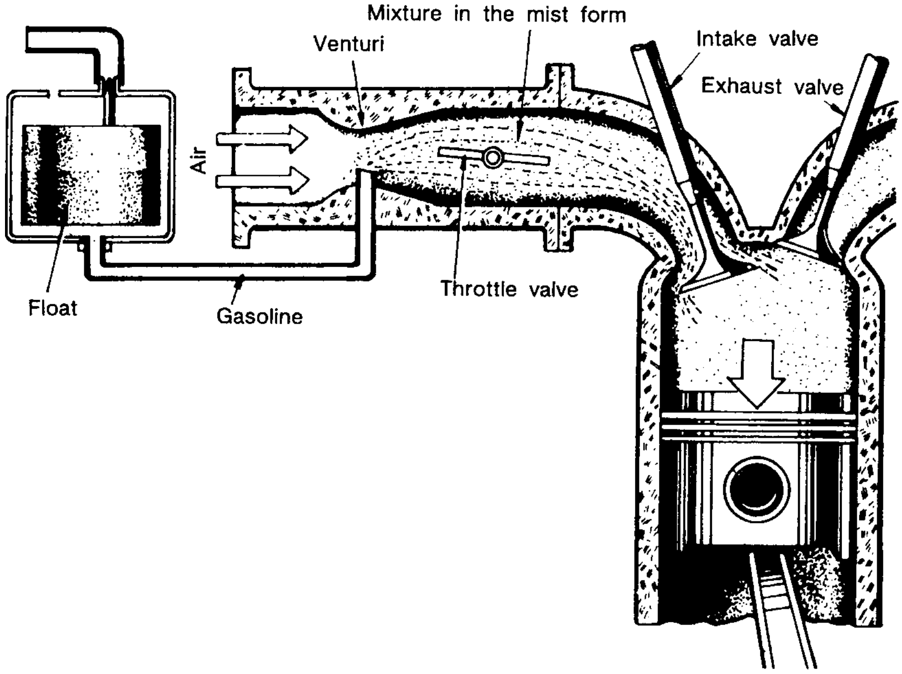
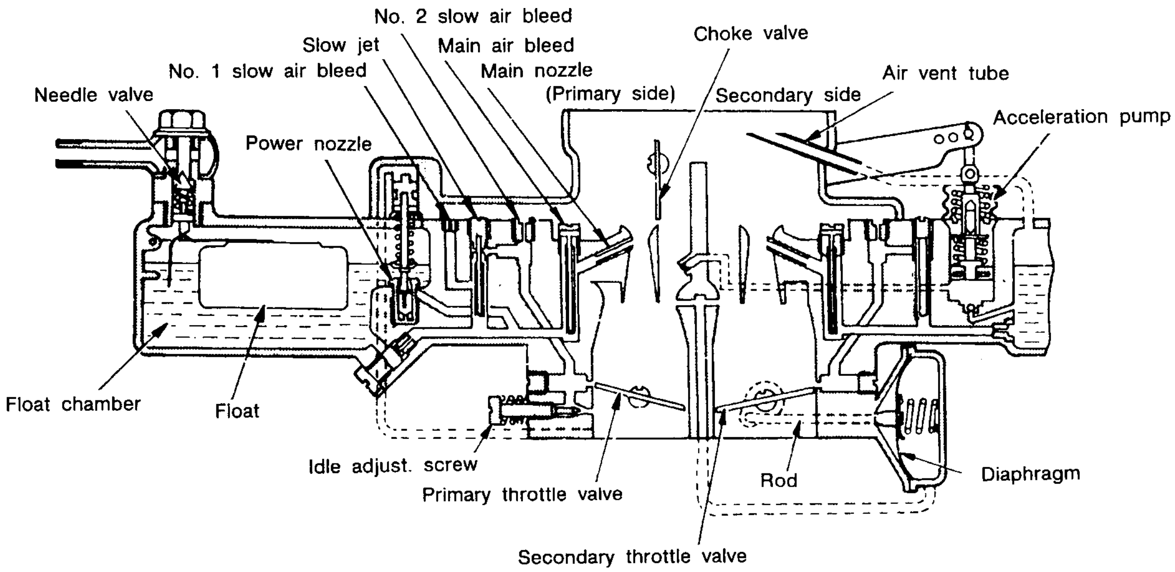
The volume of the air-fuel mixture is controlled by the throttle valve linked with the accelerator. When the piston moves downward, the air-fuel mixture is drawn up while being vaporized into the cylinder.

