SEAFARERS TRAINING CENTER

ENGINE ROOM RESOURCES MANAGEMENT.

In accordance with the STCW 78 Convention, as amended

AIMS

This course consist in exercises around of ship engine resources and the teaching of the engine room.

OBJECTIVES

Trainees should be competent to carry out:

Familiarization with the instrument exist in engine room.

- Use check list and plan for use all the equipment exist in engine room of a ship.
- Have knowledge of engine room equipment and conections.
- Have experience of engine room problems , detection and solve.
- Capacity for take decisions to carry out safe operations of the ship engine.
- Have knowledge of operations of auxiliary engines.

ENTRY STANDARDS

This course is open for trainees with basic engine knowledge.

COURSE CERTIFICATE

A certificate after approved.

COURSE INTAKE LIMITATIONS

The maximum number of participants should be 4

STAFF REQUIREMENT

Instructors must be engine officers

TEACHING FACILITIES AND EQUIPMENT

Basic equipment exists in engine merchant marine ship.

- Engine room simulator
- Low speed main engine turbo-diesel.
- A boiler steam generator.
- A diesel engine economizer.
- A turbo generator.

TEACHING AIDS

- The Instructor Manual.
- An engine room simulator.
- STCW Convention

COURSE TIME-TABLE

Learning Objectives	**(Lecture/Practical Work) Hours**
1. Course introduction	1
2. Familiarization: -Engine components -Instruments -Controls -Operation procedures	9
3. General procedures: -Auxilliary system & units -Diesel generator -Boiler steam generator -steam turbine for load -Main propulsion diesel engine	10
4. Main engine operation	10
5.Problems solution	10
TOTAL	**40**

1. COURSE INTRODUCTION

1 The instructor shall

1.1 explain the scope and objectives of the course

1.2 explain the relationship of this course to other courses within the subject area

1.3 explain that use is made during the course of individual and group activities to develop skills and attitudes in preparing for future service

1.4 explain the need to supplement what is learned with practical experience, especially for lower grade certificates

1.5 explain what is required in order to reach each learning objective and pass each evaluation exercise

2. FAMILIARIZATION

ENGINE COMPONENTS:

Valve Types

Flat head engine car. Good resistance.
Convex: industrial engines. Great resistance.
Concave: competition. Great flow, low resistance.
Types of Motor Piston ValveE

Piping system

The exhaust pipe of a vehicle equipped with an internal combustion engine is used to evacuate the combustion gases (also called "escape") from the engine to the outside of the vehicle once the engine has performed the combustion of gasoline or diesel . Likewise, it dampens the noise generated, ensuring greater engine performance, reduce temperature and pollution generated by the fumes expelled.

It generally consists of an exhaust manifold that collects exhaust gases in the outlet extended by a cylinder evacuation device. The same engine can have multiple exhaust pipes.

The exhaust pipe serves in particular to reduce noise and pollution.

• Through a system that reduces noise "muffler".

• Using a system to reduce emissions, catalysis and filtration, thanks to the particulate filter and catalyst.

The exhaust part in the operation of the engine:

• If it is too open, the engine increases power (the cylinder is emptied better after each explosion), but gets hotter and consume more.1

• If you are too clogged, the engine shows a lack of power.

• In two-stroke engines, the tube demilitarized improves while emptying the cylinder and compression.

pumps

A fuel pump is a device that delivers the working fluid or fuel the energy to move through the carburetor and then enter the intake valve which then passes to the cylinder.

The pressures that the pump works depend largely on the type of engine you have. Thus, the more power a motor need, higher flow rate will require fuel, so that an increased pump power is needed.

Treatment Plants Oil Change

In this plant are performed receive operations, declassification, pretreatment and storage of industrial and automotive oils COGERSA received and the product of the Marpol oil plant and oil residues generated in the facility COGERSA.

Zone of unloading and reloading of tanks and drums

This area consists of the following facilities and equipment:
• Area for unloading and loading trucks
• 2 reception tanks used oil with a working volume of 10 m3
• Booth pumps, filters and electrical panel
• suction and discharge pipes to storage tanks
Storage tanks used oil
It has an oil storage volume of about 9,000 m3 / year, achieved by 2 tanks of 25 m3 and 100 m3 five tanks. These tanks are located on a concrete bund to prevent any contamination of the soil.

Open area for storage of drums
There are two areas for storage of drums, depending on the state of the drum:
• Area storage cans filled (approx. 100 m2)
• Area for storage of empty containers (approx. 560 m2)
Oil separator
The entire area where the unloading, storage and loading occurs, has a drainage system and rainwater collection that lead to oil separator, where once the water and oil density separated, it is collected through about skimmers and takes storage tanks, while the water is treated on the ground of physical-chemical treatment plant sludge in solidification-stabilization and water-oil mixture in Marpol plant. In this separator can also lead water cleanup plant. The following figure shows the flowchart of the process carried out at the plant oils shown:
Main Propulsion Unit
The primary function of any marine engine or engine plant is converting chemical energy of a fuel into useful work and use that work in ship propulsion. A propulsion unit consists of machinery, equipment, and controls that can be mechanical, electrical, or hydraulic connected to a drive shaft. After reading this chapter, you will have a basic understanding of how the propulsion unit of a boat works. You will learn about the three main types of propulsion units used in the marina. You will also learn how to drive propulsion propeller of the boat by the use of gears, shafts, and clutches is transmitted.

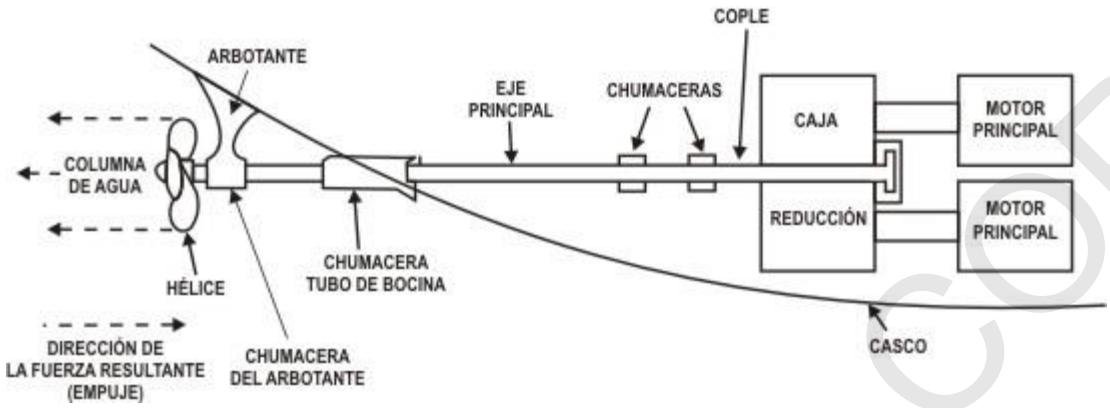
PROVISIONS OF THE PLANT

A ship moves through the water propelling devices such as impellers or propellers. These devices impart movement speed of the vessel and a water column in the opposite direction to the direction in which it is desired to move the vessel. A force, called reaction (because it reacts to the force of the water column) is developed against the speed-imparted. This force, also called thrust is transmitted to the boat and causes the boat moves through the water.

The marine propeller propulsion element is used in almost all naval vessels. The propeller thrust developed in the structure is transmitted to the ship by the main shaft by the thrust bearing (see Fig.). Extending the main shaft of the main gear shaft to the propeller reduction reduction. By suspension bushings, bearings and retaining aft bearing support is based on alignment. The thrust acting on the drive shaft as a result of the effect of propeller thrust is transmitted to the structure of the vessel by the main thrust bearing. In most of the boats, is located at the end of the main shaft within the main reduction box. In some large ships, however, the hub of the main shaft is located further aft in the machinery space or in bright shaft.

The main reduction gear connects the prime mover (motor) to the shaft. The role of main reducer is to reduce high-revving engine and allow the propeller to operate at a lower speed. In this way both the engine and the propeller shaft rotate at its most efficient speed.

ARREGLO BÁSICO DE UNIDAD PROPULSORA



INSTRUMENTS:

cylindrical punch
• Long model for security bolts brake pads
• shank Ø: 10 mm
• Ø 6 mm with pin
• Ø 3 x L 7 mm for Opel
Lima for brake jaws

• With plastic handle / rubber
• Width 14 mm, length 130 mm chopped
• Teeth thick obliquely on one side
• Removes brake dust, rust and dirt Hollow gag

Brake jaws brushes

• With plastic handle
• To clean cast steel jaws
• To clean aluminum jaws

Clamp the dock cable handbrake

• For parking brakes
• Loosen the recoil spring to mount / unmount the handbrake cable

Tool brake piston return

• For disc brake systems
• To push back the brake piston fixed calipers and floating

Brake Spring Clamp

• For drum brakes
• With special crimping and bearing ring
• Suitable for brake linings riveted and glued

Brake Spring Pliers for trucks

• heavy model with interchangeable spring hook

Brake Pipe Wrench
• Hex wrench double open
• Model reinforced layered with stopper
• Width 10 x 11, length 180 mm
Brake Pipe Wrench straight

• Hex wrench double open
• Model reinforced straight to top
• Width 10 x 11, length 160 mm

Game Double flaring and cutter

• In robust steel

double flaring

• To skirting accurately according to DIN 74234 copper tubes, aluminum and steel Bundy drawn seamless tubes rolled and double wall
• For pipe diameters 4.75 / 5/6/8/9/10 mm

Instructions:

1. Place clamping blocks as the pipe diameter.
2. Place tube in the spacer bolt (front stepped small diameter) in and tighten the clamping screw.
3. To use the D beaded pressure cone. F to select beaded beaded piece as the tube diameter. E beaded process is created again after edging F with cone pressure.

Individual pieces double flaring

Brake pipe flaring
• Double Tube flaring brake pipe and plastic coated copper
• Quick clamping device to tighten the brake pipe without damaging
• To brake pipes Ø Ø 4.75 mm and 6.0 mm
• Beaded Double DIN 74234 (brake lines and hydraulic)
• In case of metal
• Simple operation

Kit manual flaring brake lines
• Set of 13 pieces in bag, including cutter and reamer
• Application directly into the vehicle through hydraulic spindle
• Simple operation
• You can flaring pipes Ø 4.75 / 5/6 mm according to DIN and SAE
• Smooth jaws that do not harm pipes plastic coated steel
• Ideal for mobile use

Reamer interior / exterior
• For deburring steel pipes, aluminum, copper and plastic
• Ideal for brake lines
• Reamer retractable inner
• For inside diameters: 3-12 mm
• For outside diameters: 4-14 mm
• Length: 125 mm
• Material: HSS

CONTROLS

Control techniques DC motors are tools used to control the speed, torque and power supply of DC motors. The motor control can be carried out mediantetiristores and a basic knowledge of power electronics.
Most motors used in industry are directly connected to the electrical distribution lines, and fed alternating current or direct current. The terminals of the motor windings are connected directly to the power supply lines, and their operating characteristics remain unchanged, having a constant input voltage. The motor operates at nominal conditions when fed with the voltage on the plate operation, delivering constant to the load connected to the output shaft.
The nature of the load that is coupled to the motor shaft defines the behavior of the machine. In the case of a light load, the motor developed a relatively high speed and low torque rotation. Conversely, if it has a heavy load or difficult to move, the motor moves at a lower speed and deliver MasPar therefore required a greater burden. However, if the load is kept constant, the motor operation will also remain constant, unable to control the speed because the supply voltage is not altered.
Industry there are cases that require handling operating characteristics of the engine. This control is usually done using thyristors. The combination motor control thyristors and other associated electronic components are known as the speed control system, drive system or motor drive system.

Toolkit brake piston
• 37 pieces in a plastic case
• To rewind or compress piston brake systems floating brake calipers
• A screw thread on the right and one with left hand thread
• The screw thread on the left serves, p. eg., for Ford Focus and Mondeo

Set of pneumatic tools. brake piston
• 16 pieces in plastic case
• To rewind or compress piston brake systems floating brake calipers
• Spindle tire thread to the right and left

Accessories p. Tool sets. brake piston

Reamer for sensor ABS
• Special tool for cleaning the guide hole on the ABS sensor wheel bearing housing

Preamers game. automobile ABS sensor
• Ideal for cleaning the seats of the ABS sensors
• Very good handling with T-handle
• The T-handle is ideal for tight spaces
• Can also be used in combination with a ratchet 1/4 "
• In plastic case Art. No. 4415 14 16 1 with tray VAROsoft Art. No. 9026 828

Thread Repair Kit 17 pcs.
• 17 pieces in plastic briefcase Art. No. 4415 14 16 1 with tray VAROSoft Art. No. 9026 636
• The female thread M9 is in the wheel bearing housing serves to tighten the bolts guide brakes
• This female thread often damaged when removing the bolts guide
• Using the brush included in the kit insert steak thin and sturdy steel is introduced to high loads
• Use faultless copper ring included in the game for a clean fit and across the surface of the collar

Ratchet brake bleeding, long
• Special brake bleeding ratchet wide 11 for driving the rear bleed screws on VW Golf V, Audi A3, Seat Altea, Skoda Oktavia new
• Avoid having to disassemble and reassemble the rear wheels

Adapter plugs keys crankcase 1/2 "
• With hexagonal fuck width 17

Cap key crankcase

Wrench Set sump plugs
• 7 pieces

Face wrench for oil change
• Universal with 10 square sizes and a screwdriver blade
• Length: 220 mm
• Squares male: width 8.7 / 9.5 / 10.5 / 11.5 / 13 mm
• Square female: 6,8 8.7 / 10.5 to 13 / 15.2 to 18 / 16.5 to 19 mm

Funnel to fill the oil tank
• directly and hermetically fixed in place plug engine oil
• Filling controlled (<2.3 l)
• Universally applicable, among others for Audi, VW, Seat, Mercedes-Benz etc.
• For models of VAG group from 2013 with smaller oil plug

Wrench oil filter
• Film clamping spring steel buttons for a secure grip

Oil filter wrench ½ "LL27

• For mounting / removing the oil filter following new models: Ford C-Max, Focus, Galaxy, Kuga, Mondeo, S-Max; Peugeot: 308, 2008, 508, 5008, 407, RCZ; Citroën C4 Picasso and Grand Picasso, C5 etc.
• You can not use a normal wrench in your engine compartment due to compact design
• Through its catching ½ "can tighten the oil filter using a torque wrench with torque mandatory rotation

Glasses extractors oil filter
• Catching square 3/8 "Ratchets and-handle

Oil filter wrench
• With movable handle, can be bent up to 90 °
• Tape autotensora steel locking buttons

Textile strap wrench oil filter
• Dimensions AxL tape: 22 x 600 mm
• To filter Ø 20-160 mm

Chain wrench oil filter
• With reinforced chain and square to ratchet 1/2 "

Extraction of oil filters
• Fixing left and right
• Accommodation 3/8 "
• Included square housing adapter from 1/2 "to 3/8" hexagonal width 21 mm
• Accommodation 1/2 "

Game vessels extract. p. oil filters, 13 pcs.
• Vessels extractors profiled oil filter in case
• Specially designed for European vehicles such as VW, Audi, BMW, Fiat, Lancia, Mercedes, Seat, Skodo, Volvo etc.
• High quality steel inlaid with reinforced inner plate and 3/8 "square drive

Game vessels extract. p. oil filters, 15 pcs.
• Vessels extractors profiled oil filter in case
• High quality steel inlaid with reinforced inner plate and 3/8 "square drive

Game thread repair sump plugs M15
• The original thread M14 x 1.5 is cropped and enlarged for M15 x 1.5 size in the same job step
• Instead of the original sump plug a larger cap is screwed with its sealing ring matching

Jgo. Thread repair sump plugs M13-M20
• To repair threads M12 x 1.5, M14 x 1.5, M16 x 1.5 and 1.5 x M18
• The original thread is removed and increases in size in the same job step
• Instead of the original sump plug a larger cap is screwed with its sealing ring matching

Glass screwdriver 1/2 "tip RIBE
• For cylinder head bolts for Audi, VW, Skoda brands, Seat
• Length: 92 mm

Grinder manual valves
• Grinder manual valves Ø 25 x L 255 mm
• 1 spare suction cup Ø 25 mm

Grinding valves
• For operation with power drill / screwdriver
• Grinding-turn valves with automatic lapping
• Ventosa parts Ø 20 mm
• Ventosa parts Ø 28 mm

Pasta for grinding valves
• It can be diluted with oil (eg engine oil)
• Basto = grain P90
• Fine = P180

Centering clutches
• For quick and easy centering clutches with and without pilot bearing

Special key pivot
• Layered
• 2.9 mm diameter pivot
• Distance between pivots 18 mm for timing belt idler pulleys (Audi / VW)

Toolkit hook exchangeable
• With strong magnet
• To remove pins
• For mounting springs and O-rings
• To lay cables, etc.

