UNIT-4

Oil temperature gauge

Oil Pressure

- In an internal combustion engine, oil pressure is one of the important factors that is needed to be taken care of.

- Oil is pumped up by oil pump and is passed on to all the bearings via passageways. Types of bearings include main, big end, camshaft, balance, etc. Oil is also used to lubricate cam lobes and cylinder walls with the help of oil jets.

- When the engine is cold, due to the increased viscosity of the oil, the oil pressure is higher and also increases with the engine speed until the relief valve in the oil pump opens to divert the excess flow. And oil pressure is lowest under hot idling conditions.

Pressure Units

•v •t •e	Pascal	Bar	Technical atmosphere	Standard atmosphere	Torr	Pounds per square inch
	(Pa)	(bar)	(at)	(atm)	(Torr)	(lbf/in²)
1 Pa	≡ 1 N/m²	10^{-5}	1.0197×10^{-5}	9.8692×10^{-6}	7.5006×10^{-3}	0.000 145 037 737 730
1 bar	10^5	≡ 100 kPa≡ 10^6 dyn/cm²	1.0197	0.98692	750.06	14.503 773 773 022
1 at	98066.5	0.980665	≡ 1 kgf/cm²	0.967 841 105 354 1	735.559 240 1	14.223 343 307 120 3
1 atm	101325	1.01325	1.0332	1	760	14.695 948 775 514 2
1 Torr	133.322 368 421	0.001 333 224	0.001 359 51	1/760 ≈ 0.001 315 789	1 Torr≈ 1 mmHg	0.019 336 775
1 lbf/in²	6894.757 293 168	0.068 947 573	0.070 306 958	0.068 045 964	51.714 932 572	≡ 1 lbf /in²

Oil Pressure Gauge

- Pressure measurement is the analysis of an applied force by a fluid on a surface. Pressure is typically measured in units of force per unit of surface area. Many techniques have been developed for the measurement of pressure and vacuum
- There are 2 types of oil pressure gauges, which are mechanical and electrical. The electrical kind is found in most modern cars, which gauge itself, an electrical sending unit and a circuit.

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which are mechanical and electrical

The electrical kind is found in most modern cars, which gauge itself, an electrical sending unit and a circuit.

- Inside a mechanical gauge is a spring.
- The position of this spring is altered by the pressure of the oil indicating rising or falling pressures. The pressure readings in an electrical gauge are altered when electricalal signals are sent to the gauge passing through a coil altering the needle arrangements indicating the pressure
- Some vehicles have an oil pressure switch which basically serves the purpose of indicating the low oil pressure and
- Some vehicles have oil pressure gauge fitted in the dashboard or with the instrument cluster.

Thank You

POWER WINDOWS and Wind Screen Washer

POWER WINDOWS

- The up-and down motion of the individual window motors is controlled by double-pole, double-throw (DPDT) switches.
- These DPDT switches have five contacts and permit battery voltage to be applied to the power window motor, as well as reverse the polarity and direction of the motor.

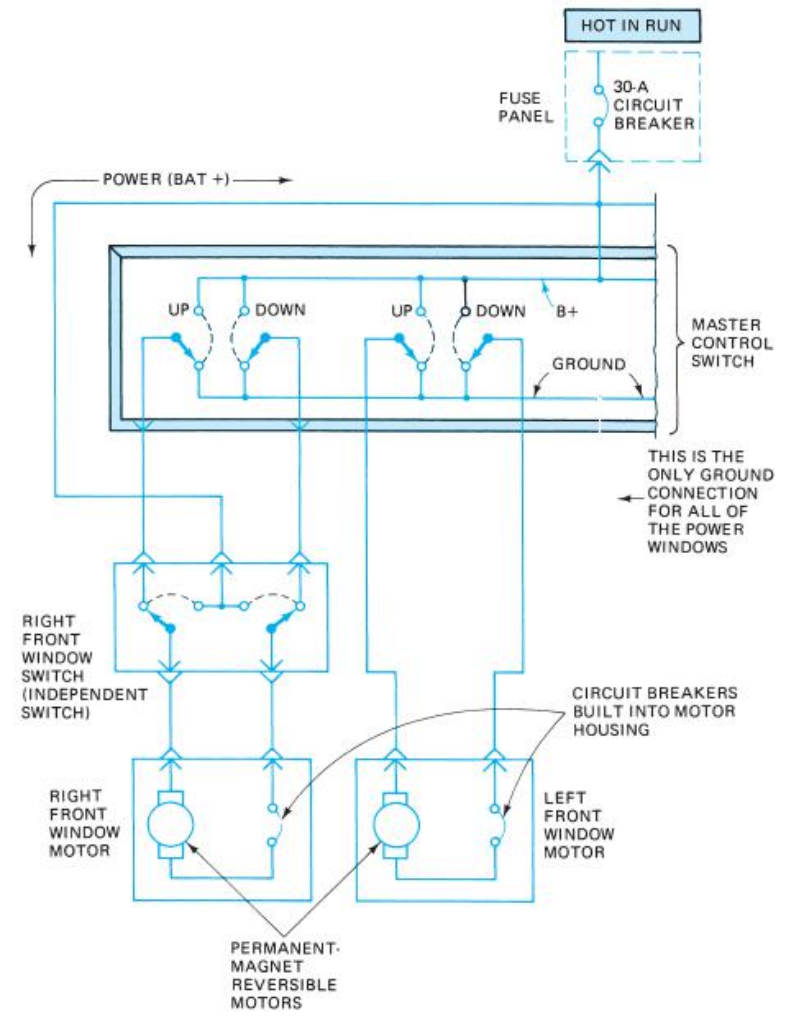
Benefits of Power Windows

Power windows are standard on most vehicles today. They allow people to control the vehicle better and allow easier access for those with arthritis, or hand injuries, to roll down the windows without as much pain. In addition, the windows in the back can be controlled from the front using the master panel. This is very helpful when children are in the back seat, and are unable to reach or roll the windows down themselves.