INTAKE OF AIR-FUEL MIXTURE



TFE014

2-2. STRUCTURE

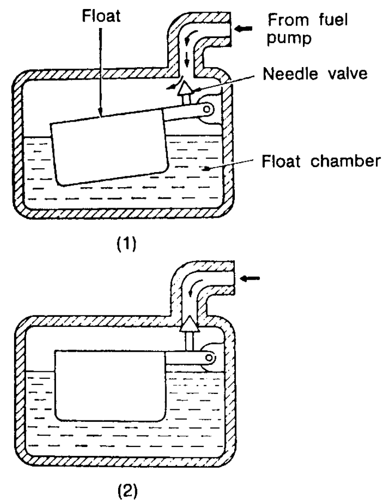


TFE015

The carburetor is used in an automobile, it requires many auxiliary systems. These systems are; a float system that stores a fixed quantity of fuel delivered from the fuel pump to obtain a proper air-fuel ratio; a slow fuel system that supplies fuel during engine idling and low speeds; a main fuel system that supplies fuel during middle and high engine speeds; a power fuel system that operates during high engine power output; an acceleration fuel system that operates during rapid acceleration; a start-up fuel system that supplies more fuel than usual at start-up; and a throttle valve which is linked to the acceleration pedal which is operated by the driver.

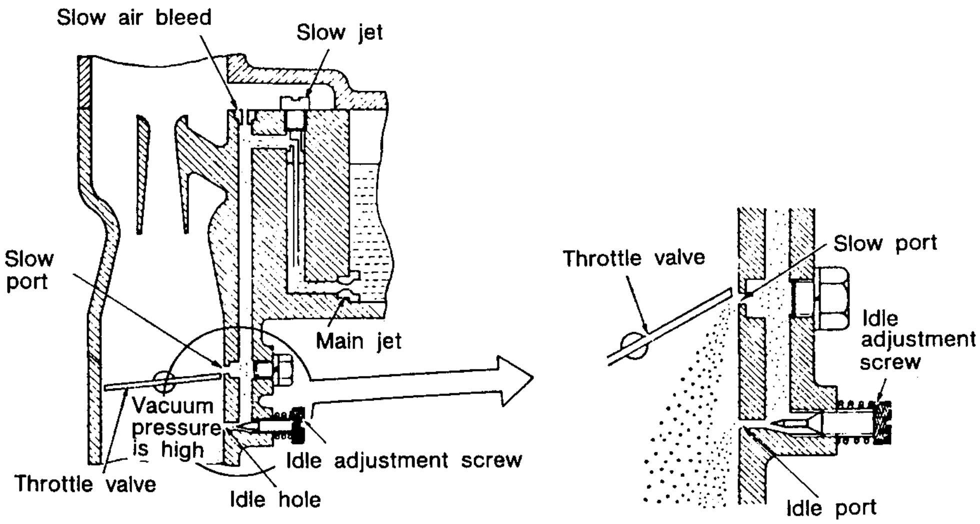
(1) FLOAT SYSTEM

The float system stores a fixed quantity of fuel to be ready to supply fuel as the engine needs it and maintains fuel at the specified level in the storage chamber (float chamber) at all times.



TFE016

(2) SLOW FUEL SYSTEM

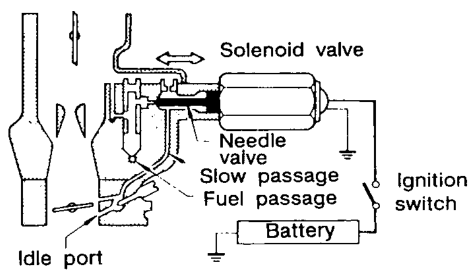


TFE017

The slow fuel system consists of a slow jet, slow air bleed, slow port, idle port, idle adjustment screw, etc. Fuel is measured at the slow jet and compensated at the slow air bleed and, simultaneously, mixed with air in the foam state at the slow air bleed, where atomizing of the fuel is enhanced.

The slow port is positioned slightly above the throttle valve as it fully closes. When the throttle valve begins to open, i.e., the engine is running at a low speed, fuel is supplied from the slow port together with the idle port that is positioned below the throttle valve until sufficient fuel is drawn out from the main nozzle. The idle port supplies fuel when the engine is idling with the throttle valve fully closed. The fuel flow volume (air-fuel ratio) can be adjusted with the idle adjustment screw.

Run-on preventive mechanism of fuel-cut system:
To prevent the *run-on phenomenon, i.e., even if the ignition switch is turned off the engine continues to run, this mechanism shuts off fuel in the slow fuel system simultaneously when the ignition switch is turned off. As indicated in the illustration, the fuel passage in the slow fuel system is opened by a solenoid valve when the ignition switch is turned on and it is shut off when the ignition switch is turned off.



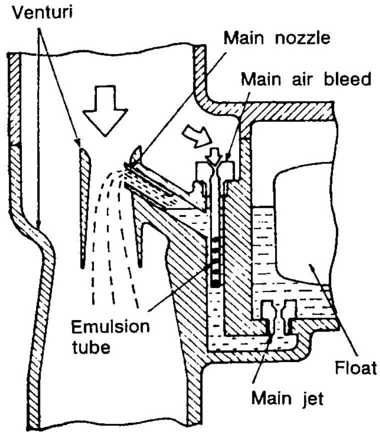
TFE018

*Run-on: This refers to the phenomenon in which the engine may continue to run after the ignition key is turned OFF by mixture gases ignited by the hot spots in the combustion chamber.