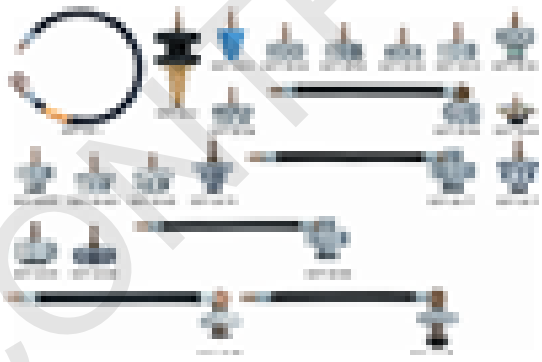
Holding wrench. V-belt pulleys
• Essential for installation and removal of all kinds of V-belt pulleys
• Suitable for alternator pulleys and water pumps and electric motors, compressors, washing machines, machine tools, etc.

Set of tools for belts, 2 pcs
• For self-tightening belts without tensioning pulley transmission
• Accurate to assemble and disassemble easily and quickly the elastic strap eg for air conditioning compressor
• Very useful to remove the belt without damaging it so that you can then mount again
• With wing nut on one side for easy attachment
• In plastic case with foam tray
disassembly:
• To rotate the belt, the inclination of the tool belt pushes out
mounting:
• When setting the tool on belt wheel, push the tool belt in position when the wheel is turned
• Suitable for many types of engines and vehicle models

Checker cylinder head gasket
• To check the filling of air between the cooling water and the radiator cap
Operating mode:
• An increased share of carbon dioxide (CO2) for the combustion gases in the air filling is indicated by a color change of the liquid leakage tester.
• A routine check can be performed either with the engine cold and hot
• Thanks to the model of two chambers erroneous indications that may arise in other devices by alkaline waste and accidental aspiration of cooling water are avoided
• Checker reaction liquid and rinse

Vacuum filling apparatus radiators
• Within 30 seconds without cooling system without bubbles fills purge
• Due to the leak test systems filling leaky cooling (after replacement of radiators, thermostats, tubes, etc.) is avoided
• Working pressure 6-10 bar
• You can use all adapters radiators (see list of use)
• Quick assembly and disassembly thanks to the quick coupling
• It can be used to purge auxiliary heating

Cooling system tester
• To test the cooling system for leaks
• Model reinforced plastic fiberglass purge valve and quick coupling
• Precision manometer with double scale 0-2.5 bar / 0-36 Psi
• You can use all adapters radiators (see list of use)
• Quick assembly and disassembly thanks to the quick coupling



OPERATION PROCEDURES

Electromotive Force factors that facilitate their management

• The intensity of the magnetic field. The more intense the field, the electromotive force tends to be higher.

• The rotation speed. The greater the velocity, the electromotive force tends to be greater. You can also vary there are different formats to develop it.

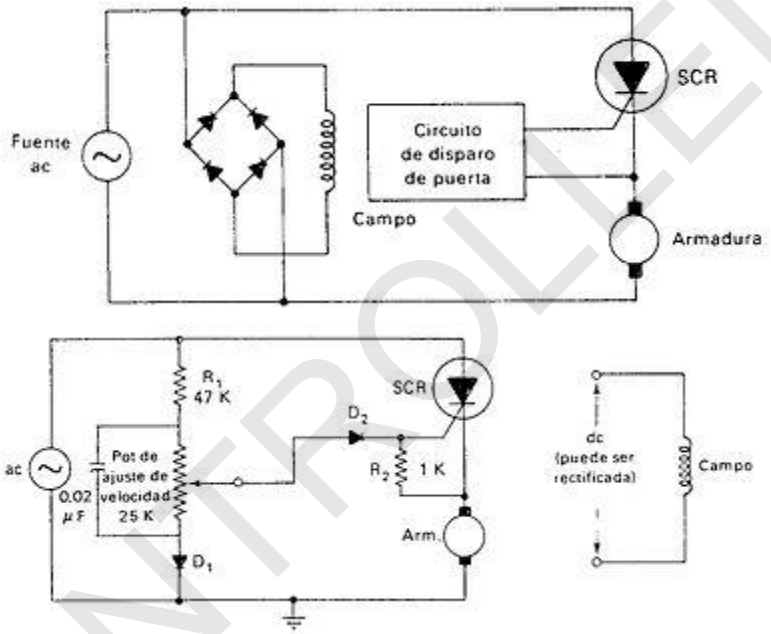
Vary the speed form of a DC Shunt Motor [edit]

• Adjust the voltage (and current) applied to the field winding. Increasing the voltage field, the motor decelerates.

• Adjust the voltage (and current) applied to the armature. By increasing the voltage at the motor accelerates armor.

Armor control often preferred because the field can be handled more freely torque production by this method.

Armature Control Thyristor



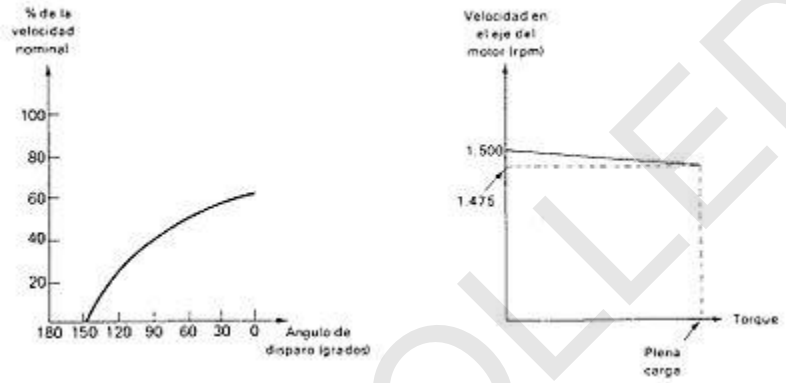
SCR and Control System

In this case the SCR (Sillicone Controlled Rectifier) can make the most of the functions of a rheostat to control the average current of a load without the limitations of great power. These are small, inexpensive and energy efficient. Naturally couple the motor armature for controlling engine speed. According to the figure the SCR then provides half-wave rectification and control the armature winding. If given an early shot of the SCR, the average voltage and armature current increases and the engine can work faster. When firing the SCR later, the average voltage and current are reduced and the engine runs slower.

Media Control System Onda and phase for speed of a DC Shunt Motor

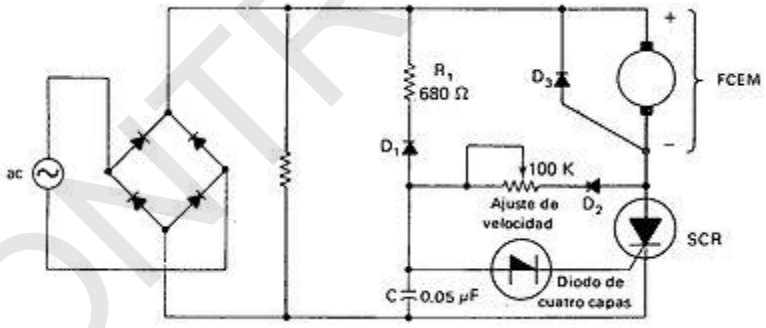
The motor speed is adjusted by the potentiometer 25 K. By turning upwards, the engine speed increases, this is because the gate voltage relative to earth becomes more of the respective line voltage AC and this allows the gate to cathode voltage reaches earlier in the cycle the value of the trigger voltage of the SCR. The relationship between the speed and angle trip delay, for this system, is plotted. You can see that the action of speed control is accomplished in a fairly tight fit 70˚ to 110˚ about.

When the electromotive force decreases, cathode voltage drops to earth, for VK largely depends on the electromotive force. VK decreases if the SCR firing VG is done before because not have to increase so that the cathode-anode voltage is large enough to trigger the SCR both. An increase in torque causes a reduction in the firing angle turn, this gives us a higher current and armature voltage raising speed and offset any drop in velocity given by the elevation of torque.



Unit Rate of Turn to Angle Shot

Control System for Single Phase Half Wave speed of a DC Motor



Onda Media Control for DC Motor Speed of a

This control operation is described below: the alternating current to a rectified full wave bridge, the DC pulse voltage is applied to the field winding and armature control circuit. The capacitor with the current flowing through the armature winding, low resistance loads, through diode D2 and potentiometer for speed setting then goes to the top plate of the capacitor. The capacitor is charged until the breakover voltage SUS [unilateral switch silicon]. At that moment the SUS allows part of the capacitor is discharged into the gate of SCR, firing it. The firing angle is determined by the resistance of potentiometer speed

setting that determines how quickly load C. The diode D3 suppresses all product inductive reverse bias armature winding to finish half cycle. When the SCR opens at the end of a half cycle, the current circulating in the loop D3 and armor. The object of the R1-D1 combination is to provide a discharge path for the capacitor C. Remember that SUS does not return completely to 0 V, when shooting. The capacitor can not download all its load along the cathode-gate silicon rectifier circuit. Some charge remains on the upper plate C. As the DC supply pulses approach 0, the load C is discharged through R1 and D1. Thus the capacitor loses any residual charge to start the next press of the diode bridge.

OPERATION

1. Intake Time - The mixed air and fuel entering through the intake valve.
2. Time Compression - The air / fuel mixture is compressed and powered by the spark plug.
3. Burn Time - The fuel is ignited and the piston is pushed down.
4. Exhaust Time - The exhaust gases are conducted out through the exhaust valve.

The Otto and diesel engines have the same main elements: (block, crankshaft, connecting rod, piston, cylinder head, valves) and others specific to each, as the high pressure injection pump on diesel or formerly carburetor in Otto .
In Q4 is common designate by its type of distribution: SV, OHV, SOHC, DOHC. Is a reference to the available (or) camshaft.
Combustion chamber
The combustion chamber is a cylinder, usually fixed, closed at one end and into which the cylinder unpistón tight slides. Position into and out of the piston modify the volume between the inner face of the piston and chamber walls. The outer face of the piston is connected by a connecting rod alcigüeñal that converts rotary motion into linear motion of the piston.
In multi-cylinder engines, the crankshaft has a starting position, called crank pin and connected to each axis, whereby the energy produced by each cylinder is applied to the crankshaft at a certain point of rotation. Crankshafts have heavy flywheels and counterweights whose inertia reduces the irregular movement of the shaft. A reciprocating engine may have from 1 to 28 cylinders.

SOLEX carburetor monocuerpo.
Feeding system

The fuel supply system for an Otto engine comprising a tank, a fuel pump and fuel metering device or atomize the fuel vaporized from the liquid state, in the right proportions to be burned. Carburetor is called the device so far was being used for this purpose in Otto engines. Now the fuel injection systems have completely replaced for environmental reasons. His greatest precision dosing reduces fuel injected CO2 emissions, and ensures a more stable mixture. In diesel engines diesel fuel not proportional manner to incoming air is metered, but according to the command of acceleration and engine (control) scheme via a fuel injection pump.

Fuel injection pump BOSCH diesel engine.

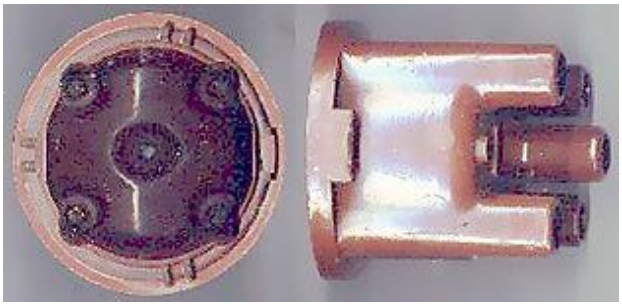
In multi-cylinder engines the vaporized fuel to the cylinders is carried through a tube called branched intake manifold. Most engines have an exhaust manifold or expulsion, which carries out the vehicle and dampens the noise of the gases produced by combustion.

Distribution system

Valves and camshaft.

Making each cylinder and fuel gas ejected through the head valves or sliding valves. A spring holds the valve closed until opened at the right time, to actuate the cams levasrotatorio tree driven by the crankshaft, or thestring coordinated by timing belt assembly being. There have been several other distribution systems, including distribution by sliding sleeve (sleeve-valve).

Chain.ignitionMain article: Starting the Engine



Distributor cap.
The engines need a way to initiate combustion of fuel into the cylinder. In gasoline engines, the ignition system is a component called ignition coil, a high voltage auto-transformer which is connected to a switch which interrupts the primary current to an electric high-voltage pulse is induced in the secondary.
Said pulse is synchronized with the compression stroke of each cylinder; the impulse is carried to the corresponding cylinder (who is in compression at the time) using a rotary distributor and wires that carry high voltage discharge to the spark plug. The device produces the ignition of the fuel / air mixture is a spark plug, which is installed in each cylinder, has few tenths of a millimeter apart electrodes, the electrical pulse produces a spark in the gap between an electrode and another that inflames fuel; There spark plugs with several electrodes, spark plugs using the process of 'surface discharge' to produce the spark, and 'glow plugs' (Glow-plug).
If the coil is bad reheated; that result in energy losses, reduces the spark plugs and cause system failures automotive ignition. Systems of electricity generation motors, magnets give a low voltage at low rpm, increasing the spark voltage by increasing rpm, while battery systems give a good spark at low rpm, but the intensity of the low spark with increasing rpm.

Main article: Refrigeration internal combustion engines
Because combustion produces heat, all engines must have some type of cooling system. Some stationary engines of cars and planes and outboard engines are cooled with air. The cylinder engines that use this system have on the outside with a set of sheet metal which emit the heat produced inside the cylinder. In other engine cooling water is used, which means that the cylinders are within a housing filled with water which in automobiles is circulated by a pump. The water is cooled by passing through the blades of a radiator. It is important that the liquid used to cool the motor is not ordinary water because combustion engines working regularly higher than the boiling point of water temperatures. This causes a high pressure in the cooling system failures leading to gaskets and seals water and the radiator; a refrigerant is used, it does not boil at the same temperature as the water, but at higher temperature, nor is frozen at very low temperatures.
Another reason why you should use a refrigerant is that it does not produce scale or sediment adhere to the walls of the engine and radiator forming an insulating layer would

decrease the cooling capacity of the system. In marine engines sea water is used for cooling.

Starting System

Unlike engines and steam turbines, internal combustion engines produce no torque when starting (see Moment of force), which implies that it must be caused movement of the crankshaft so that you can start the cycle. Automotive engines use an electric motor (starter motor) connected to the crankshaft by an automatic clutch is disengaged as the engine starts. On the other hand, some small engines are started manually turning the crankshaft with a chain or pulling a rope that wraps around the flywheel.

Other ignition engines are the initiators of inertia, which accelerate the flywheel by hand or with an electric motor until it has enough speed to move the crankshaft. Some large engines use explosives initiators, by the explosion of a cartridge move a turbine coupled to the engine and provide the necessary oxygen to fuel the combustion chambers in the first movement. The initiators of inertia and explosives are mostly used to start aircraft engines.

3. GENERAL PROCEDURES

The engine of a ship is like the human heart, vital for its operation. Therefore, it requires special care to keep it in top condition to ensure good performance and longer life.

This care is performed during preventive maintenance truck (5,000 km on average) and engine timing (every 20,000 km).

preventive Maintenance

It consists of a general overhaul of the car and its components. It handles predict future failures and make the necessary adjustments to ensure the safety and good vehicle.

These are the elements related to the engine to be taken into account in the periodic review:

Changing the oil filter: it is possible that the 5,000 km oil filter is full of impurities and does not have the same effects on the engine, as its cleaning function will be reduced.

Engine Oil Review: Over time, the oil loses its lubricating properties and for this to be changed by the filter. To do this you must take into account the manufacturer's recommendation on the right oil for your car.

Review air filter: This filter is responsible for protecting the motor from dust and other particles that brings air for better combustion. When deteriorated, dirt entering the engine affects its performance.

Dry cleaning: water and moisture can damage the electrical system of the engine. It is best to leave the laundry in the hands of experts and do it in a reliable place.

Review of coolant: The coolant is responsible for regulating the engine temperature and prevents overheating and oxidation. Be sure to keep it at the appropriate levels.

Another aspect that can minimize engine durability is the habit of expecting their best to fill the fuel tank. This causes the motor to work harder to absorb waste and eventually cause damage inside.

Engine timing

Synchronization is the process of calibrating the engine parts that are damaged by use, which makes its functioning is not efficient.

To perform this synchronization is necessary to change the parts that have more wear and clean engine components.
These procedures are taken into account in the engine tuning:
• Change spark plugs.
• Clean the ventilation system.
• Change oil filter.
• Change the air filter.
• Correction on time.
• Adjusting the carburettor.
• Review of the bands engine.
• Replacement hoses.
• Clean or change valve positive ventilation.
• Clean the injection system.
All these elements work the best way is essential to increase engine performance and extend the life of the vehicle.
How do you know that the engine needs to sync?
The synchronization should be done every 20,000 kilometers on average, however, it is possible to identify some symptoms that warn us of a possible failure:
1. High fuel consumption.
2. irregular movements.
3. motor noise.
4. Engine overheating.
5. Leaking oil or coolant.
6. Decrease of power.
Do not wait until the damage become apparent. Identify the signs that the car gives you and Lend due attention.
Perform engine maintenance at the times indicated will save major expenses in the future.