How Power Windows Work

Power windows have an electronic motor attached to a worm gear, which is attached to several other gears, to create torque to lift the window. A long arm is attached to a bar at the bottom of the window. One end of the arm slides into a groove as the window rises up. On the opposite end of the arm is a gear with teeth cut into it. The motor turns this gear to engage these teeth allowing the window to open.

POWER WINDOWS



IN FIGURE A typical power window circuit using PM motors.

Control of the direction of window operation is achieved by directing the polarity of the current through the non-grounded motors.

The only ground for the entire system is located at the master control (driver's side) switch assembly.

POWER WINDOWS

(a)

(b)

IN FIGURE This independent (driver's door) power window switch plate looks like a normal simple switch until you turn it over. (b) Notice that this power window contains a large integrated circuit with a lot of other electronic components to operate the express up and express down.

POWER WINDOWS

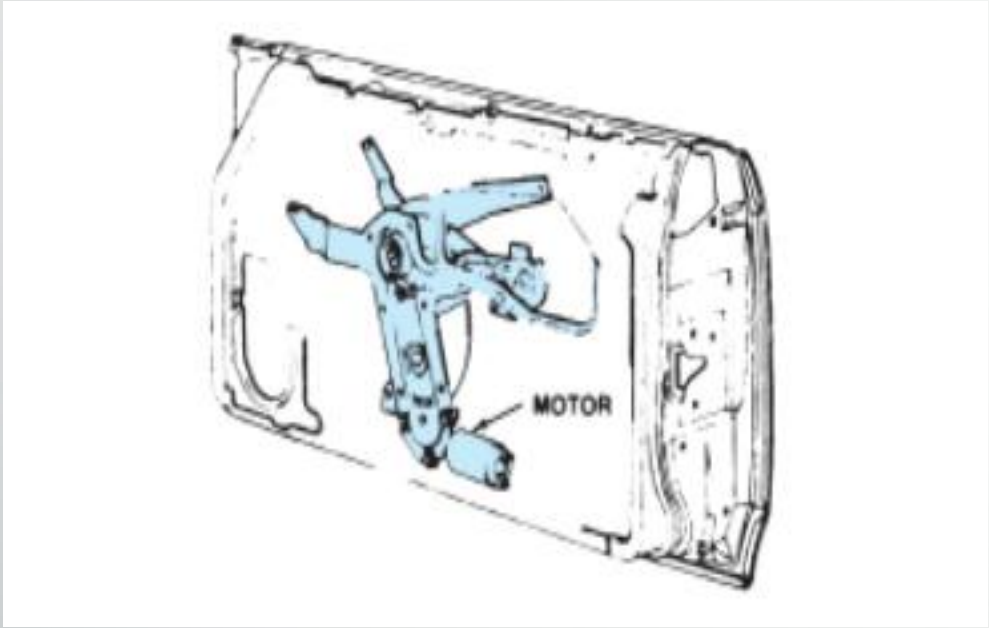


FIGURE An electric motor and a regulator assembly raises and lowers the glass on a power window.

- The window regulator is attached to the door glass and controls opening and closing of the glass.
- Door glass adjustments such as glass tilt and upper and lower stops are usually the same for both power and manual windows.

POWER WINDOWS

Troubleshooting Power Windows

- The direction wires and the motor must be electrically connected to permit operation and change of direction of the electric lift motor in the door.

1. If both rear door windows fail to operate from the independent switches, check the operation of the window lockout (if the vehicle is so equipped) and the master control switch.

2. If one window can move in one direction only, check for continuity in the control wires (wires between the independent control switch and the master control switch).

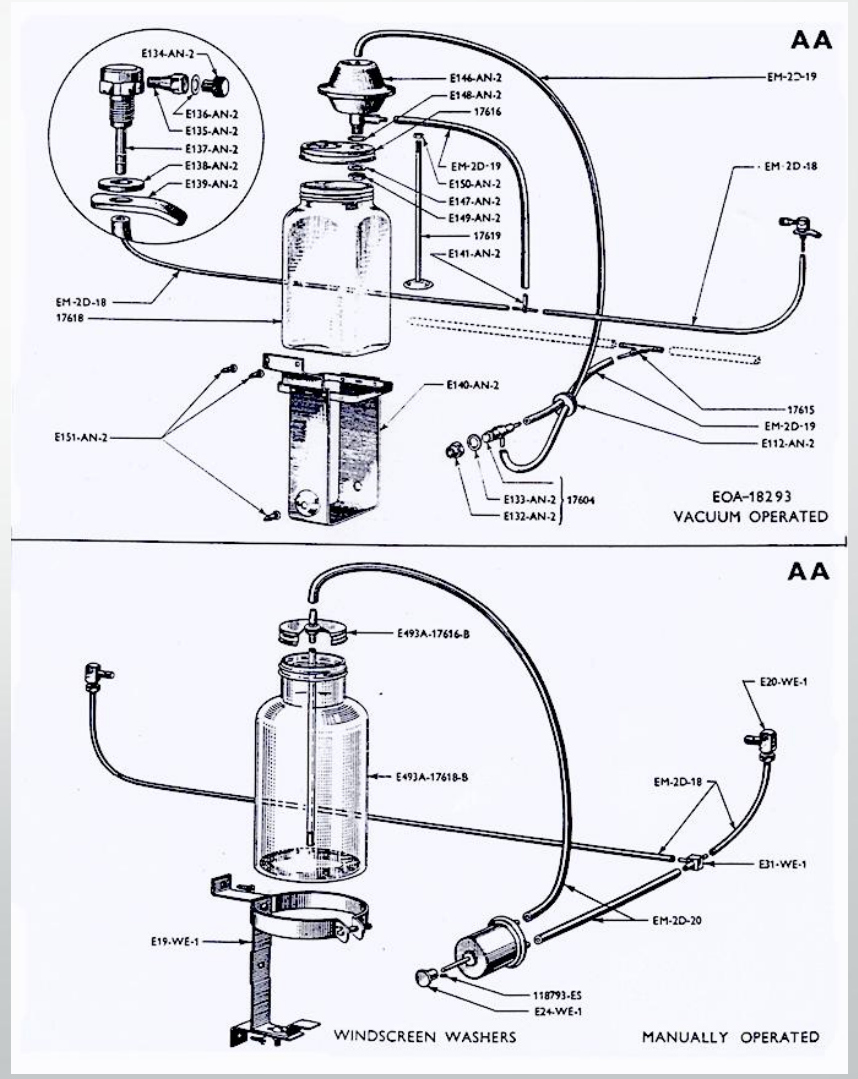
POWER WINDOWS
Troubleshooting Power Windows