(3) **MAIN FUEL SYSTEM**

The main fuel system supplies fuel during normal engine operation. The main jet which is attached to the lower part of the float chamber meters and regulates fuel.

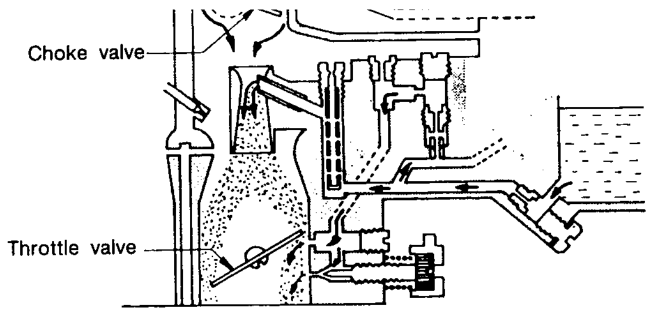
The main air bleed consists of a jet and an emulsion tube with several holes on its perimeter. As indicated in Fig. below, fuel in the main fuel system is metered and compensated by the main air bleed, and at the same time, mixed with air in the emulsion tube, and thus the atomizing of the fuel is enhance



TFE019

(4) **START-UP FUEL SYSTEM**

This is a mechanism to facilitate start-up of a cold engine. When the engine is cold, the fuel in the air-fuel mixture is not well vaporized and it is difficult to start up the engine. Thus, a richer than normal air-fuel mixture is required.

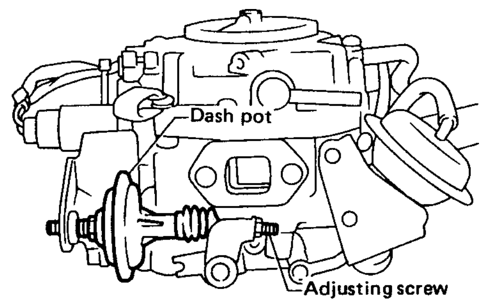


TFE020

To improve start-up and operation of the cold engine, a choke mechanism is provided. The choke mechanism has, as indicated in Figure above, a choke valve to restrict intake air in the intake air inlet of the carburetor. It also produces a large vacuum pressure below the valve by closing the choke valve and allows as much fuel as possible to flow from the main fuel system and slow fuel system in order to obtain a richer than normal air-fuel mixture.

(5) DASH POT

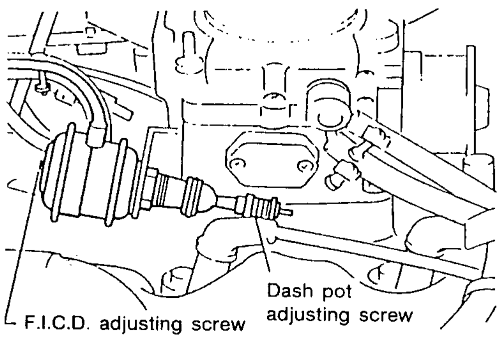
During quick deceleration, the negative pressure in the intake manifold increases due to rapid closing of the throttle valve. The mixture becomes over rich temporarily and harmful incomplete combustion gases will be emitted. To prevent this, the dash pot is designed to close the throttle valve slowly so that this over rich situation can be avoided.



TFE021

(6) F1 POT

The FI pot has both functions of the dash pot described above and FICD*.



TFE022

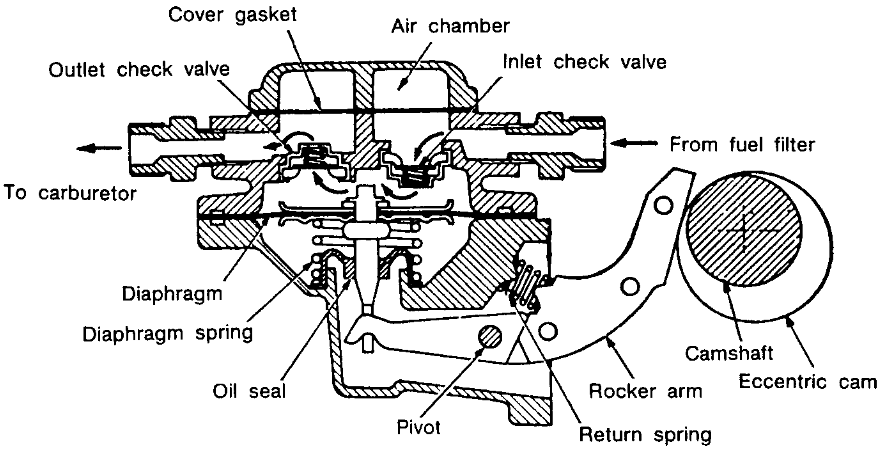
*FICD

The FICD stands for Fast Idle Control Device. When the air conditioner compressor operates, engine load increases resulting in rough idling. To prevent this, this device forcibly opens the throttle valve a little to increase the engine speed.

