INDIAN INSTITUTE OF TECHNOLOGY KANPUR

NPTEL

NPTEL PROGRAMME ON TECHNOLOGY ENHANCED LEARNING

Course Title
Aircraft Maintenance (Engines)

Lecture - 15
Engine Fuel and Fuel Metering Systems Contd**…**

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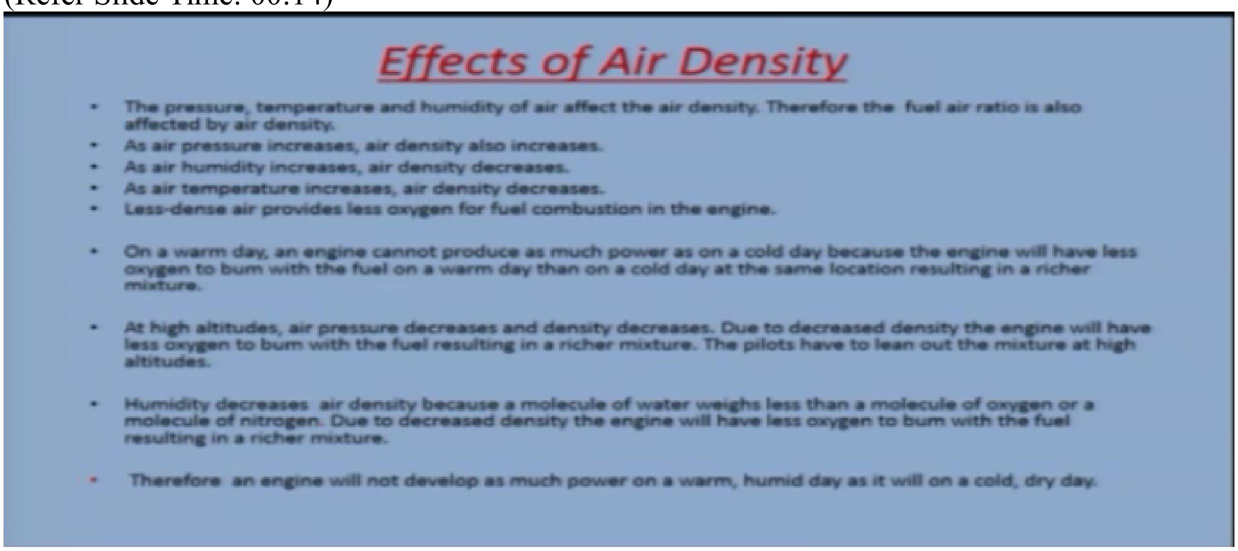

Now next let us see what is the effect of air density, the pressure temperature and humidity of air effects the air density, we all know that the temperature, pressure and humidity of air it will affect the density of air, therefore the fuel air ratio is also affected by air density.

As air pressure increases air density also increases, as air humidity increases air density decreases, as air temperature increases air density decreases, so we have seen that as your pressure increases your density increases, as your humidity and temperature increase your density decrease.

Now when you have less dense air, it will provide less oxygen for fuel combustion in the engine, so less dense air is providing less oxygen for combustion.

On a warm day an engine cannot produce as much power as on a cold day, because the engine will have less oxygen to burn. Now on a warm day you have high temperature, we have seen that when you will have high temperature you will have less density, and when you have less density you will have less oxygen to burn with the fuel on a warm day then on the cold day, and the same location which results in a richer mixture.

At high altitudes air pressure decreases and density decreases, due to decrease density the engine will have less oxygen to burn with the fuel resulting in a richer mixture, the pilots in that case will have to lean out the mixture at high altitudes.

Humidity decreases air density because a molecule of water weighs less than a molecule of oxygen, so in a humid climate you have more moisture in the atmosphere, and a molecule of water weighs more than a molecule of oxygen, so in that case your humidity decreases air density, due to decrease density the engine will have less oxygen to burn with the fuel resulting in a richer mixture, therefore an engine will not develop as much power on a warm humid day as it will on a cold dry day, so we can see the effect of density on a warm humid day the engine will not be able to develop as much power as it can develop on a cold dry day.

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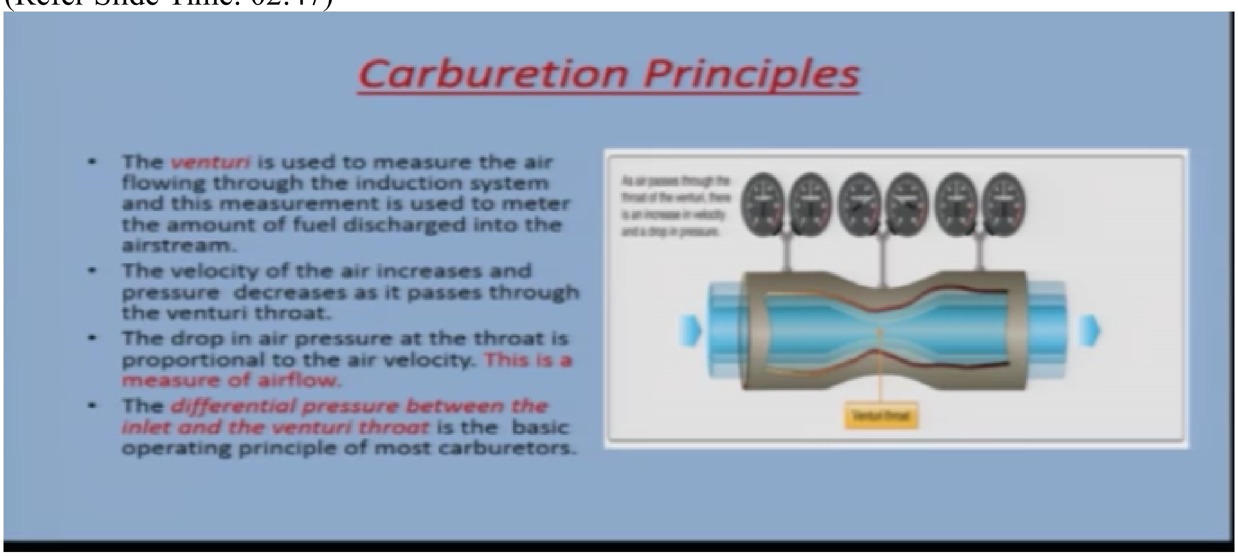

Now coming to the fuel air metering device the first unit which we are going to see is a carburetor, let us see what are the basic carburetion principles being used in a carburetor, you all know about the venturi, the venturi is used to measure the air flowing through the induction system, and this measurement is used to metered the amount of fuel discharge into the airstream.

Now the venturi, the air is flowing through the venturi, through the induction system and this measurement is used to meter the amount of fuel discharge into the airstream.

The velocity of air increases and pressure decreases as it passes through the venturi throat. The drop in air pressure at the throat is proportional to the air velocity, this is a measure of air flow, so the air flow is measured when you have a pressure drop at the throat this is a measure of air flow.

The differential pressure between the inlet and the venturi throat is the basic operating principle of most carburetor, so the basic operating principle is the pressure drop, differential pressure between the inlet of the venturi and the venturi throat.

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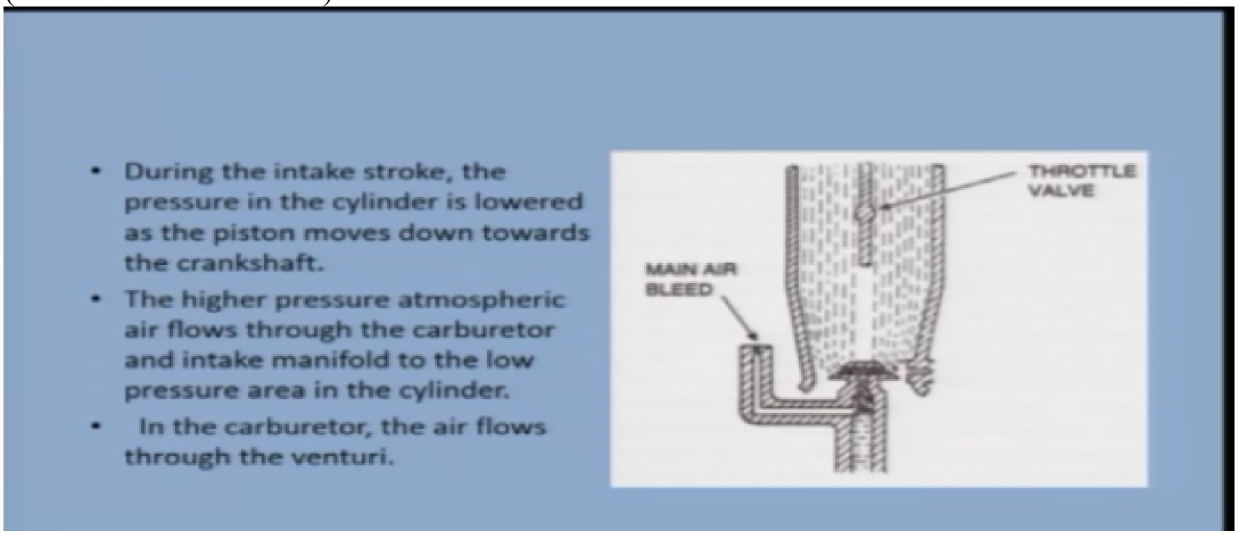

During the intake stroke the pressure in the cylinder is lowered as the piston moves towards the crankshaft, so when the piston is moving towards the crankshaft there is a low pressure in the cylinder, the higher pressure atmospheric air flows through the carburetor and intake manifold to the low pressure area in the cylinder, so I have seen that there is a low pressure in the engine cylinder, the atmospheric air which is at higher pressure is flowing through the carburetor intake manifold and into the cylinder where you have low pressure.

In the carburetor the air flows through the venturi, and inside the carburetor there is a venturi through which air is flowing.