3. If *all* windows fail to work or fail to work occasionally, check, clean, and tighten the ground wire(s) located either behind the driver's interior door panel or under the dash on the driver's side. A defective fuse or circuit breaker could also cause all the windows to fail to operate.

4. If one window fails to operate in both directions, the problem could be a defective window lift motor. The window could be stuck in the track of the door, which could cause the circuit breaker built into the motor to open the circuit to protect the wiring, switches, and motor from damage.

Windscreen Washer

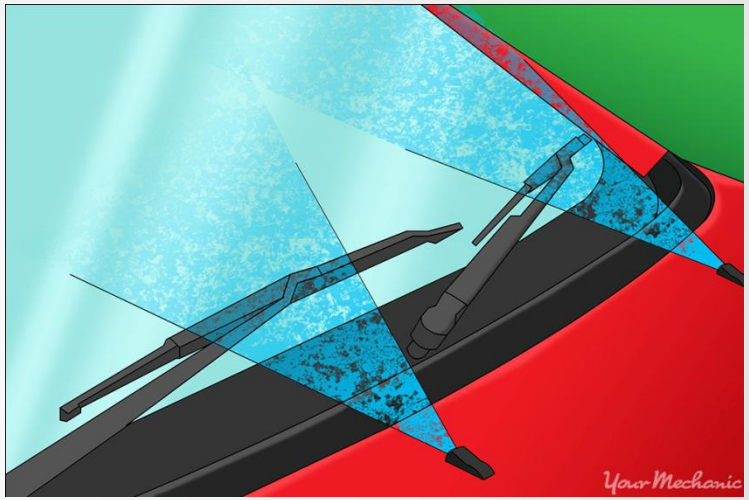
- A
  Small Nozzle on the Bonnet of a motor vehicle, from
  which jets of water
  are squirted elec tronically onto the windscreen t o help clean it.



Windscreen Washer

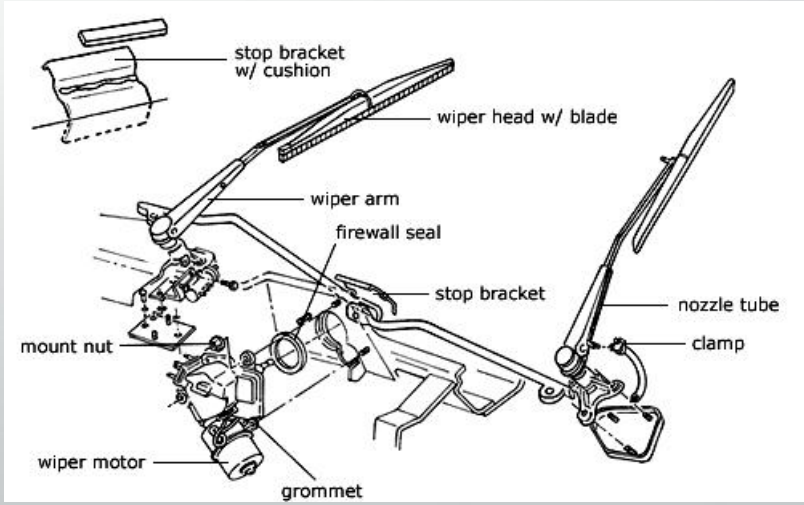
•Windshield control is a vital operation of driver during driving. The mountings fitted in the windscreen or also called windshield are essential to use for smooth driving. These can be automated by using sensors and microcontroller. A complete windshield controlling system has been developed here to increase human comfort and flexibility. The wiper has been controlled by a water level sensor which regulate the wiper motor through sensing the level of water or rain. A dust sensors has been integrated to spill some water in the windscreen and then wipe it. It senses when a certain level of dust get accumulated in the screen. The sun visor which is mounted inside the car to shade the driver's eye from sun would be easier to control by a servo motor. Here an automatic sun visor has been designed to be controlled through a light sensor which is used to measure the light intensity and send the signal to the main control unit. This project focuses on improving human comfort in the existing system so that the driver can pay full attention in driving at all weather even in dusty, rainy or summer.

Windscreen Washer



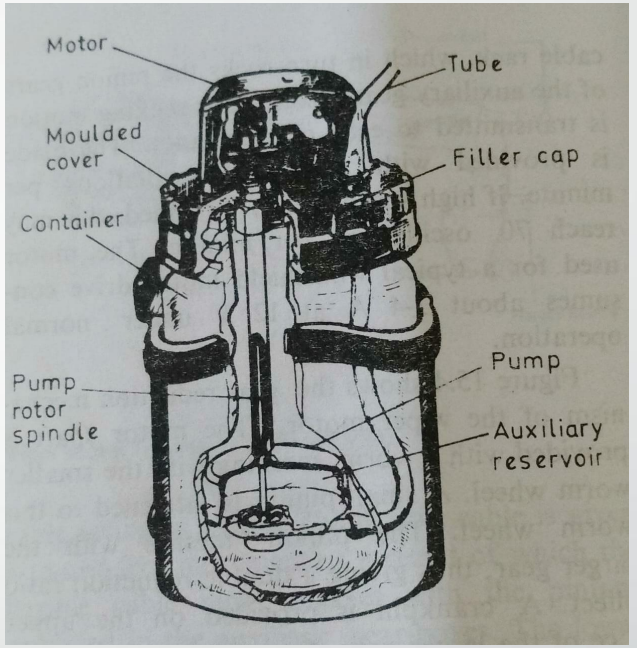
•A windshield washer nozzle is designed to spray washer fluid (a fluid mixed with water and methanol) in a directional mist onto the windshield. Some washer nozzles are mounted on the hood and some are mounted on the arms of the washer blades. Most washer nozzles are mounted on the body between the hood and the windshield.