AUXILIARY UNITS AND SYSTEMS

The overall características That defines the operation of the engine are:
• The fuel injection system does not integrate or Incorporate the ignition system, so That it is not controlled by the ECU.
• Be is a fully electronic control system, Wherein the UEC Constantly Receives information from each one of the sensors available to the motor. This That Provides parameters and stores, According to a pre-built program, making instant decisions That lead to very clarify orders to take the injectors and other system devices, as required.
• it is provided With an injector for each cylinder,
• measuring and controlling the amount of air entering the intake manifold-through a flowmeter probe Consisting of a moving air butterfly, with Greater or lesser angle, Depending on the amount of air entering the intake manifold made, ie, air Consumed.
General scheme of the team.
First noteworthy have any available powerful control unit and a flow meter. The Latter is the data provided by the passage of electric current ramp-through resistors. The current

value and provided the UEC is Transformed into signals Which are developed together With signals from other sensors and just thus obtains a final release current injectors, just thus performing dosing. And now a quick explanation of the parts in Original and Their operation are: I deposited fuel. The pump and filter are responsible for providing the fuel distributor ramp at a pressure of 2.5 bar acerca. The pressure regulator has a mission to Prevent the circuit exist excessive pressure values, So THAT opens When 2.5 bar or value Entrusted to them by device are exceeded.

Since the ramp distributor some pipes send the fuel to all injectors also included the start injector.
Other elements of all automotive injection circuit are the distributor of ignition, battery and the ignition. The electronic part is composed of a large number of sensors that send information to the ECU. These sensors are switch throttle, potentiometer or resistance box branch flow meter, thermo switch timed cold start; The temperature sensor of the engine temperature; and lambda probe, which is not obligatory on all computers, and used to control pollution through the catalyst.
Finally, we have the additional air box, relay box and the throttle.
The screws are adjusted idle speed adjustment and the richness of the mixture at idle. These are the fundamental elements of computer L - Jetronic.
It should come to consider in some detail some of its main parts, which we mentioned in this overview these parts are:
The flowmeter.
The electronic control unit.
Injectors.
The cold start system.
The probe temperature of the coolant.
The hydraulic equipment.
The lambda probe.
The flowmeter.
An electronic system as L-Jetronic is distinguished by the accuracy with which gets the mixture proportions, ie, the fuel injection with respect to a given volume of air into the intake manifold. This requires, however, have a system of very precise measurement of air in any engine operating states: full load, half load or idle, and all its attendant nuances to obtain this goal the team uses a flowmeter that translates electrical any position to which the airflow is subjected to a gate values.
It consists of a butterfly-probe that pivots on a central axis and has a flap compensation moves in a clearinghouse to dampen pulsations. The air inlet from the filter occurs through the mouth and, depending on the amount thereof, moved about a butterfly probe proportional to the amount of air sucked manner.
The butterfly-probe is also supportive of a cursor that moves through a potentiometer with a ramp of resistance, so as to provide different electrical signals according to the position occupied by the throttle position sensor. To get the idle air control duct has a bypass for air,

which makes the butterfly short circuit and can be regulated by a throttle screw to go to the correct setting.

The internal constitution flowmeter is its butterfly-sensor and potentiometer connector from the power given information UEC. The entire mechanism is enclosed within a sealed housing within which there is a very dry atmosphere. It consists of a ceramic plate with a series of contacts and 14 resistors whose values are adjusted very accurately with lasers because of their perfect and unchanging values provided the perfect operation of the equipment is derived in terms of dosage is concerned.

The internal electrical constitution of the potentiometer. Sandwiched ramp with respect to the cursor position, the series resistance, high ohmic value, ranging from R1 to R12. The battery power remains a tension between the input terminal and output. The current flows through all resistance, so that the input voltage of the positive terminal which is 9 volts, has a negative output terminal 5 volts. For its part, the cursor commands to the ECU for its US terminal (output voltage) a voltage value that depends on the number of resistors that throttle position sensor (which is integral) has at all times. So you can work with a current (battery voltage UB) you have modified their values by going through all resistance, or by a single 4.5.6.7. etc., for them, because as the cursor moves to the left come into play fewer resistors and this makes the output voltage (US) is increasingly high in the UEC values related to the opening time butterfly probe. This basic impulse in turn used to regulate the opening time of the injectors.

The team also consists of a thermistor that controls air temperature data that affects its density, and this data is also involved in general stress value obtained and sent to the ECU, where all signals are processed to achieve a final stream injector opening that determine the perfect dosage at all times.

In the potentiometer the basics of its operation are the cursor that is attached to the motion of the probe butterfly and return spring, which forces the cursor to remain in the closed position.

The device also comprises a ring gear, through which access can be tensioned pressure spring.

The core of the device is in contact track and all the resistors that form the potentiometer itself.

This piece has been made with a mixture of ceramic and metal, the furnace at high temperatures, and also ceramic plate, forming a watertight joint around. It is secured by screws and if damaged, must be removed or replaced entirely.

The flowmeter is located between the filter from the air intake from the atmosphere and the bellows-shaped duct that transfers the air to the intake manifold.

The electronic control unit (ECU).

Produces its basic operation of the form of a structure of two blocks: the two key parameters used to determine the amount of time it must remain open injectors are given by the engine speed and the air flow into the collector. The first of these values goes to the "pulse shaper," where the signal is processed by halving these impulses, besides turning them into rectangular signals to facilitate further processing in other blocks.

From here go to a "multivibrator division control" that makes these signals together with information received from the potentiometer. With these two variable parameters, the multivibrator processed, has called basic injection time (Tb) that later will be expanded with the addition of new parameters.

The thus prepared signal passes after the so-called "multiplier stage" block. This block, TB addition, receives information from sensors air temperature, supply voltage of the vehicle and the state of full load. With these parameter values provided by the multiplier calculates a correction time (Tc) and multiplies it by the basic injection time (Tb), which had previously calculated the multivibrator. Subsequently, the resulting time is added to Tb, ie will Tb + Tc.

The supply voltage must also be controlled in the multiplier stage as the excitation winding of the injectors, which determines its opening, much depends on the battery voltage. Yes tension was low battery and no measures to correct this defect were taken, injectors would open for less time and this would make a poor diet for very poor dosing was established. When receiving signals that the supply voltage is too low, automatically increases the pulse time of stress (Tt) corrected so that the injectors can inject the correct flow for each case.

Injectors.

The injectors or injection valves are key elements in electronic fuel injection equipment.

From a hydraulic point of view, the nozzles are in direct contact with the injection distribution ramp part of all the fuel that exists in this circuit as the operation of the electric control state and submits it to the pressure regulator. Besides the start injector I know there's length the rest of the injectors. Mounting pressure is around 2.5 bar to 3 bar and, according to the equipment installation L Jetronic.

The internal constitution of the injector comprises an injection needle seat by the action of a spring is applied to its seat, impeding the outflow of the fuel, as said, is between 2.5 bar and 3 bar and permeating filling the inlet chamber of the injector and after passing through the filter. Moreover, the injector comprises an electrical winding which, through its connector is in direct contact with the ECU, and it receives electrical impulses that determine the time of opening, opening and rest times lasting between 1 and 1.5 milliseconds. The injection needle has an armature core, integral with the same, which is removed when the CEU current passes through the coil under the magnetism created. This time the injector is opened, the lifting of the needle is about 0.1 mm and the fuel exits the annular orifice left free at this time under high pressure which is located in the hydraulic circuit.

When the current ceases from the UEC is responsible for return spring to the needle its closed position and rest.

The cold start system.

A relay box receives the start signal from the key switch. In situation of the motor starter, power is sent to the injector start making mass through time switch. At this time the injector coil gives way to gasoline for a few seconds, but when heated opens the circuit and start injector is closed, even if the starter is still running.

The internal constitution of an injector starting from those used in the L Jetronic. The basic element of this valve is the magnetic armature winding and which in turn acts dela valve as pressure in the circuit and inside the chamber. Has a filter input and a return spring that

causes the valve is always closed except when the electric current flows through the coil. At the top of valve are the two connector pins. At startup, the thermo time switch provided with bimetal strip, became the rector of uptime start injector. The electrical circuit supplying the injector winding only reaching mass may occur through thermal switch contacts. However, also the current, when I know is producing startup, can be derived to resistance, which heats the bimetal plate that after a certain time, bends and interrupts the ground path of the current from the injector .

This operation only occurs when the engine is completely cold, then, because the thermal switch is in contact with the engine cooling water when the water is hot, the bimetallic strip is bent and is not always possible to act nozzle boot even if you press the switch contact position move the starter. It is estimated this thermo switch to -20 ° c disconnection occurs at eight seconds of operation, while time is considerably reduced when the initial temperature is higher.

Probe coolant temperature.

In general this temperature sensor works by the action of an electrical resistance which is sensitive to heat which supports. It is, therefore, a truly simple device.

The inner constitution of the probe consists of a head provided with a thread, which duly aided by a sealing washer, it engages the hole of the engine that is in contact with the coolant passage. Inside this body is hollow and serves to provide therein an NTC resistance which must be traveled by an electric current, eventually reach one of many terminals the ECU. For this also has two sockets electrical connection having two terminals for receiving input and output current.

The difference between the values of input and output is so precise that it can be interpreted as temperature values, because the heat from the refrigerant is also on the probe tip and is received by the resistance.

This is a strength of the NTC calls (negativer temperatur coefizient, as the Germans say) ie a negative temperature coefficient is thus a resistance that has the distinction of decreasing value of ohmic resistance as supporting the temperature increases. When the engine is cold, so is its liquid cooling. The result is to obtain low values of current when electricity passes through the NTC resistor. When the engine starts and gradually warms the coolant, resistance begins to receive heat and show progressively less effective, which increases the flow of current. Thus, the obtained values are so precise that perfectly serve as measurement values.

The ECU determines clearly the values of heat resistance values provided by the probe and can enter into the circuits of your processor temperature data and combine them with other data that determine the precise duration of injection.

The hydraulic equipment.

The salient points are:

Electrobomba.

Fuel filter.

Pressure regulator.

What I know is designated as "hydraulic equipment" is of course the fuel supply circuit. It is but a simple circuit must retain, above all, a constant pressure in the circuit because it

depends largely the result of the amount of gas provided in each injection. It consists of, first, an electric pump which generally is immersed in the fuel tank.

Second, it is provided with a filter capable of a very scrupulous work of filtering micro fuel to get so this pass without impurities of a certain minimum size that could be deposited between him feel and the injector needle valve injection , and thus hinder the perfect closing of this valve.

Third, we find the precision regulator. It is a device whose mission is to maintain a constant pressure value inside the circuit, and supplying the irregularities of this value observed in the same electric pump, where the engine speed can be changeable according with the supply voltage and hence also the pressure supplied. Below these items separately:

ELECTROPUMP

This is a driven by an electric motor, which rotates at the end thereof, a roller pump that is responsible for providing bias the pressure fuel pump due. The distribution of the electric elements is as follows: first, we find him armature winding which collects current from its collector through the brushes. Moreover, a magnetic masses magnetic lines contain the necessary rotary motion to proceed to the armature when it is crossed by an electric current from outside.

At one end of the armature is the roller cell pump it drives the fuel pump comprises a valve which only opens when the pump has acquired a certain threshold pressure, calculated according to the overall pressure in circuit. Once achieved this threshold, the check valve remains open during normal operation of the pump. Moreover we have a discharge valve that performs the work of pressure limiter when the pressure obtained by the roller pump is excessive, this valve opens and returns fuel stooping input circuit, thus, the prevailing pressure value. The roller cell pump, is available in an eccentric chamber, a set of rollers 5 are applied to the inner wall of the pump by centrifugal force that is established during fast rotation of the armature integral with the same pump.

Without pressure fuel enters through the duct and passes fill the lower chamber of the pump, as one of the rollers leaves the sliding position on the part to be driven to the next position, from which the fuel pressure begins to take because the volume of the chamber decreases in a progressively as the fuel is forced. And the cycle is repeated for 5 times per revolution or rotation of the movable shaft of the pump.

Generally, the pump starts working only when the starter is connected to the engine when it already operational. If the engine stops uncut contact, the pump stops working. This prevents the risk of fire during an accident in which, due to the coup, the engine tends to stop but the driver can not remember or not be able to remove the contact position of the switch of the same name.

Finally it must be said that this electric pump designed with the goal that sends an abundant flow of fuel to the circuit above maximum it needs, so that pressure is never lost when consumption is established by the engine the maximum possible.

Therefore, it requires a good return circuit or overflow, by which is constantly returning excess fuel to the tank. This also has the advantage of homogenizing the temperature of the fuel and minimize power loss by a poorly achieved by thinning the mixture fuel.

FUEL FILTER.

The filter contains a paper element and is a typical design of fuel filter. Its main features are the smallness of its pore in the fuel injection is set to 10 microns, which collects all the impurities that can harm the injectors. In addition to this low pore size of the filter is provided with a very thick sieve which serves to retain any particles that emerge paper filter paper for their continued use and consequent progressive deterioration.

Arrows recorded in it determine the correct position, which, if not taken into account, can cause considerable disruption to the operation of the computer if tiny fragments are incorporated into the paper flow circuit. So you have to always take care of the correct placement of the filter following the directions of the arrows.

The duration of these filters depends heavily on native soil of petrol and also, of course, the volume of gasoline that has to be filtered. In general it can be said that its duration is between 30,000 KM in the most extreme cases, to 80,000 KM in the most favorable cases.

PRESSURE REGULATOR

Mission that is charged to this device is to obtain a constant value of the pressure inside the circuit. Therefore the performance of the controller viewed from the practical point of view, is the most important circuit. However, it is a fairly simple valve.

A capsule consisting of divided into two sections or chambers by means of an elastic membrane which, when moved, can vary the volume of each of these chambers. At the top have a chamber through which flows the fuel and is the pressure in the circuit provided directly by the pump. At the bottom, we find the vacuum chamber which formulates an antagonistic pressure with respect to the upper chamber. This chamber is in communication with the intake manifold through the vacuum which exerts a modulatory action on the displacement of the membrane.

As the pump is operated and sends a pressure flow of fuel is distributed substantially equally to all areas of the circuit. The fuel also enters the pressure chamber through the conduit. In this camera is the diaphragm assembly which determines the position of the valve.

Received when the pressure is below the required values, the same force fuel is unable to move the membrane, since it is strongly assisted by the action of the return spring. But when the pressure value surpasses the limits for which it was designed controller, the same pressure is able to overcome the force of the return spring, opening or removing valve down and make way for the fuel through the duct overflow returns the fuel tank.

As the minimum opening of this valve should occur, immediately establishes a pressure drop in the circuit, the more important the higher the obtained opening, so that the pressure value decreases. But also brings down the automatic closing of the valve due to the lower pressure that exists now on the membrane, which is not able to overcome the spring action. Thus, the closed valve the pressure and reopen it for discharging liquid overflow duct, keeping in this game a substantially constant pressure in the circuit increases.

If the nozzles are closed, the system pressure increases, so that the diaphragm is removed and gives way to more increases, so that the diaphragm is removed and gives way to a more fuel to return the deposit by the overflow duct. But if a group of injectors is opened, the pressure decreases and so does not have the capacity to overcome the action of the spring and remove the force diagram, so overflow line is open.

When depression in the duct is very strong, because the motor is rotating at a high number of turns, the vacuum in the chamber helps overcome the withdrawal of the diaphragm to open the overflow pipe more easily, is say, to a value lower than usual pressure, and this eases the passage of fuel when it really is not needed.
By contrast, when the engine is running at full load and as a result, the throttle is fully open, the vacuum in the chamber has a value very close to 1 bar, so fails to influence some on the dock and it maintains a high pressure value. Now the membrane is removed only if the value of the fuel pressure required to do so.

The lambda probe.
The function of this device is therefore to constantly alert to the ECU of the stoichiometric ratio of the mixture output by the exhaust manifold. With this notice, the UEC may vary slightly the contribution of gasoline, and get the engine is always working with the best possible driving conditions requested by the driver and the most burning mixture.
At the time that high temperatures occur, ceramics becomes conductive and a potential difference is established between the two electrodes when the amount of oxygenated is not the same on both sides.
The voltage variation is established an electrical control signal to the ECU will be a factor can be corrected through the injection time, so that the stoichiometric ratio of the mixture in the proportion may remain tuned. When a mixture containing waste burned for being too rich, the probe sends a voltage value to the ECU that it identifies and proceeds immediately to restrict the fuel input. As a result, the upcoming arrival of mixing is less rich and restores function to maximize their burned in the combustion chamber.
The way this is a lambda probe constituted firstly consists of a body which includes the negative voltage. The fundamental basis of this probe is, of course, the presence of the electrodes: The negative and positive, on the intermediate body is ceramic. The current generated passes through a conductive contact element of an electrical connection and placing it in communication with the ECU. Also consists of a ceramic body lift and a protective tube placed in the tip and will be able to withstand high temperatures.
Finally the lambda probe is installed in the same exhaust, usually near the same collector, so that the gases impinge directly on the protective tube.

DIESEL GENERATOR

Are commonly used when there is a deficit in generating electricity from somewhere, or when there are frequent cuts in electricity supply. Also, the legislation of different countries may require installing a generator in places where there are large densities of people like malls, restaurants, prisons, administrative buildings, etc.