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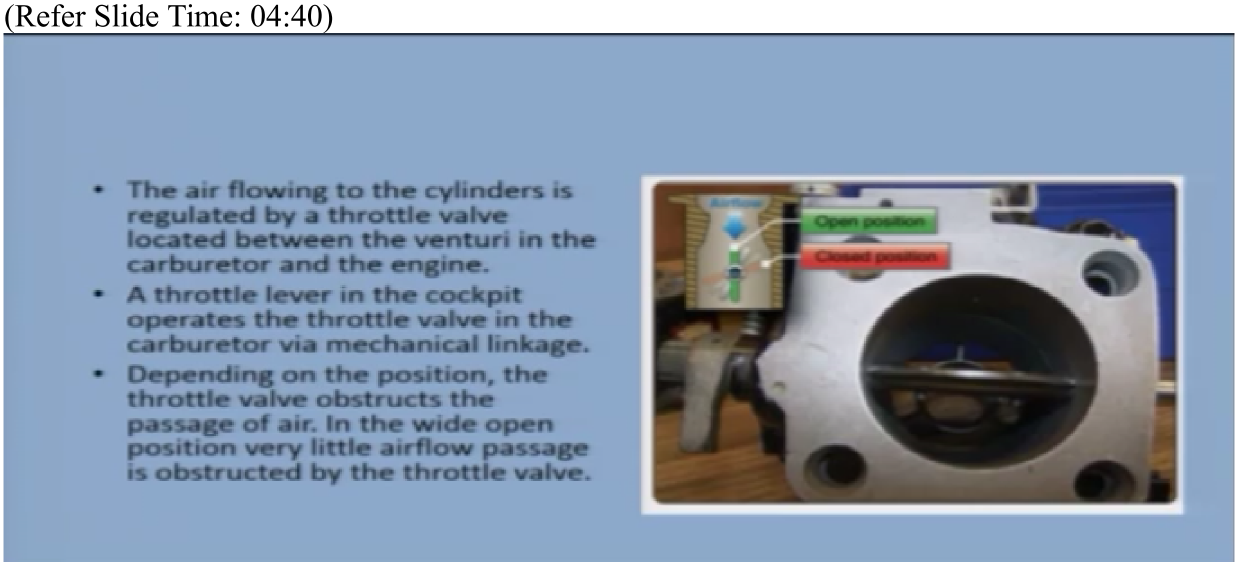

The air flowing to the cylinders is regulated by a throttle valve located between the venturi in the carburetor and the engine, now here in this picture you can see this is the picture where you can see a throttle valve, so the air in the cylinders is flowing through a throttle valve and this throttle valve is located between the venturi in the carburetor and the engine.

A throttle lever in the cockpit operates the throttle valve in the carburetor via mechanical linkage, so this valve is operated via control in the cockpit called the throttle control via mechanical linkage.

Depending on the position the throttle valve obstructs the passage of air, so this valve this obstructs the passage of air in the wide open position very little air flow passage is obstructed by the throttle valve. In the diagram you can see there are various positions shown, this green position here this is complete open position and you can see the air is not getting obstructed, the air is flowing there is a smooth air flow, and at lower throttle settings this disk will obstruct the path and there will be an obstruction for the air flow.

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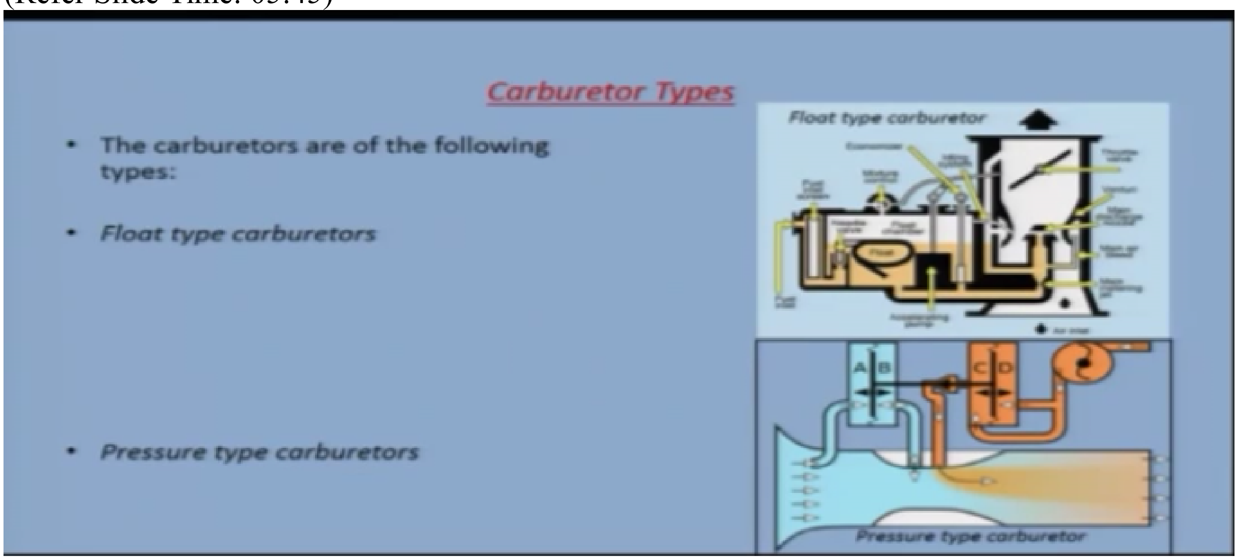

Now let us see what are the different types of carburetors? The carburetors are of the following types, float type carburetors, pressure type carburetors, coming to the float type carburetor.
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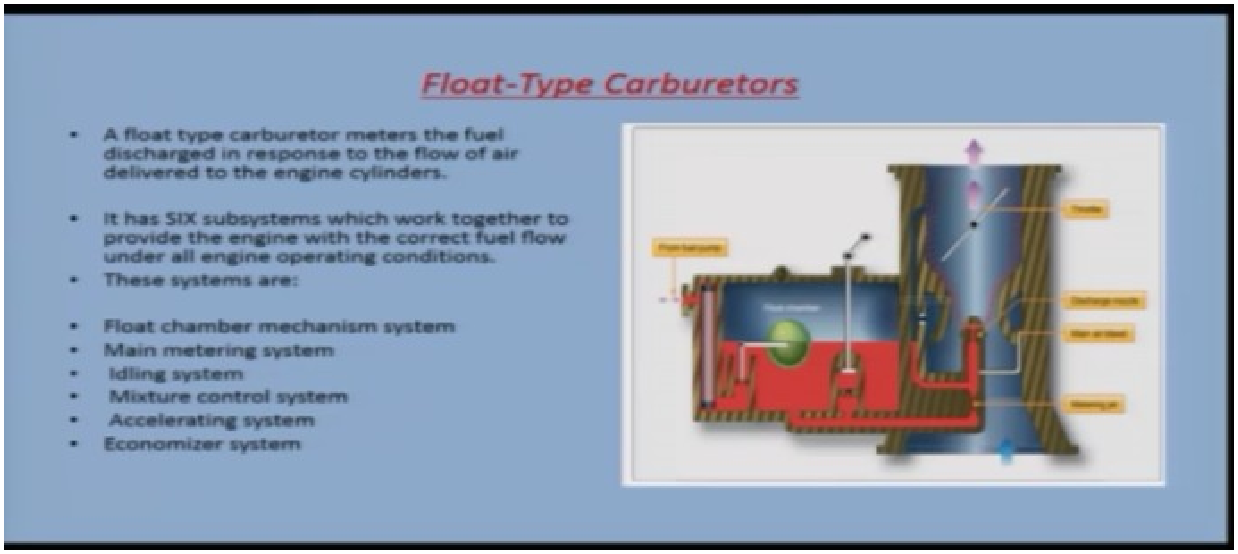

A float type carburetor meters the fuel discharged in response to the flow of air delivered to the engine cylinders, since this carburetor this is a fuel air metering unit, so in response to the air the carburetor has to meter the fuel and deliver it to the cylinders, it has six subsystems which work together to provide the engine with the correct fuel flow under all engine operating conditions.

Now in the figure you can see this is a diagram of a basic float type carburetor, this, this and this is the fuel inlet point, the fuel is coming inside the carburetor from the fuel pump, this chamber is the place, is the reservoir where your fuel is stored, this is termed as the float chamber and this thing is your float.

Now this is your air passage and here you can see there is a venturi, the air is flowing through this venturi, and this is your throttle valve which is beyond the venturi and the engine side, it is between the venturi and the engine side, so this carburetor, this float type carburetor it has various subsystems and all this subsystems they operate together to provide the correct fuel flow under all operating condition.

Different systems in this carburetor are this is your float chamber mechanism system, here you can see this is your main metering system it has got the metering jet, the mixture control system you have a mixture control here, we will see in our further slides, you have accelerating system and economizer system, so various systems float chamber mechanism, main metering, idling system, mixture control system, accelerating system and economizer system.

So let us see the first system float mechanism, in a carburetor fuel reservoir or float chamber is provided between the fuel supply from the pump and the main metering system,
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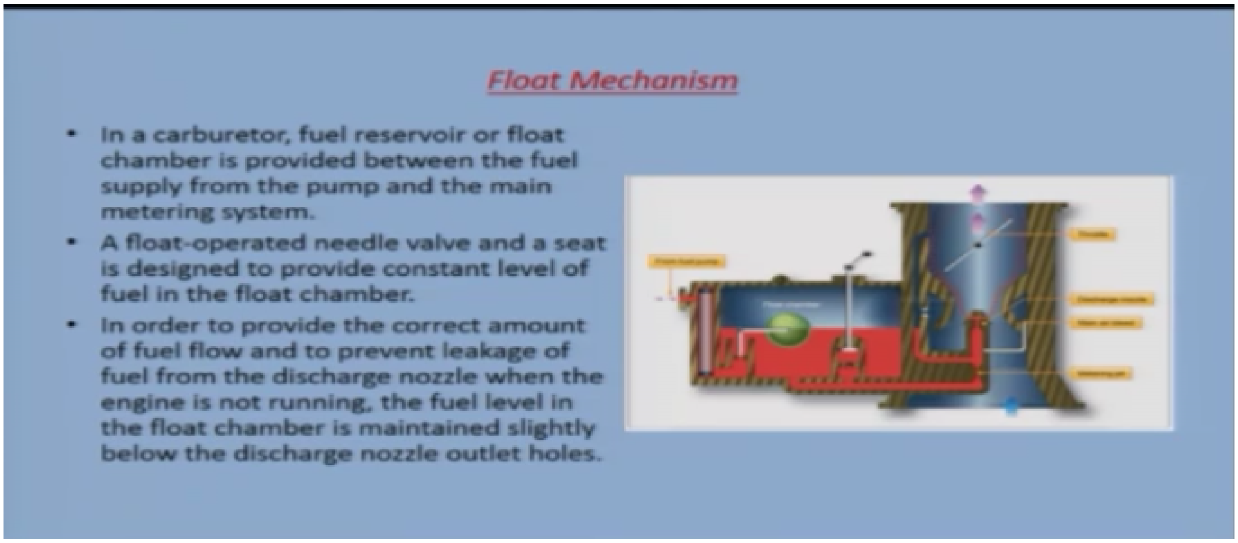

so this is your fuel supply from the pump and this is your main metering system, so this fuel reservoir or the fuel float chamber is between the supply from the pump and the main metering.

A float operated needle valve and a seat is designed to provide constant level of fuel in the float chamber, this is your needle valve here, this needle valve is attached to the float and this needle valve and seat this provides a constant level of fuel in the float chamber, in order to provide the correct amount of fuel flow and to prevent the leakage of fuel from the discharge nozzle when the engine is not running, the fuel level in the float chamber is maintained slightly below the discharge nozzle outlet holes.

Now here is your discharge nozzle, you have the outlet holes here, so the fuel level in the throat chamber is kept at a slightly below level as compared to this discharge nozzle to prevent leakage of fuel from the nozzle when the engine is not running, so the fuel level in this float chamber is slightly below the discharge nozzle.

