MESLEKİ İNGİLİZCE II

ROAD VEHICLES & THE VEHICULAR SYSTEMS

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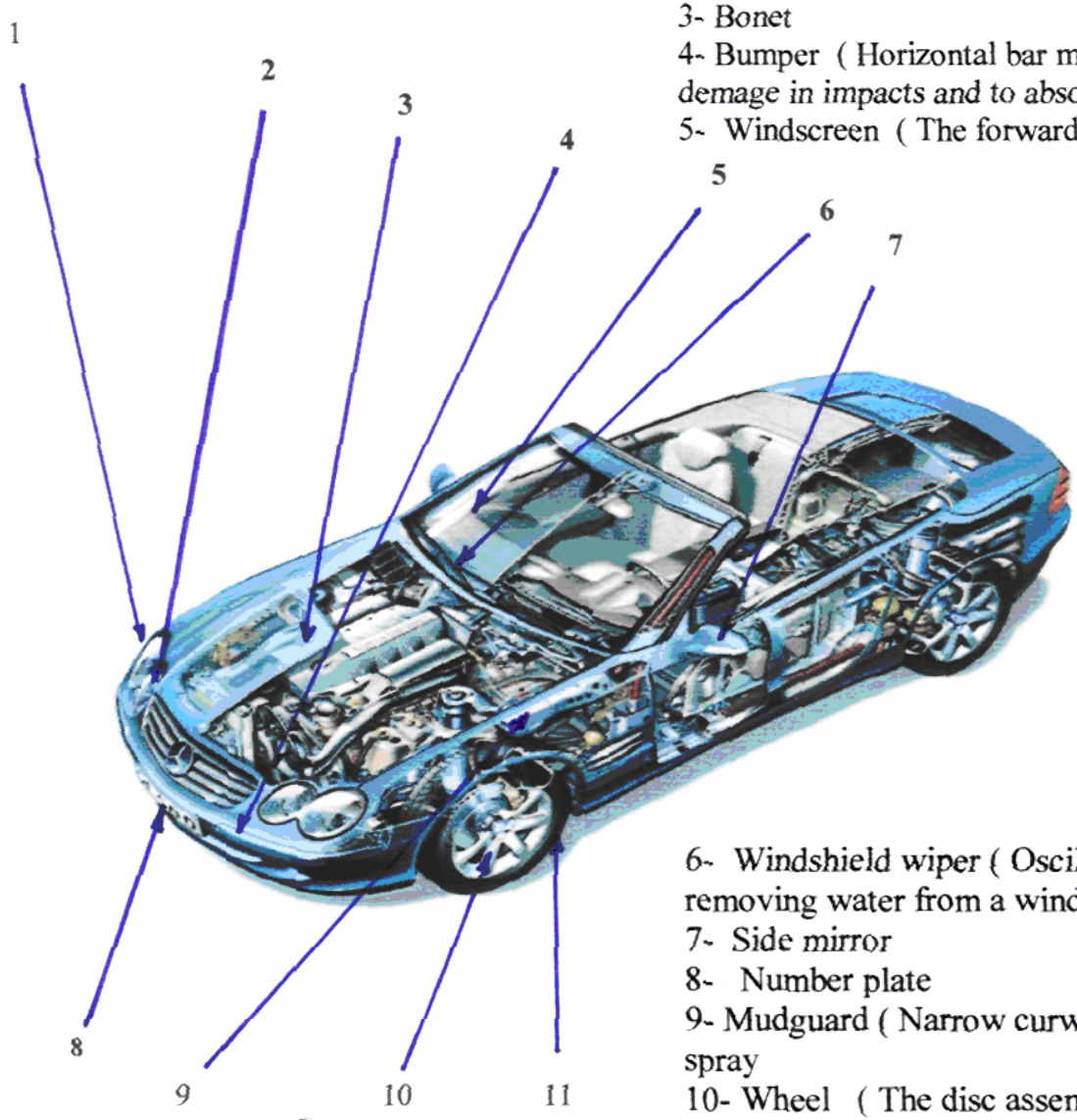
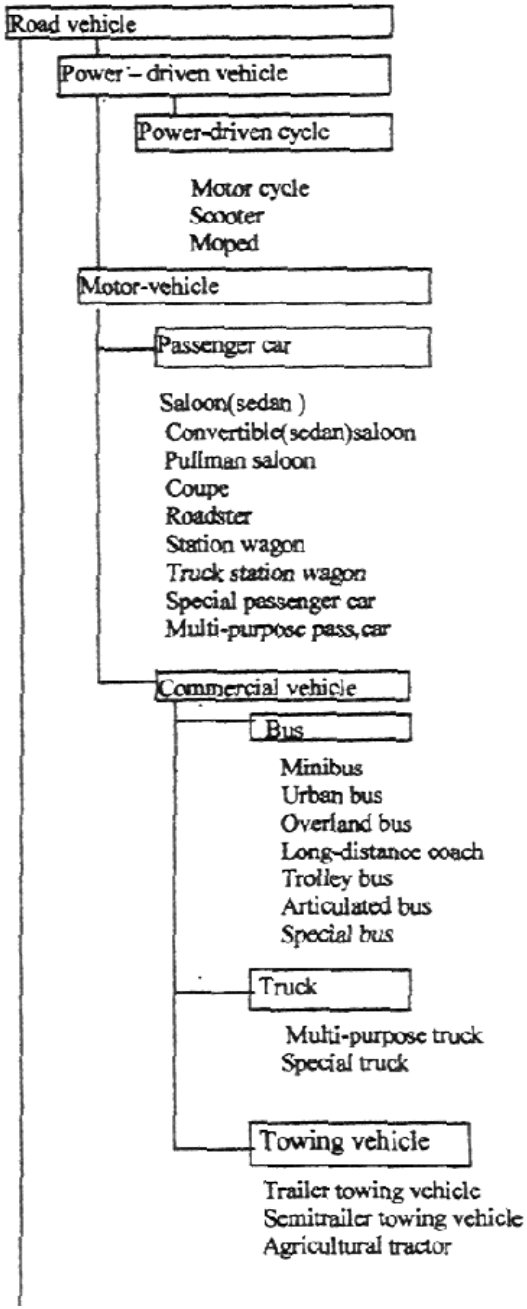


1- Headlamp (produces upper and lower beam illumination)
2- Parking lamp (Lamp to show the presence of parked vehicle, white front and red to the rear
3- Bonet
4- Bumper (Horizontal bar mounted at front and rear of vehicle to prevent or reduce demage in impacts and to absorb impact energy
5- Windscreen (The forward facing window of a vehicle

Layout of an Automobile

6- Windshield wiper (Oscilating blade with flexible rubber blade for cleaning and removing water from a windscreen
7- Side mirror
8- Number plate
9- Mudguard (Narrow curwed panel mounted over a wheel to deflect tyre generated spray
10- Wheel (The disc assembly on which a vehicle runs)
11- Tyre (Air filled or solid rubber covering for a wheel)

1. Road –vehicle systematics



Definition, examples

Engine-driven road vehicle

Single track vehicle with 2 wheels , possibly with sidecar

With fixed vehicle parts (e.g , tank) in knee area
Without fixed vehicle parts in knee area
With characteristics of bicycles

Multiple –track power –driven vehicle

For max . 9 persons.

Enclosed body,max. 4 side doors
Convertible top , fixed side panels
Stretched to provide more cabin space , max . 6 side doors
Enclosed body,max. 2 side doors
Open body , possibly with roll bar , 2 or 4 doors
Larger interior with loading area
Delivery truck
Ambulance , recreational vehicle
All-terrain vehicle , enlarged saloon

Transport of passengers and goods .

Transport of more than 9 passengers and luggage

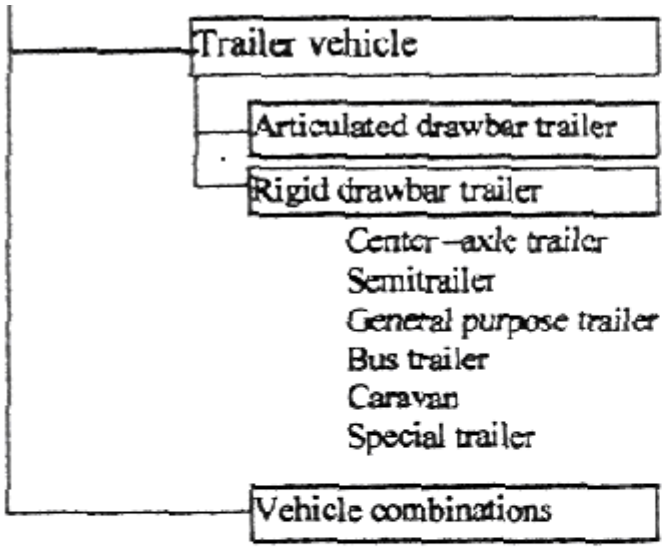
max, 17 passengers
Urban and suburban scheduled routes , seating and standing room
Overland scheduled routes , without special standing room
Long-distance transport , no standing room
Electrically powered from overhead wires
Two vehicle sections with articulated design and walk-through feature
Special vehicle bodies , eg , for the disabled , prisoners

Transport of goods.

Truck with open or closed body
Transport of specific goods (e.g , tankers) or for particular uses
(e.g ., towing vehicles)

Commercial vehicle for pulling trailer vehicles

For pulling trailers , goods on auxiliary loading area
For pulling semitrailers
Towing vehicle , also for pushing , carrying or driving
interchangeable units