One of the most common utilities is to generate electricity in places where no electricity supply, are generally remote areas with little infrastructure and very sparsely populated. Another example is in public places, hospitals, factories, etc., places where the electricity network is insufficient, need another source of alternative energy to stock.

Motor. The engine is the source of mechanical energy to turn the alternator and generate electricity. There are two types of engines: gasoline and gasoil (diesel). Generally diesel engines are the most used generator sets for its mechanical, environmental and economic benefits.

Motor control. The motor controller is a mechanical device designed to maintain a constant engine speed relative to the load requirements. The motor speed is directly related to the output frequency of the alternator, so that any variation in engine speed will affect the frequency of the output power.

Engine electrical system. The engine electrical system is 12 V or 24 V negative ground. The system includes an electric starter, one / s Battery / s, and the sensors and alarms available to the motor. Normally, a motor has a pressure switch oil, a thermal temperature and contact load on the alternator engine to detect a failure in the battery.

Cooling system. The engine cooling system can be by means of water, oil or air. The air cooling system consists of a high capacity fan cold air passes over the engine to cool. The cooling system water / oil comprises a radiator, an internal fan to cool its own components.

Alternator. The output power is produced by an alternator shielded, splash-proof, self-driven, self-regulating and accurately coupled to the motor brushes, but may also be coupled with brushless alternators for those groups whose operation is to be limited and, any circumstances, forced to older regimens.

Fuel tank and bench. The engine and alternator are coupled and mounted on a steel frame Heavy duty The bench includes a fuel tank with a minimum capacity of 8 hours of operation at full load.

Vibration isolation. The generator is equipped with antivibration pads designed to reduce vibration by the motor-generator group transmitted. These insulators are placed between the base engine, alternator, control panel and bench.

Muffler and exhaust system. The muffler is installed to the engine to reduce noise emission.

System control. You can install one of the different types of panels and systems for controlling the operation and output of the group and to protect against possible malfunctions. The control system manual provides details of the system that is installed on the generator.

Output circuit breaker. To protect the alternator circuit breaker suitable for the model output and output rate generator is supplied with manual control. For generators with automatic control the alternator is protected through appropriate contactors for the appropriate model and system output.

Other installable accessories at a generator. In addition to the above, there are other devices that help us manage and maintain, automatically, the correct functioning. For automatically adjusting engine speed electronic control board for input signal "pick-up" and output "actuator" is used. The pick-up is a magnetic device that is installed right on the gear on the

motor, and this, in turn, is coupled to the starter gear. The pick-up detects the engine speed, produces an output voltage due to movement of the gear that moves through the magnetic field of the tip of the pick-up, therefore, there must be a proper distance between the tip of the pick -up and gear motor. The actuator serves to control the motor speed under load. When the load is very high engine speed increases to provide the required power and, when the load is low, the speed decreases, ie, the foundation of the actuator is automatically control the speed rating of the motor no fast acceleration, engine power generating continuously. Typically the actuator is coupled to the input of engine fuel oil.

When the group is in a place far removed from the operator and operates 24 hours a day is necessary to install a mechanism to restore the spent fuel. It consists of the following elements:

Transfer pump. It is a 220 VAC electric motor which is coupled a pump that is responsible for supplying the fuel to the tank. An indicator buoy maximum and minimum detects a low fuel level in the tank and activates the transfer pump.

When cold conditions in the environment are intense it has a heating device called preheating resistance which helps the engine start. The air-cooled generators typically use an electric heater, which is placed under the engine, so that keeps the oil at a certain temperature. In water-cooled engines preheating resistor is coupled to the cooling circuit, this resistor is fed 220 VAC and heats the coolant to warm the engine. This resistance has an adjustable thermostat; it select the right temperature for the group to start in a few seconds.

Alternator [edit]

Main article: Alternator

If a coil is rotated, the ends are attached to two rings, under the action of a north-south magnetic field is generated emf AC; the value of the frequency depends on the speed for a given number of poles.

Transformer controlled generators [edit]

The main stator provides power to excite the excitation field through transformadorrectificador. Combining elements of the transformer voltage and current derived from the output of the main stator to form the basis of a system open loop control, which is self-regulating nature. The system itself makes up the magnitudes of intensity and power factor maintains the short circuit current and additionally has good starting characteristics of electric motors. Three phase alternators are usually controlled by a three phase transformer to improve performance with unbalanced loads. Optionally it can be supplied with a single phase transformer to facilitate reconnection to several Three phase voltages.

Start manual or automatic [edit]

The manual start occurs at will, this means that when you need the electricity generated by the generator start it manually. Usually the boot drive is usually provided with a key switch or start button of an electronic control unit with all monitoring functions. When an engine warming occurs when fuel is missing or when the engine oil pressure is too low, the unit will detect it automatically stopping the engine.

There automatic exchanges operating in manual or automatic mode; these switchboards or control panels detect a failure in the power grid, forcing the generator started immediately. Normally automatic groups predisposed boxes that contain basically a relay stop and start another install, besides having installed into the connector all sensors and alarm clock upon whom the generator. Set aside an automatic table that are installed drives network change the generator.

BOILER STEAM GENERATOR

The boiler is a machine or device designed engineering to generate steam. This steam is generated through unatransferencia heat at constant pressure, in which the fluid, originally in a liquid state, is heated and changes its phase.

According to the ITC-MIE-AP01, boiler pressure vessel is everything where heat from any source of energy is converted into usable energy through a conveyance in liquid or vapor phase.

The boiler is a particular case in which high temperature rises a set of heat exchangers, in which a phase change occurs. It is also pressure vessel, whereby it is built partly rolled steel Like many gas containers.

Due to the wide applications having steam, mostly water, the boiler is widely used in industry, in order to generate for applications such as:

Sterilization (tindarización) was common to find boilers in hospitals, which generate steam to "sterilize" elinstrumental physician; Also in the dining rooms, with industrial capacity, steam is generated to sterilize loscubiertos and to prepare food in pots (previously it was thought that this was a sterilization technique).

To heat other fluids, such as in the oil industry, where steam is used to heat heavy petroleos and improve their fluency.

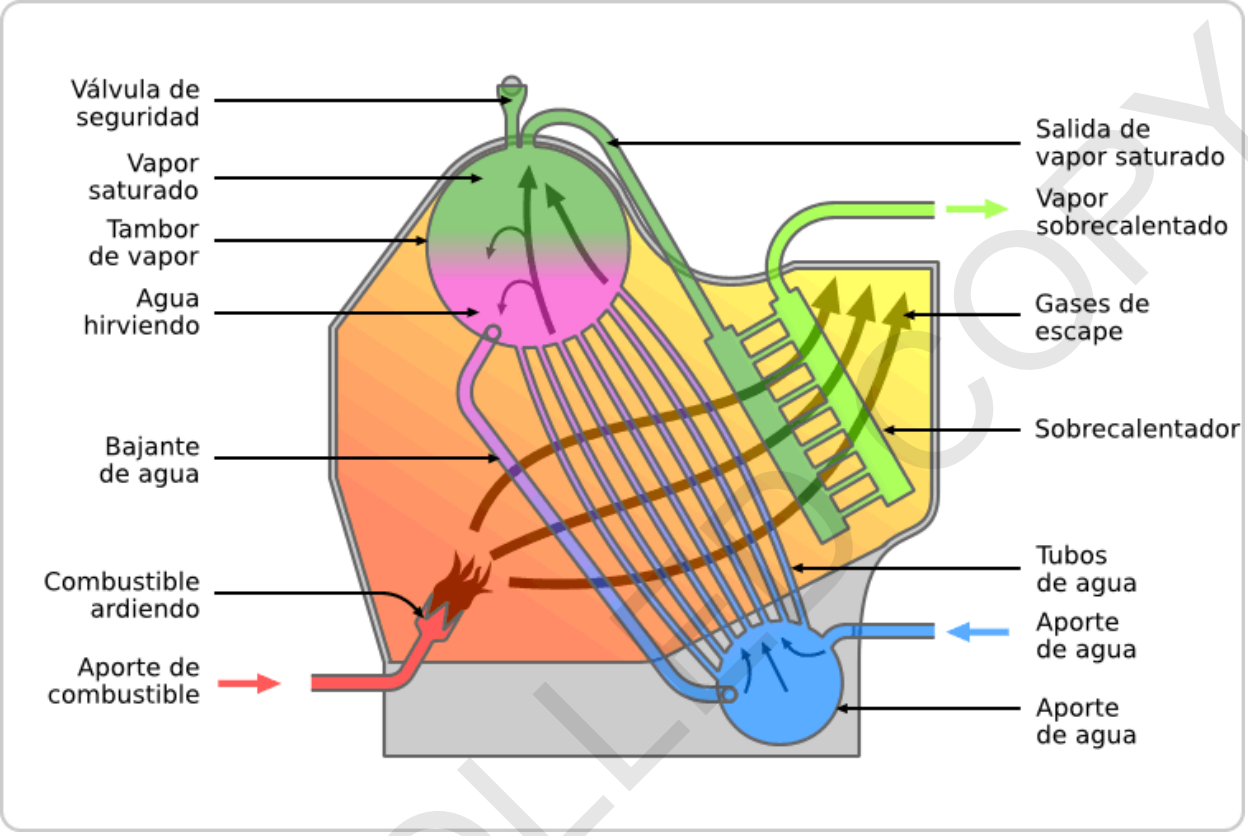
Generating electricity through a Rankine cycle. The boiler is a fundamental part of the thermoelectric plants.

It is common confusion between boiler and steam generator, but their difference is that the latter generates superheated steam.

TYPES OF BOILER

Watertube: those boilers in which the working fluid moves through tubes during heating. Are the most used in power plants, allowing high pressures to its output and have great generation capacity.

Pirotubulares: In this type, fluid liquid is in a pipe traversed by container, which circulate gases at high temperature, the product of a combustion process. The water evaporates on contact with the hot tubes products circulation exhaust gas.



THERMAL ELEMENTS AND COMPONENTS

Water Supply: Input is water that feeds the system generally well water or tap water with a chemical treatment such as demineralization.

Condensate: the water from the condenser pond and representing the delvapor quality.

Dry or saturated steam: Steam optimal conditions.

Wet or saturated steam: Steam trawl foam from a high alkalinity water.

Condenser system to condense the steam.

Accumulation pond: the pond accumulation and distribution of steam.

Deaerator: is the system that expels gases into the atmosphere.

Blowdown: disposal of sludge and concentrate the bottom of the boiler.

Purge surface: dissolved solids evacuation from the water level of the boiler.

Hearth or home: alma combustion system, to seek continuous improvement of containers and circuits established by the boiler.

Fuel equipment that produces heat energy when burned.

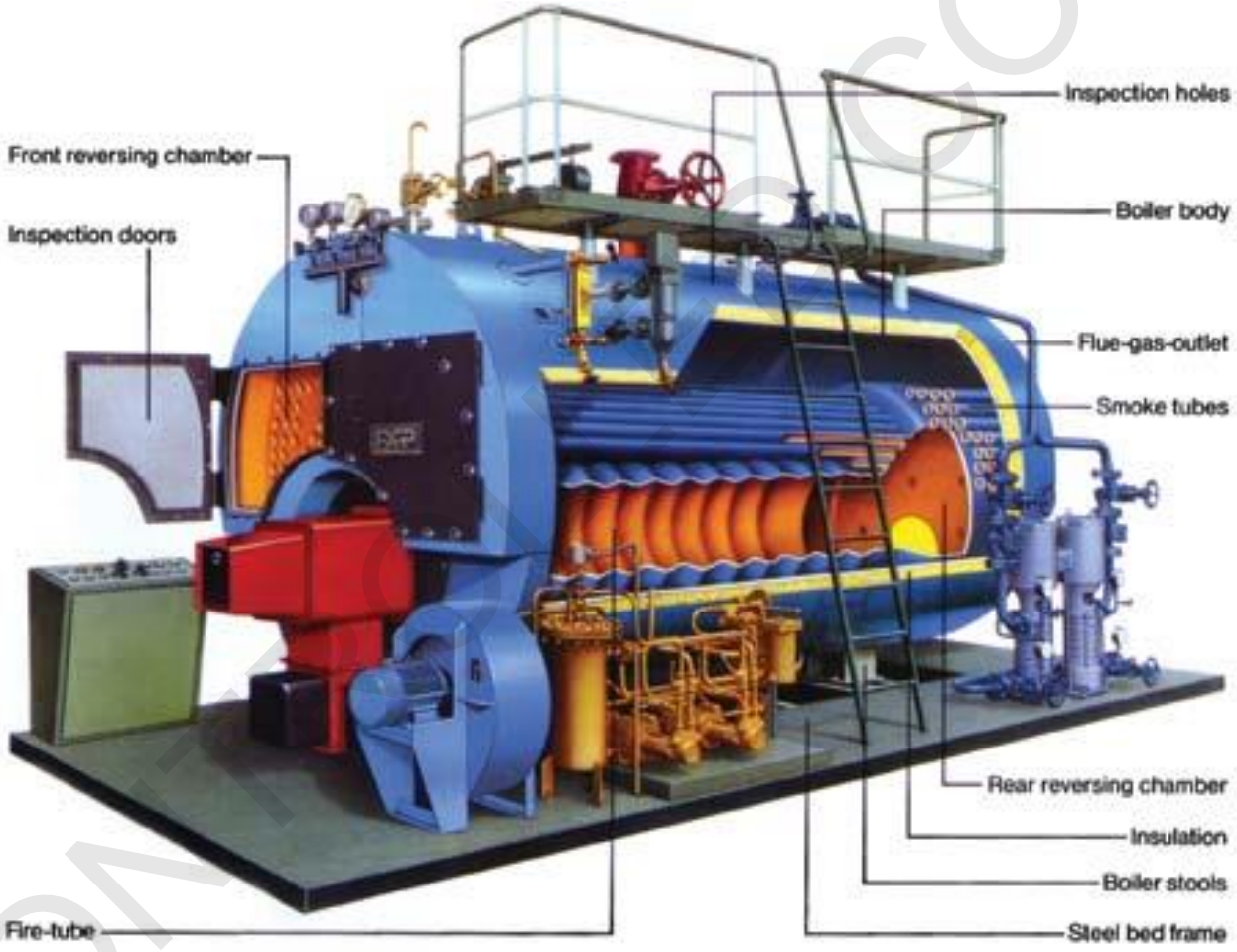
Boiler water: water inside the boiler circuit whose characteristics depend on the cycles and inlet water.

Concentration cycle: number of times that the feedwater is concentrated on water supply.

Alkalinity: salinity level expressed in ppm of CaCO3 gives a concentration of hydroxyl ionescarbonatos and determining the pH of a boiler operation, generally from 10.5 to 11.5.

Deoxygenation: chemical treatment that removes oxygen from the water boiler.

Embedding: sedimentation of solids with formation of crystalline or amorphous cores sulfate, magnesium silicates carbonatoso that reduce the operating efficiency of the boiler.
Dispersant: chemical system that keeps the solids incohesive before an event embedding.
Antifouling: chemical system that allows the solids remain in solution fouling.
Anticorrosive: chemical system that provides protection for forming protective films with corrosive ions present in the water.
Corrosion: Corrosion see
Index vapor / fuel: efficiency ratio for steam boiler.



STEAM TURBO GENERADOR

A steam generator is a machine or device engineering, where energy chemical, thermal enenergía transformed. Usually used in steam turbines to generate steam, usually steam, with enough energy to power a turbine in a modified Rankine cycle.

Steam generators differ from the boilers to be larger and more complicated.

PARTS OF A GENERATOR

An economizer is a mechanical heat transfer fluid heated to its boiling point without passing it. Make use of the enthalpy in fluids that are not hot enough to be used in a boiler, recovering power that otherwise would be lost, and improving rendimientodel steam cycle.

You can help save energy in buildings, using outside air as a cooling medium. When the outside air enthalpy is lower than the enthalpy of the recirculated air, outside air cooling is more efficient, energetically, cool air that has recirculated. Save energy costs in temperate and cold climates, but is inappropriate in hot and humid climates.

A reheater is a device installed in a boiler receiving superheated steam which has been partially expanded through the turbine. The function of the reheater in the boiler back to the super heat the vapor to a desired temperature.

In the Rankine cycle is placed in the reheater outlet steam generator to further increase the temperature of steam before being introduced to the turbine to improve cycle efficiency, a certain amount of the steam and expanded by the turbine is used in water heaters that can be closed or open type.

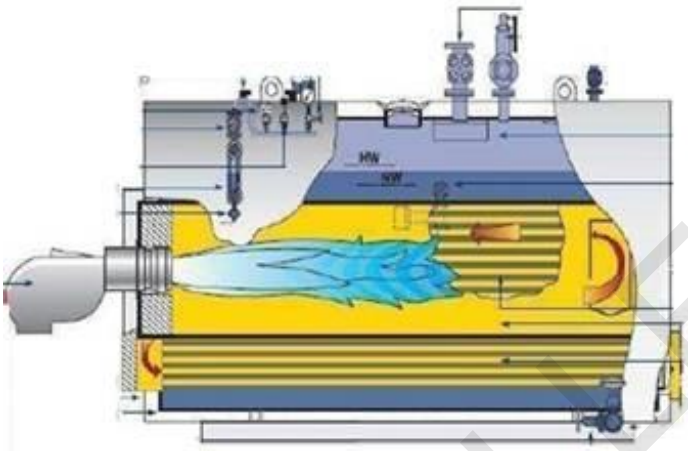
HOME FIRE

The word home, fireplace, stove or brazier refers to where fire is lit (usually wood) in a house that used to be located in the common area (which served as a kitchen, dining room). Focāris comes from the Latin word derived from focus (fire). In some regions of Spain is called lar or collar. By extension, it is called home to the house where you live, central point because it was considered the place where the fire was.