3. FUEL PUMP

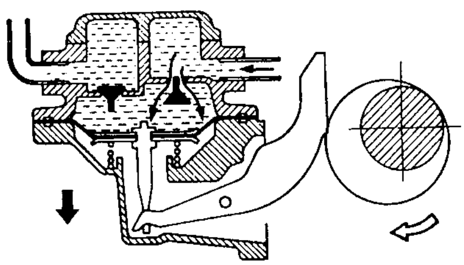
3-1. MECHANICAL FUEL PUMP

The fuel pump supplies fuel from the fuel tank to the float chamber of carburetor under a fixed pressure. There are two types, i.e., mechanical and electromagnetic, and generally the mechanical pump flitted to carbureted engines is commonly used.

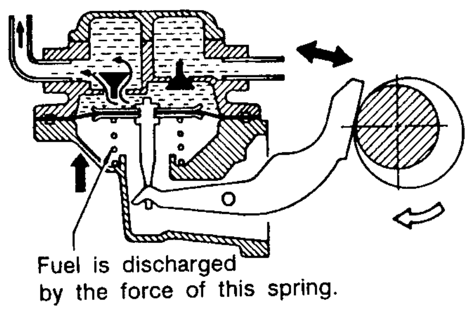


TFE023

The operation of a mechanical fuel pump is made by an eccentric cam driven by the camshaft of the engine. The rocker arm is pushed by the motion of the cam, and the diaphragm is pulled up and down. When the diaphragm is pushed downward, the inlet check valve is opened and fuel is drawn into the pump chamber; when the diaphragm is pushed back to its original position by spring force, the inlet check valve is closed and the outlet check valve is opened, allowing feeding of fuel under pressure to the float chamber of the carburetor.



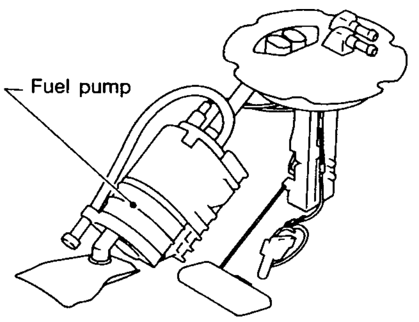
TFE024



TFE025

3-2. ELECTRICAL FUEL PUMP

Generally fuel pump is mounted with inside fuel tank. Motor turns in fuel, because fuel goes through the inside of motor of fuel pump. Opening pressure of relief valve is approximately 343 to 441 (3.43 to 4.41 bar, 3.5 to 4.5 kg/ cm^2, 50 to 65 psi). And it has a check valve to improve startability of engine and to protect from vapor lock by remaining a suitable residual pressure inside the fuel system.

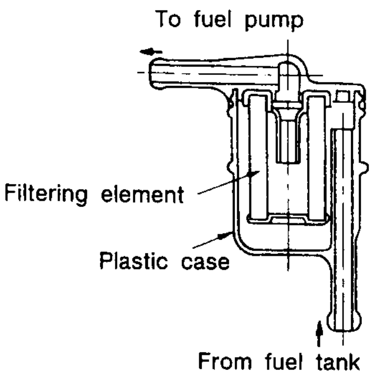


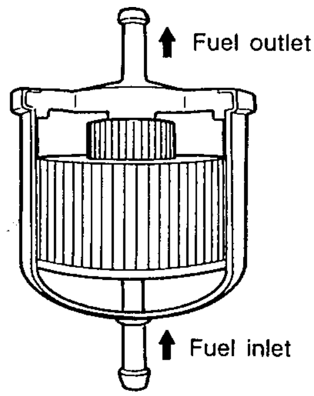
TFE026

4. FUEL STRAINER

The fuel strainer is also called a fuel filter, and is generally provided between the fuel tank and fuel pump in a carburetor system. ECCS uses a metal type fuel strainer and is generally provided between the fuel pump and fuel pressure regulator.

Fuel contains dust, gum substances and water. Since dust and gum substances may clog the narrow passages in the carburetor, and water and rust may cause freezing, these must be removed. Fuel strainers require replacement as they are a non-serviceable part.





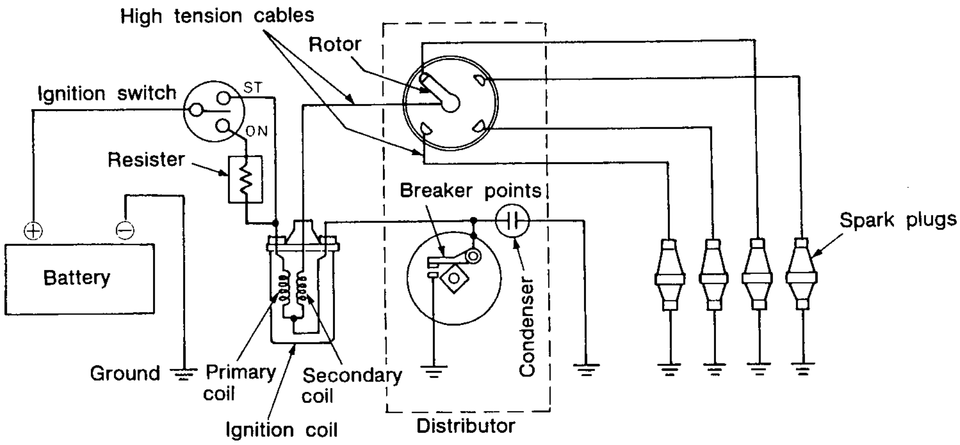
TFE027

ENGINE ELECTRICAL SYSTEM

1. IGNITION SYSTEM

IGNITION SYSTEM COMPONENTS

Illustration shows a typical 4 cycle engine ignition system. Each component is briefly described below.