•When you operate a nozzle sprayer switch, there should be washer fluid spraying out onto the windshield. If a washer nozzle is broken, then the washer fluid will not spray a hard mist but rather come out like a running faucet hose with no restrictions. You may also see washer fluid leaking from the nozzle.



Windshield Washer

•The windshield washer has a bottle or container containing water and some kind of pump and jets to spray the water. Earlier, the pump used was either hand or foot-operated or engine vacuum-operated type. These days an electric motor is employed to pump water. It is located at the top of the container or bottle The electric motor is a small permanent magnets type of motor. The pump may take the form of either a diaphragm type or an irnpeller type pump. The pump is switched on b means of a button and takes its supply through the ignition switch. When the motor s supidrrent. it operates the pump whishing turn sends water under pressure to a pair o jets fitted on the metal bonnet support just below the windshield. The washers are even fitted with an automatic control. When the dash board switch is depressed, the water is sprayed on to the windshield for a limited period of about seven seconds. It is followed by an interval and then another spraying period. The motor of the pump consumes about 1.5 A at 12 V.



•Figure shows the windshield washer unit in section with internal details

CENTRAL LOCKING SYSTEM

CENTRAL LOCKING SYSTEM

Function

- The locking system in a vehicle must grant access only to authorised persons. It is the means via which the vehicle doors and boot lid are locked and unlocked and the engine is started.The locking system is operated with a key or remote control.

Transponder

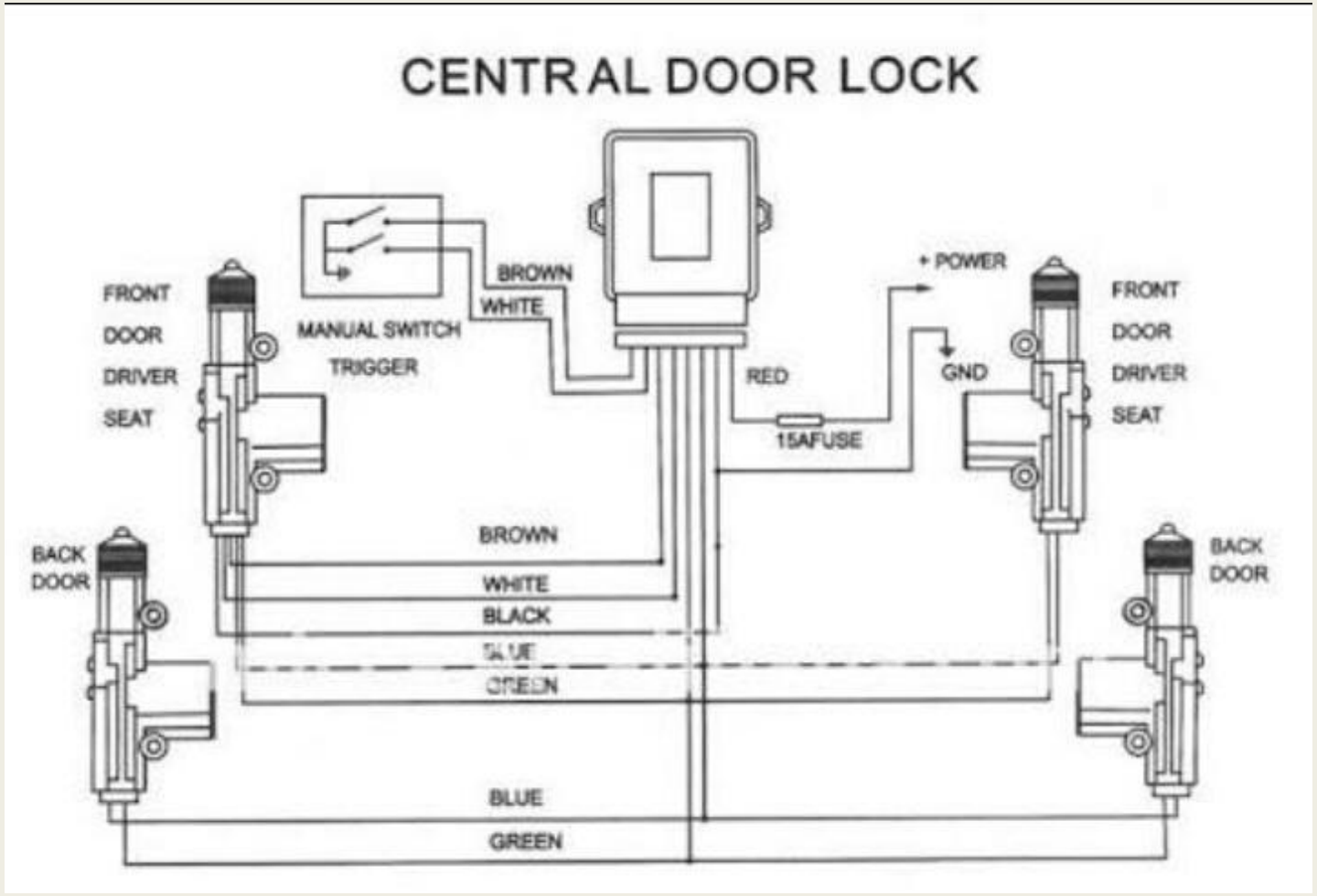
- The transponder is usually integrated inside the key bow. It is the means by which the electronic immobiliser identifies that the correct key is being used. The transponder's code is read out as the key nears the ignition lock. If the code is correct, the electronic immobiliser sends the start enable to the engine.