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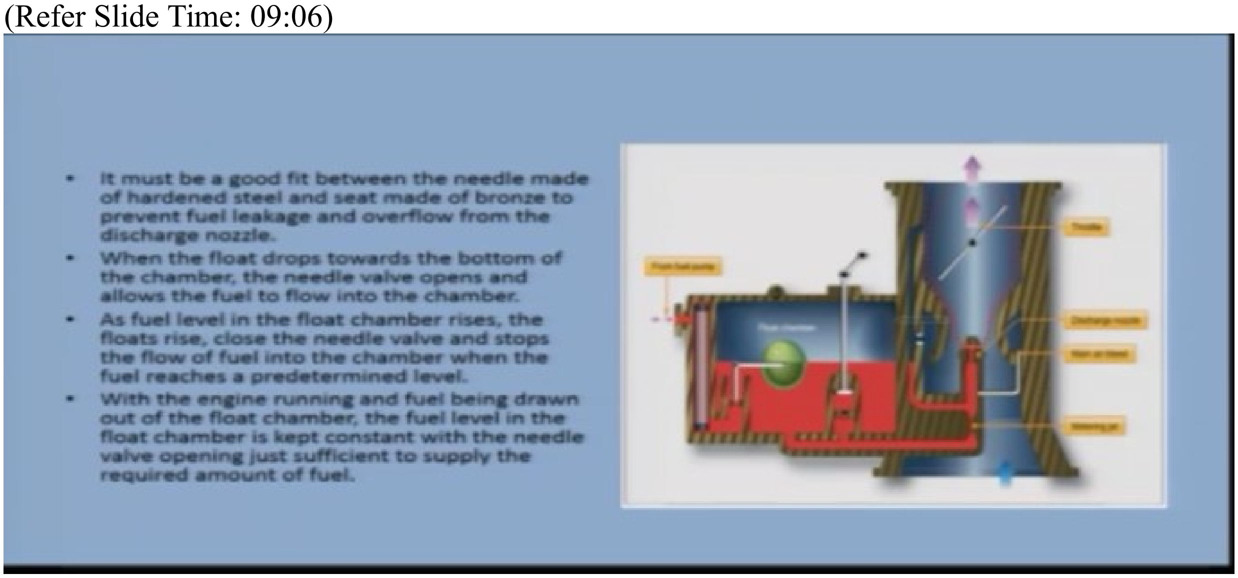

Now coming to the needle valve and the seat, this needle valve and the seat it must be a good fit, this needle is made of hardened steel and the seat is made of bronze to prevent fuel leakage and overflow from the discharge nozzle, when the float drops towards the bottom of the chamber, now when the float drops below towards the bottom of the chamber this needle valve goes up, it opens the passage and allows the fuel to flow into the chamber, so when the float goes down the needle goes up and the passage, the fuel passage is opened and the fuel is allowed to enter the chamber, the float chamber, as fuel level in the float chamber rises, as the fuel level in the float chamber rises the floats also rise it closes the needle valve, the needle valve as the float rise the needle valve will close and it will stop the fuel flow, it will stop the passage of fuel, it will obstruct the passage of fuel and the fuel will not enter the float chamber, when the fuel reaches a predetermined level.

So when the fuel has reached a predetermined level the needle valve, the float has come up, the needle valve has gone down it has closed a fuel passage and fuel has stopped coming in the chamber, with the engine running and fuel being drawn out of the float chamber, the fuel level in the float chamber is kept constant with the needle valve opening just sufficient to supply the required amount of fuel, so now when the engine is running there is a continuous supply of fuel from the float chamber to the discharge nozzle, so in that condition your float is at an intermediate position and it keeps the needle also at an intermediate position so that you have continuous supply of fuel to the chamber and the fuel can be continuously supplied to the discharge nozzle.

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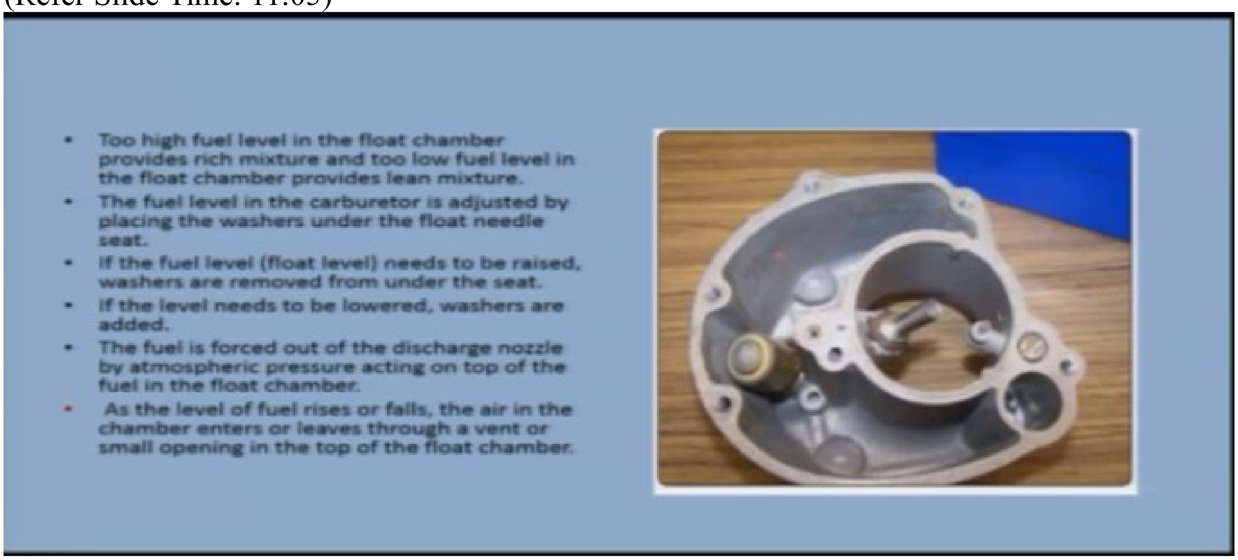

Here in the picture you can see this is a float chamber of 1 carburetor, this is your float chamber, too high fuel level in the float chamber provides rich mixture and too low fuel level in the float chamber provides lean mixture, so if the float chamber fuel level is too high you have rich mixture and if it is too less, then it is providing a lean mixture, the fuel level in the carburetor is adjusted by placing washers under the float needle seat, so the fuel level in the float chamber can also be adjusted by placing washers under the seat.

If the fuel level needs to be raised that is the if the float level needs to be raised then the washers are removed from under the seat and if the level needs to be lowered washers are added, the fuel is forced out of the discharge nozzle by atmospheric pressure acting on top of the fuel in the float chamber, so on top of the fuel in the float chamber you have atmospheric pressure acting, so this atmospheric pressure forces the fuel to the discharge nozzle, out of the discharge nozzle.

As the level of fuel rises or false the air in the chamber enters or leaves through a vent or small opening in the top of the float chamber, so as the fuel enters or leaves the chamber the air in the chamber it enters or leaves through a vent.

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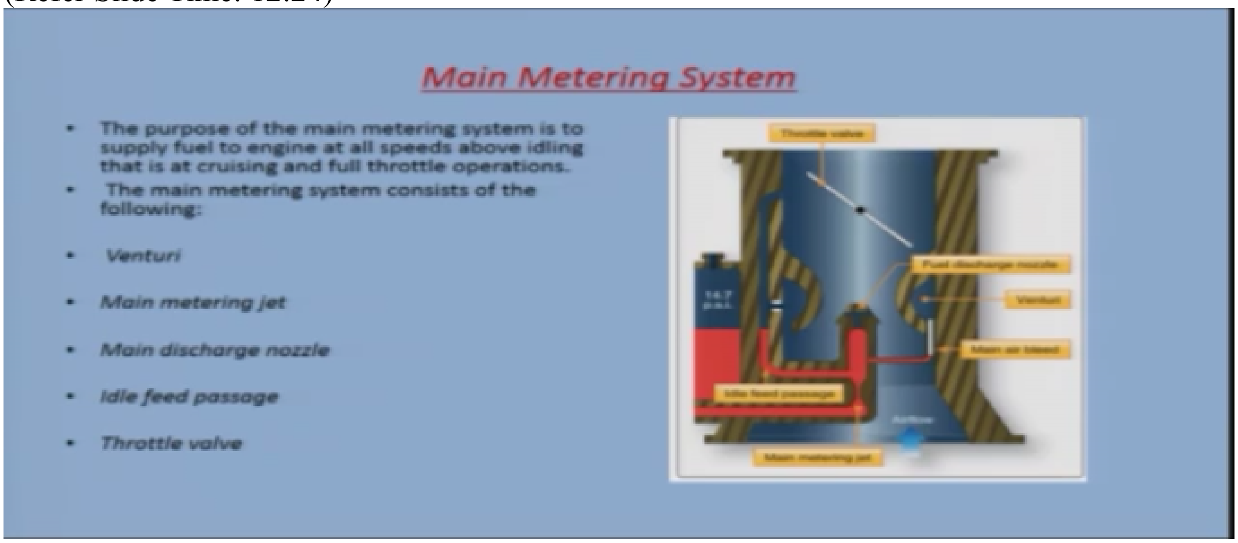

Coming to the next system it is the main metering system, the purpose of the main metering system is to supply fuel to engine at all speeds above idling that is the cruising and at full throttle operations, so main metering system it is a very important system its purpose is to provide supply of fuel to engine at all speeds above idling, so it is providing speed engine fuel supply at all speeds above idling that is at cruising and at full throttle operations.

The main metering system consist of the following, it has a venturi you can see in the diagram this is your venturi, here you can see this is your main metering jet, it has a main discharge nozzle here you can see this is your main discharge nozzle, it has the idle feed passage and a throttle valve, so you have seen different parts of the main metering system, the venturi performs the following functions, now venturi has got some functions,
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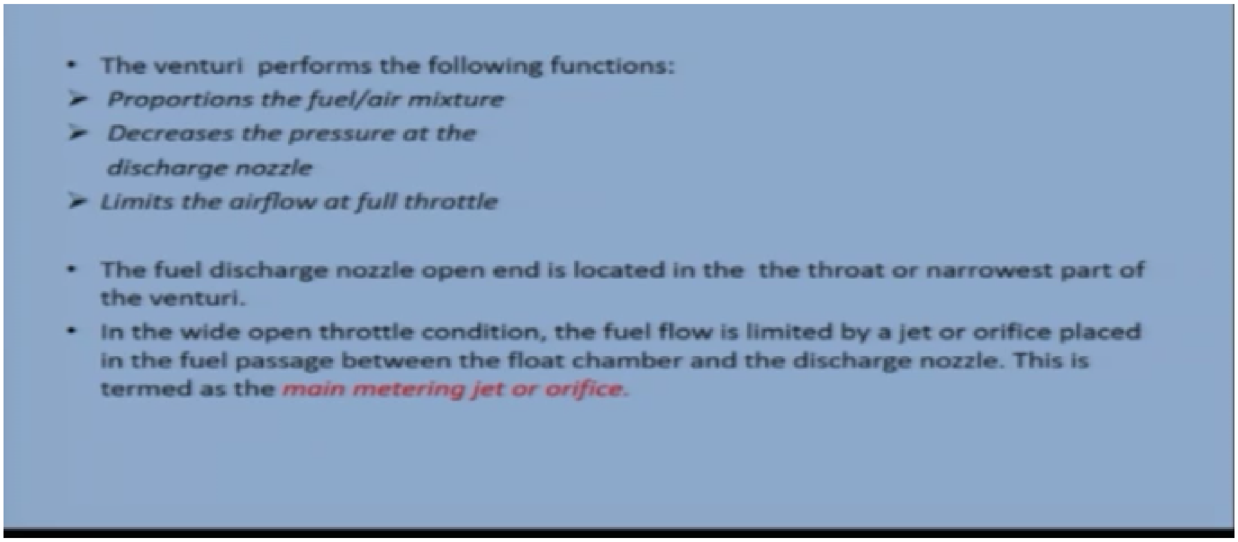

it proportions the fuel air mixture, it decreases the pressure at the discharge nozzle and limits the airflow at full throttle, so venturi is a very important part of the metering system it has the functions like it proportions the fuel air mixture, decreases the pressure at the discharge nozzle and is limiting the air flow at full throttle.