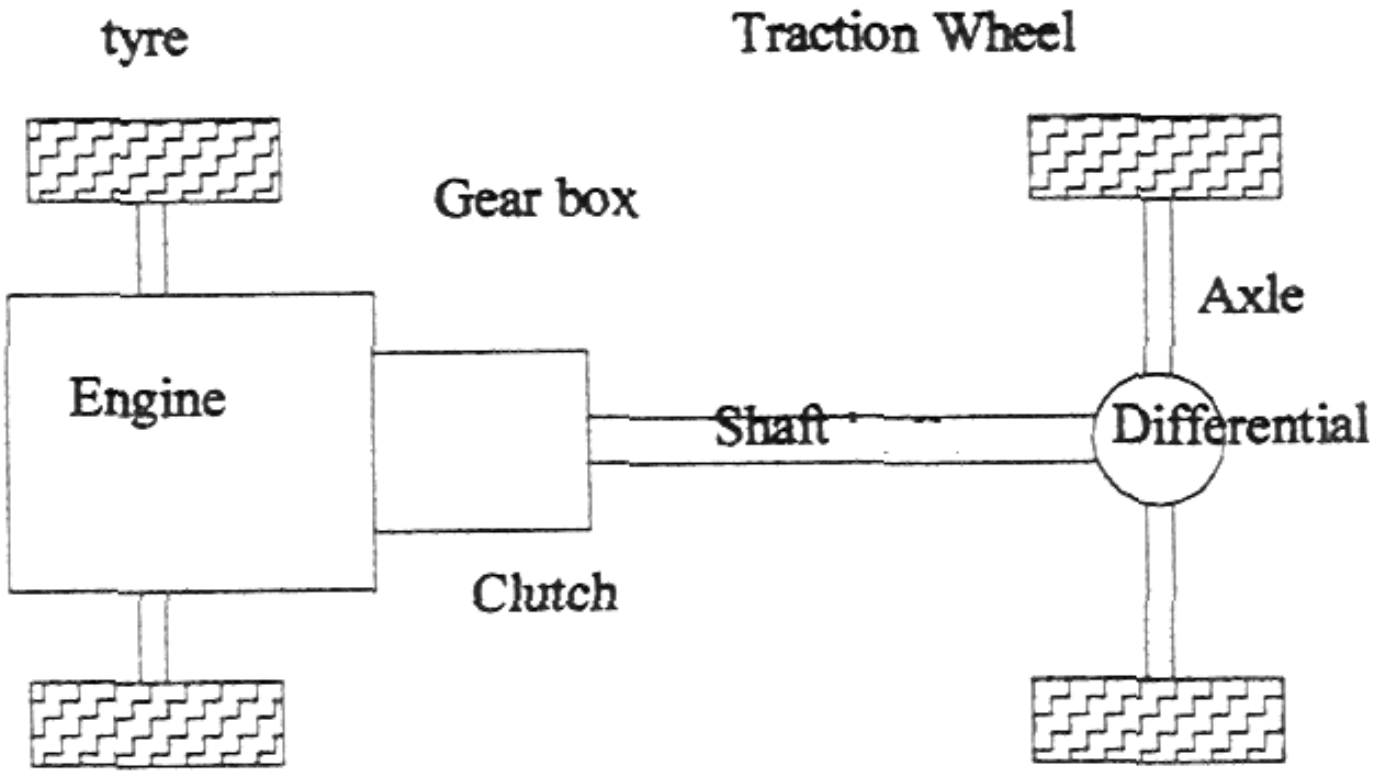


Non-self propelled vehicle

Vehicle with trailer

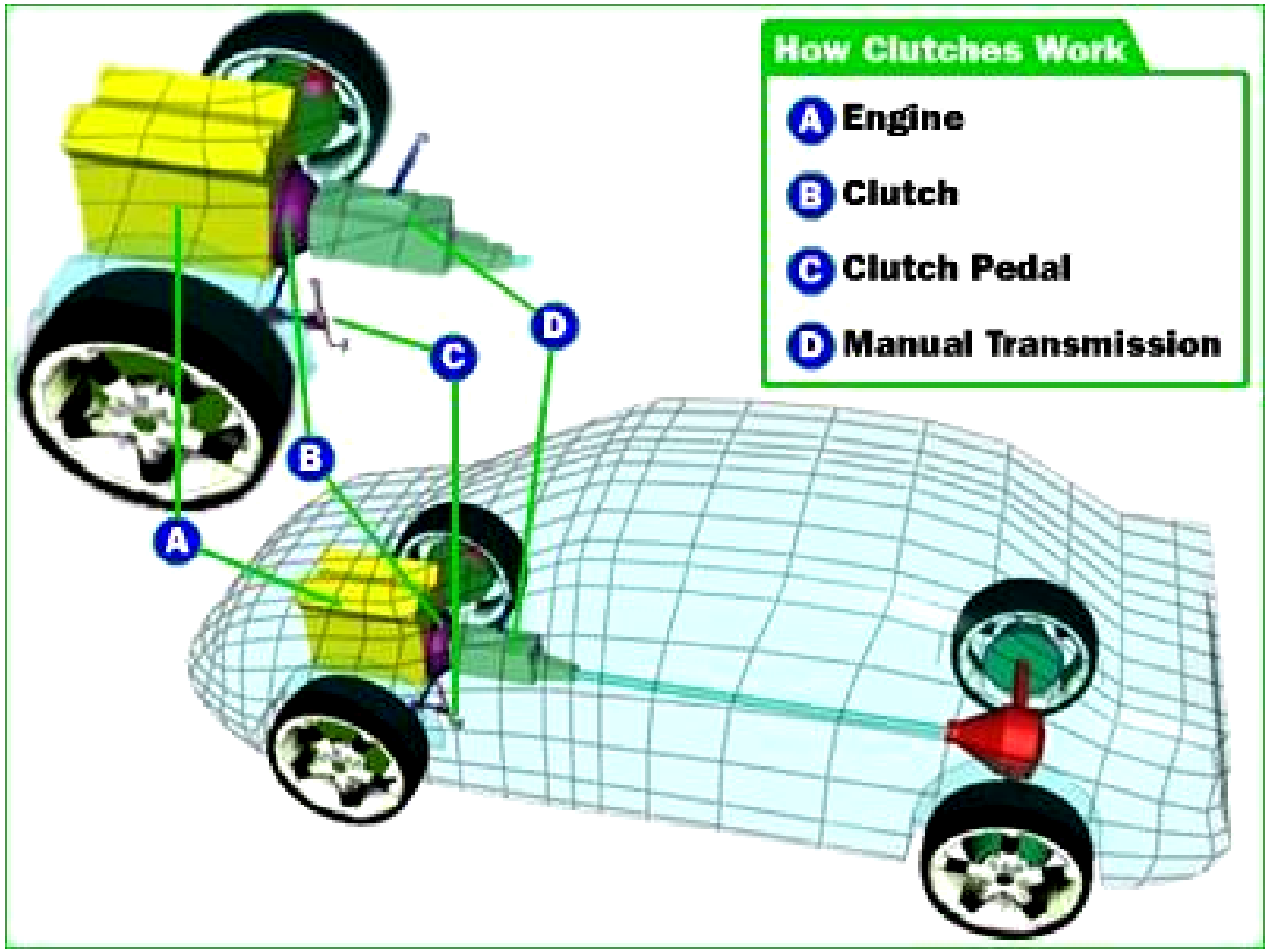
Passenger car with trailer
Bus with trailer
Truck with trailer
Towing vehicle with trailer
Semitrailer towing vehicle with semitrailer
Semitrailer vehicle with semitrailer
Truck or towing vehicle with special trailer (dolly), the load forms the connection between two vehicles

Powertrain



The power train of the car

Clutches

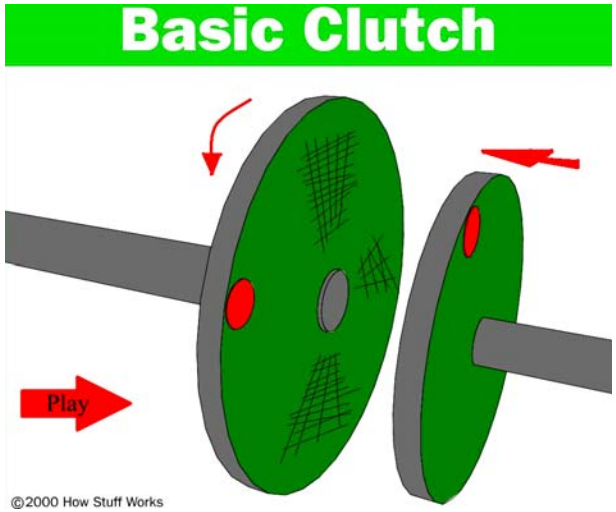

How Clutches Work
A Engine
B Clutch
C Clutch Pedal
D Manual Transmission
A
B
C
D

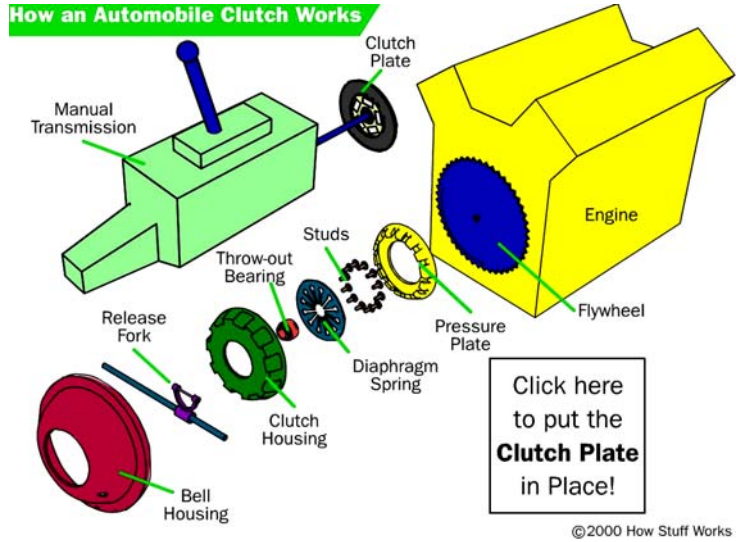
Why Do We Need Clutches?

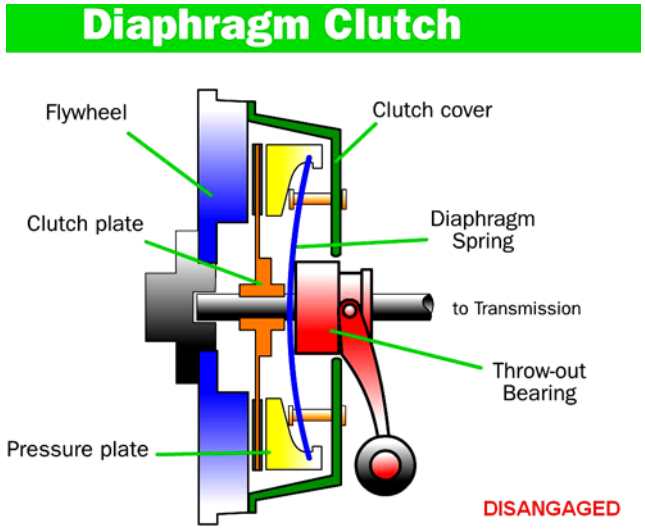
Clutches are useful devices with **two rotating shafts**. One of the shafts is typically driven by a motor or pulley, and the other shaft drives another device. *In a drill, for instance, one shaft is driven by a motor and the other is driving a drill chuck (matkap aynası). The clutch connects the two shafts so that they can either be locked together and spin at the same speed, or be decoupled and spin at different speeds.*

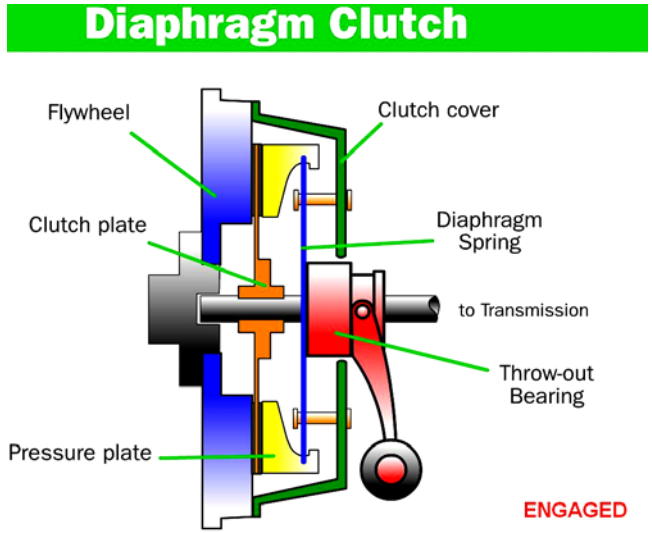
In a vehicle, a clutch is indispensable, because the engine spins all the time and the *wheels* do not!!. In order to a car to stop without killing the engine, the wheels need to be disconnected from the engine somehow. The clutch allows us to engage a spinning engine to a non-spinning transmission smoothly by controlling the slippage between them. To understand how a clutch works, it helps to know a little bit about friction.