Definition of steam generator and boiler.

The term steam generator is being used today to replace the name of boiler and indicates the set of teams composed of: oven (or home), water chambers (or evaporator), burners, superheater, reheater, economizer and air pre-heater (Fig. 2). Boilers are devices Engineer-designed to generate saturated steam (steam at point condense) due to heat transfer from the

transformation of chemical energy of the fuel by the combustion, into usable energy (heat), and transfers the fluid work (liquid water) which absorbs and changes phase (steam becomes). The term boiler has long been used and the two terms are used interchangeably. It is common confusion between the terms of boiler and steam generator, but the difference is that the latter generates superheated steam (dry steam) and the other generates saturated steam (wet steam) .The steam production from burning fossil fuels is used in all types of industries processing raw materials and power plants.



classification

Among the classification of the boilers would rank:

- By the nature of service can be: Fixed, portable, locomotive or marine.

- For the type of fuel: coal boilers, liquid fuels, gaseous fuels,

mixed and special fuels (waste, black liquor, fruit peel).

- For shooting: natural shot or forced draft (with home pressure, depression or equilibrium).

- For support systems: Boilers supported and suspended boilers.

- For heat transfer: convection boilers, boiler radiation, radiation-boilers

Convection.

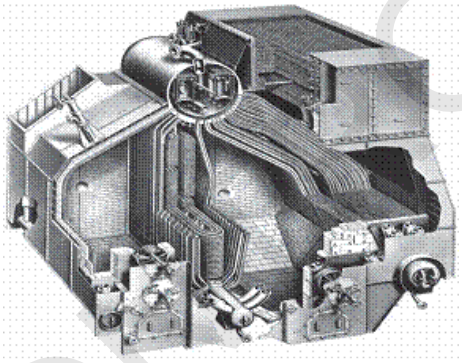
- For the provision of fluids: water tube boilers (water tube or steam generators) and

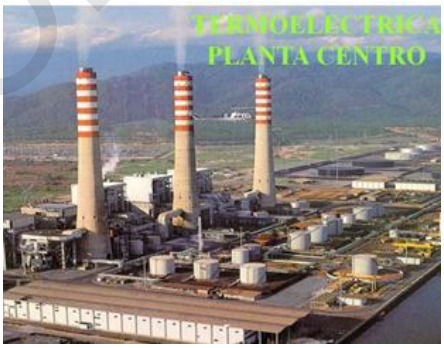
smoke tube boilers (firetube).

The steam boiler fire tube generally have a comprehensive home (called firebox) limited water cooled surfaces. Horizontal Integral used in home heating at low pressure. These boilers, especially designed for the use of gas recovery, has the following characteristics: The body of the boiler is formed by a cylindrical body of a horizontal arrangement, internally incorporates a multitubular package heat transfer and an upper forming chamber and vapor accumulation. The movement of gases is performed from a front camera equipped adapter plate, to the rear where it ends its journey in another chamber vent.

Characteristics of the steam generator or water tube boiler

The steam generator to be used as a basis for this work is owned by the No. 1 unit the power plant Planta Centro, Edo. Carabobo, Venezuela, which is a fixed water tube boiler, gas fuel forced overpressure Home shot suspended mediantes large beams I, heat transmission through convection and radiation, of water tube type, boiler tube is radiant type, single steam collector (type "step"), which is known worldwide as a natural circulation boiler with high capacity. Its function is to generate superheated steam and comprises in its interior by: An economizer, a separator drum or dome, evaporator, a striped superheater, a reheater and an air preheater. This slitting steam generator along its major equipment is constructed MOVICOM.X2 SCADA software for better understanding of the path of the main fluid systems comprising such a device....





Main steam generator systems

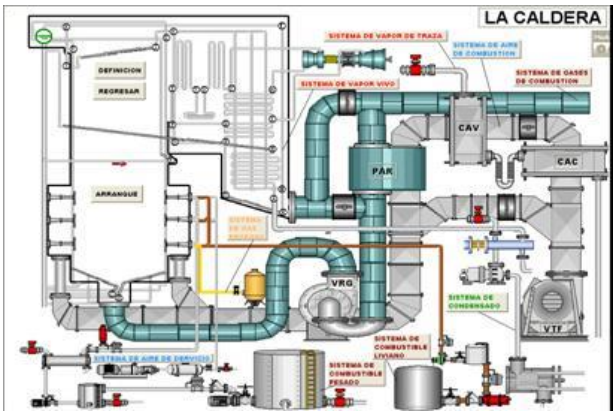
Due to the extensive range of systems that comprise a steam generator, the following describes only three systems or circuits with their respective teams, which are involved in this work, namely: Circuit combustion air, flue gas circuit and water-steam circuit.

Combustion air circuit

This circuit is the system that is responsible for supplying the air, so that by the fuel combustion is performed. But the air in its path must pass through a series of heat recovery equipment, responsible for absorbing energy that could drag the chimney smoke, steam and condensate (and used) before being tried again.

Then travel by air alone or side branch described, because the other is symmetrical. The main characteristics of the equipment that crosses its path the air, heading home to the boiler for combustion, which begins with the specified:

- Fan forced draft (VTF): A centrifugal fan that draws air from the atmosphere at 30 ° C and sucks to download it in a square metal duct at a certain pressure drop in mmca (mm water column) to reach home



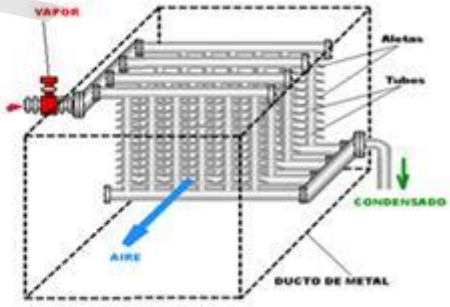
- Heated air capacitor (CC): Several panels each composed of a collector (condensate inlet) above, together with other similar lower manifold (discharge) through finned tubes for better heat transfer between the condensate inside (from the CAV) and the air passing between the finned tubes.

Its main function is to increase the air temperature to 80 ° C at the expense of the heat of condensation from the CAV, lowering the air pressure, then move to:

- Steam air heater (CAV): Similar to the CAC team but inside vapor passes

Its function is to increase the air temperature at 140 ° C, but its pressure drops to enter:

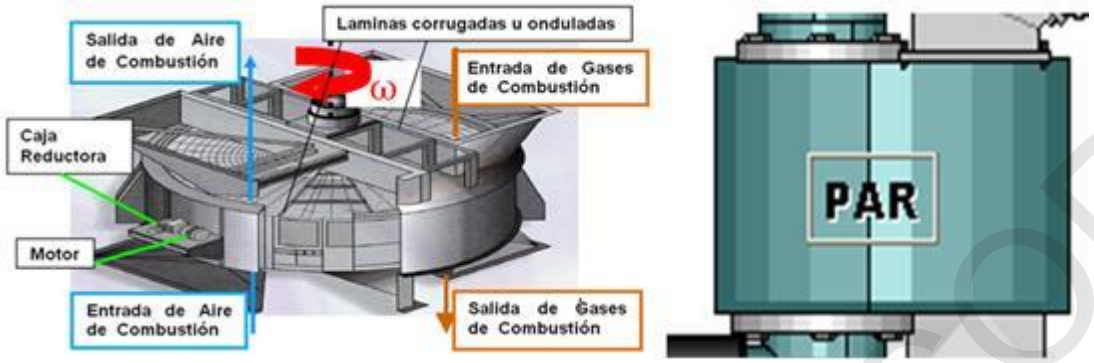
- Regenerative air preheater (Luvo): A gas-heat exchanger gas, circular diameter of 5 m high one, which rotates at an angular velocity of 1 to 3 rpm because a motor coupled (?) to a reducing gearbox. These "luvos" consists of corrugated sheets (or wavy) parallel and concentric to its axis of rotation. A channel for air and other (counterclockwise) for gases: At the entrance and exit of the preheater, a pipeline with a dividing wall longitudinally resulting in two sections (channels) in the preheater is formed. As the "Luvo" rotates, the combustion gases coming from the coils and heat through economizer, preheater and enters the pass between the parallel plates and corrugated heat. Due to continuous rotation, these plates and hot, are placed in the passage or air path, leaving the latter with a temperature of 312ºC, heading home to the boiler for combustion. These sheets then air cooled again placed, due to the constant rotation in the path of the gases to be heated again, and so on.



Air pressure in the equipment drops and reaches the:

- Air box: The enclosure covering the burners and allows air to;

- Records: Son sheets placed in an underhand (like blinds a circular window) responsible for regulating the combustion air to be open letting air and when closed form a cylinder that does not allow air inward wherein the burner lance is.



- Burner: The air out of the regenerative air preheater travels through a pipeline to reach the air box where there are 24 burners (12 for the front, 4 in each level and 12 for the rear,

Also level 4) and wherein each burner has the function of:

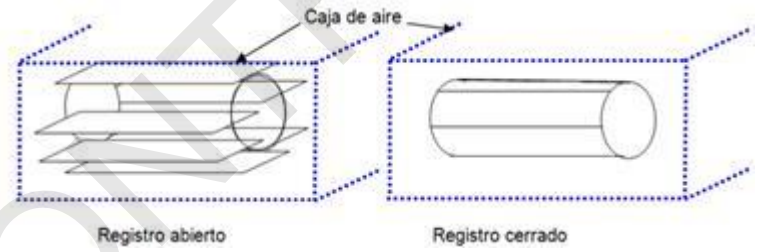
a) injecting fuel: In direct gas in an atomized form and if it is liquid.

b) Give way to the air required for combustion effect, which is achieved by recording palettes.

c) Create great turbulence in the supplied air and fuel due to broadcasters, forming a good, homogeneous mixture for combustion.

• d) Increasing gas turbulence when used with splines or refractory brick, with

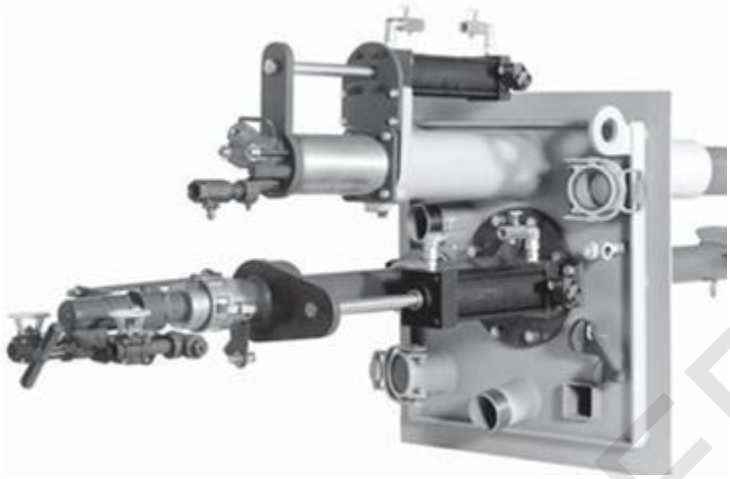
The cavities are molded around the burners.



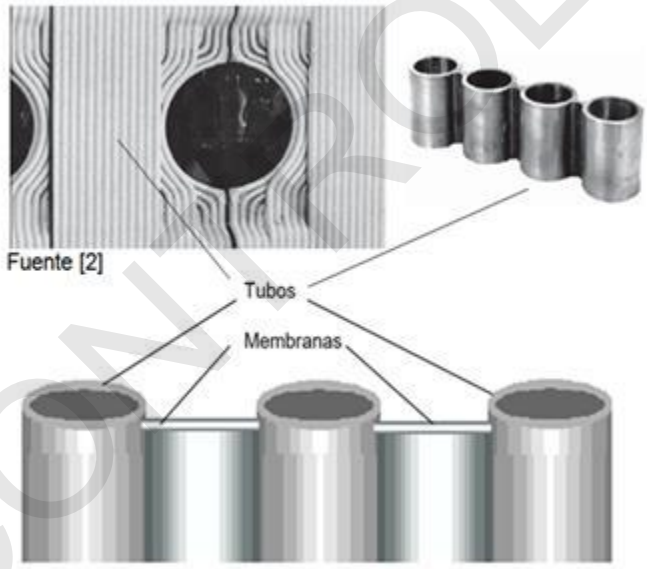
- Home or evaporator: The last stop of the air, as it is the radiation zone of the steam generator where the heat required for steam generation is produced by combustion of the fuel-air mixture which causes the flame or fire.

Each steam generator are putting 24 oil and gas burners 12 in the front wall units and 12 units in the rear wall of the boiler, always in a common air box.

The evaporator consists exclusively of radiation heating surface and forms the enclosure walls of home. These walls consist of finned tubes, which are joined sealingly together by welded or membranes webs



The evaporator is divided into 4 enclosure walls of the home, or the anterior wall, which simultaneously forms the front of the home, the two side walls consist exclusively of vertical tubular panels, roof and back wall of home



The top of the rear wall simultaneously forming step the superheater, which is influenced by the fuel gas consisting of loose tubes. This part of the steam generator called "evaporator" consists of bundles of "risers" positioned vertically (front walls, rear and side) and horizontal (top and bottom) which are joined at the top with the dome and at the bottom

with manifolds that are fed by the "downcomers" from the dome (see figure). This area is a temperature of about 1426ºC due to direct heat from the fumes and combustion flame.

Flue gas circuit

When burning the fuel-air mixture in the boiler furnace or radiation area (see Figure), fumes or combustion gases are formed which are conducted through the boiler (for the entire convection zone), from home by the upward step (first vertical step), then goes to horizontal shot (horizontal step) and finally crosses the downward step (second vertical step). In its route the flue gases pass on their heat to the superheater, reheater, economizer and air preheater. These systems are defined as follows:

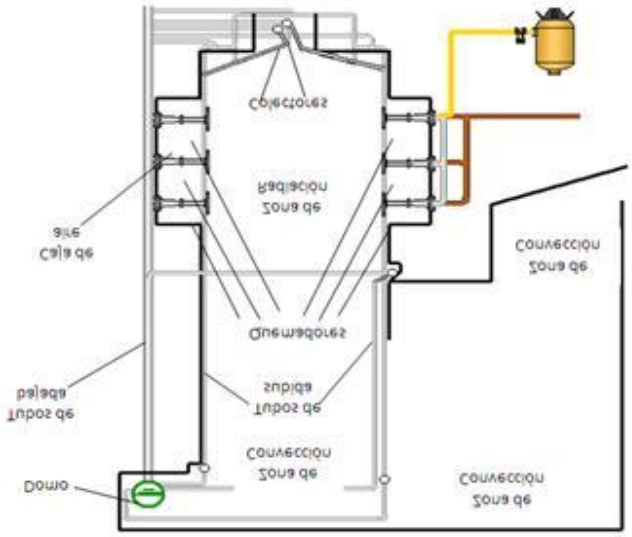
- Superheaters:

Is the section of tubes which uses the heat of the exhaust gases to raise the temperature of the steam generated above the saturation temperature. Superheated steam increases the performance of the steam cycle. In a turbine, for each 40 ° C increase in saturation temperature on a 3% increase over the yield is obtained. The superheated steam prevents condensation on pipes while erosions and imbalances in the equipment.