CENTRAL LOCKING SYSTEM

Safety

- Modern locking systems help to increase both security and safety in vehicles. Where security is concerned, they provide protection against theft and, in conjunction with an alarm system, act as a deterrent. In terms of safety, the integrated control of lighting elements when doors are unlocked, for example, contributes to safety on the road by improving the visibility of open doors.

CENTRAL LOCKING SYSTEM



CONVERTIBLE MECHANISM

CONVERTIBLE MECHANISM

- Convertible mechanism is use in the 2 – door coupe, 4 – door sedan.
- Convertible mechanism utilize a kinetic system to move the roof between a closed position and a stored position in which the roof is in the luggage compartment.
- There is two type of convertible mechanism

1. Hard top mechanism
2. Soft top mechanism

CONVERTIBLE MECHANISM

WORKING

COMPONETS OF CONVERTIBLE MECHANISM :-

- Pump motor
- Hoses
- Latches & Catches
- Switch
- Weather stripping
- Relay
- Roof
- Hydraulic cylinder
- Top frame

CONVERTIBLE MECHANISM

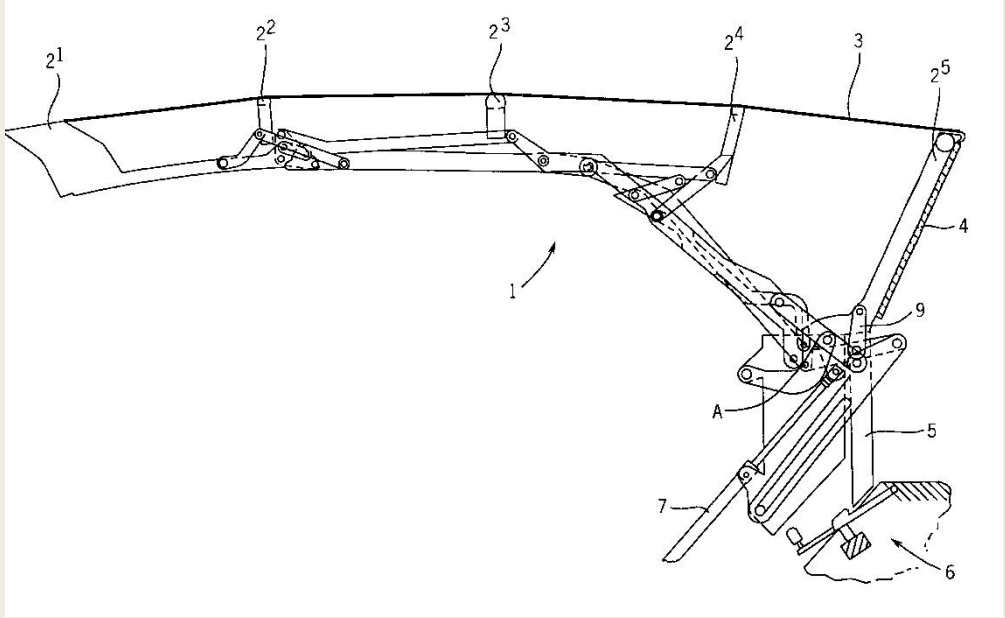
APPLICATION OF CONERTIBLE MECHANISM

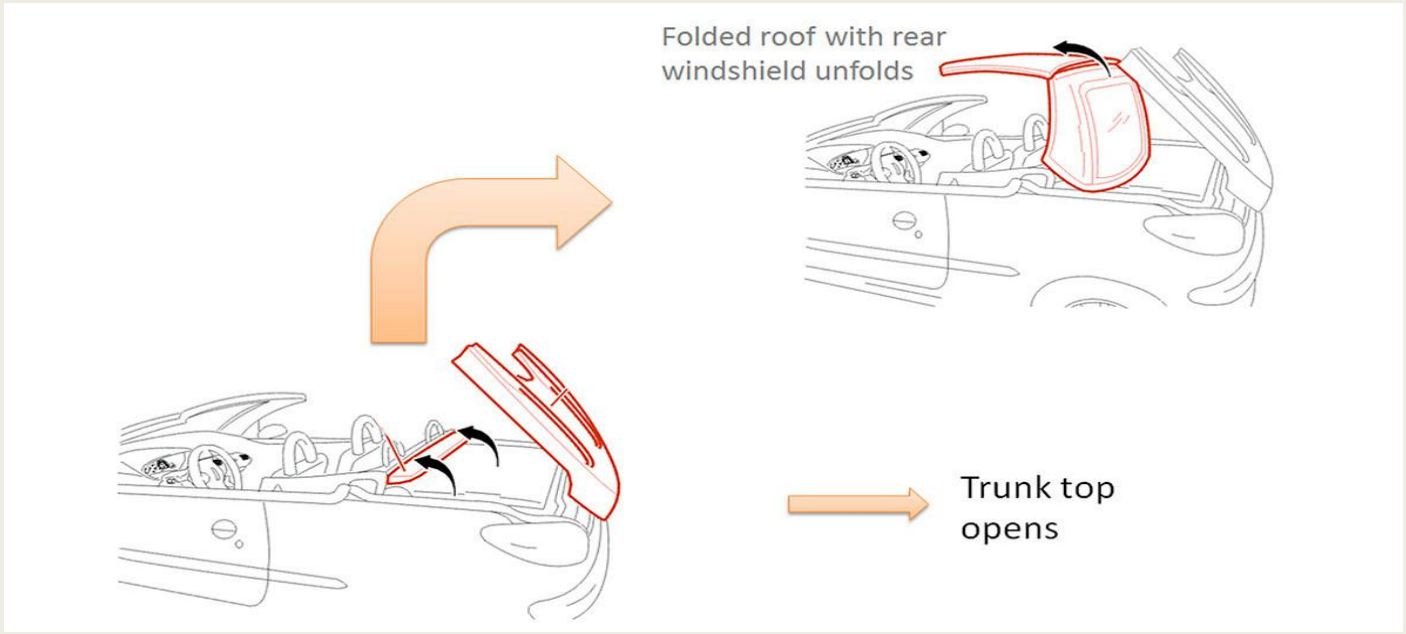
