obstacle, ease off the gas immediately because of possible breakage
- With manual, start engine in gear without using clutch
 - Might need to enable this on newer vehicles
- With automatic, practice two-footed driving



Going Uphill

- Know what's on the other side!
- Going Uphill w/ Good Traction
 - Take it easy going up as to not tear up the trail
- Going Uphill w/ Medium Traction
 - If no lockers, probably need a little more momentum
 - If use lockers, can use less momentum
- Going Uphill w/ Low Traction
 - Probably will need momentum to carry you up
 - Lockers will be a benefit
- Don't fly over the top of the hill, ease up on the throttle as you near the top; if you can



Going Downhill

- Go as slow possible or as fast as necessary to keep control of the vehicle
- Pick the lowest gear possible; engine braking
- Some hills might not have enough traction to go slow (i.e. loose rocks, gravel or dirt)
- On a steep downhill with low traction, it's easier to speed up a vehicle than trying to slow it down
- If you lockup your brakes on a steep, low traction hill you can lose steering



Going on Side Hill

- Try to avoid steep side hills if possible because of higher probability to rollover
- If can't avoid, try to stay as flat as possible on the trail
- Don't drive over something that may lift the high side of the vehicle even higher
- If vehicle feels like it's going to rollover, turn down hill and possibly apply a little gas to shift weight of vehicle



Mud Hole

- Check the depth before continuing on
- Are there tire tracks on the other side?
- Any hidden obstacles in there?
- May need a little more momentum
- Don't spin the tires too much if stuck as you can dig yourself into a deep hole
- Lockers and Tire Type help tremendously with traction
- If attempting something deep, have a strap attached to the vehicle before hand
- Mud can invade system fluids in differentials, transfer cases, transmissions and brakes. Check fluids for mud if you drive through mud frequently or if you went through a deep mud hole



Water Crossings

- Cross streams at designated crossings
- Enter stream at a moderate speed
- Be cautious of all stream crossings, especially fast-moving water
- Water flow level fluctuation can indicate obstacle or drop-off in crossing
- If you can't see the bottom of the stream, use a stick or have a person cross the stream to check its depth and to check for hidden obstacles
- Before going into water above your axles, know where the air vents are and the air intake is located
- If water deep
 - you may hydro-lock your engine
 - watch engine RPM as the fan blade may bend and hit the radiator
 - can put a tarp over the front of the vehicle
- If engine stalls mid-stream and have manual transmission, **DON'T USE THE CLUTCH**. Start the engine in gear if the engine has not hydro-locked



Crossing Logs

- Logs are best crossed at an angle
 - One tire at a time
 - Therefore the other three (3) tires provide traction
- Make sure you have the ground clearance to get over the log
- If not enough ground clearance, you can place rocks, branches, etc. to build a ramp to provide better clearance
- You may need to “Bump It”
 - a term used to apply a little extra gas to get over an obstacle



Rocks

- Rocks are your friends
- Put a tire on the rock to lift the underside of vehicle
- Go as slow as possible so the vehicles doesn't bounce around
- Lower tire pressure helps as the tire will conform around the rock to give you better traction
- Lockers and Tire Type help tremendously with traction
- You may need to "Bump It"
 - a term used to apply a little extra gas to get over an obstacle



Stuck on an Obstacle

(kind of)

- Backup and take a different line
- Turn wheel left and right to get traction
- Try “Bumping It” to get over it
- Get out and check
 - ONLY if the vehicle can be safely left
- Ask for a spotter
- Stack some rocks
- Turn on those Lockers
- With an open differential, tapping on the brakes can transfer power to the wheel with the most traction



General Driving Tips

- Know your vehicle
- Watch what other people do
- Other vehicles are different from yours' and therefore will react differently on the same terrain
- An obstacle will change after each vehicle; a little or a lot depending on the terrain
- If need momentum, try a little first then increase as much as necessary or that you feel comfortable with
- Get out and check obstacle before attempting or if stuck
- Don't be shy, ask for help
- No shame in going around an obstacle or taking a strap/winch to get through it