TEL014

(1) IGNITION COIL

An ignition coil is actually a pulse-type transformer that transfers 12 volt battery voltage into a high voltage necessary for ignition. The secondary high voltage is generated by intermittent interruption of the primary current in the coil by opening and closing the breaker points inside the distributor.

(2) DISTRIBUTOR

In order to respond to various engine operating conditions, the distributor is designed to provide ignition sparks at the correct time to the spark plugs. It contains breaker points that intermittently open and close to send the current flow to the primary winding side of the ignition coil. It is also designed to. distribute secondary high voltage to each spark plug according to the firing order and to control spark advance in response to valve opening and engine rpm.

(3) SPARK PLUG

A spark plug ignites the gas mixture by the use of two electrodes from the secondary high voltage which is supplied from the ignition coil and the distributor.

(4) HIGH TENSION CABLE

A cable designed to transmit secondary high voltage from the ignition coil to the spark plug.

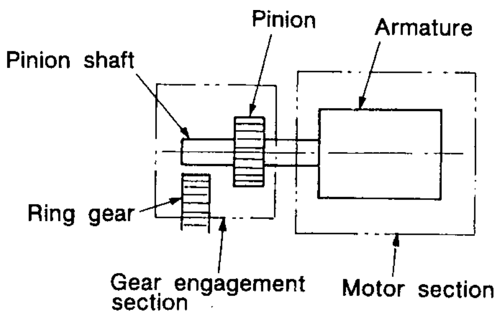
2. STARTER SYSTEM

STARTER SYSTEM FUNCTION

In order to start the engine through a cycle of gas mixture intake, compression, ignition, and exhaust, it must be cranked by an outside force. For this, a DC motor (called a starter) is connected to a battery.

Illustration shows a schematic diagram of a starter. The starter is mounted on the flywheel housing and operates a pinion gear that can be meshed with a large ring gear (which is installed on the flywheel.). The pinion gear can be moved forward and backward on the shaft. In other words, during starts, the pinion gear moves out and engages the ring gear. After the engine starts, the pinion gear disengages and returns to the original position and stops.

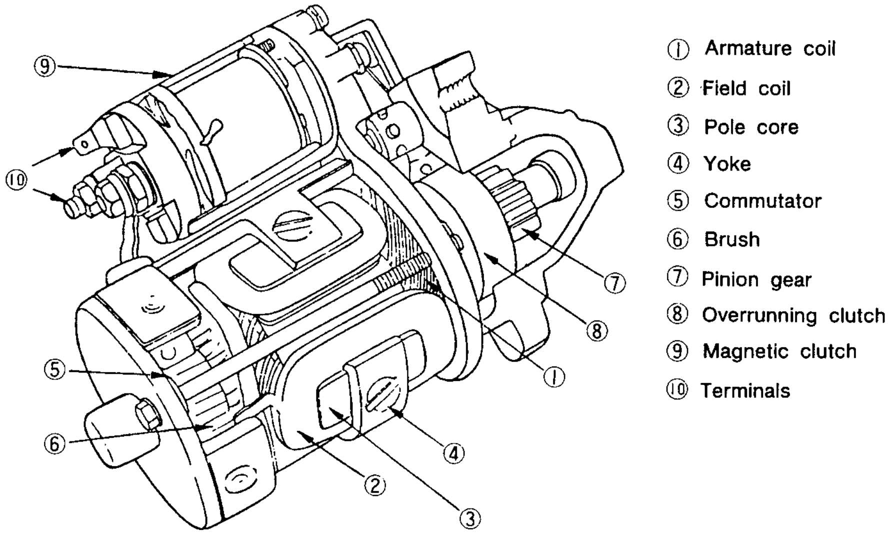
STARTER SCHEMATIC LAYOUT



TEL015

Thus, the main components of the starter are composed of a motor section that generates torque and the pinion gear structure that engages and disengages with the ring gear.

SCHEMATIC DRAWING OF STARTER MOTOR



TEL016

3. CHARGING SYSTEM

3-1. DESCRIPTION

The electrical charging system is part of the automobile electrical power system, and its output varies according to each operating condition. The electrical power output from an alternator is low at relatively slow engine rpm, and when electrical demand exceeds that of the alternator output, the power is supplemented from the battery. At middle to high engine speed, the output power from the alternator is increased to a sufficient level that excess electricity is stored back to the battery.