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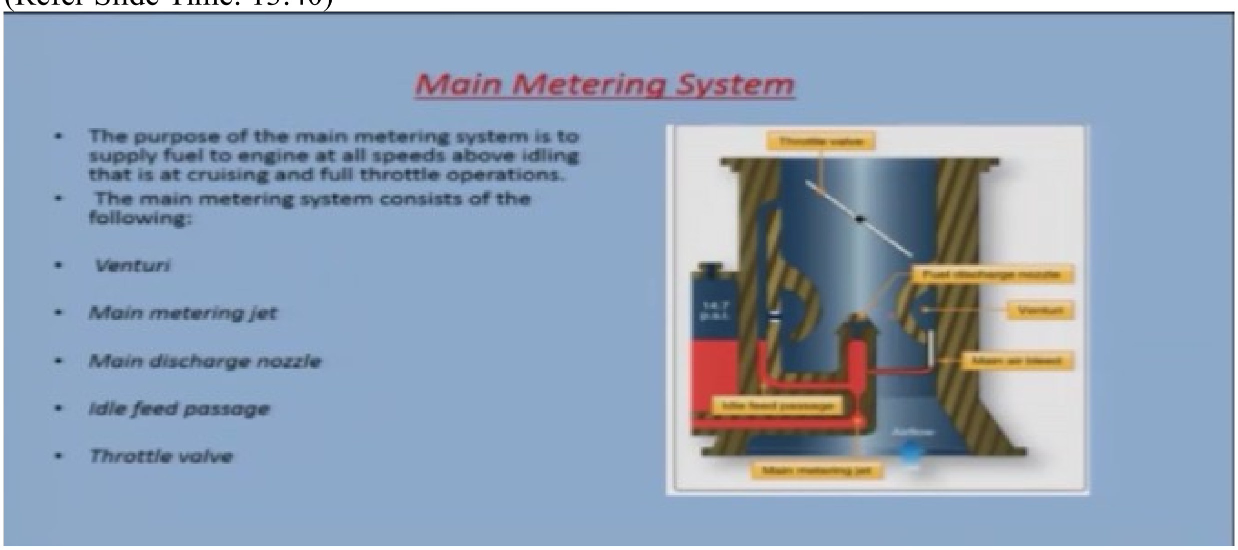

The fuel discharge nozzle open end is located in the throat or the narrowest part of the venturi, so now you see in the diagram your fuel discharge nozzle is in the throat of the venturi, it is here in the throat, so at this point the pressure is minimum, you have low pressure, in the wide open throttle condition,

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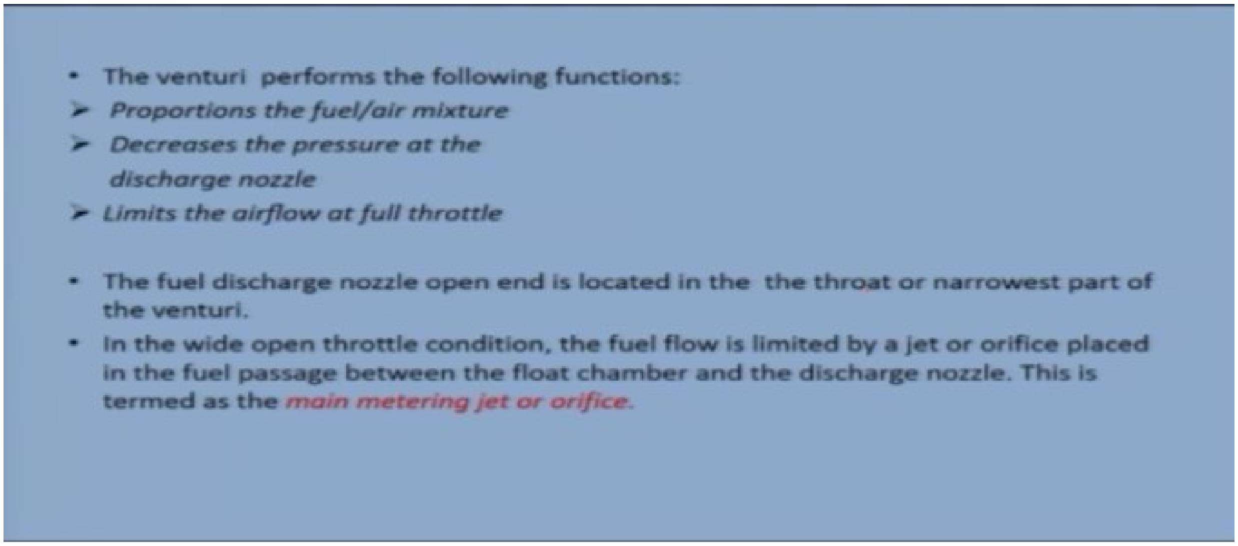

the fuel flow is limited by a jet or orifice placed in the fuel passage between the float chamber and the discharge nozzle, this is termed as the main metering jet or orifice, so in the diagram here you can see this is your main metering jet, this is between the discharge nozzle and the float chamber, and in wide throttle conditions this main metering jet, here it is the main metering jet, this main metering jet regulates the fuel flow to the discharge nozzle and that is why this is termed as the main metering jet.

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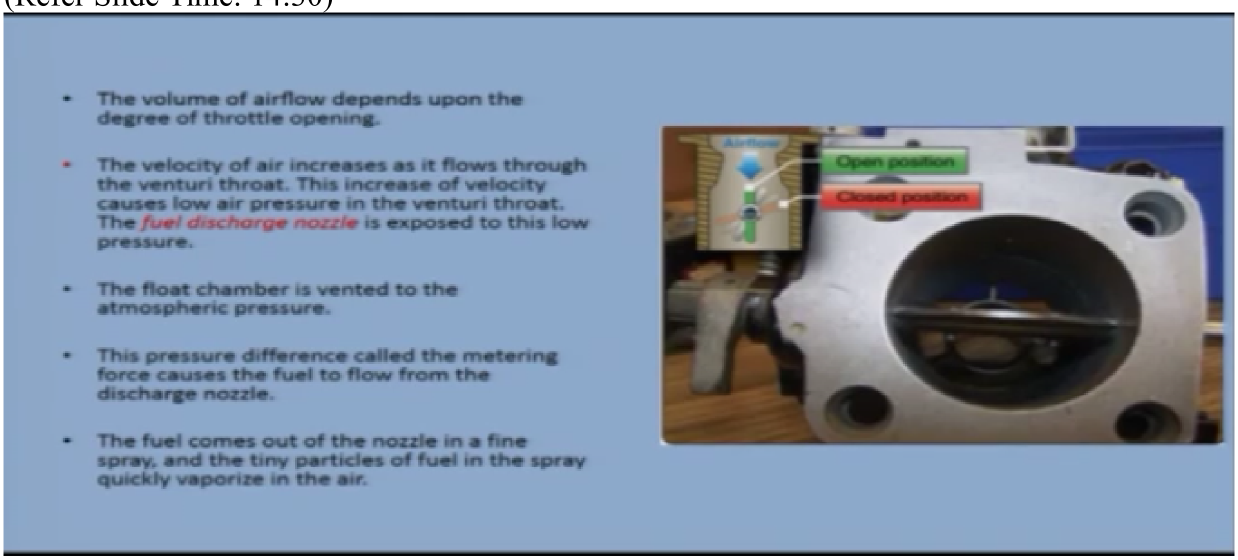

The volume of airflow depending upon the degree of throttle openings, so the air flowing through this carburetor it depends, the volume of the airflow depends on the degree of throttle opening.

The velocity of air increases as it flows to the venturi throat, this increase of velocity causes low air pressure in the venturi throat, the fuel discharge nozzle is exposed to this low pressure, so we have seen in the diagram that is air flowing through this passage, through the venturi there is low pressure here and there is the discharge nozzle is here in the throat and the discharge nozzle experiences low pressure.

The float chamber is vented to atmospheric pressure, this pressure difference that is since the float chamber is vented to atmospheric pressure and the discharge nozzle is in the low pressure that is a pressure differential, this pressure differential is called the metering force and it causes the fuel to flow from the discharge nozzle, so atmospheric pressure and there is a low pressure on the discharge nozzle, there is a pressure differential and this pressure differential is the metering force responsible for the fuel to flow from the discharge nozzle.

The fuel comes out of the nozzle in the fine spray and the tiny particles of fuel in the spray quickly vaporize in the air.
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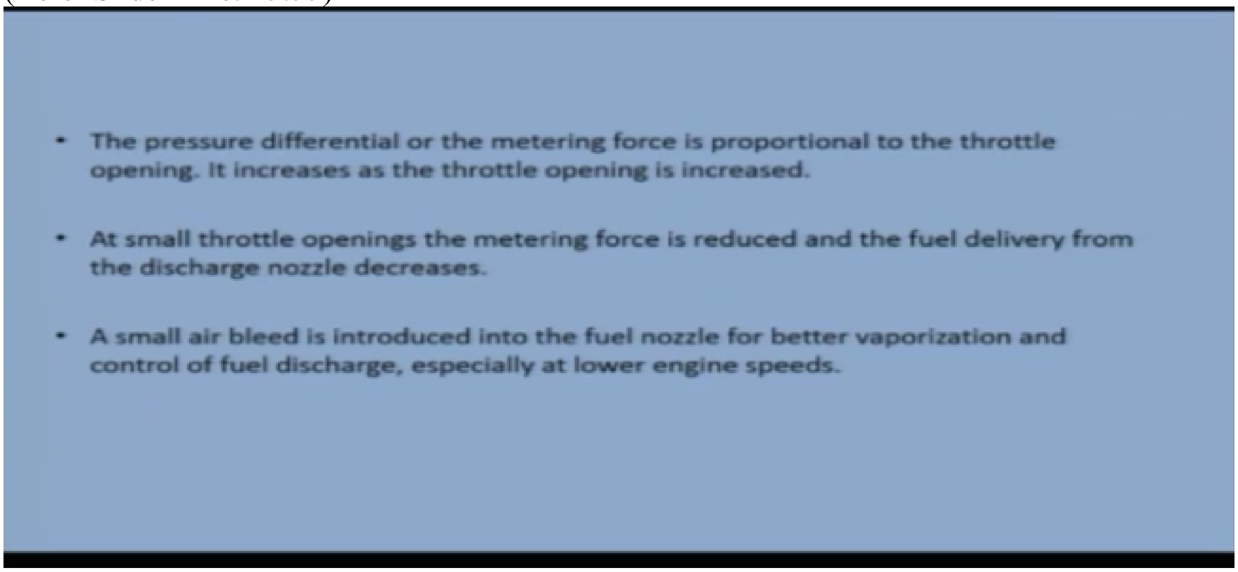

The pressure differential or the metering force is proportional to the throttle opening, so we know that the air flows through the carburetor depending on the throttle opening, so the volume of air which is flowing through the throttle is dependent on the throttle opening and the metering force, the pressure differential or the metering force is therefore dependent on the throttle opening. It increases as the throttle opening is increased.