Clutches

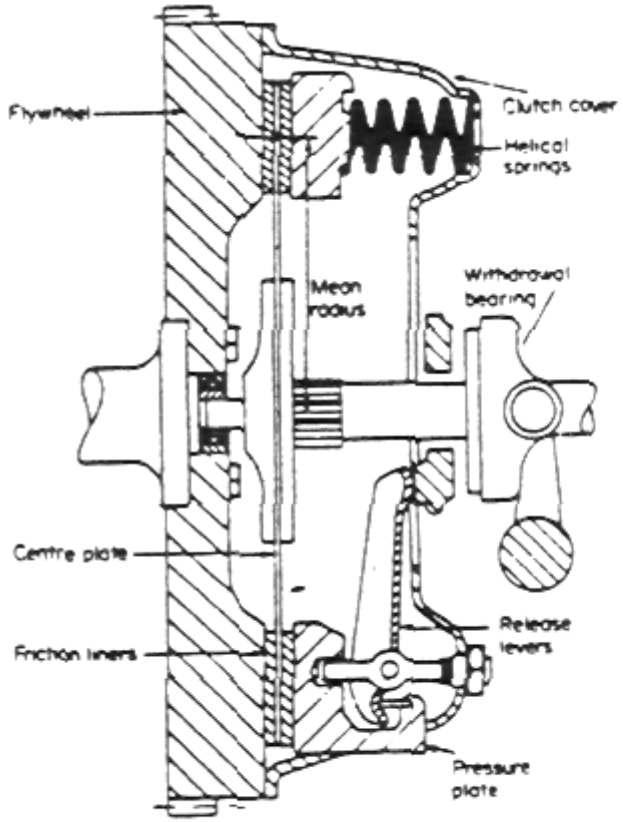

Basic Clutch
Play
©2000 How Stuff Works

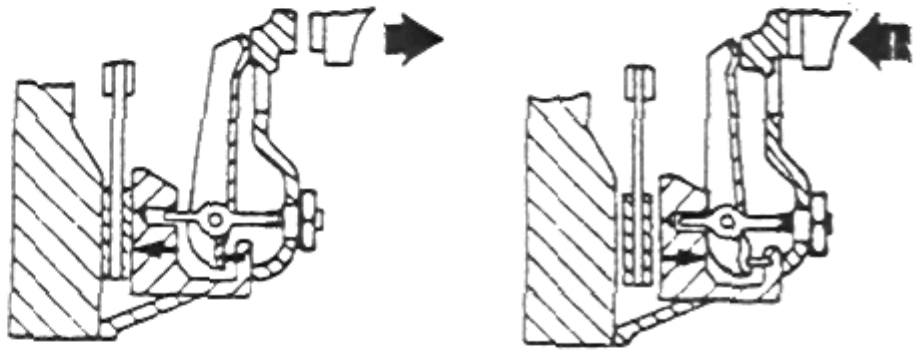

How an Automobile Clutch Works
Clutch Plate
Manual Transmission
Engine
Studs
Throw-out Bearing
Release Fork
Pressure Plate
Flywheel
Diaphragm Spring
Clutch Housing
Bell Housing
Click here to put the Clutch Plate in Place!
©2000 How Stuff Works


Diaphragm Clutch
Flywheel
Clutch cover
Clutch plate
Diaphragm Spring
to Transmission
Throw-out Bearing
Pressure plate
DISANGAGED


Diaphragm Clutch
Flywheel
Clutch cover
Clutch plate
Diaphragm Spring
to Transmission
Throw-out Bearing
Pressure plate
ENGAGED

Clutches





General arrangement of a multicoil spring clutch

The purpose of *clutch* is to engage and disengage the *transmission system* from the *engine* when a *vehicle* is being driven away from a standstill and when the *gearbox* gear change is necessary. The gradual increase in the transfer of engine torque to the transmissions must be smooth.

When the clutch is in the coupling (normal running) position, power flows from the engine through the transmission. If the transmission is in gear, then power flows through the *propelling wheels* of the vehicle.

Essentially, the clutch has the job of permitting the driver to uncouple the engine temporarily so that the gears can be shifted from one to another forward, into reverse or into neutral gear position. It is necessary to interrupt the flow of power before gears are shifted. Otherwise, gear shifting would be extremely difficult , even impossible.

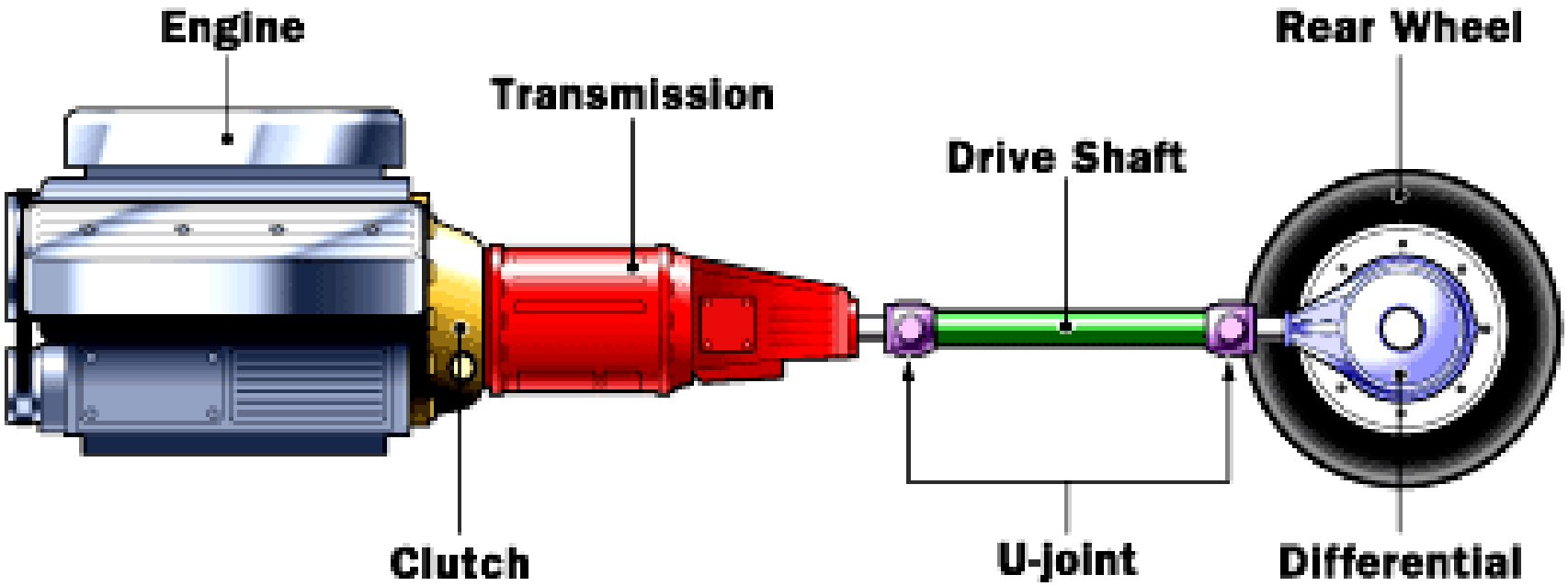
The clutch contains a friction disc, spring arrangement and pressure plate for pressing this disc tightly against the smooth rear face of the flywheel. The friction disc is splinted to the clutch shaft (transmissions input shaft). The splines (kama) consist of two sets of teeth, an internal set on the hub of the friction disk and the matching external set on the chitch shaft. They permit the friction disk to slide back and forth along the shaft but force the disk and shaft to rotate together.

Some Clutch Parts

Clutch plate

Pressure plate

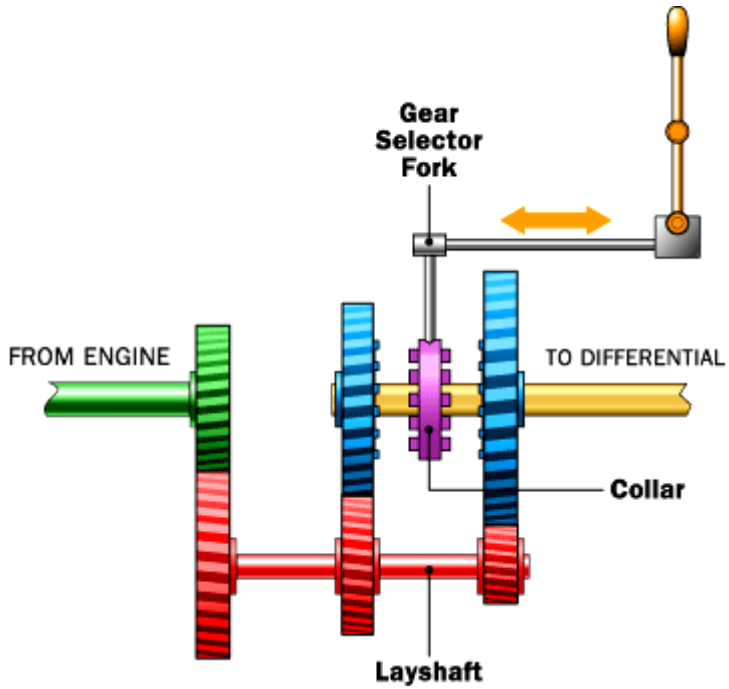
How Transmissions Work



The transmission is connected to the engine through the clutch. The input shaft of the transmission therefore turns at the same speed (rpm) as the engine.

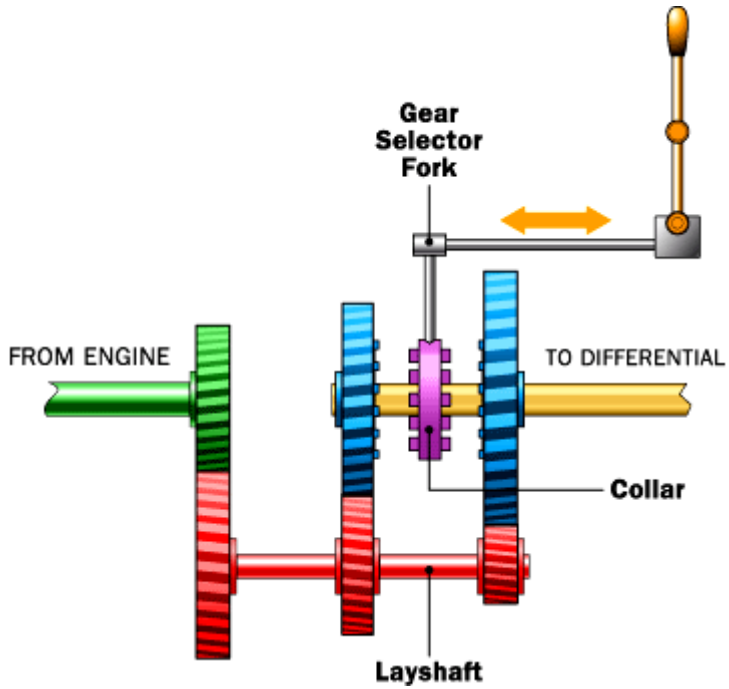
A Very Simple Transmission

To understand the basic idea behind a standard transmission, the diagram below shows a very simple two-speed transmission in neutral:



- **The green shaft comes from the engine through the clutch. The green shaft and green gear are connected as a single unit. (The clutch is a device that lets you connect and disconnect the engine and the transmission. When you push in the clutch pedal, the engine and the transmission are disconnected so the engine can run even if the car is standing still. When you release the clutch pedal, the engine and the green shaft are directly connected to one another. The green shaft and gear turn at the same rpm as the engine.)**
- **The red shaft and gears are called the layshaft. These are also connected as a single piece, so all of the gears on the layshaft and the layshaft itself spin as one unit. The green shaft and the red shaft are directly connected through their meshed gears so that if the green shaft is spinning, so is the red shaft. In this way, the layshaft receives its power directly from the engine whenever the clutch is engaged.**