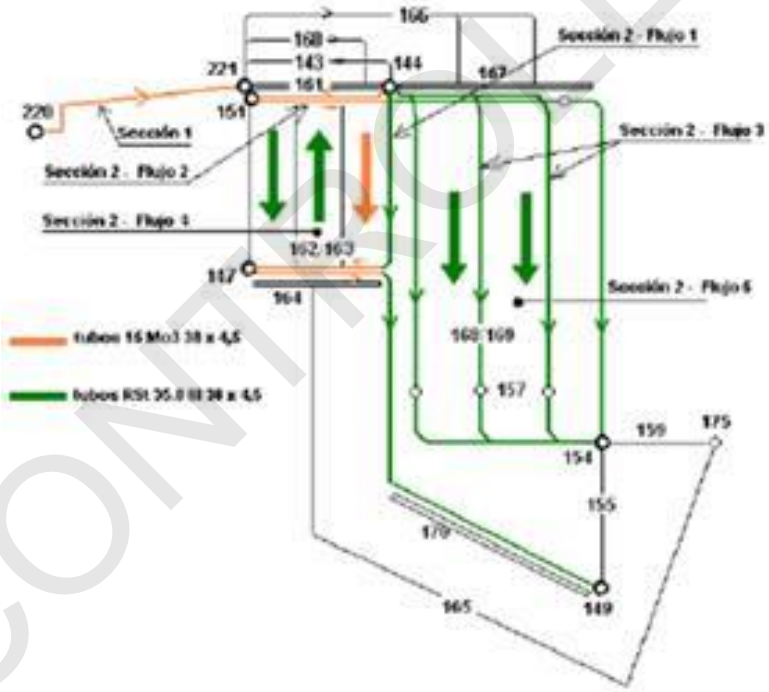
Is the convective superheater, which allows the reheating temperature is independent of the boiler load. It must be said that it is subdivided into four superheater, where the last two there is a small injection of water through a tempering to control superheater outlet temperature superheater 3. This division into four sections is as follows:

- Superheater 1: This is the only team that is suspended from the roof of the boiler. The first stage consists of the enclosure walls of horizontal shot (horizontal step) welded to form walls, ceiling and floor tubes with membranes as well as the space below for collectors and desuperheater injection, the enclosure walls Shot Vertical convention (second vertical step). Different systems are connected in parallel and so tuned to one another, that the separation points of the parallel systems may not cause unacceptable differences in temperature. The fumes at a temperature of 1426 ° C transfers the heat to these walls and ceiling, lowering the temperature of the gases at 1339 ° C, and then go to:

- Superheater 3: on heater high pressure 3 is suspended from the ceiling and arranged as first heating surface in the flow of combustion gases in the horizontal step, after the home and is composed of bundles of parallel and vertical shaped tubes coils and spaced apart at a distance of 37 mm.



Tubes in the uniform temperature is achieved by appropriate selection of wall thickness and by a corresponding selection of the lengths. Here the gases are at a temperature of 1339 ° C, yield their heat and leave at a temperature of 1189 ° C, and then go to:



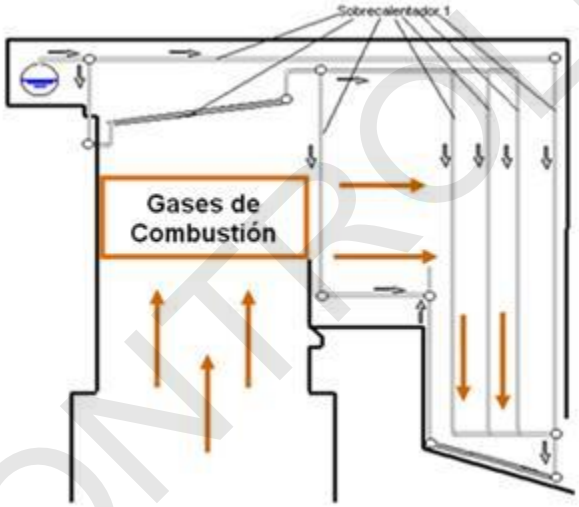
- Superheater 4: Like the superheater 3, is suspended from the ceiling. Binding superheater stage 4 is performed the desuperheater outlet header 24 through connecting tubes 133 mm outside diameter, high pressure superheater coils 3. superheater tubes 3 and 4 are hung by

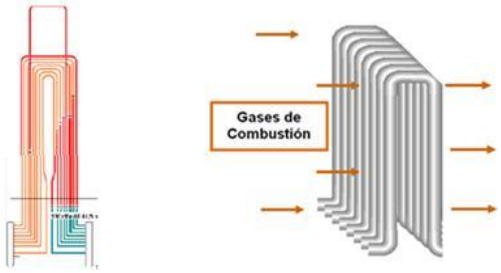
springs through special suspension devices, which in turn pass through the roof of the horizontal shot. These springs compensate the difference in expansion between the expansion of the enclosure walls and pipes. The gases entering the superheater at a temperature of 1179, to give its heat these gases come out with a temperature of 995 ° C, and then diverted to the downward vertical shot (second vertical step) and crosses another group or tube bundles coils that go top down and one after the other, which form the:

- Burner: The medium pressure superheater is suspended from the ceiling and arranged as heat exchanger bundles of coils arranged in two horizontal and the vertical downward throw convention stages as upper surface and heating fluid is countercurrent in the first stage and the second stage in parallel with the flue gascurrent.

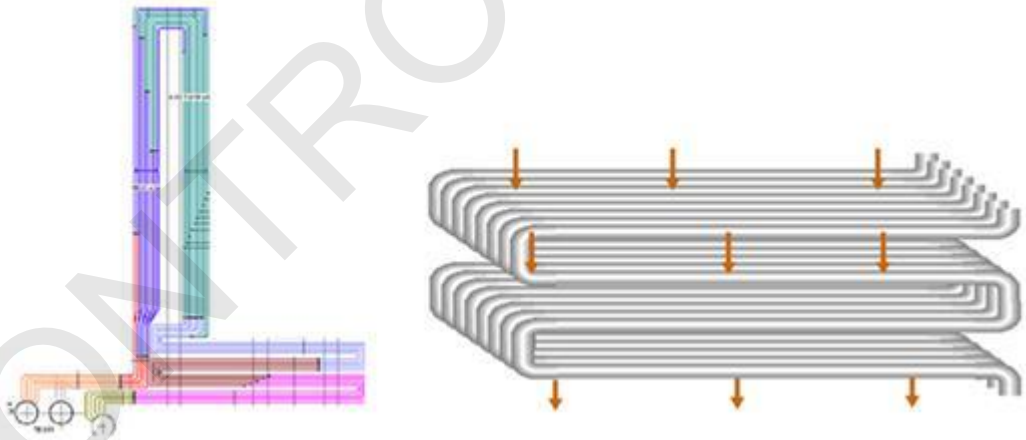
The fumes at a temperature of 983 ° C transfers the heat to these walls and ceiling, down the gas temperature to 673 ° C, and then go to:

- Superheater 2: These coils are arranged horizontally in the shot vertical convection. The gases enter to 642 ° C, yield their heat and leave with a temperature of 381 ° C, and then passed to...





- Saver: economizers cover the same function as water heaters (receiving water from the feed water pumps and download it to a higher temperature in the separation drum steam generator), these are used instead of increasing the steam generating surface inside the boiler, as the water absorbs heat to be at a temperature lower than the saturation, the gas may be cooled further, for greater heat recovery and increase efficiency. This element is suspended from the ceiling, placed under medium pressure superheater. The economizer is arranged as heat exchanger tubes as a bundle of steel alloy as coils, in a perpendicular horizontal stage the combustion gases, which pass each other in parallel. The gases through it and will give up their heat coming with a temperature of 381 ºC. At the end of the boiler, the combustion gases are deflected and brought down horizontally, symmetrically about the center of the boiler, two rectangular duct section to:



- Regenerative air preheaters: A device for recovering heat from the flue gases. The air passes through the heat exchanger before being mixed with fuel, and since the gas temperature is higher than room temperature, a reduced amount of heat energy loss is transferred. The heat added to the air goes home, reducing the fuel required by an equal amount in heating value, which has been transferred to the air. Approximately 25 per air temperature rises, it saves 1% of fuel. The combustion gases or fumes entering with a

temperature of 334 ° C and out of the air preheater to a temperature of 154 ° C, for a channel that is divided into two: the first one sends a part of the fumes to a temperature of 148 ° C to fireplace and the other sends the rest of the combustion gases:

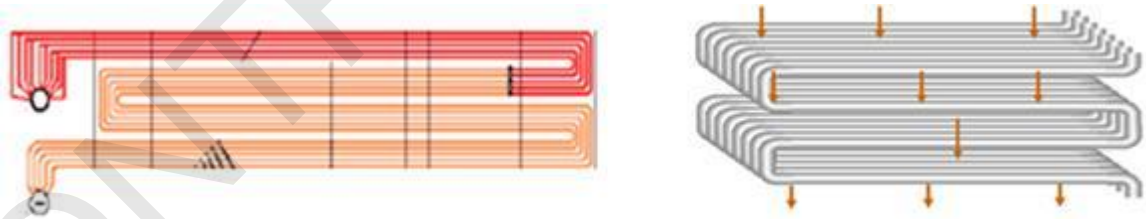
- Gas recirculating fan (VRG): Like the VTF A, is a centrifugal fan that absorbs part of the flue gas and injected below the steam generator (see Figure), to raise the temperature in the home and reducing fuel consumption.

Water circuit - steam

Water is sucked into the feed water pumps, where each unit or plant has three pumps 50% each (two in service and backup) .Dichas pumps push water through high-pressure preheaters, which is conducted to the boiler preheater called "economizer" (Figure), where the water is heated by convection inside the pipes of these coils, which were heated by convection on the outside, by gases produced in combustion and going to the fireplace. This water enters the economizer with a temperature of 249 ° C and comes with a 306 º C, crosses the vertical upward passage of the boiler and enters the

- Domo or separation drum: Where four main functions are:

A) Separation of water vapor: This involves the separation of liquid that could drag the vapor leaving the drum toward the superheater and prevent the evaporation of the liquid in the superheater leave deposits that hamper their conditions of heat transfer and cause overheating and possible burning of its tubes. This separation is performed by two separate mechanisms: Primary and Secondary (see Figure)



A.1) The primary separation: This mechanism is effected by the action of gravity, centrifugal action and impact.

A.1.1) Action Gravity: Upon entering the water-steam mixture to the dome the highest density of liquid to vapor is used, ensuring greater evaporation surface (average drum water level drops and the steam rises) and the maximum steam path turbulence baffle plates, vortices and low flow rates)

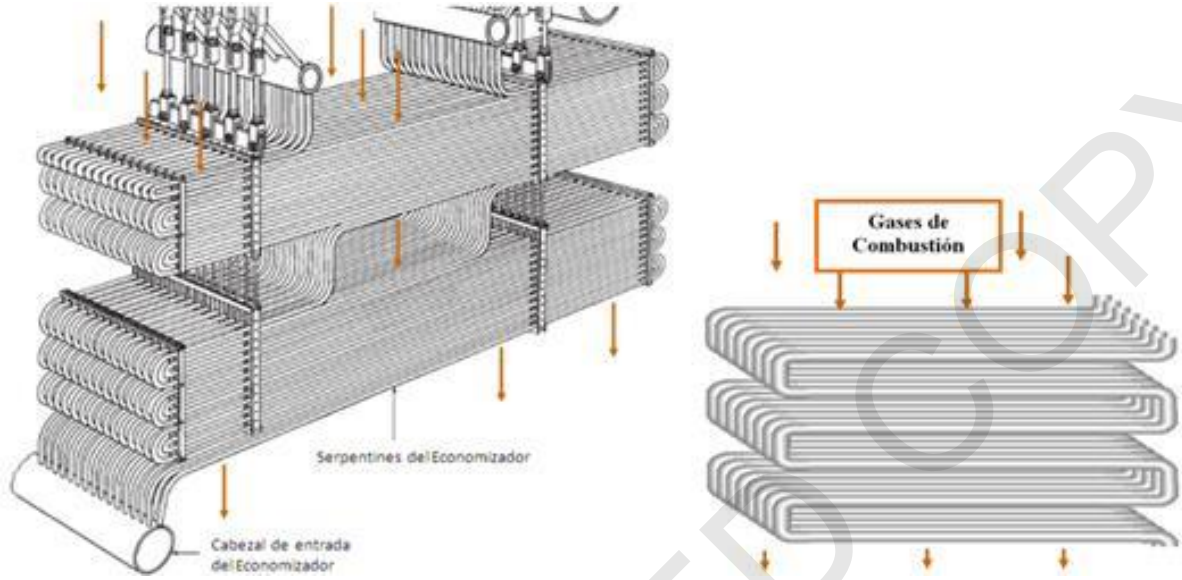
. A.1.2) centrifuged Action: Multiply the difference in density by artificial acceleration (centrifugal) obtained in cyclones, bells reversal or sudden changes of direction.

. A.1.3) Impact: The impact against the vapor bubble screens or other types of obstacles, helps break the surface tension of the wrapping film.

A.2) Secondary drying or separation. The separation of liquid droplets suspended traveling within the steam is achieved by passing it through intricate paths (mesh filters, chip or perforated plates).

B) steam washing: In the steam generators, it is possible that the water together with some silica type impurities evaporate, which pass through the superheaters and eventually condense on the turbine where and imbalance can cause erosion of the blades. The lavage may be performed by spraying distilled water into the steam dome going out (with a temperature of 358 ° C), pulling down the temperature in the steam particles, forcing the liquid to precipitate after expelling by purging continuous substances harmful to the steam generator in the bottom of the dome.

C) cold water supply pipes descent and ascent: the dome temperature water rises and falls tubes fall or down (outside the boiler) to a collector under the boiler that distribute water tubes promotion or raise, which are the "walls of water" or "evaporator" up until you get back to the dome. As the heat produced by combustion heats the water that goes through the "water wall", this begins to evaporate, whereby a water-vapor mixture, which is led to a collector up and then enters is formed to dome. This cyclical process that meets the dome water - downcomers or fall -tubes of climb or uploaded - dome, is what is called "natural circulation" (the water density is greater than the steam), since due to water weight fall pipes, this drives the water-steam mixture through the tubes to rise toward the dome



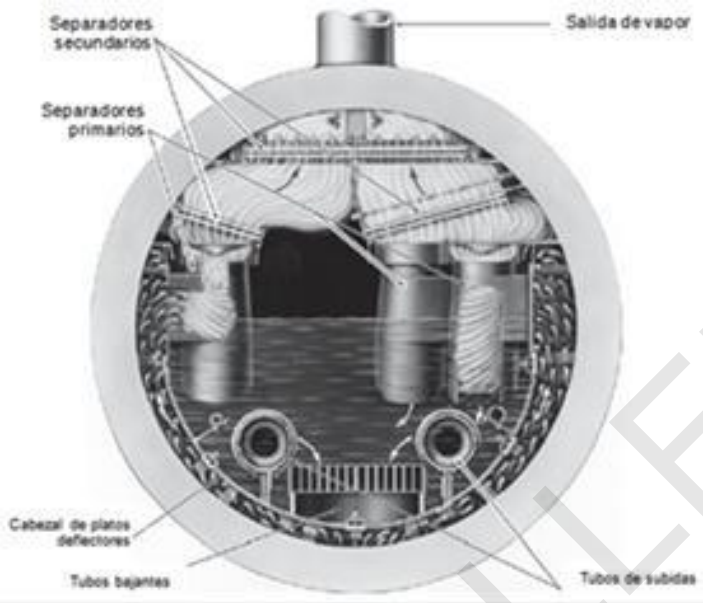
The water-vapor mixture to enter the dome undergoes separation. The separated water vapor is mixed with the water coming from the economizer, raising the temperature of this mixture to 332 ° C which enters the chutes.

D) Internal Water Treatment Steam Generator: The separation drum is the most convenient place to cause the deposition of impurities (intense distillation), to prevent these adhere to metal, to draw water with high concentrations of impurities and controlling metal corrosion by water.

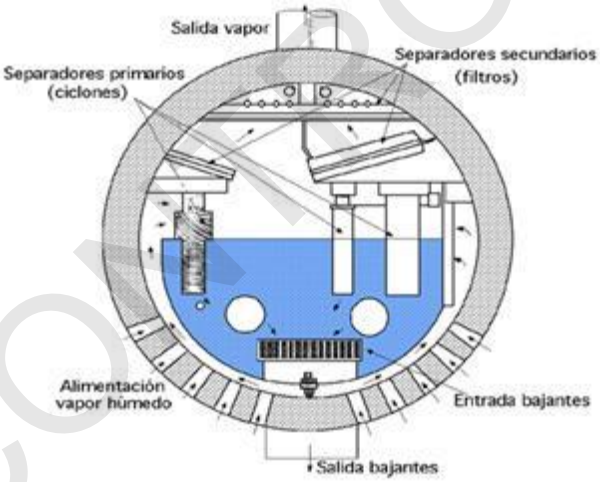
This is accomplished by feeding chemical additives such as caustic soda or potash or phosphates (accelerate sedimentation), colloidal compounds (reduce adherence) and anticorrosive. The elimination of high water concentration is accomplished by purging systems of higher rainfall areas.

The separated steam leaves the dome, and as saturated at a temperature of 358 ° C and enters the steam superheater 1, which are the "tube wall" of the boiler, but in the convection part (contact tubes combustion gases the horizontal and in the second vertical channel) .From superheater 1, the steam exits at a temperature of 379 ° C into the superheater 2, which coils are in parallel forming a bank or panel suspended from the roof outer side, heated by the gases, and comes with a temperture of 401 ° C. After passing steam superheater 3 wherein the temperature rises to 455 ° C and this vapor then passes through a station "Tempering" where its temperature is decreased, to ensure that sufficient heat absorbed in the next and last, that is the superheater 4 to exit at a temperature of 541 ° C and enter the high pressure turbine. The vapor leaving the last superheater (4) goes to the

high pressure turbine, where it expands against the blades thereof and the kinetic and thermal steam energy is converted into mechanical energy, impressing a rotary motion to the turbine shaft. This induces the steam loses much of its thermal energy by lowering its temperature to 343 ° C and pressure 43



The steam is led to the boiler back into the element called "superheater"



where its pressure drops to 41.5 but its temperature increases to 540 ° C and exits to the medium pressure turbine. Here again, the thermal energy is converted into mechanical energy and further contribute to the movement of the turbine shaft, then move to the low

pressure turbine, which again makes your job and enters the condenser where it returns to its liquid state.