3-2. EACH COMPONENT FUNCTION

The charging system consists of an alternator, voltage regulator, and warning lamp.

(1) ALTERNATOR

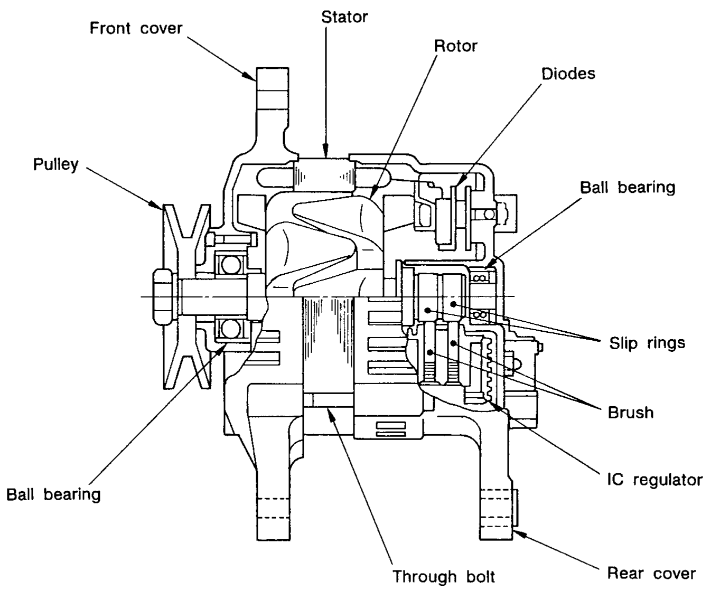
The alternator is driven by the engine via a belt attached to the crank pulley. It is a generator that converts engine rotation (mechanical energy) into electrical energy.

(2) VOLTAGE REGULATOR

A voltage regulator controls voltage generated from the alternator to maintain a constant value. There are two types of voltage regulators: contact type and non-contact type. In recent years, almost all automobiles are equipped with IC regulators inside the alternators, a non-contact type.

(3) CHARGE WARNING LAMP

A charge warning lamp illuminates when the alternator belt becomes loose, or when the alternator itself becomes inoperative and does not generate electricity.



SCHEMATIC OF GENERATOR

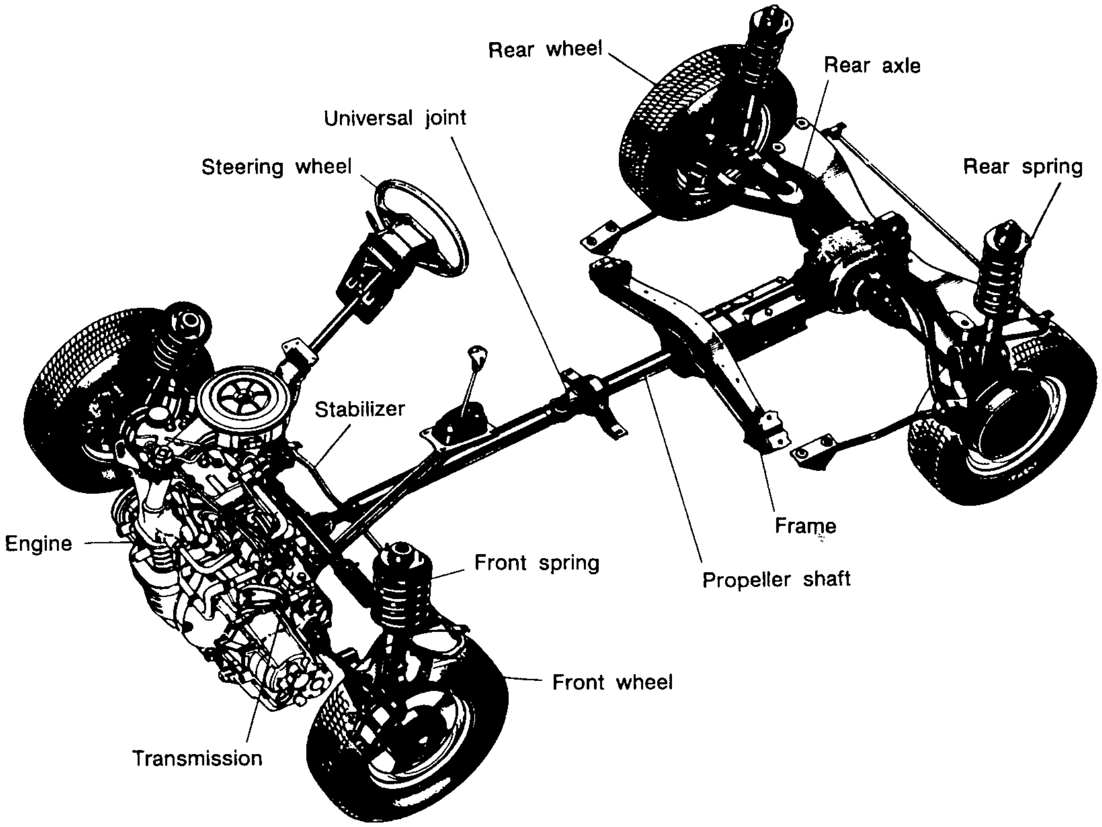
GENERAL INFORMATION

1. UNITS MAKING UP THE CHASSIS

Normally, a chassis is defined as “the part of a vehicle excluding the body which carries passengers or objects; the chassis frame and all units needed for self-propelling that are mounted on the chassis frame are collectively referred to as the chassis”.