Transmission



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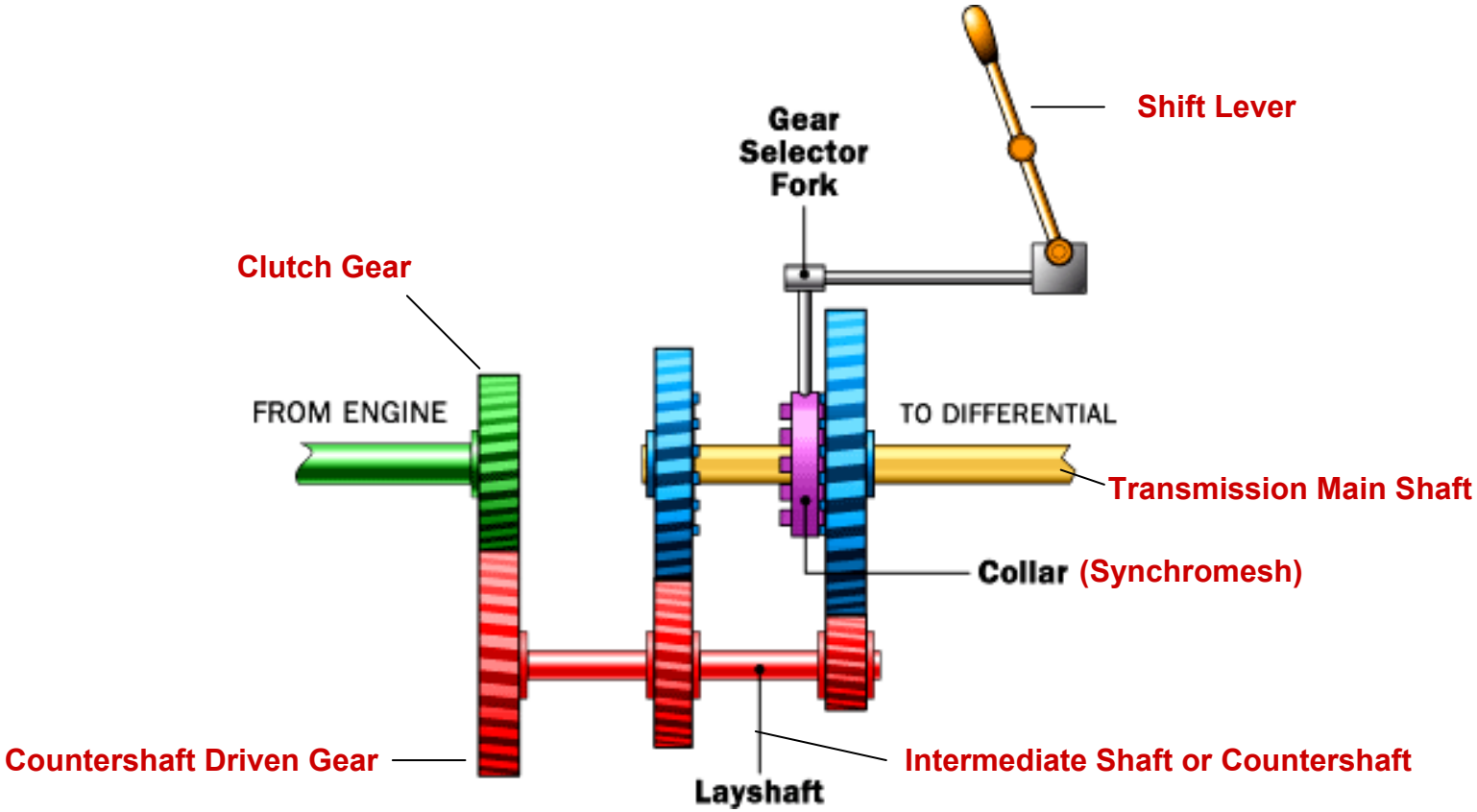
- The yellow shaft is a splined shaft that connects directly to the drive shaft through the differential to the drive wheels of the car. If the wheels are spinning, the yellow shaft is spinning.
- The blue gears ride on bearings, so they spin on the yellow shaft. If the engine is off but the car is coasting, the yellow shaft can turn inside the blue gears while the blue gears and the layshaft are motionless.
- The purpose of the collar is to connect one of the two blue gears to the yellow drive shaft. The collar is connected, through the splines, directly to the yellow shaft and spins with the yellow shaft. However, the collar can slide left or right along the yellow shaft to engage either of the blue gears. Teeth on the collar, called dog teeth, fit into holes on the sides of the blue gears to engage them.

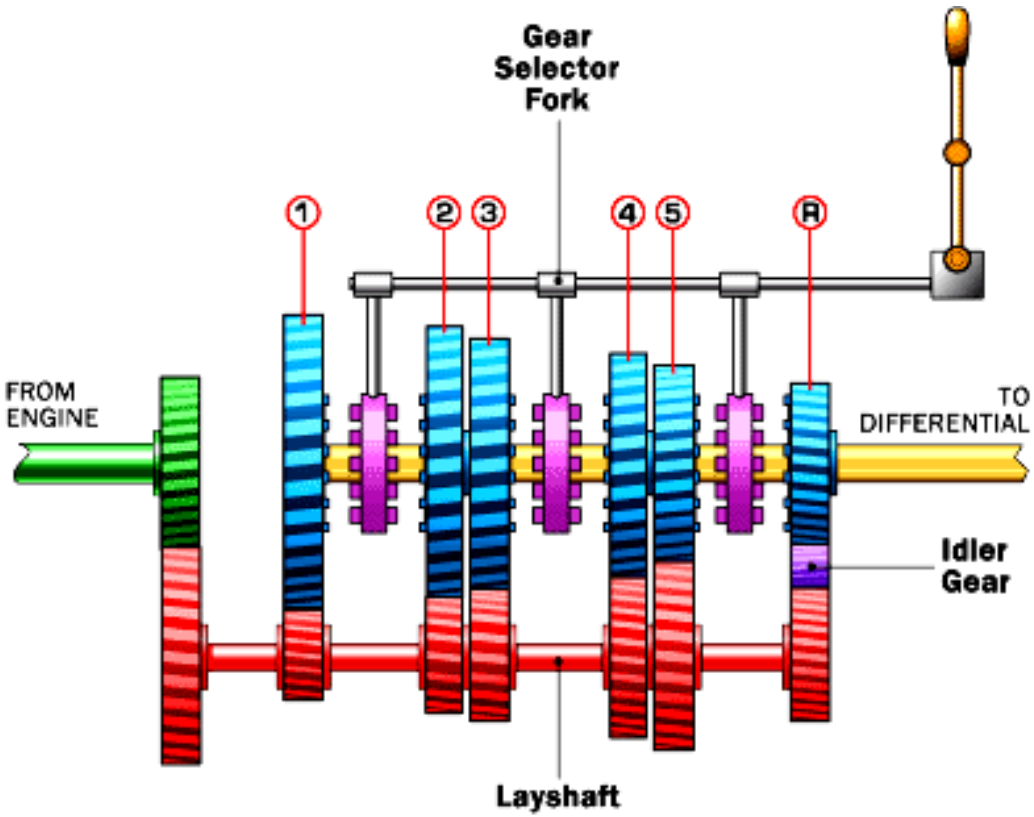
First Gear

The picture below shows how, (when shifted into first gear), the collar engages the blue gear on the right:



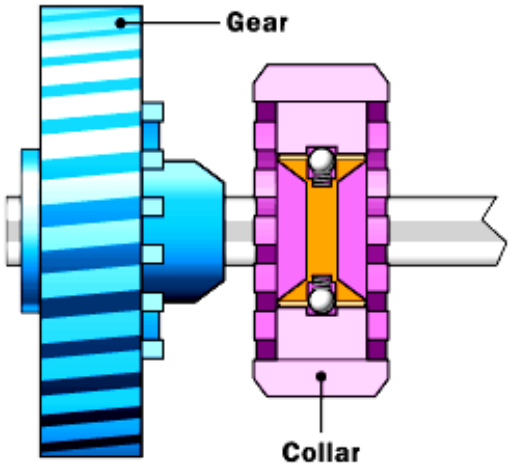
The green shaft from the engine turns the layshaft, which turns the blue gear on the right. This gear transmits its energy through the collar to drive the yellow drive shaft. Meanwhile, the blue gear on the left is turning, but it is freewheeling on its bearing so it has no effect on the yellow shaft.
When the collar is between the two gears (as shown in the first figure), the transmission is in neutral. Both of the blue gears freewheel on the yellow shaft at the different rates controlled by their ratios to the layshaft.

A **five-speed manual transmission** is almost a standard on cars today. Internally, it looks something like this:

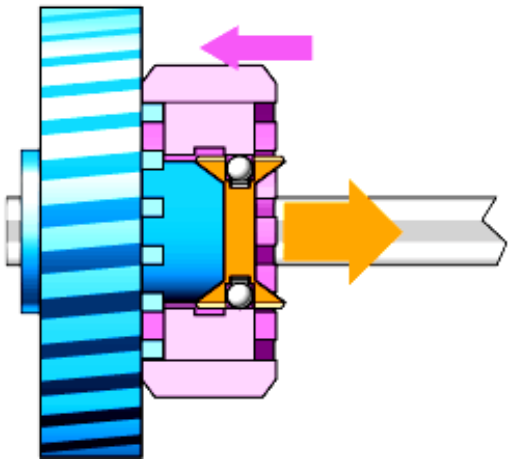


Synchronizers

Manual transmissions in modern passenger cars use **synchronizers** to eliminate the need for double-clutching. A synchro's purpose is to allow the collar and the gear to make frictional contact before the dog teeth make contact. This lets the collar and the gear synchronize their speeds before the teeth need to engage, like this:

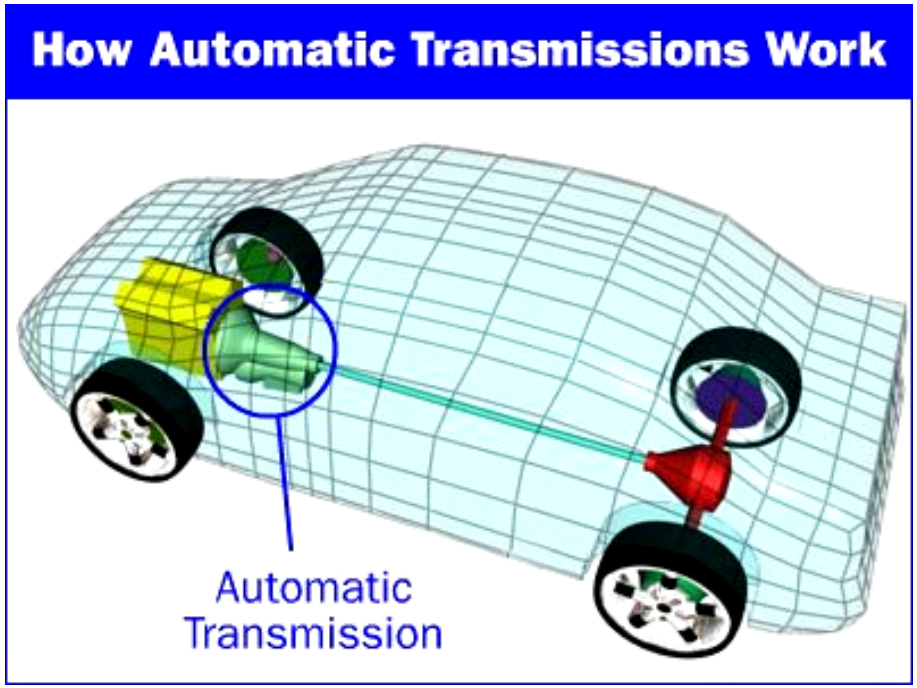


The cone on the blue gear fits into the cone-shaped area in the collar, and friction between the cone and the collar synchronize the collar and the gear. The outer portion of the collar then slides so that the dog teeth can engage the gear.