STEAM TURBINE

A steam turbine is a turbomachine motor, which transforms laenergía a flow of steam into mechanical energy through an exchange of momentum between the working fluid (meaning the vapor) and elrodete, principal organ of the turbine, which has with blades or vanes which have a particular way to make the energy exchange. Steam turbines are present in several power cycles using a fluid that can change phase, among these the most important is the Rankine cycle, which generates steam in a boiler, which goes under conditions of high temperature and pressure. In internal energy turbine steam into mechanical energy that normally is transmitted to a generator to produce electricity becomes. In a turbine there are two parts, the rotor and stator. The rotor is formed by paddle wheels attached to the shaft and constituting the moving part of the turbine. The stator is also formed by blades, but not attached to the shaft of the turbine housing.

The steam turbine term is used to refer to a driving machine which has a set of turbines to transform steam power, also the entire impeller and guide vanes.

The modern steam turbine was invented in 1884 by Sir Charles Parsons, whose first model was connected to a dynamo generating 7.5 kW (10 hp) of electricidad.1 The invention of the steam turbine Parsons made possible a cheap and abundant electricity and revolutionized maritime and naval warfare

There CLASSIFICATION steam turbines in a variety of sizes, from units of 1 HP (0.75 kW) used to drive pumps, compressors and other equipment powered by arrow until HP 2,000,000 (1,500,000 kW) turbines used to generate electricity. There are different classifications for modern steam turbines and turbomachinery to be susceptible to the same criteria for the classification of these. On the other hand, it is common to classify them according to their degree of reaction:

Action turbines: The enthalpy change or jump or expansion is performed in the vanes or injection nozzles if it is the first stage of a turbine assembly, these elements are subject to the stator. In step the rotor vapor pressure remains constant and will be a reduction in speed.

Reaction turbines: The expansion, that is, the jump steam enthalpy can be made both in the rotor and the stator, this jump occurs only when the turbine rotor is known as pure net reaction.

4. MAIN ENGINE OPERATION.

The diesel engine is a heat engine having alternative internal combustion occurs by self-ignition of fuel due to high temperatures resulting from compression of air within the cylinder, according to the principle of the diesel cycle. It differs from the gasoline engine. [Which?] Has been one of the most widely used since its creation.

A diesel engine operates by ignition (ignition) of fuel to be injected very sprayed under high pressure in a chamber (or prechamber, in the case of indirect injection) containing combustion air at a temperature higher than the temperature of spontaneous combustion, without spark as in gasoline engines. This is the llamadaautoinflamación.

Initiating temperature combustion has the increased pressure that occurs in the second half of the engine compression. Fuel is injected at the top of the combustion chamber at high pressure from very small holes having the form inyectorde atomized and mixed with air at high temperature and pressure (700 to 900 ° C). As a result, the mixture is ignited very quickly. This combustion causes the gas in the chamber to expand, driving the piston down....

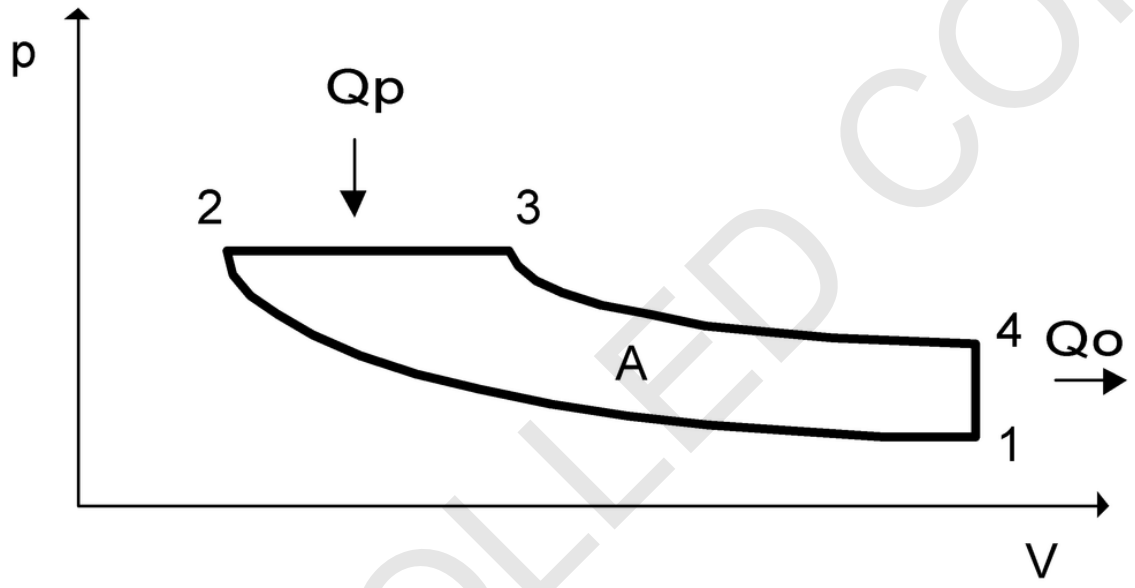
Common rail injector electrohydraulic control.

This expansion, unlike the adiabatic gasoline engine is generating rectilinear motion through the stroke. The connecting rod transmits this motion to the crankshaft, which rotates, transforming the reciprocating rectilinear motion of the piston into a rotational movement.

For auto-ignition occurs is necessary to reach the temperature of the spontaneous combustion of diesel. Cold is necessary pre-heat the oil or use heavier than those used in

the gasoline engine fuels, using the oil distillation fraction fluctuating between 220 ° C and 350 ° C, which is referred to as oil or diesel in english.

OPERATION OF MOTOR HOME



Compression process 1-2 is a process of reversible adiabatic compression (isentropic), ie sinintercambio heat outside. Comes to symbolize the compression process of the fresh dough in the actual engine, in which the piston being in the bottom dead center (BDC) begins its upward stroke, compressing the air contained in the cylinder. This raises the thermodynamic state of the fluid, increasing its pressure, its temperature and reducing its specific volume under adiabatic effect. In the idealization, the process is governed by the isentropic equation with index k = isentropic politropicidad Cp / Cv.

Combustion Process 2-3: This idealization, the heat input Qp is simplified by a process isobaric (constant pressure). However, the diesel combustion is much more complex: at around top dead center (TDC) (generally a little before reaching due to problems associated with thermal inertia of the fluid, ie the delay between injection and spontaneous) inflammation, fuel injection (in car engines, diesel starts, but enough that the fuel is sufficiently self-igniting and low volatility). The injector and sprayed perliza "atomizes" the fuel, which in contact with the atmosphere inside the cylinder begins to evaporate. Since the fuel in a diesel engine has to be very self-igniting (high detonating power, high cetane index), it happens that, long before they have finished all the fuel injection, the first drops

of fuel injected will spontaneously ignite and given start to a first combustion characterized by very turbulent and imperfect, not having had the air-fuel mixture long enough to be homogenized. This step is very fast, and this cycle is obvious, but not in the so-called fast Diesel cycle, which is symbolized as an isochoric compression at the end of compression. Subsequently occurs on the fresh dough that has not been burned, a second combustion, called diffusion combustion, much slower and perfect, which is simplified here for isobaric process. In this combustion by diffusion is usually burned around 80% of the fresh weight, hence the previous step was sole ignore. However, it is also true that the vast majority of work pressure and losses and irreversibilities cycle occur in the initial combustion, so without further omit only lead to an imperfect model of the Diesel cycle. Consequence of combustion is the sudden lifting up the thermodynamic state of the fluid, in reality due to the chemical energy released during combustion, and that in this model must be interpreted as a thermodynamic heat receiving fluid, and which consequently expands in isobaric reversible process.

Explosion / expansion, 03.04 process: is simplified by an isentropic expansion (adiabatic) the fluid thermodynamic until specific volume to be had at the start of compression. In reality, the expansion occurs due to the high thermodynamic state of the gases after combustion, pushing the piston from TDC to BDC, producing work. Notice how, as in any cycle four-stroke or two times, only in this race in expansion work occurs.

Last stage 4-1 process: this stage is isochoric process (escape) ie at constant volume. Since the final pressure of expansion to the initial compression pressure. In fact, devoid of any physical meaning, and simply ad hoc is used to close the ideal cycle. However, some authors dissatisfied with all idealizations made insist on giving a physical siginificado this stage, and associated with the renovation of the load. Therefore, they reason, is this what occurs in both races preceding the compression and expansion follow the escape of burned mass and the admission of fresh dough. However, the escape is a process that requires much more work than that implied by this process (none), and also none of the two processes is given, even remotely, at constant specific volume.

It is important to note how, in the Diesel cycle must never confuse the four-stroke engine with that idealized thermodynamic cycle, which only refers to two of the times: the compression stroke and expansion; the renewal process of the load .. falls outside the Diesel cycle processes, and not even a thermodynamic process in the strict sense.

5. ENGINE TROUBLE (PROBLEM SOLUTION)

Difficulty starting the engine.

Diagnoses plus 7, 8, 9,15 and 21,

1. Battery discharged.

2. dirty or loose terminals.

3. Lack or excess gasoline in the carburetor.

4. Malfunction of the ignition system, or synchronization.

5. Low compression in the cylinders.

6. Defects in the starter.

The engine fails or stops at idle.

Besides diagnostics 3, 4, 5, 6, 15, and 16,

7. Inadequate dosing of the mixture in the carburetor.

8. Low engine temperature.

9. direct suction air.

The engine fails at rapid traverse.

Besides diagnostics 3, 4, 5, 6, 7, 8, 9, 15, and 16,

10. High engine temperature.

11. Output clogged exhaust gases.

12. Auto excess coal combustion chambers.

Engine loses traction power.

Besides diagnostics 3, 4, 5, 6, 7, 8, 9, 10, 11, and 12,

13. The clutch slips.

14. Wheels braking.

15. Malfunction of tuning on, or belt relaxed or damaged distribution.

Detonation in the cylinders by requiring power to the motor.

In addition to diagnostic 4, 7, 10, 12,

16 - Failure octane selector dealer.

17. Spark bad or charred.

18. On poorly tuned.

19. Cylinder head gasket shabby.

20. Coal combustion chambers.

21. Engine valves in disrepair, or without tolerance.

22.- past or inadequate octane fuel.

23. Air filter clogged carburetor.

Explosions in the carburetor idle.

Besides diagnostics 3, 4, 7, 8, 9, 11, 16, 18, 19, and 21,

24 - Changes in the order of ignition.

Explosions in the carburetor at rapid traverse.

Besides diagnostics 3, 4, 7, 8, 9, 10, 11, 12, 16, 17, 18, 19, 20, 2 and 22,

25. Defects in the centrifugal advance, rotor or distributor cap.

Explosions in the exhaust slow macha.

Observe diagnostics 3, 4, 5, 7, 10, 11, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, and 25,

Explosions in the exhaust at rapid traverse.

Besides diagnostics 3, 4, 5, 7, 8, 9, 11, 12, 16, 17, 18, 19, 20, 21, 22, 23, 24, and 25,

26.- Engine wear generally.

27. Ignition Condenser shabby.

Excessive oil consumption.

Besides diagnostics 3, 5, 10, 11, 15, 17, 18, 19, 21, 23, 26,

28. Oil leaks outward.

29. Poor quality or inadequate degree of density of the oil.

Low oil pressure.

Diagnoses plus 26, 28, and 29.

30. Failure of the oil pump, or industry.

Excessive pressure oil.

In addition to 29 and 30 diagnoses.

31. Sensors pressure switch or manorresistencia, shabby.

Excessive consumption of gasoline.

Besides diagnostics 3, 4, 5. 7, 8, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23. 25, 26, and 27,

32. Failure carburetor.

33. Losses on the fuel pump or ducts.

34. Failure of the pump.

35. Leakage between the tank and the pump.

Failure of the pump.

36. clogged vent tank or airtight lid.

37. clogged ducts or perforated gasoline.

38. Air leak in the suction side of the pump.

39. clogged fuel filter.

40. Diaphragm or electric drive shabby.

41. Valves pump shabby.

42. Excessive free play of the drive lever, or desgate of the eccentric cam.

Failure of the carburetor.

Besides diagnostics 3, 5, 7, 8, 9, 15, 19, 21, 22, 23, 24, 25, 34, and 39,

43. Docking to the collector of loose motor.

44. Gaskets Carburetor shabby.

45. Choke locking system air.

46. Defects in the regulatory mechanism of the fuel level in the bowl.

47. Loosen the mixing controller.

48. Incorrect Mixing ratio for rapid traverse.

49. ducts or diffusers clogged carburetor.

50. Steps calibrated clogged fuel.

51. Supplier defective quick way to go.

52. Suction air ducts loose.

Failure of the oil pump.

53. Loss of pressure lubricated wear on the network.

54. Excessive wear of the drive shaft of the pump, or its caps.

55. Wear gearbox gears or pump.

56. Wear stretch marks, or coupling the drive shaft.

57. Air leak in the suction line.

58. Filter clogged suction duct.

59. Pressure control valve damaged.

60.- Flow loss coupling to the cylinder block.

61. Drive shaft damaged.

Failures on.

In addition to diagnostic 4, 12, 15, 16, 17, 18, 20, 24, 25, and 27,

62. Moisture in the distributor cap or ignition coil.

63. In power system injection nozzles shabby.

64. interrupted circuits high voltage cables.

65. Distributor Cap jump spark to ground.

66. Rotor distributor spark shabby.

67. Loose electrical connections on the coil circuit.

68. switch defective contact.

69. Failure retailers.

Failures dealer.

In addition to diagnostic 4, 16, 18, 24, 25, 27, 62, 63, 64, 65, 66, 67, and 68,

70. Defects in the electronic module.

71. Defects in the magnetic rotor.

72. Distance being the primary circuit breaker contacts, poorly calibrated.

73. Hinge stuck moving contact.

74. breaker primary contacts, burnt or dirty circuit.

75. System Jammed centrifugal advance.

76. General wear the whole distributor.

77. Wear stretch marks coupling the drive shaft of the distributor.

78. Wear drive gear

79. Wear of the chain or drive belt that drives the camshaft.

80. faulty synchronization tuning on.

Failure of the ignition coil.

Diagnoses plus 27, 62, 63, 64, 67, and 68,

81. Short circuit in the primary winding of the coil.

82. There is no continuity in the primary coil circuit.

83. No continuity in the secondary coil circuit.

84. The high voltage jumps at the output mass of the coil.

Failure of the spark plugs.

Diagnoses plus 27, 62, 63, and 64,

85. Wear, carbon buildup, moisture, or incorrect distance

between the electrodes.

86. Bad type plug.

87. Noise Filters defective or cable without continuity.

88. protective caps to ground path.

89. Splitting of the insulating ceramics,

Failure of the starter.

Diagnoses plus 1, 2, and 6,

90. Solenoid Dysfunction attack.

91. worn brushes.

92. Piers drivers of distended brushes or sliding dirty.

93. Porta poorly insulated, or burned positive brushes.

94. Porta negative brushes with bad ground contact.

95. Surface dirty collector.

96. Loose connections in control circuit or power.

97. Delgas rotor shorted or interrupted.

98. Stator Coils short or interrupted.

99. Rub the rotor against the stator.

100. Excessive wear of the bushings or bearings supporting the rotor shaft.

101. drive system attack locked or damaged.

Generator system failures.

Besides diagnostics 1 and 2,

102. slipping or broken drive belt.

103. Ammeter indicator light or shabby.

104. runout or dirt collector.

105. rotor winding shorted or burned.

106. connections between winding and evil welded collector.

107. Contact between the rotor and stator.

108. Excessive wear of the bushings or bearings support the rotor.

109. collector shorted.

110. Excessive wear of brushes.

111. Porta poorly insulated positive brushes.

112. Porta negative brushes with bad ground contact.

113. Diodes transistors damaged. (alternators).

Docks 114.- expired or burned brush.

115. Loose connections or unsoldered in brushes or stator.

116. Stator winding shorted or partially burned.

117. Voltage Regulator shabby.

Battery failure.

Besides diagnostics 1 and 2,

118. No power from the generator system.

119. Low, or low density of the electrolyte.

120. Abuse starter.

121. Short circuit somewhere in the electrical system.

122. Excessive consumption in the power grid.

123. Battery exhausted.

Failure of the engine cooling system.

In addition to diagnostic 4, 10, 11, 12, 15, 16, 18, 21, 22, 24, 69, and 76,

124. Low oil pressure in the engine.

125. Water leakage somewhere in the system.

126. Obstruction in the circuit.

127. Failure of the water pump.

128. Thermostatic valve faulty.

129. electroventilador system malfunction.

Wear or premature rupture of the straps

fan, or generator.

130. abnormal belt tension.

131. Correa or pulleys inadequate characteristics.

132. Oil and dirt traction bands.

133. Overload or stiffness of the rotor of the dynamo or alternator.

2. TROUBLE IN THE TRANSMISSIONS.

Noises in the gearbox in neutral.

134. drive gear, or partner of the fixed train shabby.