Recently, however, with the adoption of the monocled body (a reinforced body that incorporates the functions of a chassis frame), many vehicles no longer use a chassis frame. Moreover, there is also an increasing trend for the engine and the engine electrical equipment to be classified in a separate category from the chassis.

CHASSIS CONFIGURATION



TCH001

- Chassis
  - Transmission
    - Clutch
    - Transmission
    - Propeller shaft and universal joint
    - Drive shaft
    - Final drive and differential gears
  - Suspension unit
    - Axles and suspension
    - wheels and tires
  - Brake system
    - Brake
    - Parking brake
  - Steering system
    - Steering

2. CHASSIS SPECIFICATIONS

2-1. WEIGHT

(1) CURB WEIGHT (C.W.)

The weight of an empty vehicle without payload or driver but including maximum amounts of fuel, radiator coolant, engine oil, spare tires, jack, hand tools and mats in designated position.

(2) GROSS VEHICLE WEIGHT (G.V.W.)

The maximum permissible total weight of the vehicle that may not be exceeded, as designed by the manufacturer, taking into account all legal requirements and material stresses.

(3) SPRUNG WEIGHT

Refers to the weight of the section supported by the chassis springs.

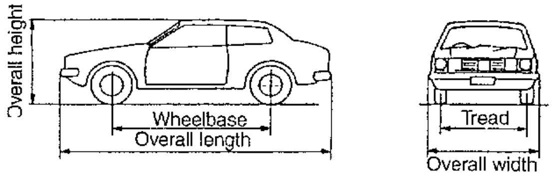
(4) UNSPRUNG WEIGHT

Refers to the weight of areas not supported by the chassis springs (for example, wheels and axles). Some parts that fall into both the sprung and unsprung weight categories (for example, propeller shafts, suspension arms and steering rings) are classified in the sprung weight category.

2-2. DIMENSIONS

(1) OVERALL LENGTH

Indicates the maximum vehicle length including accessories (bumpers, tail lights and so on) when measured parallel to the centre plane and ground plane of the vehicle.



DIMENSIONS OF AN AUTOMOBILE

TCH002

(2) OVERALL WIDTH

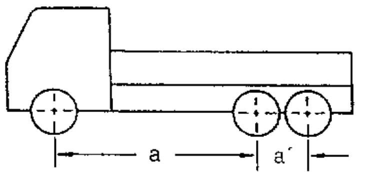
Refers to the total width of the vehicle, including accessories, when measured at right angles to the centre plane.

(3) OVERALL HEIGHT

Indicates the height of the vehicle from the ground surface to the highest point on the vehicle.

(4) WHEELBASE

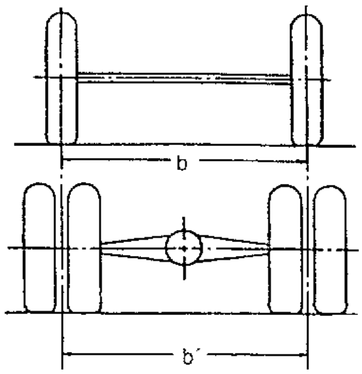
This is the horizontal distance between front and rear axles. As shown in Fig. 126, in the case of a 3-axle vehicle the distance “a” between the front axle and the middle axle is axle length 1, while the distance “a” between the middle and rear axles is axle length 2. Also, in some cases this indicates the distance between the front axle and the center of the multiple axles.



TCH003

(5) TREAD

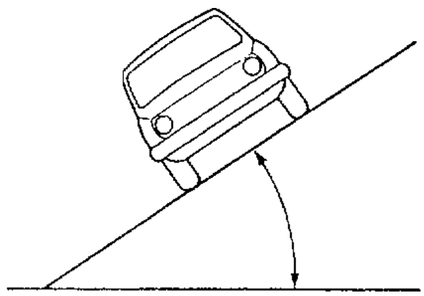
Indicates the distance between the left and right tires in the center of the ground plane. In the case of multiple wheels, this value refers to the distance between lines drawn through the center of each set of wheels, as shown by b' in the figure.



TCH004

(6) MAXIMUM STABLE ANGLE

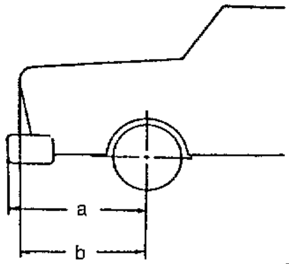
When an empty vehicle is tilted, this value indicates the angle, formed by the ground and horizontal surface, at which both wheels on the upper side of the tilt leave the around. In the case of a vehicle with the same wheel distance (tread), the lower the center of gravity, the greater this value will be.