At small throttle openings the metering force is reduced and the fuel delivery from the discharge nozzle decreases, now when there is a small throttle opening the flow of air will be less, there will be less differential force, there will be less metering force and the fuel delivery from the discharge nozzle will be less.

A small air bleed is introduced into the fuel nozzle for better vaporization and control of fuel discharge, especially at lower engine speeds, so for at low engine speeds if we want to have better vaporization from the fuel nozzle there is a small air bleed which is introduced into the fuel nozzle.

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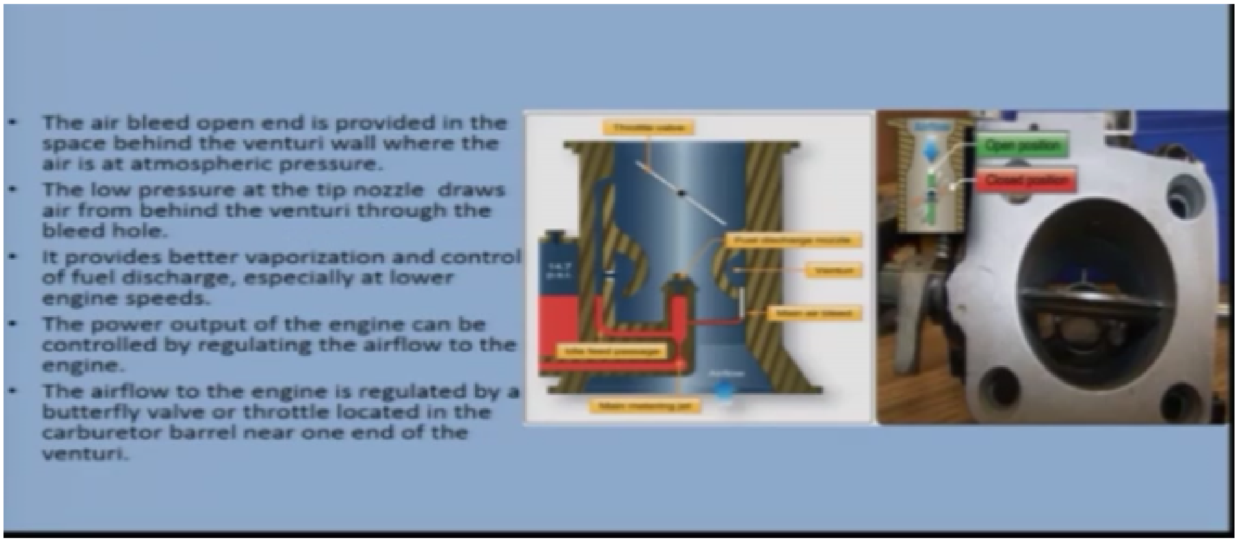

The air bleed open end is provided in the space behind the venturi, so here in the diagram if you see that this is your main discharge nozzle and this is your main air bleed, a air bleed passages provided and this is opened at a space behind the venturi where you have atmospheric pressure.

So the low pressure at the tip nozzle, this low pressure at the tip nozzle draws air from behind the venturi through the bleed hole, so the air is going through the bleed hole to the discharge nozzle.

It provides better vaporization and control of fuel discharge, especially at lower engine speeds, so because of this air bleed we have better vaporization and control of fuel discharge especially at low speeds.

The power output of the engine can be controlled by regulating the airflow to the engine, so the power output of the engine can be controlled by regulating the airflow to the engine.

The airflow to the engine is regulated by a butterfly valve or throttle located in the carburetor barrel near one end of the venturi, so we have seen about this throttle valve in our previous slide, so the airflow is regulated with the help of this throttle valve.

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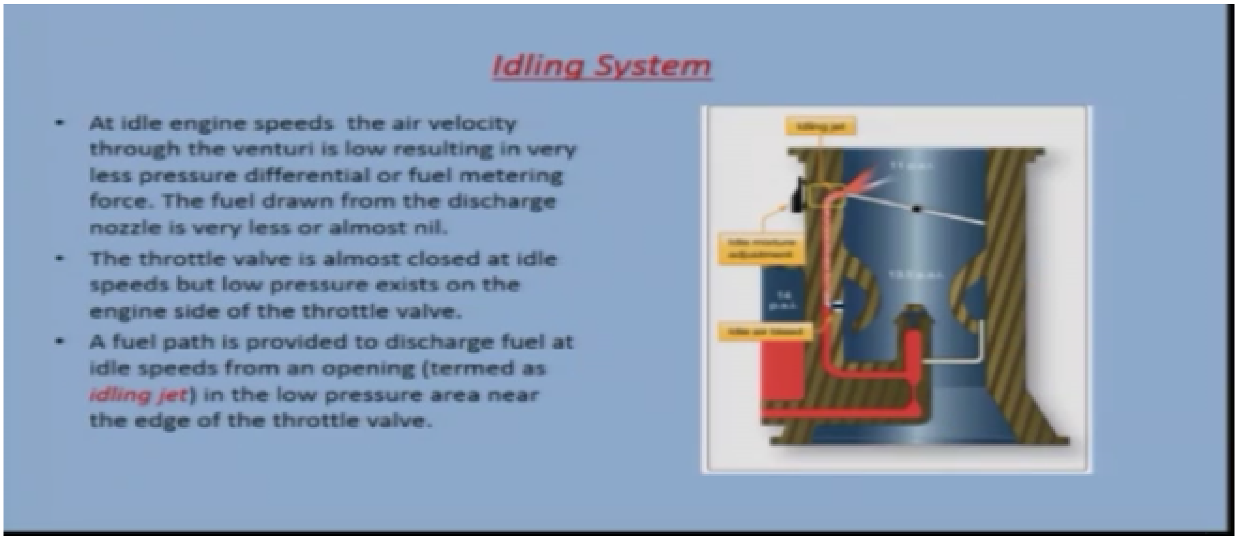

Coming to next system idling system, you can see here in the diagram, and idling at idle engine speeds the air velocity through the venturi is low resulting in very less pressure differential or fuel metering force, so we have just seen in our previous slide that at low speeds you have low volume of air going inside the carburetor, you have low pressure differential, you have low metering force and low fuel discharge, so the fuel drawn from the discharge nozzle is very less or almost nil.

The throttle valve is almost closed at idle speeds, but low pressure exists on the engine side of the throttle valve, so in the idle condition you can see here in the diagram the throttle valve is almost closed but on the engine side of the throttle there is a low pressure.

A fuel path is provided to discharge fuel at idle speeds from an opening termed as idle jet, here in the diagram if you can see here this is your idle path and here idling jet is provided and the fuel supply is coming out of this idling jet, so a fuel path is provided, so this is your fuel path which is provided to discharge fuel at idle speeds from an opening, which is termed as the idling jet in the low pressure area near the edge of the throttle valves, so near the edge of the throttle valve in the low pressure area the fuel is supplied from this path through the idling jet.

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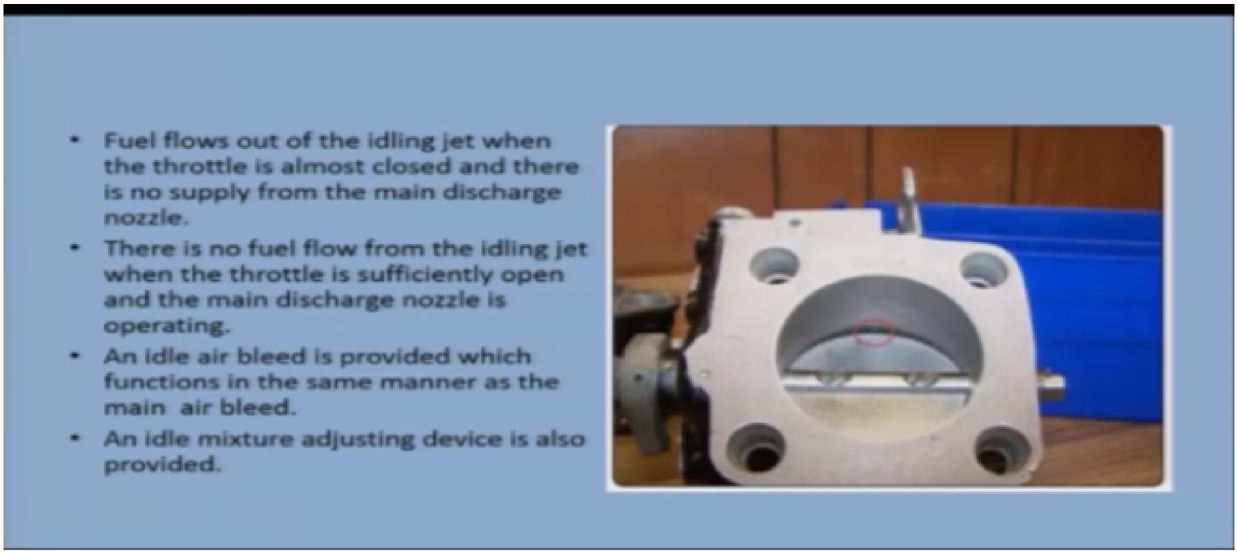

Fuel flows out of the idling jet when the throttle is almost closed, so here you can see in the diagram this throttle, this is almost closed and here there is one hole it has been circled here, there is a hole through which your fuel is discharged during the idling speeds, so fuel flows out of the idling jet when the throttle is almost closed and there is no supply from the main discharge nozzle, so during idling there is no supply from the main discharge nozzle, fuel is being supplied from the idling jet on the engine side of the throttle.

There is no fuel flow from the idling jet when the throttle is sufficiently open and the main discharge nozzle is operating, and when we have a normal operation we have higher throttle settings then there is no fuel supply from the idling jet and we have fuel supply from the main discharge nozzle.