HARD TOP ROOF :-

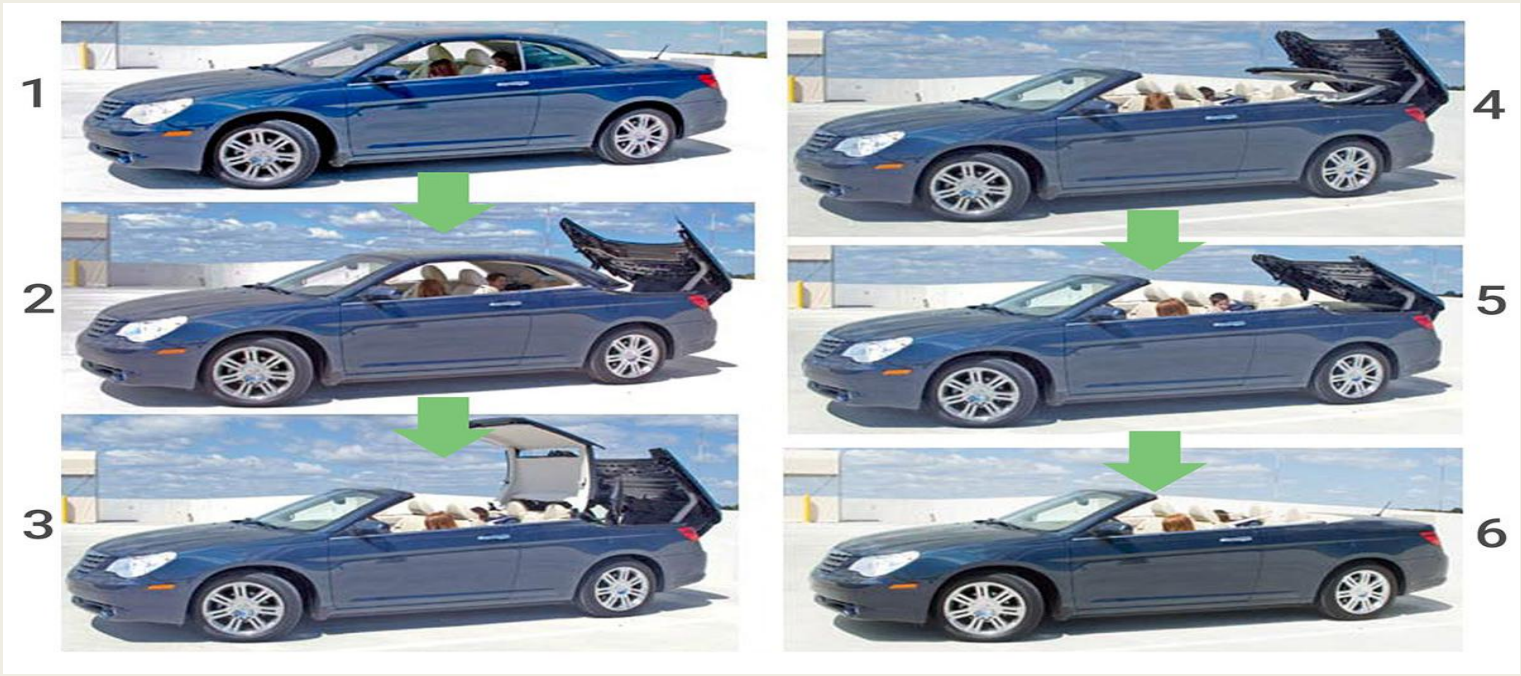
- B.M.W E92 M4
- B.M.W E93 M3

SOFT TOP ROOF :-

- Lamborghini Gallardo Spyder
- Porsche 911 Carrera 2 cabriolet




Folded roof with rear windshield unfolds
Trunk top opens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DOOR LOCK MECHANISM

There are different methods of door lock and unlock mechanism:-

1. With a key
2. By pressing the unlock button inside the car
3. By using the combination lock on the outside of the door

1. By pulling up the knob on the inside of the door
2. By a signal from a control center

Power Lock mechanism:-

In the case of power door locks, the body controller monitors all of the possible sources of an "unlock" or "lock" signal. It monitors a door-mounted touchpad and unlocks the doors when the correct code is entered. It monitors radio frequency and unlocks the doors when it receives the correct digital code from the radio transmitter in your key fob, and also monitors the switches inside the car. When it receives a signal from any of these sources, it provides power to the actuator that unlocks or locks the doors.