TCH005

(7) FRONT OVERHANG

Indicates the horizontal distance from (a) the vertical plane passing through the from most axle to (b) the from most part of the vehicle, including bumpers, hooks and all other parts fastened to the vehicle. There are sometimes two values for front overhang, one for the body overhang and another for the frame overhang. In the figure at right, value b indicates the front body overhang, while value a indicates the front frame overhang.



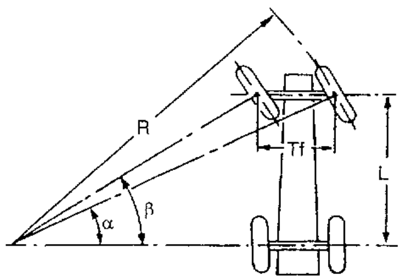
TCH006

(8) REAR OVERHANG

Indicates the horizontal distance from (a) the vertical plane passing through the center of the rearmost axle to (b) the rearmost part of the vehicle, including tow hooks and other parts fastened to the vehicle. This value may be differentiated between frame and body, as in the case of the front overhang discussed above.

(9) MINIMUM TURN RADIUS

This indicates the radius traveled by the outer wheels of the vehicle (on the center of the ground plane) when the vehicle is turned at low speed with the steering wheel turned as far as possible to one side.



TCH007

2-3. PERFORMANCE

(1) MAXIMUM SPEED

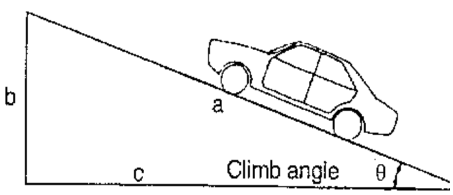
Maximum speed is established by testing the loaded vehicle on a level road The distance that the vehicle travels in one hour is expressed by km/h.

(2) FUEL EFFICIENCY

The distance that can be traveled on 1 liter of diesel is expressed by km/l. Fuel efficiency is a comparison of 1 kw to the gasoline consumed and is expressed by g/kw-h.

(3) MAXIMUM GRADEABILITY

Maximum gradeability is the ability of a vehicle to go up an incline and is measured by the maximum incline that the vehicle is capable of climbing. Maximum gradeability is expressed in most diagrams by b/ a = sin 0; b/c x 100%) is also used.



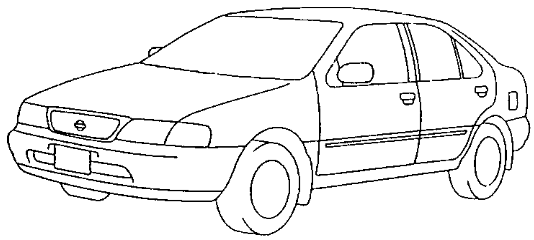
TCH008

3. BODY TYPES AND CONSTRUCTION

3-1. BODY TYPES-1

SEDAN

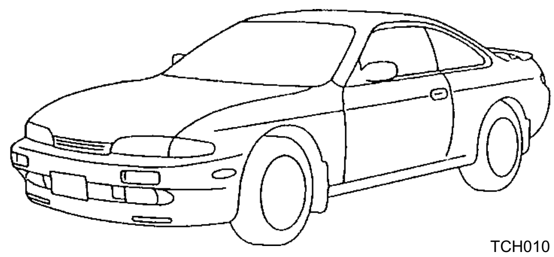
A vehicle with two rows of seats in the front and the rear. The most basic type for the passenger car.



TCH009

COUPE

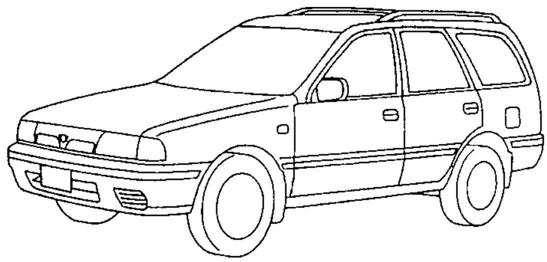
A sporty passenger car with two doors. The basic form is a 2-seater accommodating only two passengers. Normally, compared with a sedan, the roof is smaller and the height of the vehicle is lower.



TCH010

WAGON

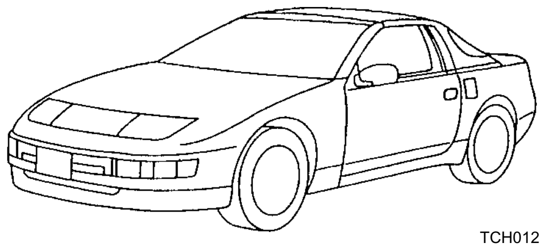
This is a vehicle formed by extending the interior space of the sedan. The rear part can be used as a baggage space. Originally, it was called the station wagon, which is a reminder of the era of horse-drawn wagons.



TCH011

CONVERTIBLE

The 2-door vehicle with a folding roof. Cabriolet is the German name.



TCH012