135. Use of a new gear with your partner used.

136. Moving the intermediary abnormal reverse gear.

137. Backing bearings shabby.

138. Excessive axial play of the drive, or fixed gear shaft.

139. inadequate or poor lubricant.

Noise or trouble putting any speed.

Besides diagnostics 136, 137, 138, and 139,

140. Freewheel Mechanism poorly regulated.

141. synchronizer rings shabby,

142. Excessive wear at the entrance of the movable gears.

143. Offset by body wear the input and output shafts.

Running noise at normal speed.

In addition to the diagnostic 134, 135, 136,137, 138,139, 140, 141m 142m and 143,

Abnormal position 144. hairpins shifting gears.

145. Noise acting resonance.

The shifter is locked in gear.

140 In addition to diagnosis,

Abnormality 146. Sliding shafts of the forks.

147. abnormal shift linkage adjustment.

148. Moving the input or output shafts.

The shift lever to neutral position jumps to try to put

the vehicle in motion or while driving.

Besides diagnostics 136, 137, 138, 142, 143, 144, 146, 147, and 148,

149. Excessive general wear.

Oil leaks from the gearbox.

139 In addition to diagnosis,

150. Together shabby.

151. seals or stamps shabby.

152. loose or rolled thread screws.

153. Breaks box structure.

The engine power does not drive, because the clutch slips.

In addition to the diagnostics 14, and 140,

154. disengage the locking mechanism.

155. diaphragm springs or press the clutch, outdated or broken.

156. disc friction Forums worn or crystallized clutch.

157. Sliding clutch release bearing stuck.

The tugs clutch or vibrates to start and drive the vehicle.

In addition to the diagnostics 14, 140, 154, 155, 156, and 157,

158. Joint Press and inadequate disk.

159. sliding surfaces rough or bumpy.

160. The disc is installed with its inverted face.

161. The dam has been released from his bolted to the flywheel coupling.

162. excessive wear of the splines of the driveshaft coupling the clutch disc, stretch marks or braces planetary differential, or striae drive axles.

163. Supports loose, or broken motor.

Premature wear of the clutch disc.

In addition to the diagnostics 14, 140, 154, 155, 157, 158, 159, 160,

164. Bad habit of keeping your foot on the clutch pedal.

165. Bad Habit to accelerate the clutch too.

166. Excessive use of the clutch. Excessive load. Stuck brakes. Bad habit of using the engine as a brake to hold, or downhill.

Noises in the clutch system with the engine running, the gear lever in neutral position without depressing the clutch pedal.

Besides diagnostics 140, 160, 161, and 162,

167. Disc springs up, or broken clutch.

168. objects penetrate the system.

The same noises, disengaging with the pedal.

Besides diagnostics 158, 160, and 162,

169. Bearing Releaser shabby.

170. Bearing support the end of the drive shaft on the steering wheel shabby.

The vehicle does not move at any speed.

Besides diagnostics 140, 154, 156, 157, and 182,

171. broken clutch disc.

172. Gears or broken axles in the gearbox. The broken propeller, or splines worn wheel coupling shaft.

173. Shifter disconnected from its linkage.

174. fork shifting gears box disconnected changes.

The motor stalls to engage.

14 In addition to diagnosis,

175. The gearbox has been locked gear breakage.

176.- two speeds have been coupled together.

177. It has locked one of the propeller shafts.

178. It has locked the brakes, or is actuated parking brake.

179. It has been locked differential system.

The engine and gearbox work normally, but no traction on the wheels.

180.- broken gears in the gearbox or differential assemblies.

181. Report broken propeller shaft system.

182. Drive shaft decoupled differential.

183. Drive shaft decoupled from a wheel.

Intermittent noises or pulling on propeller shafts (front wheel drive).

184. Union CV damaged.

185. runout of a propeller shaft.

186. Excessive wear of the grooves, or the support of planetary gears.

Noises in the differential or rear axles in full swing, for straight and level road (RWD).

187. Wheel bearing damaged.

188. excessive free play gear differential assembly.

189. Joint gear damaged by inadequate lubrication.

190. crown gear differential pair, loose or damaged.

191. bearings support the reduction assembly, or differential, damaged.

192. Supports the differential assembly with wear, or excessive axial liibre game.

193. bearings support the propeller shaft bevel gear, worn, or damaged.

194. foreign body embedded between the gear teeth of the gear pair.

195. Drive shaft of one of the offset, twisted, or excessive play in their support wheels.

Noises in the differential in full swing, when cornering.

196. Gears satellites in disrepair, or wear on its axis. gears

Planetary damaged or wear in support. Differential assembly poor lubrication.

Oil leaks in the differential (RWD), or the differential assembly yy transmission (FWD).

In addition to the diagnostic 192, and 195,

197. excessively high level of lubricating oil.

198. Together bad or loose.

199. seals or stamps shabby.

200. unsuitable lubricant, low density.

3. TROUBLE IN THE DIRECTION.

Excessive play of the steering wheel.

201. Set rack gear with excessive free play.

202. Excessive wear reduction assembly.

203. Excessive wear support sleeves, ball joints or bars.

204. Coupling loose wheel or rubber block the universal binding damaged.

205. reducer set loose on their supports to the frame.

206. the loose wheel bearings,

207. Pivots support excessive wear.

208. loose wheel discs.

209. Joints Bars with excessive wear, or loose in your link

210. General wear the steering assembly.

Address unduly harsh.

Besides diagnostics 202, 203, 204, and 207,

211. Low air pressure in the front tires.

212. spherical support of the telescopic suspension stiff frame.

213. twist or rupture of the support base of the frame.

214. Line, or degrees of tilt and convergence of defective front wheels.

215. Poor lubrication steering assembly, brush areas, and swivels.

Oscillation or vibration of the steering wheel at a certain speed.

Besides diagnostics 201, 202, 203, 204, 205, 206, 207, 208, 209, 210. 211, 212, 213, and 214,

216. Supports front shocks loose, or damaged rubber blocks.

217. cushions uneven action.

218. Mangueta of twisted or damaged wheel.

219. wheel rim offset, distorted, unbalanced, or pneumatic

defective.

220. Use of two tires of different features.

221. Different air pressure in the front tires.

Suspicious or tendencies to deviate direction.

Besides diagnostics 201, 202, 205, 206, 207, 208, 209, 210, 212, 213, 214, 216, 217.218, 220, and 221,

222. seizing or wear assembly anywhere.

223. Points for the loose, damaged or displaced rear suspension.

Noises in the address.

Besides diagnostics 201, 202, 203, 205, 206, 207, 208, 209, 210, 213, 216, and 219,

224. Broken teeth in group zipper or reducing system.

Birdies front tire cornering.

Besides diagnostics 207, 209, 210, 211, 213, 214, 218, 220, and 221,

225. Excessive load on the rear of the vehicle.

4. TROUBLE IN SUSPENSION.

The suspension springs expire prematurely.

Besides diagnostics 213, and 217,

226. Excessive load of the vehicle.

227. Journey usual evil ways.

228. Defects temple of the docks or crossbows.

229. Break limiter block rubber butt load of the suspension.

Spring break or crossbows.

Observe the diagnostic 207, 213, 216, 217. 226, 227, 228, and 229,

Noises in the suspension.

Besides diagnostics 207, 208, 212, 213, 215, and 216,

230. rubber blocks stabilizer bara shabby.

231. Rubber Blocks amortiguadotes shabby.

232. rubber blocks trapezoids, arms, chains or padlocks shabby.

5. TROUBLE ON THE BRAKES.

The brake pedal is spongy or sink to the bottom.

233. Pills or friction linings of shoes worn.

234. It is necessary to provide for the approximation of shoes to the drums.

235. Leakage of fluid in the hydraulic circuit.

236. Failure of the pump, the power brake booster, or the ABS system.

237. Accurate purge air introduced into the circuit.

238. Lack liquid in tank pump phenes.

239. The pump drive shaft has been disengaged.

One or more wheels of the vehicle remain braking.

Besides diagnostics 236, and 237,

240. It is being used brake fluid not indicated.

241. The liquid does not return to the pump after braking

242. Pistons drives seized, return springs of the distended shoes, shoes stiff hinges

The engine stops when braking.

243. Mechanism of the booster shabby, broken diaphragm, suction lines disconnected from the vacuum pump or intake chamber of the engine.

The brake pedal is not actuated and normal.

Diagnoses plus 23,236, 237, 238, and 240,

244. Flexible ducts distended.

The brake is noticed suspicious and sensitive,

Observe the diagnostic 236, 239, 242, and 243.

Premature wear on any of the tires.

Besides diagnostics 207, 209, 210, 211, 212, 213, 214, 217, 218, 219, 220.221, 222, 223, 225, 226, and 232,

245. Excessive use or violent brakes.

Noises in the wheels when braking.

Besides diagnostics 206, 208, 233, and 242,

246. Foreign body between pad and disc, or between shoe and drum.

247. pads or shoes worn the most.

248. Supports the worn shoes.

249. bolts loose wheel, or conical couplings runaway.

17. KEEP A SAFE GUARD MACHINES

Principle: Ability to maintain an engineering watch and general surveillance of spaces containing the main propulsion and auxiliary machinery.

The engineer designated for that purpose is effectively in charge of the engineering watch and exercise general supervision over the main propulsion machinery, essential ship equipment and systems necessary for the safe operation of the main plant and auxiliary machinery of the ship, and to avoid contamination of the marine environment.

The engineering watch shall comprise at least one engineer having proper jurisdiction and may include an adequate number of sailors from the engine.

The organization of the guard ships that are authorized to operate with reduced manning, because its operation is automated or because no permanent endowment to assist you required, shall be consistent with the authorization allowing it to operate well.

Neither the engineer on duty or any other person of the engine shall be obliged, being alone, to make a call on an engine or enter main machinery spaces, unless at frequent intervals can confirm the bridge, through a system of monitoring or other equivalent method acceptable to the Administration, the safety of that person is not endangered.

OPERATION AND MAINTENANCE OF MACHINES

Principle: Ability to operate and maintain safely the main propulsion and auxiliary machinery so that the ship can overcome the foreseeable perils of the voyage.

There will be competent personnel in sufficient numbers to:

operate the main propulsion machinery, ship essential equipment and systems necessary for the safe operation of the main plant and auxiliary machinery of the ship as well as perform routine maintenance of the machinery, equipment and systems;

meet the potential need to maintain safe operation of the vessel by manual procedures for a limited case of failure of automated systems or instruments period.

SECURITY PROVISIONS OF MACHINERY SPACES

Principle: Ability to maintain safety and cleaning machinery spaces in order to minimize the risk of fire.

They have designated staff sufficient to ensure adequate cleaning machinery spaces.

Fit to establish supply systems under which the crew not permanently assigned to staff the engine are trained in certain tasks of said chamber and work on it during certain periods you specify.

The firefighting team of the engine and detection and prevention thereof, will undergo maintenance operations need to be performed.

18. duties associated with taking over and accepting WATCH

Primary objectives:

(1) Maintain the presence of an observer coverage 50-100% of foreign vessels operating within the area covered.

(2) Maintain the presence of an observer in 10-15% of all domestic vessels greater than 30 m.

(3) Collect information on fish stocks and fishing techniques to improve the level of knowledge in the areas of administration of the stock of TAC, population dynamics, performance art, etc.

(4) Monitor and report on compliance with the acts, regulations and fisheries policy.

(5) Provide management with relevant information necessary for the formulation of sound fisheries policies and regulations.

(6) To assist the fishing industry when and where possible and communicate the achievements gained through the program of observation.

Secondary objectives:

(7) Control of pollution.

(8) Protection of telecommunication cables submerged.

These objectives respond to regional interests and provide a basis from which to measure program compliance. The observer programs that are made in other areas must necessarily develop their own objectives.

19. DURING the duties WATCH

Observer's Responsibilities

During the assignment to a fishing vessel, a period that can last from 5-30 days various tasks are assigned to the observer, which define two basic responsibilities:

1. Check the compliance by the fishing vessel fishery regulations concerning areas where fishing gear used, authorized fisheries, methodology used to complete the logbook, capture and report on additional catch restrictions and

2. Obtain and record biological data from representative samples of fish, such as age and sex determinations, height measurements / weight, precise biological data of certain species, analysis of stomachs, and catch and effort.

Obligations of the observer

The tasks assigned to the observer during his period on board can vary from ship to ship, from fishery to fishery, and from season to season. In most cases, however, the observer must perform some or all of the following functions:

1. maintain frequent communication with regional centers (1-2 times per week) using the communication system of the ship,

2. obtaining specifications and diagrams of the trawl to determine the performance of the fishing gear,

3. control the overall pattern of fishing ship in relation to bottom topography, concentration of the fleet fishing strategy that follows the captain, restrictions imposed by the regulations, etc.,

4. detail the fish processing operations which effects the ship with reference to the types of product freezing times, packaging and packaging procedures, manpower utilization, mechanization, plant layout process, quality control, etc. .,

5. conduct periodic checks of methods for registration of the vessel's catch, as they are defined by the regulations,

6. describe the process used by the vessel, associated with the tasks of puff and trawl tack, focusing on the time and manpower used,

7. randomly sampled fish and take note of scientific observations similar to those described above,

8. Although randomized blocks of fish and / or fish boxes of different series and processing operations,

9. supplying a campaign report, detailed written, covering the activities of assigned work.

20. DUTIES ASSOCIATED WITH DELIVERY OF A WATCH

An observer performs similar to those of the deckhands and officers on board fishing vessels tasks. You can help load stores, take part in drills (fire-fighting, abandoning ship and man overboard), help ensure crew members and preparing the ship for sea and assist in the management of fishing lines. Once on board the observer and often helps in the maintenance crew Art and network, helping needles with twine, holding and cutting remark network and helping cables.

During the shooting and handling of art, since the observer is on the bridge. You should take note of the time, location and depth of the start and end positions of each puff. This requires a deep understanding of basic navigation practices using the tools of the bridge (Loran C., Satellite Navigation, Omega, depth sounders and recorders, etc.). It also requires that the observer note the types of background, water temperature and fishing area. This information on a serial basis, is stored together with corresponding data capture. Taken together, this information represents a comprehensive and accurate of the fishing vessel registration.

The observer samples twice a day, working alongside the crew, while the sailors cut and gut the catch. Finished biological sampling, the observer is aboard a domestic vessel invariably helps in processing the catch, an activity that gives you more opportunities to comment on the arrest. Can also assist in the selection of species and in handling conveyors. Participation in refrigeration and freezing of fish is another activity that can be useful because it allows you to control the storage capacity. Finally, it is usual for the observer to help in cleaning the fishing park. All these activities help to promote a good working relationship with the crew.

In contrast with national and campaigns and which are initiated and completed in port, foreign deployments usually involve performing one or more transhipments at sea, which are carried out using small lifeboats handled by crewmembers . The captain of the receiving vessel position your vessel so that a lee that allows the use of a pilot ladder. The observer

always has the final word on the task of completing the transhipment; its assessment of sea conditions and time determines whether a transfer will take place.

The mandate regarding control measures and accurate information to the observer examine the vessel's fishing license, certificates and specifications of art. The license must be examined to ensure its validity and to identify the conditions concerning the fishery under control. From the ship's certificates, the observer must obtain information regarding deadweight capacity, gross tonnage, length, ship type and layout and design of the process area and equipment. The planes of the gear must also be studied and verified by physical examination of it to verify its performance and its relevance to fisheries regulations. Data for the vessel and gear thus obtained subsequently form an integral part of the campaign report.

The observer must possess a good knowledge of the basic methods of navigation, which is of primary importance on board fishing vessels, as these vessels are obliged to restrict its operations to specific areas. The observer must determine and record the exact positions for another data set (regardless of the master) at least several times a day of fishing. By having this information, the observer can monitor compliance of the vessel with respect to the regulations concerning transfers between fishing areas, areas of input / output avoidance closed to fishing and exclusion zones (pipelines, oil wells) areas, and passive fishing gear. A board foreign ships, the observer routinely participates in the control of transshipment of fish. You may be required to registerar the esligas load, verify the types and weights of products and examine the ship's manifest and bills of lading. During most of campaigns carried out on board foreign ships, the observer should assist the master with regard to:

(1) interpretation of telexes, official documents, license conditions fishing logbooks, etc.,

(2) radio communication with patrol vessels, coastguard stations and pilot boats, and

(3) loss of boat and ship traffic patterns.

It may also be required to provide a shuttle service customs agents and inspectors of the fishery.

Each observer is licensed marine radio operator who qualifies to use the ship's radio. More often, they are required to send coded status reports, usually on a weekly or biweekly basis, providing the department of fisheries a summary of the activity of the vessel. Additionally, it may be necessary for an observer to ship radios for long periods under special circumstances, eg during inspections or situations of violation of law, to maintain contact with patrol vessels, other observers or the fisheries department.

References

1. NED MOHAN, TORE M. UNDELAND y WILLIAM P. ROBBINS. Power Electronics: Converters, Applications and Design. ↑ # # TIMOTHY J. MALONEY. Electrónica Industrial Moderna.
2. B. W. WILLIAMS Power Electronics, Devices, Drivers, Applications and Passive Components.Macmillan Press LTD, 1987.