An idle air bleed is provided which functions in the same manner as the main air bleed, so an idle air bleed is also provided here you can see this is your path for the idle fuel, you have the idle jet and an idle air bleed is also provided and it functions in the same manner as the main air bleed.

An idle mixture adjusting device is also provided, so for idling speeds you have fuel supply coming from the idling jet, you have an idle mixture adjustment also and you have an idle air bleed also provided which functions in the same manner as an air bleed.

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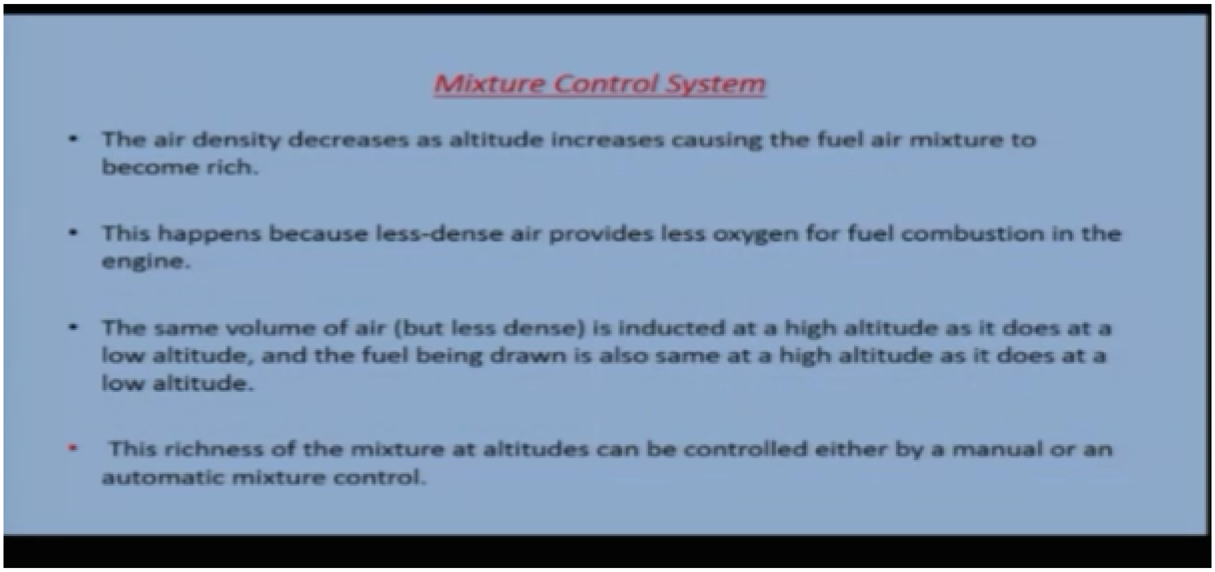

Coming to the mixture control system, another system the air density decreases as altitude increases causing the fuel air mixture to become rich, we have seen it our previous slide the fuel air mixture becomes rich as we go up at higher altitudes.

This happens because less dense air provides less oxygen for fuel combustion in the engine, the same volume of air, that is less dense air is being inducted at high altitudes, as it does at a low altitude, now the volume of air being inducted is the same but at high altitude it is less dense, and the fuel is also which is coming inside, the fuel which is being drawn is also the same at high altitudes and it low altitudes, so with less dense air at high altitudes your fuel air mixture becomes rich, so this richness of the mixture at altitudes can be controlled either by a manual or an automatic mixture control, so this is the reason why we need a mixture control, so it can be a manual mixture control or it can be an automatic mixture control.

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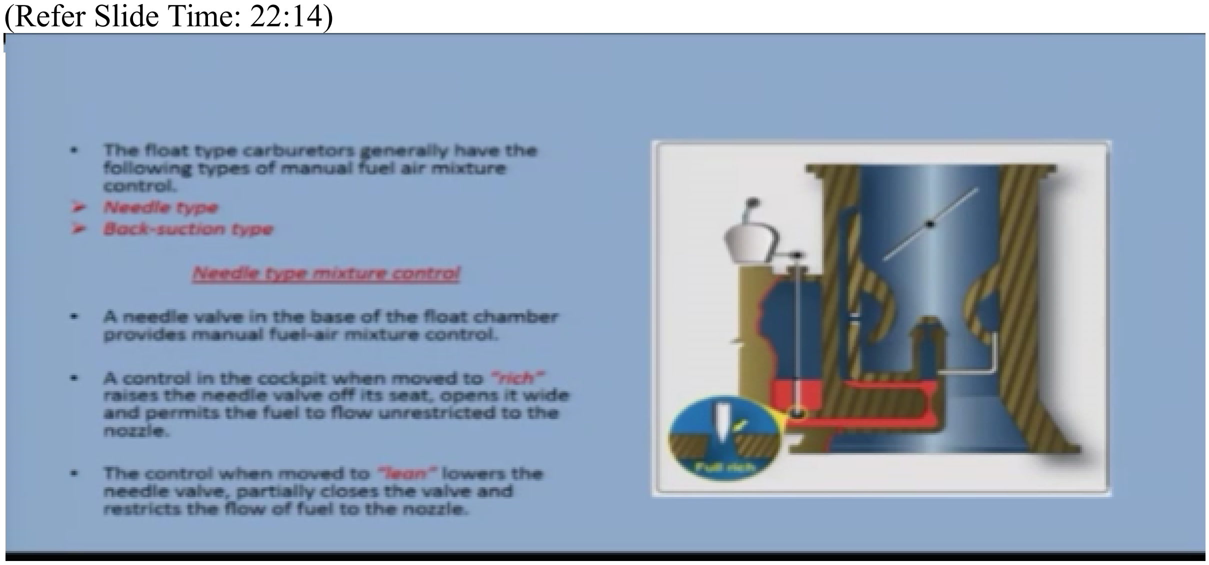

Now the float type carburetors, they are the basic type carburetors they generally have the following types of manual fuel air mixture control, a needle type and a back suction type, so there are mainly two types of mixture controls being used in basic float type carburetors are needle type and a back suction type, so here in the diagram this is the needle type mixture control, a needle valve in the base of the float chamber provides manual fuel-air mixture control, so here in the base you can see there is a mixture control this is a needle type, this provides manual fuel-air mixture control.

A control in the cockpit when moved to rich, that is the control in the cockpit when it is moved to rich it will raise the needle valve off its seat, so this needle valve goes up, it is off it seat it opens it wide, there is a wide opening, it opens the passage and permits fuel to flow unrestricted to the nozzle, so the fuel is allowed to flow unrestricted to the nozzle through this opening.

The control when moved to lean, now when the control is moved to lean it will lower the needle valve, the needle valve will be lowered, it will partially close the valve and the fuel flow to the nozzle will be restricted, so this is a needle type mixture control a very simply type mixture control needle type where the needle is either restricting the air flow, restricting the fuel passage or opening the fuel passage to the discharge nozzle.

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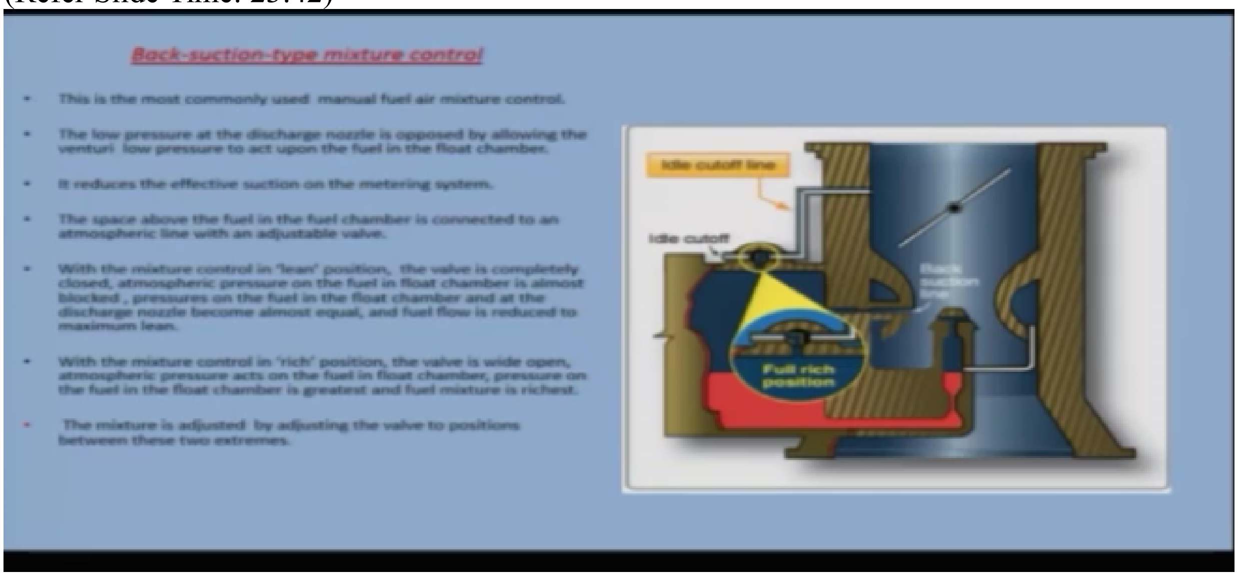

Next mixture control is the back suction type mixture control, this is the most commonly used manual fuel air mixture control, the low pressure at the discharge nozzle is opposed by allowing the venturi low pressure to act upon the fuel in the float chamber, so there is a low pressure at the discharge nozzle, you can see this discharge nozzle is experiencing low pressure in the venturi throat, now in this type of mixture control, back suction type mixture control this low pressure is allowed to act upon the fuel level in the float chamber, this will reduce the effective suction on the metering system.

Now since this low pressure is also acting on the fuel level in the float chamber it reduces the effective suction. The space above the fuel in the fuel chamber is connected to an atmospheric line with an adjustable valve, so this space above the fuel in the float chamber it is connected to an atmospheric line within adjustable valve.

With the mixture control in lean position, when the mixture control is in the lean position the valve is completely closed, this valve is completely closed, this valve is completely closed atmospheric pressure on the fuel in the float chamber is almost blocked, pressure on the fuel in the float chamber and at the discharge nozzle becomes almost equal and the fuel flow is reduced to maximum lean, so in the lean condition this valve, this almost closes the passage of the atmospheric pressure and the pressure in the float chamber and the discharge nozzle is almost equal and the fuel flow is reduced to maximum lean.

With the mixture control in rich position the valve is wide opened, and the atmospheric pressure acts on the fuel in the float chamber, the pressure on the fuel in the float chamber is greatest and full mixture is richest, so in the rich condition you have the atmospheric pressure acting on the fuel in the float chamber you have higher pressure and you have more fuel being supplied to the nozzle, so fuel mixture is richest.

The mixture is adjusted by adjusting the valve to positions between these two extremes, so the mixture can be adjusted by moving the mixture control between these two extremes of lean and rich.