Every manufacturer implements transmissions and syncronasation in different ways, but this is the general idea.

How Automatic Transmissions Work



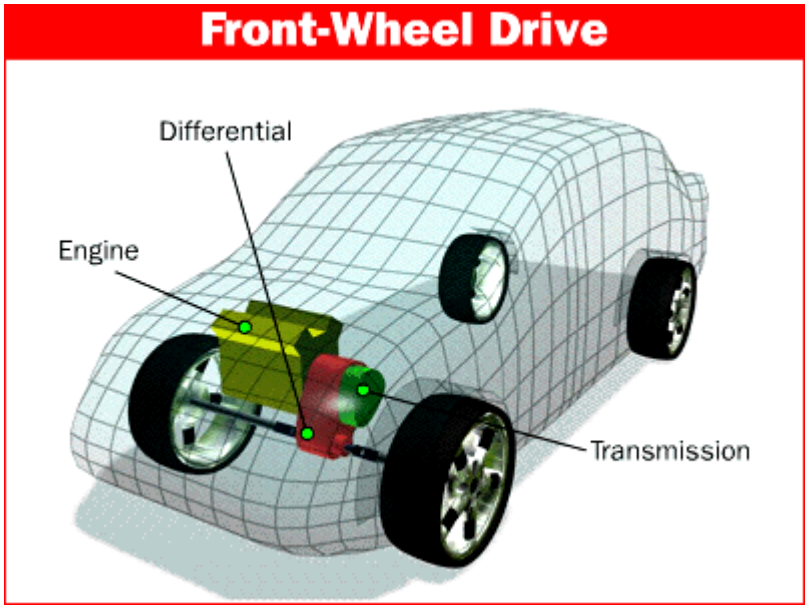
If you have ever driven a car with an automatic transmission, then you know that there are two big differences between an automatic transmission and a manual transmission:
There is no clutch pedal in an automatic transmission car.
There is no gear shift in an automatic transmission car. Once you put the transmission into **drive**, everything else is automatic.
Both the automatic transmission (plus its torque converter) and a manual transmission (with its clutch) accomplish exactly the same thing, but they do it in totally different ways. It turns out that the way an automatic transmission does it is absolutely amazing!

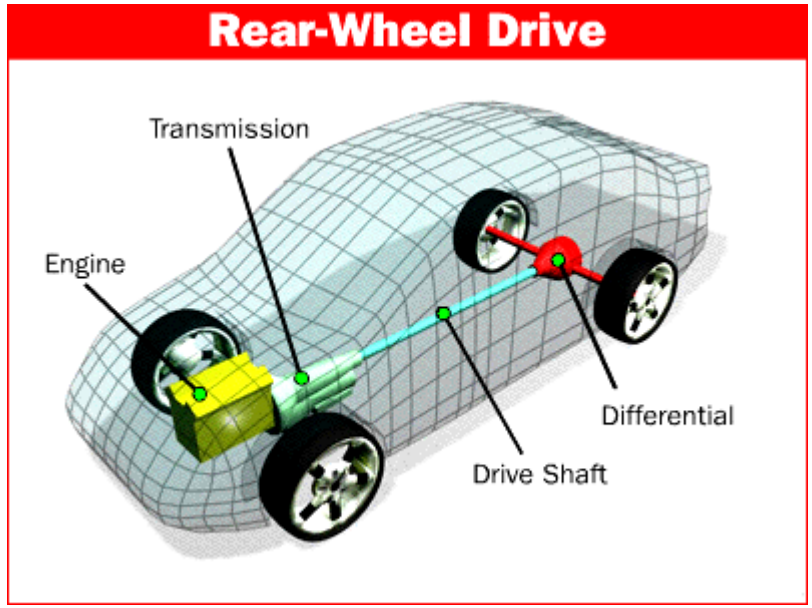
What is a Differential?

The differential is a device that splits the engine torque two ways, allowing each output to spin at a different speed.

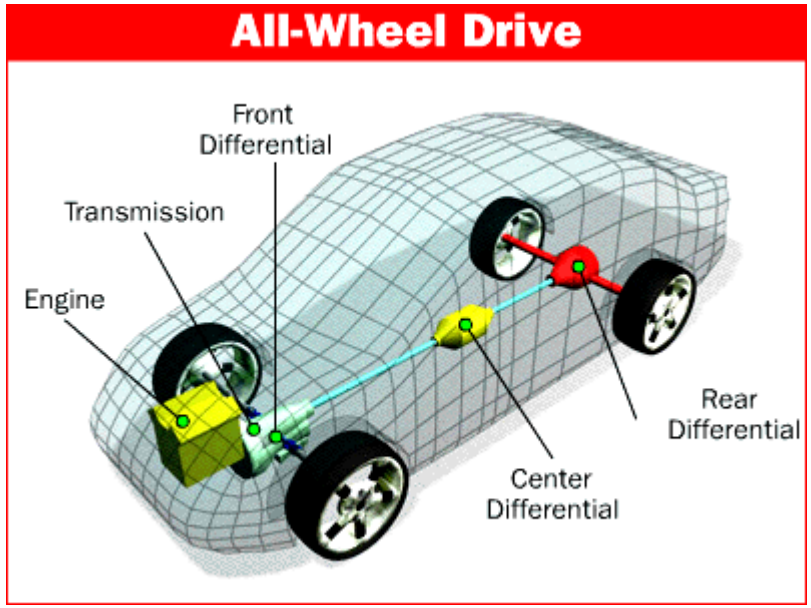
How Differentials Work

The differential has three jobs:
-To aim the engine power at the wheels
-To act as the final gear reduction in the vehicle, slowing the rotational speed of the transmission one final time before it hits the wheels
-To transmit the power to the wheels while allowing them to rotate at different speeds (This is the one that earned the differential its name.)



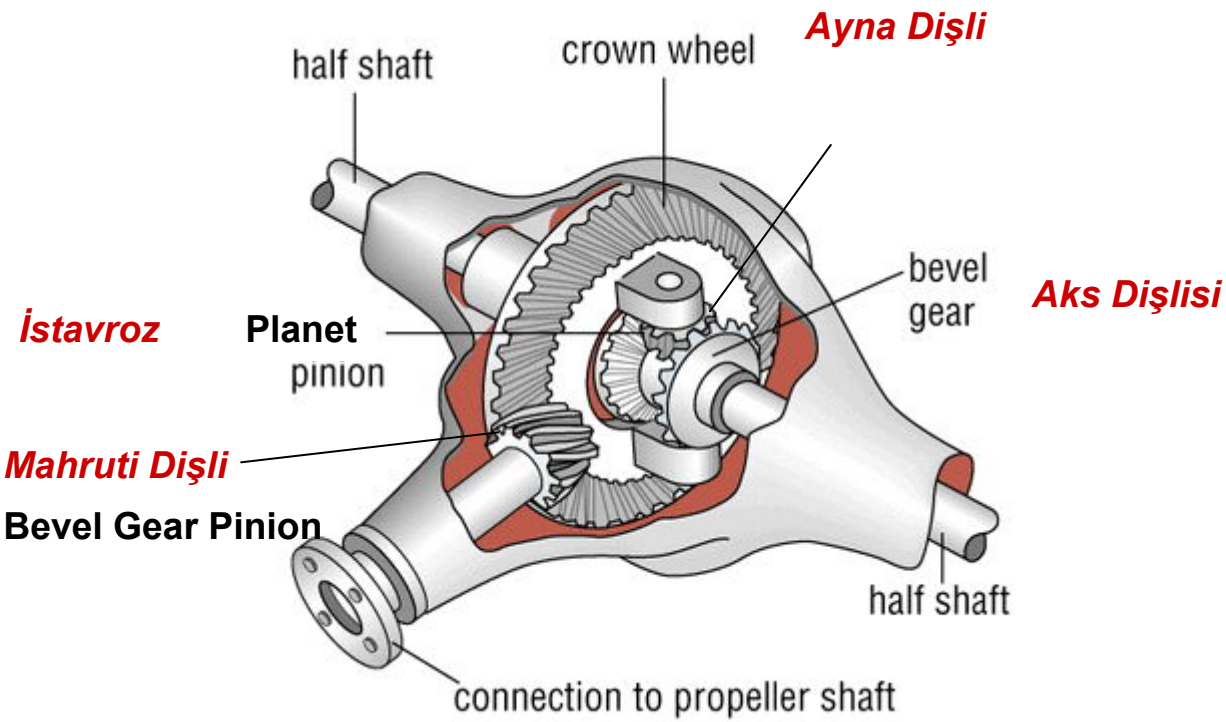


The differential is found in all modern cars and trucks, and also in many all-wheel-drive (full-time four-wheel-drive) vehicles. These all-wheel-drive vehicles need a differential between each set of drive wheels, and they need one between the front and the back wheels as well, because the front wheels travel a different distance through a turn than the rear wheels.



Part-time four-wheel-drive systems don't have a differential between the front and rear wheels; instead, they are locked together so that the front and rear wheels have to turn at the same average speed. This is why these vehicles are hard to turn on concrete when the four-wheel-drive system is engaged.

Differential



Brake Basics

When you depress your brake pedal, your car transmits the force from your foot to its brakes through a fluid. Since the actual brakes require much greater force than you could apply with your leg, your car must also multiply the force of your foot. It does this in two ways:

Mechanical advantage (leverage)

Hydraulic force multiplication

The brakes transmit the force to the tires using **friction**, and the tires transmit that force to the road using friction also. Before we begin our discussion on the components of the brake system, let's cover these three principles:

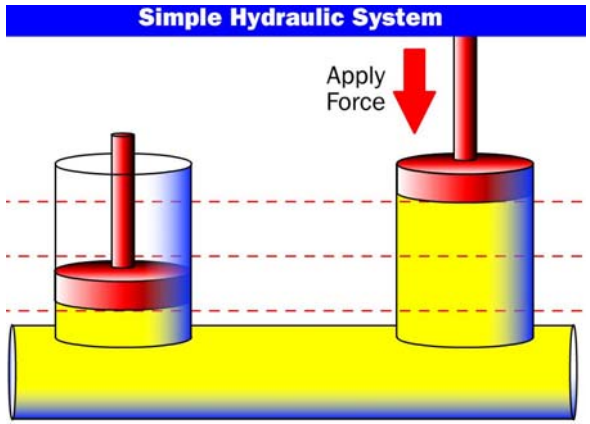
Leverage

Hydraulics

Friction

Hydraulic Systems

The basic idea behind any hydraulic system is very simple: Force applied at one point is transmitted to another point using an **incompressible fluid**, almost always an oil of some sort. Most brake systems also multiply the force in the process. Here you can see the simplest possible hydraulic system:



In the figure above, two pistons (shown in red) are fit into two glass cylinders filled with oil (shown in light blue) and connected to one another with an oil-filled pipe. If you apply a downward force to one piston (the left one, in this drawing), then the force is transmitted to the second piston through the oil in the pipe. Since oil is incompressible, the efficiency is very good -- almost all of the applied force appears at the second piston. The great thing about hydraulic systems is that the pipe connecting the two cylinders can be any length and shape, allowing it to snake through all sorts of things separating the two pistons.