Inside a car door:-

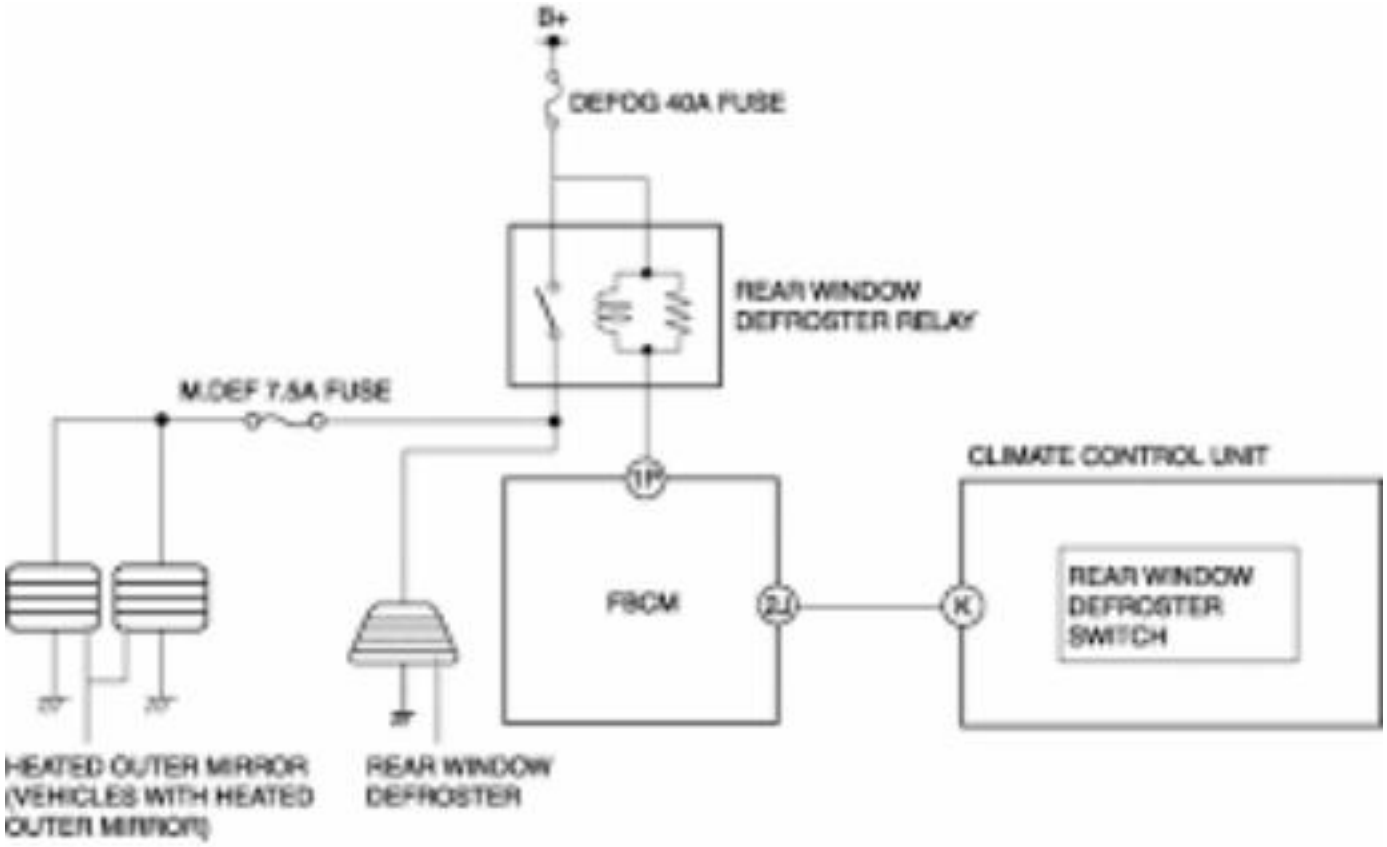
In this car, the power-door-lock actuator is positioned below the latch. A rod con-nects the actuator to the latch, and another rod connects the latch to the knob that sticks up out of the top of the door.

When the actuator moves the latch up, it connects the outside door handle to the opening mechanism. When the latch is down, the outside door handle is disconnected from the mechanism so that it cannot be opened. To unlock the door, the body controller supplies power to the door-lock actuator for a timed interval.

Rear window glass heating system

- Rear windows often have a defrost grid. Because the heater in your vehicle is situated in the dash of your cabin, it would take forever to melt any snow or ice off therear window without another method to apply heat to that rear glass.

- defoggers, such as those used on a vehicle's backglass and/or side view mirrors, often consist of a series of parallel linear resistive conductors in or on the glass. When power is applied, these conductors heat up, thawing ice and evaporating condensation from the glass. These conductors may be composed of a silver-ceramic material printed and baked onto the interior surface of the glass, or may be a series of very fine wires embedded within the glass. The surface-printed variety is prone to damage by abrasion, but can be repaired easily with a conductive paint material.



Rear window heating system block diagram

Rear View Mirror Adjusting

Rear view mirror adjusting

- Rear view Mirrors have played a vital role when it comes to rear vision.
- But, not every person needs or can work with the same mirror configuration.
- Thus mirrors are to be adjusted, with the help of three degree of freedom.
- This adjustments can be made in two ways:
  - Electrical adjustors
  - Mechanical adjustors

ANTI-GLARE

Glare from a following vehicle's headlamps in a rear view mirror

Prismatic anti-glare

Day position Night position Show all

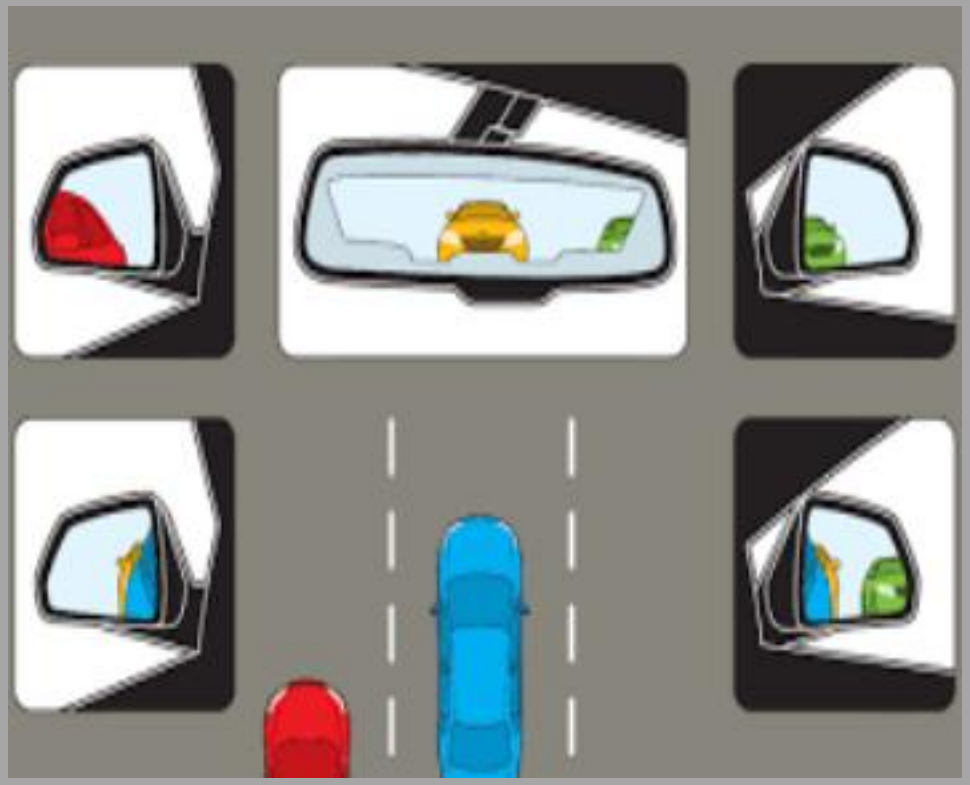
In the 'day' position, the driver sees the road behind by reflection on the (rear) metal surface. In the 'night' position, the driver sees the dimmer reflection on the (front) glass coating. The light is attenuated in the second mode, which partially compensates the pupillary response.