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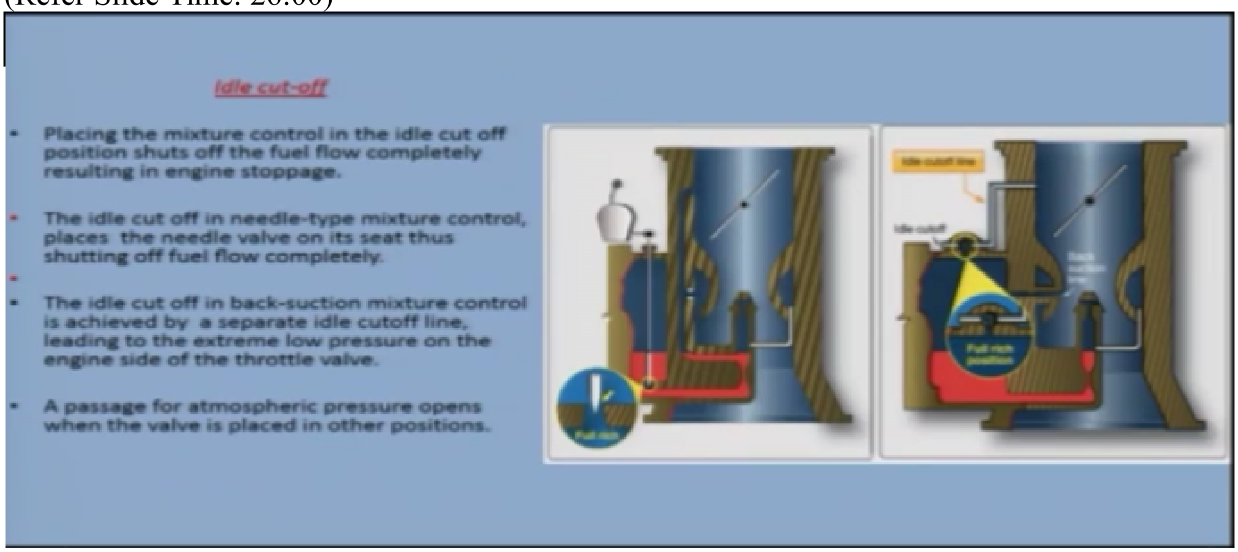

Now what is idle cut-off? Placing the mixture control in the idle cut off position shuts of the fuel flow completely resulting in engine stoppage, so when we have to stop the engine the fuel mixture control, fuel air mixture control is moved to the idle cut off position, in that position the fuel supply is shut off and the engine comes to a stop.

The idle cut off in the needle type mixture control here on the left side this is your needle type mixture control it places the needle valve on its seat, so in the idle cut off position this needle valve will be completely at it seat thus shutting off the fuel flow completely.

The idle cut off in back-suction type mixture control is achieved by a spate idle cutoff line, so in the back suction type mixture control you have a separate idle cutoff line leading to the extreme low pressure on the engine side of the throttle valve, so this line is tapping the pressure, the low pressure on the engine side of the throttle valve.

A passage for atmospheric pressure opens when the valve is placed in other positions, so this valve that is an adjustable valve in the back suction type mixture control when this valve, when the mixture control is moved to the idle cutoff condition this valve is linked to the low pressure on the engine side of the throttle and you have low pressure and the fuel supply is stopped to the discharge nozzle.

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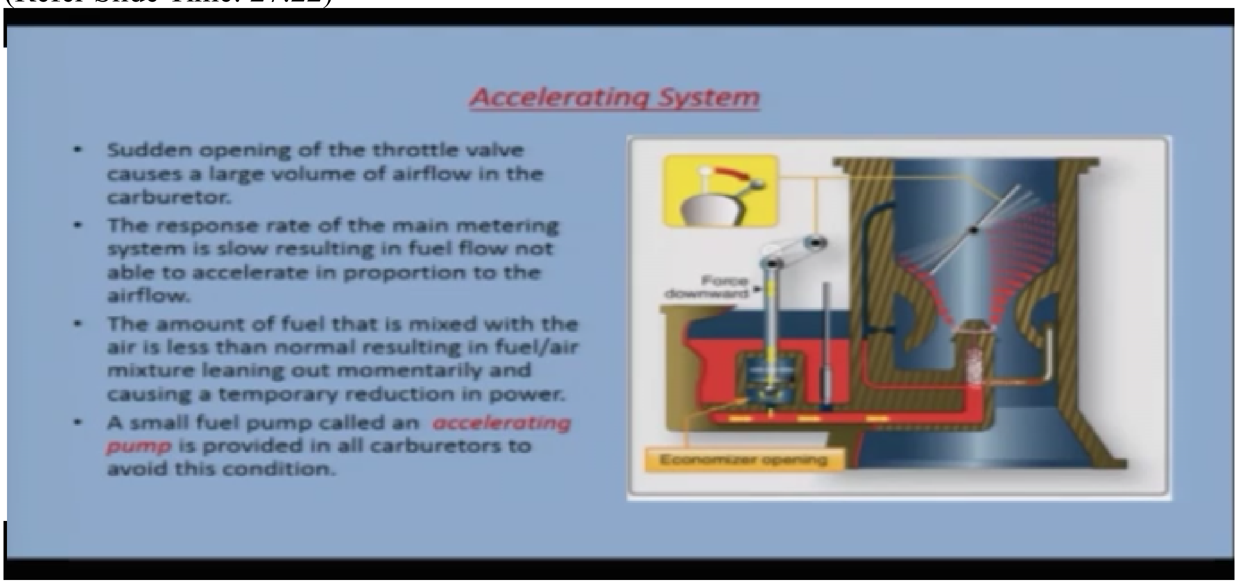

Coming to another system accelerating system, now when your throttle valve is opened suddenly, it causes a large volume of airflow in the carburetor, the response rate of the main metering system is slow resulting in fuel flow not able to accelerate in proportion to the airflow, now when there is a sudden throttle opening, large volume of air will flow in the carburetor, the main metering system will not respond immediately, it will not respond as per the throttle opening, so there will be a short lag in fuel supply.

The amount of fuel that is mixed with the air is less than normal resulting in fuel air mixture leaning out momentarily and causing a temporary reduction in power, so because of this lag there will be a temporary reduction in power, so to avoid this function, this problem, a small fuel pump which is called an accelerating pump is provided in all carburetors.

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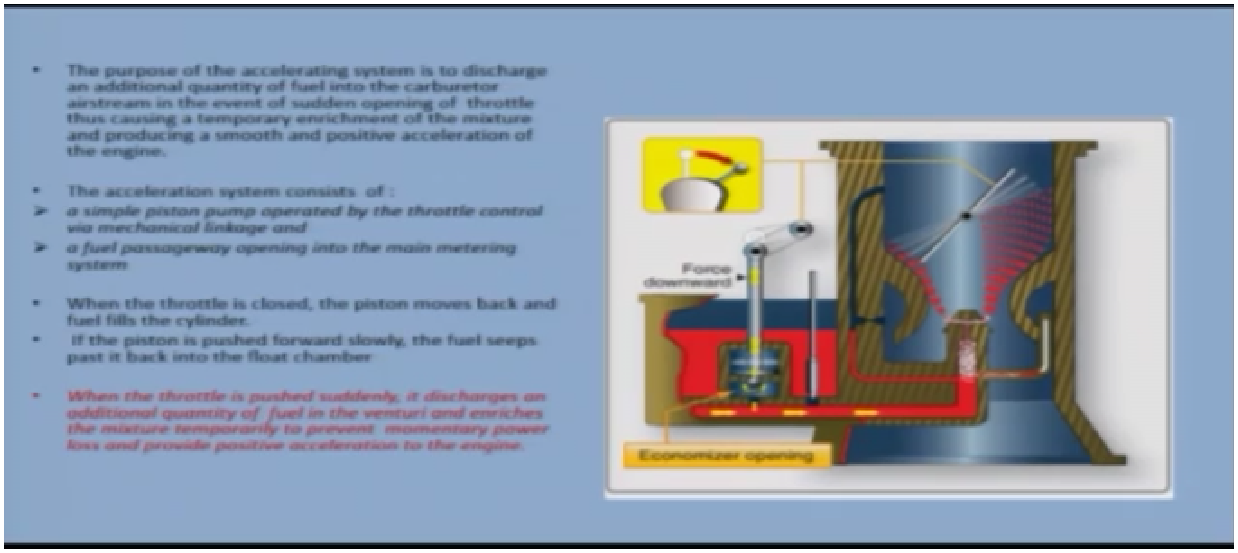

The purpose of the accelerating system is to discharge an additional quantity of fuel into the carburetor airstream in the event of sudden opening of throttle thus causing a temporary enrichment of the mixture and producing a smooth and positive acceleration of the engine, so the purpose of the accelerating system is to discharge that additional quantity of fuel in case your throttle is opened suddenly, and provide a temporary enrichment of the mixture, so that smooth and positive acceleration of the engine is achieved.

The acceleration system consists of a simple piston pump operated by the throttle control, here in the figure you can see this is a simple piston pump which is operated by the throttle control,, a fuel passage way opening into the main metering system, this is the fuel passage way which is opening into the main metering system.

When the throttle is closed the piston moves back and fuel fills the cylinder, so when the throttle is closed the piston moves back and your fuel is filled inside this cylinder.

If the piston is pushed slowly the fuel will seep out of this chamber and will flow into the float chamber, so in case if the throttle is pushed suddenly it will push and extra quantity of fuel, additional quantity of fuel in the venturi, and will enrich the mixture temporarily to prevent momentary power loss and provide positive acceleration to the engine, so this is the function of the acceleration system it provides additional quantity of fuel, it enriches the mixture temporarily so that a positive acceleration of the engine is achieved.

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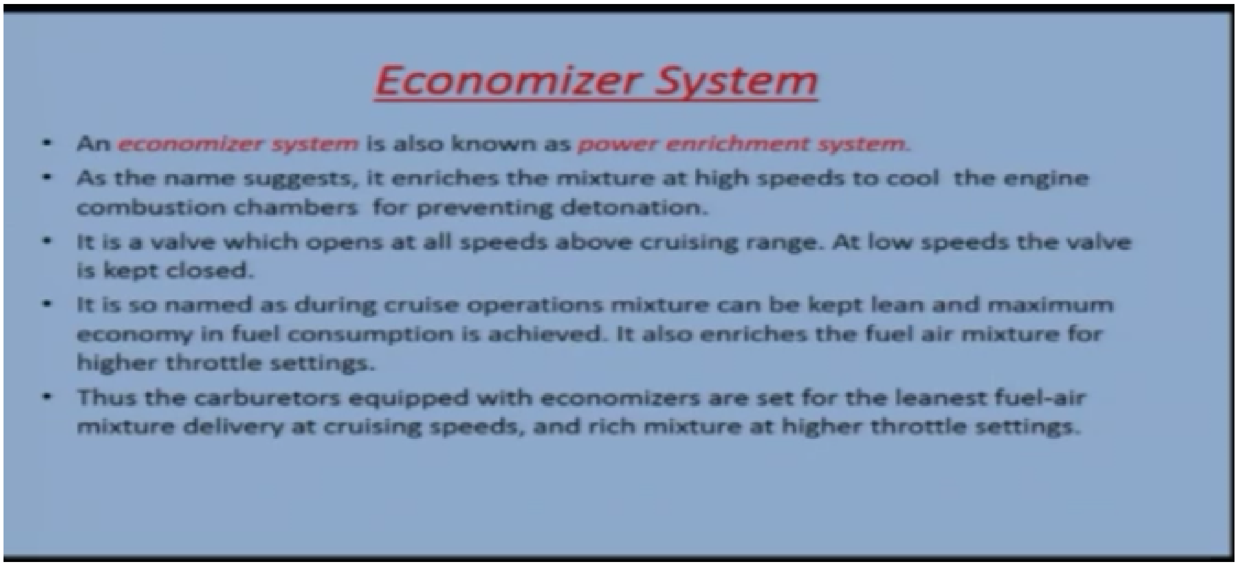

Coming to the next system it is the economizer system, now an economizer system is also known as power enrichment system, as the name suggests it enriches the mixture at high speeds to cool the engine combustion chambers for preventing detonation, so this economizer system is also known as the power enrichment system it will enrich the mixture at high speed and the basic purpose is to cool the engine combustion chambers and prevent detonation.