Force and Friction

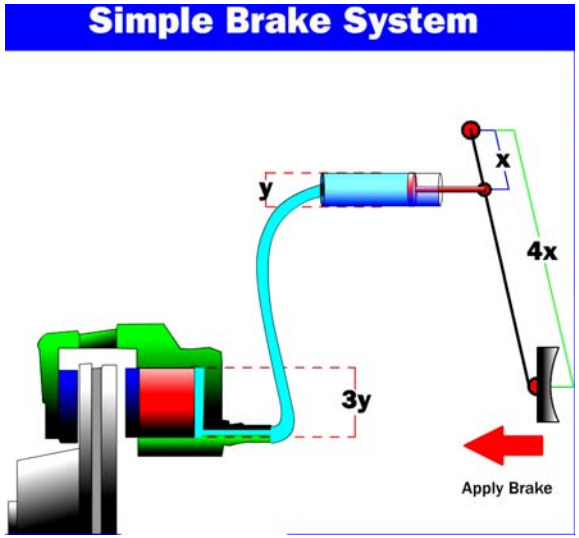
The amount of **force** the clutch can hold depends on the friction between the clutch plate and the flywheel, and how much force the spring puts on the pressure plate. The friction force in the clutch works just like the blocks in the friction section of How Brakes Work, except that the spring presses on the clutch plate instead of weight pressing the block into the ground.

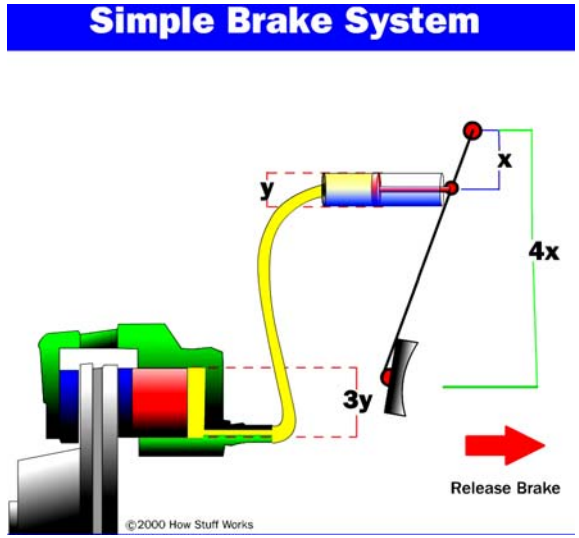
How a clutch engages and releases

When the clutch pedal is pressed, a cable or hydraulic piston pushes on the release fork, which presses the throw-out bearing against the middle of the diaphragm spring. As the middle of the diaphragm spring is pushed in, a series of pins near the outside of the spring causes the spring to pull the pressure plate away from the clutch disc (see below). This releases the clutch from the spinning engine.

A Simple Brake System

Before we get into all the parts of an actual car brake system, let's look at a simplified system:

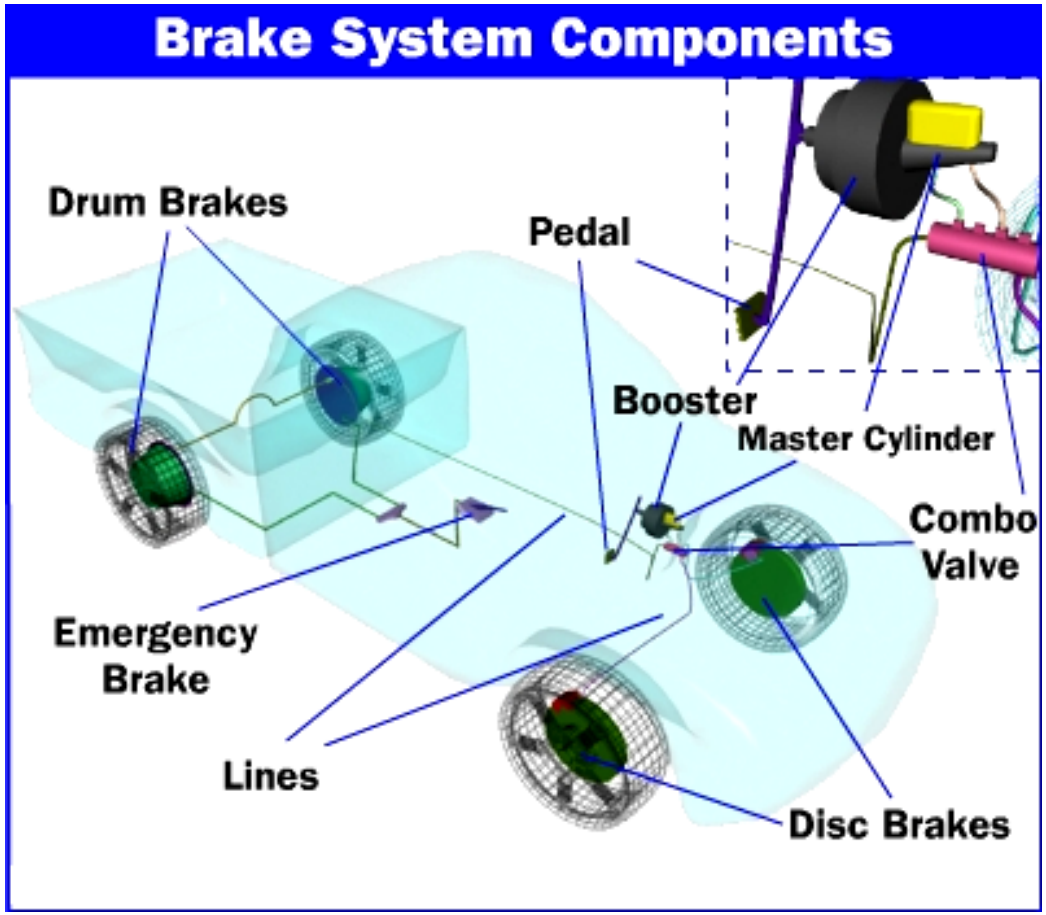




The distance from the pedal to the pivot is four times the distance from the cylinder to the pivot, so the force at the pedal will be increased by a factor of four before it is transmitted to the cylinder.

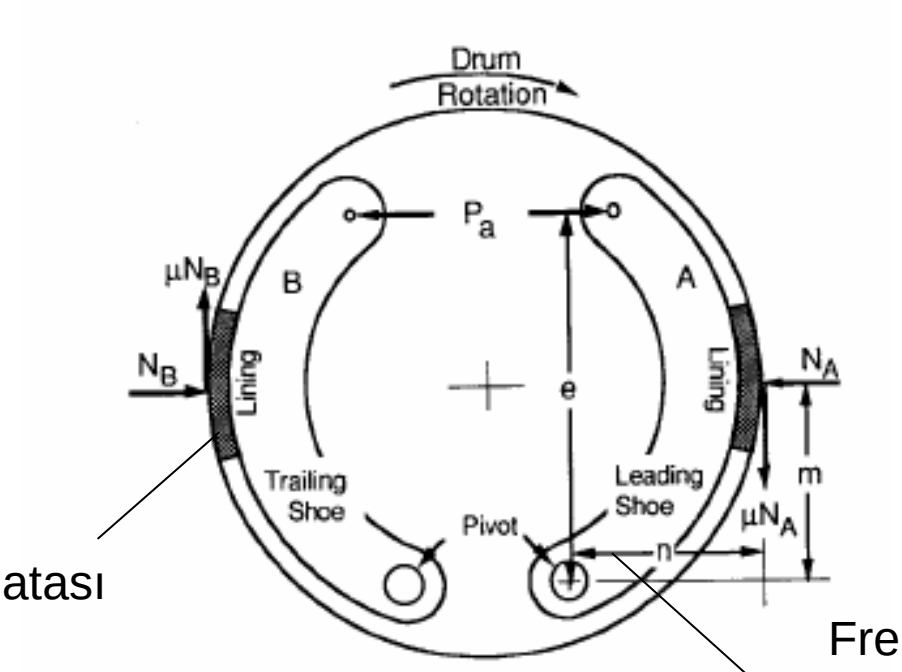
The diameter of the brake cylinder is three times the diameter of the pedal cylinder. This further multiplies the force by nine. All together, this system increases the force of your foot by a factor of 36. If you put 10 pounds of force on the pedal, 360 pounds (162 kg) will be generated at the wheel squeezing the brake pads.

Brake System



Drum Brake

For a drum brake:

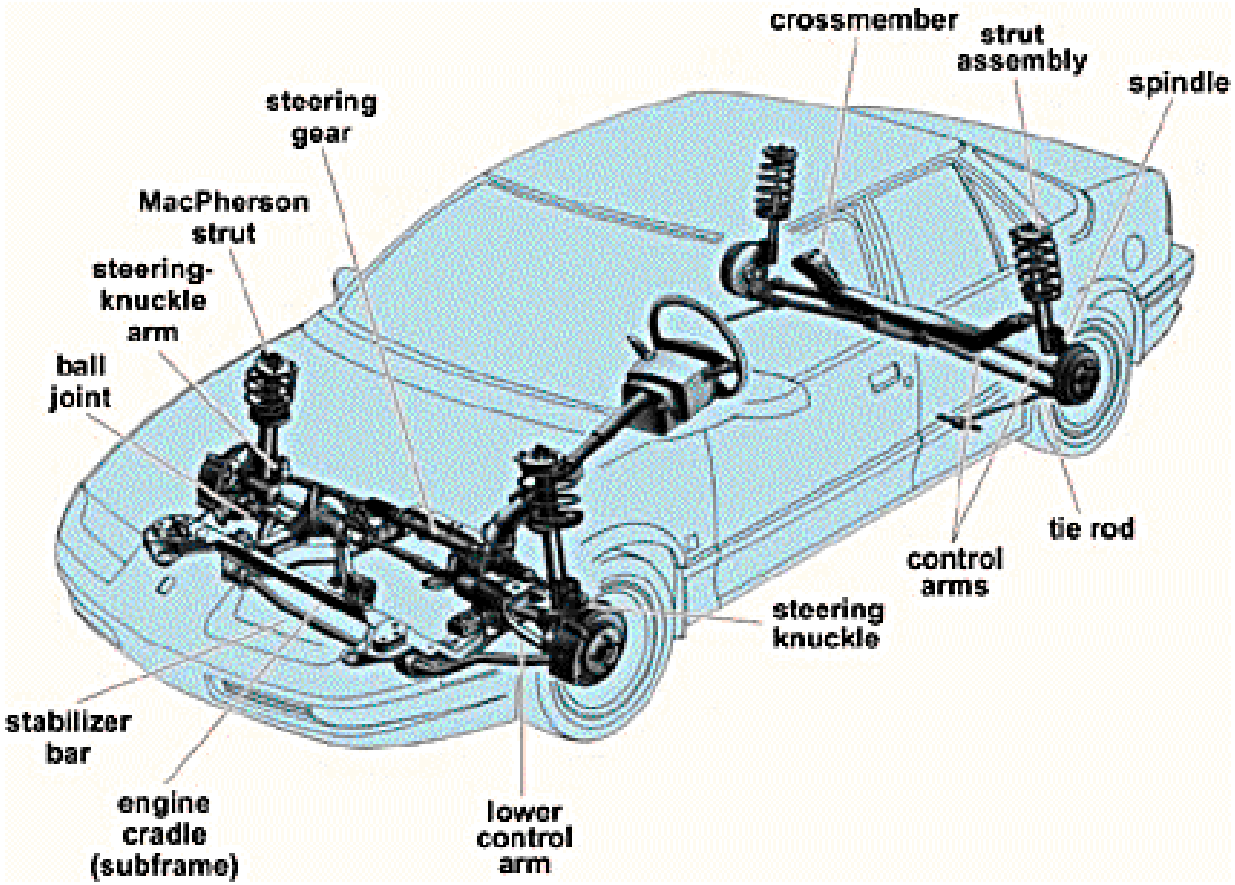


Fren balatası

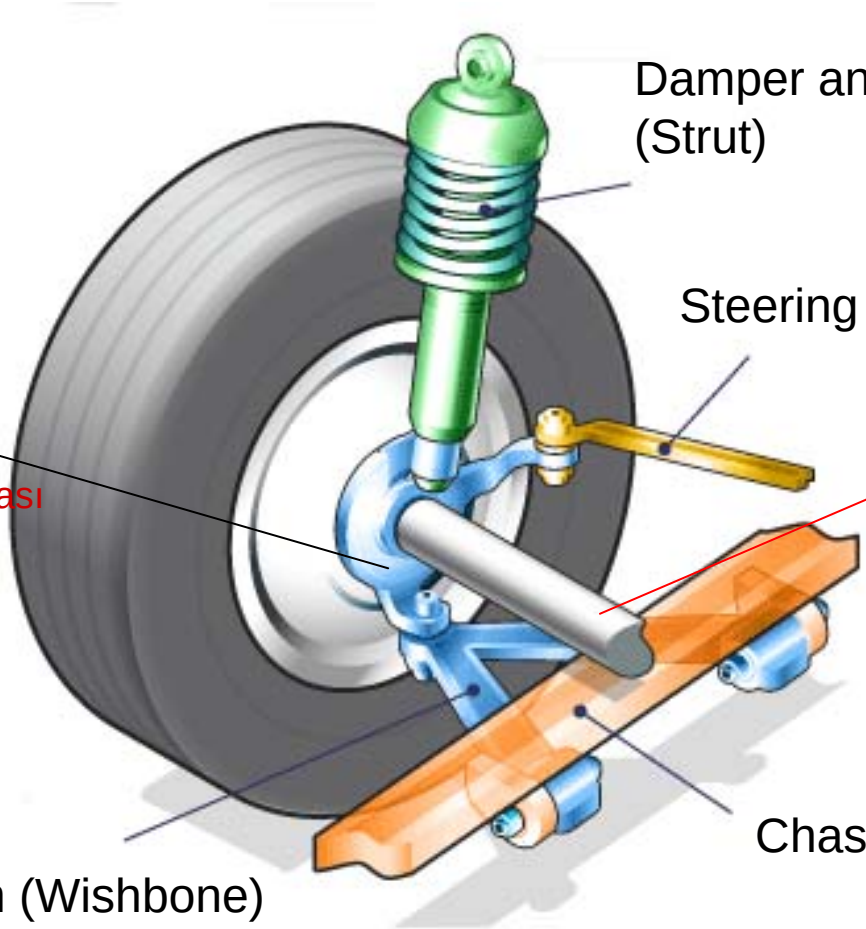
Fren pabucu

Disc Brake

Suspension System



Suspension System



Damper and Spring
(Strut)

Steering Knuckle Arm –Tie rod

Steering Knuckle

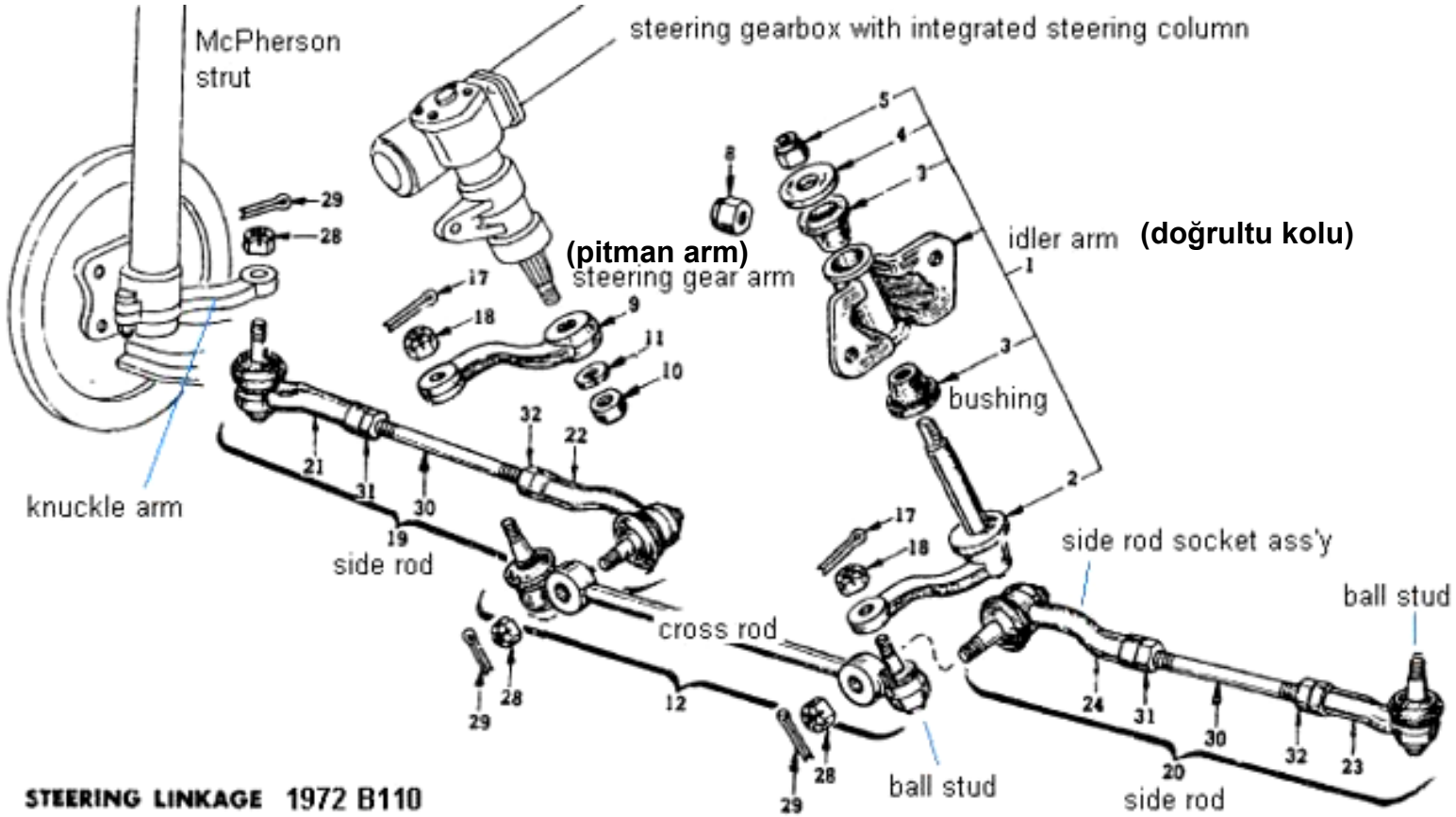
Direksiyon Mafsalı
Tekerlek Rulman Muhafazası

Drive Axle

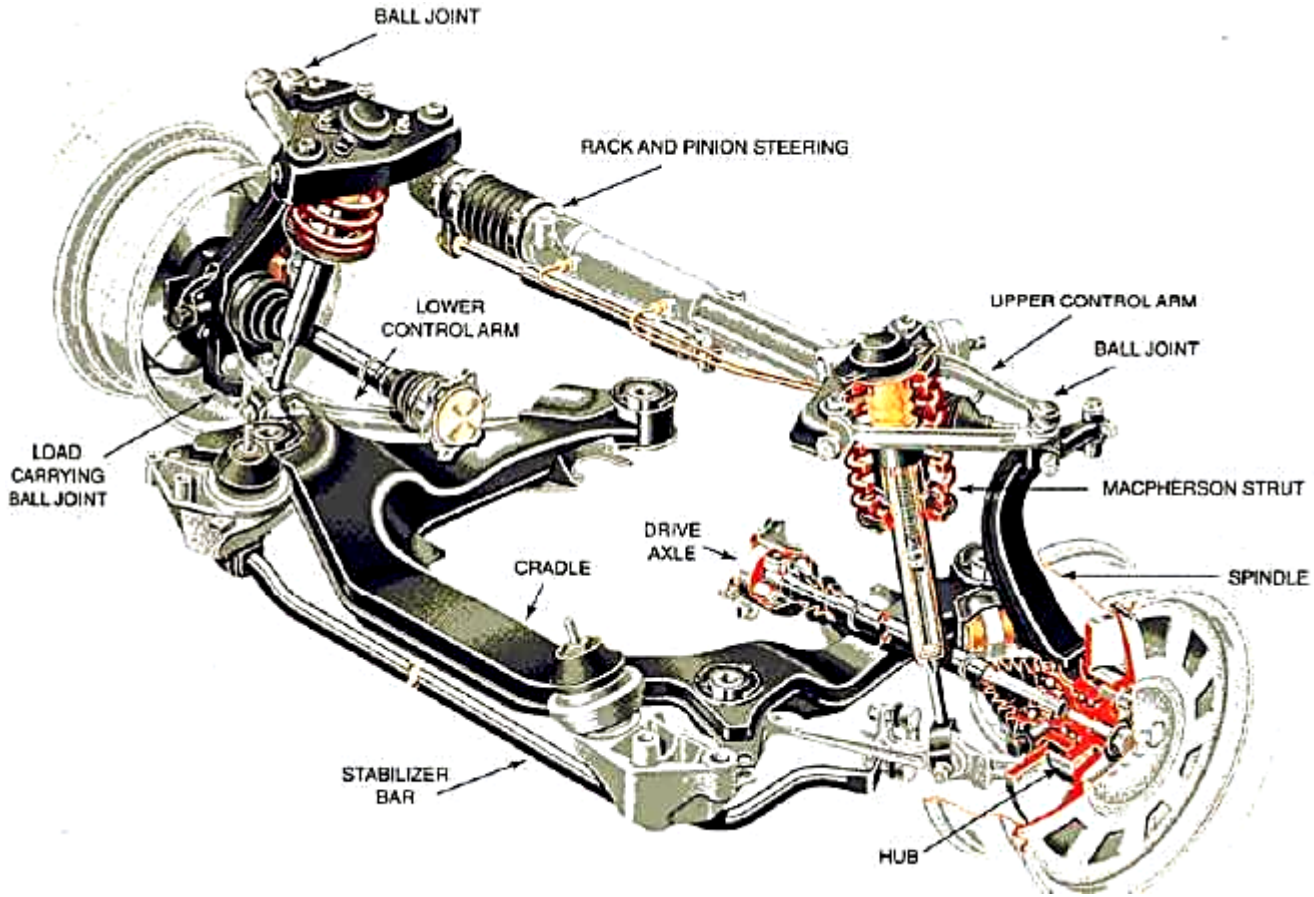
Chassis Frame

Lower Control Arm (Wishbone)