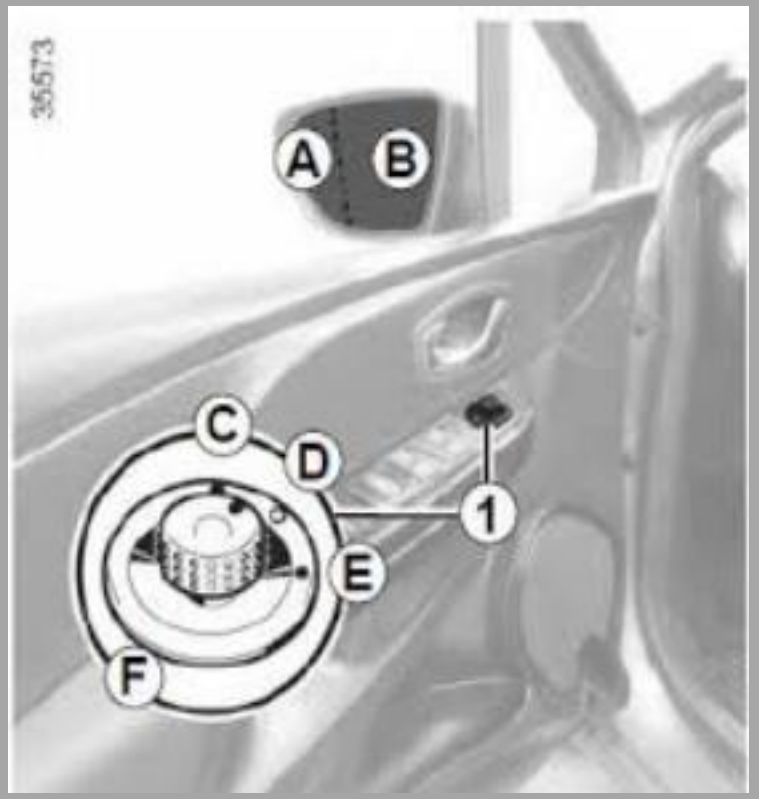
A prismatic rear-view mirror—sometimes called a 'day/night mirror'—can be tilted to reduce the brightness and glare of lights, mostly for high-beam headlights of vehicles behind which would otherwise be reflected directly into the driver's eyes at night. This type of mirror

ANTI–GLARE

On manual tilt versions, a tab is used to adjust the mirror between ‘day‘ and ‘night‘ positions. In the day view position, the front surface is tilted and the reflective back side gives a strong reflection. When the mirror is moved to the night view position, its reflecting rear surface is tilted out of line with the driver’s view. This view is actually a reflection off the low–reflection front surface; only a much–reduced amount of light is reflected into the driver’s eyes.

‘Manual tilt‘ day/night mirrors first began appearing in the 1930s and became standard equipment on most passenger cars and trucks by the early 1970s.

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DAY LIGHT REGULATING SYSTEM

DAY LIGHT REGULATING SYSTEM

- Daytime Running Lights (DRL), also known as a daylight or daytime lighting system, is what the expresses, lights on a vehicle for use in the daytime. There is a contradiction for this idea, which is why we should turn on the light on sunny days even when it is still blindingly bright with sunglasses.
- In people's general impression on driving, driving with the lights on in the daytime is not necessary except for signal and brake lights. If a driver turns on the headlights during the day, others might think that he is sleepy and forgot to turn off the light.
- Daytime Running Lights are automatically activated along with the starting engine for easier detection of moving cars and the reduction of traffic accidents. The DRL is turned off as soon as a driver manually turns on the dipped light.
- From the lighting system design of cars, the tail lights and lights on the instrument panel are automatically activated as turning on headlights and the electricity consumed is about200-300 watts. When using the design of Daytime Running Lights with only one active function, the electricity amount consumed is only 30 watts, which is 25-30% of that for typical dipped lights.

DAY LIGHT REGULATING SYSTEM

- Many vehicle manufacturers have equipped DRL from the car manufacturing stage, althrough all new cars are enforced to adopt this systemfrom 2011 as regulated by the European union. The design requirements of the DRL are a long life-time, low energy consumption, compact size, no blinking lights for oncoming cars and pedestrians, as well as no strong light strength needed.
- A LED light source with all of these characteristics is optimal for this system. Therefore, the DRL developed becomes a huge hit discovered with an LED light source, after the technology of the LED signal $($including the brake lights, signal lights, etc.$)$ is mature and before the LED lighting system $($headlights, front fog lights,$)$ gains in popularity.
- For example, one set of DRL, composed of LEDs, among AUDI's A8 headlight sets only produces a light strength of about one third of that of the dipped light. That not only meets the requirements of photometric characteristics $($ECE R$87)$ for DRL, but it also consumes energy, which is 10% that for conventional headlights.
- The next challenge is to develop DRL with less energy consumption, smaller size and longer lifetimes for the domestic industry of the car lighting system.

DAY LIGHT REGULATING SYSTEM