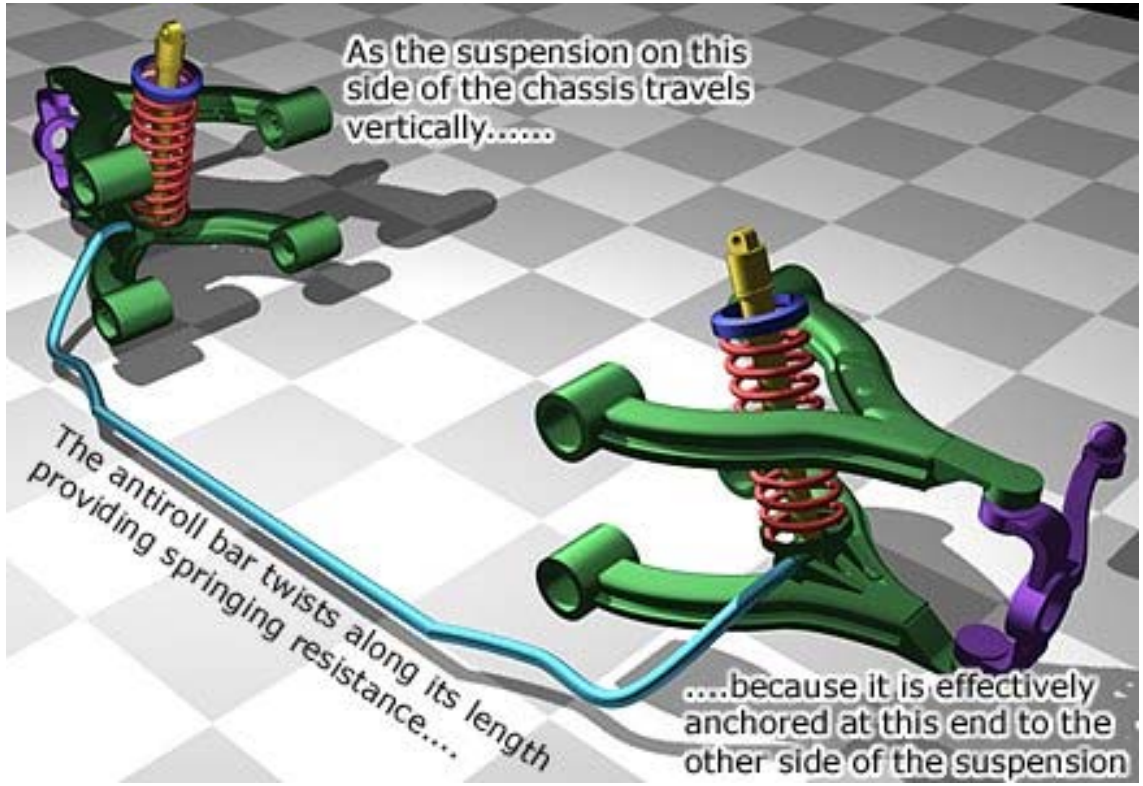
Suspension System



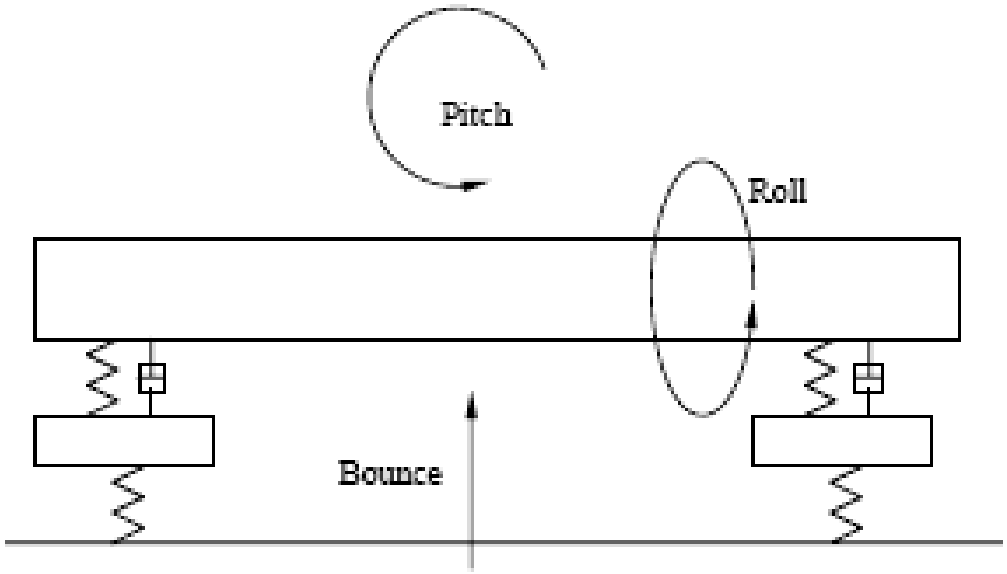
Suspension System



Suspension System



Anti-Roll Bar


Pitch
Roll
Bounce

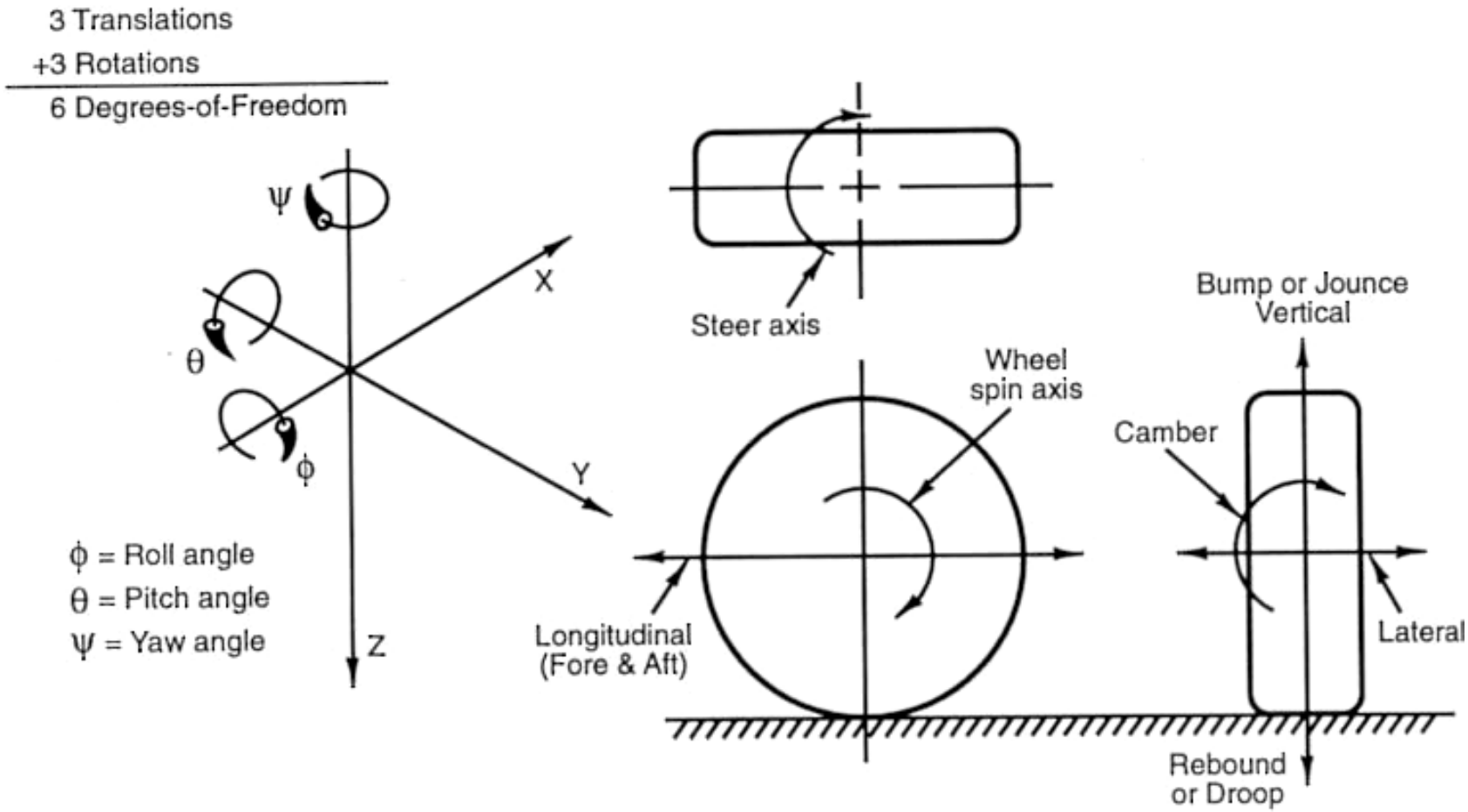
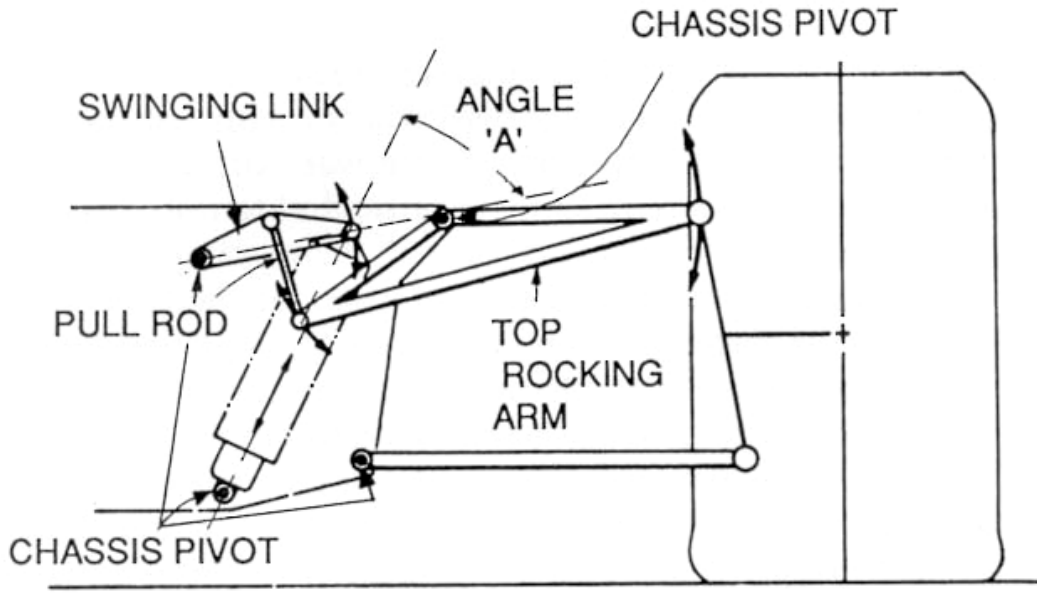


Figure 17.1 *Degrees of freedom and suspension motion definitions (Ref. 1).*


CHASSIS PIVOT
SWINGING LINK
ANGLE
'A'
PULL ROD
TOP
ROCKING
ARM
CHASSIS PIVOT