It is a valve which opens at all speeds above cruising range, so this is opening at all speeds above cruise range at low speeds the valve is kept closed, it is so named as during cruise operations mixture can be kept lean and maximum economy in the fuel consumption is achieved, it is named as an economizer system because during cruise operations this can be, mixtures can be kept lean and maximum economy in fuel consumption can be achieved, it will enrich the fuel air mixture for higher throttle settings, so for high throttle operations we will get a rich fuel air mixture and for lower throttle settings we can keep the mixture lean and achieve maximum fuel economy.

Thus the carburetors equipped with economizers are set for the leanest fuel-air mixture delivery at cruising speeds and rich mixture at higher throttle settings.

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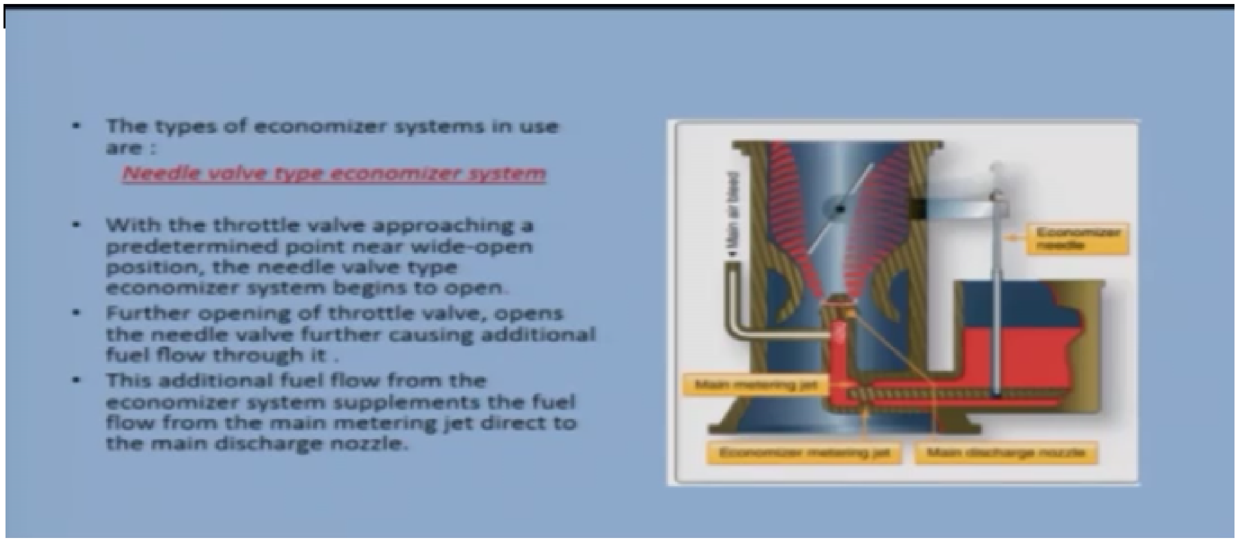

The types of economizer systems in use are, the needle type economizer system here in the diagram you can see a needle type economizer system with the throttle valve approaching a predetermined point near wide open position, the needle valve type economizer system begins to open, we've seen in our previous slide that this economizer operates at higher throttle settings so at a predetermined throttle setting, the needle valve type economizer system begins to open, you can see in the diagram this is your needle valve and this is our needle valve type economizer system.

This further opening of the throttle valve opens the needle valve further causing additional fuel flow through it, so further opening of the throttle valve will open this needle valve and the fuel will flow through it.

This additional fuel flow from the economizer system supplements the fuel flow from the main metering jet direct to the main discharge nozzle, now this fuel passage is supplementing the fuel to the main metering passage and will enrich in the mixture, so thus additional fuel flow from the economizer system will supplement the fuel flow from the main metering jet direct to the nozzle, the main discharge nozzle.

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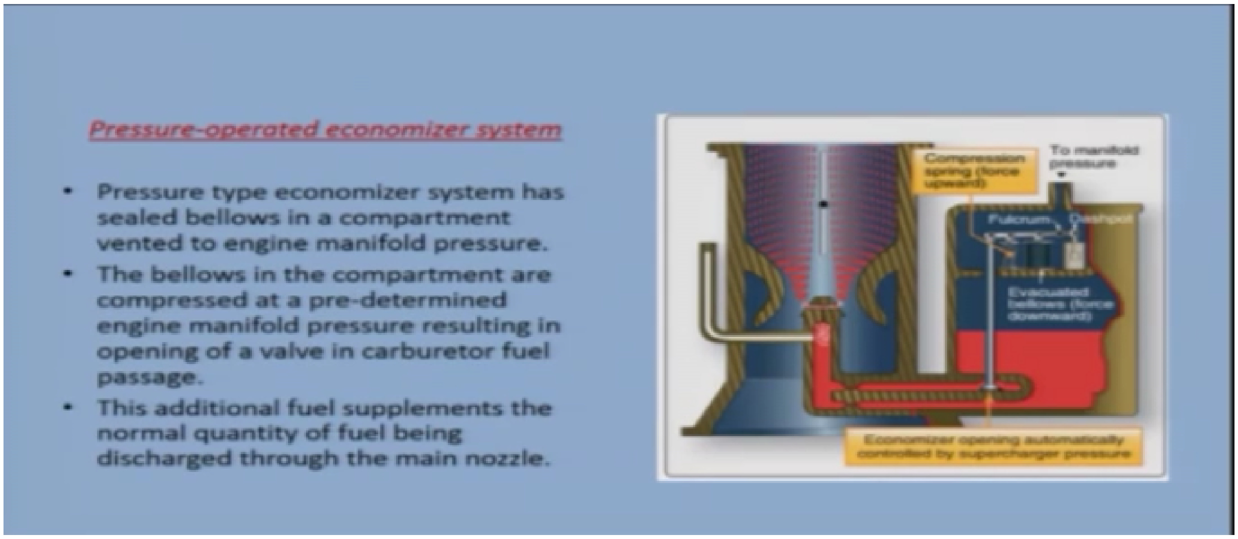

Another type economizer system is the pressure operated economizer system, the pressure type economizer system has sealed bellows in a compartment vented to engine manifold pressure, so here you can see in the diagram this is a compartment which has got a sealed bellows and this seal, and this compartment is vented to the engine manifold pressure.

The bellows in the compartment are compressed, these bellows in the compartment they are compressed at a pre-determined engine manifold pressure resulting in opening of a valve in the carburetor fuel passage, so at a pre-determined manifold pressure these bellows are compressed and this valve gets opened.

The additional fuel supplements the normal quantity of fuel being discharge through the main discharge nozzle, so this is a simple type of economizer system, pressure economizer system your manifold pressure is acting on the bellows, the bellows get compressed and this valve gets opened and you have fuel supplement going to the discharged nozzle.

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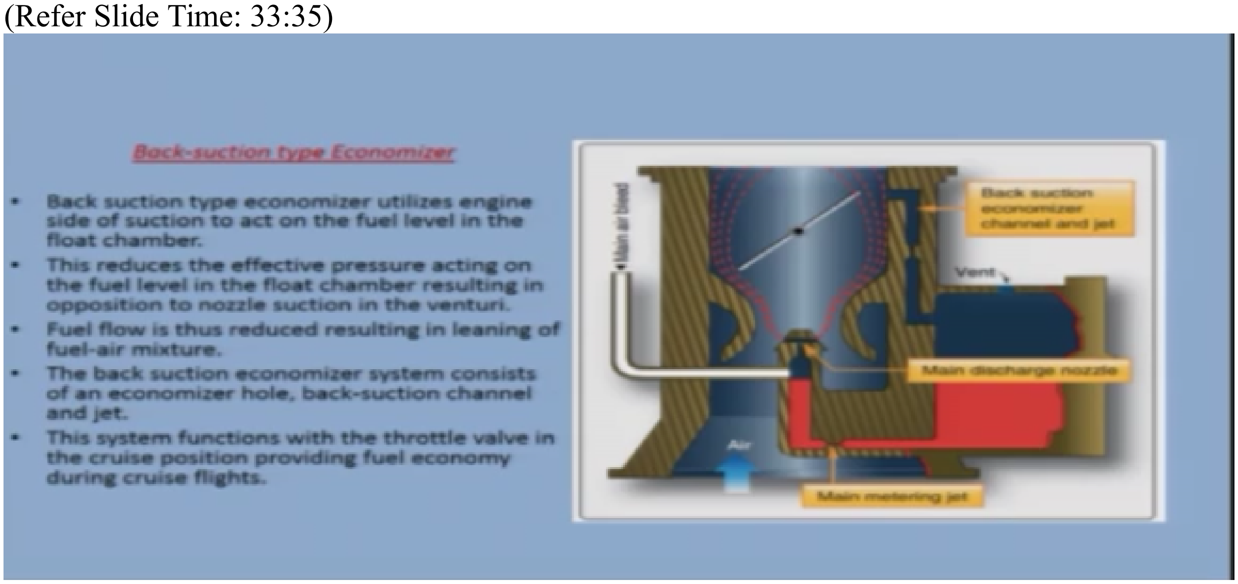

Next is the back suction type economizer, back suction type economizer utilizes engine side of suction to act on the fuel level in the float chamber, so this type of economizer is using the engine side of suction to act on the fuel level in the float chamber, this reduced the effective pressure action on the fuel level in the float chamber resulting in opposition to the nozzles suction in the venturi, so the effective pressure acting on the fuel level in the float chamber is reduced and it results in opposition to nozzle suction in the venturi.

Fuel flow is thus reduced resulting in leaning of fuel-air mixture, the back suction type economizer system consists of an economizer hole, there is an economizer hole back-suction channel and jet, so here you can see in the diagram you have a back suction economizer channel and jet.

This system functions with the throttle valve in the cruise position providing fuel economy during cruising flights.

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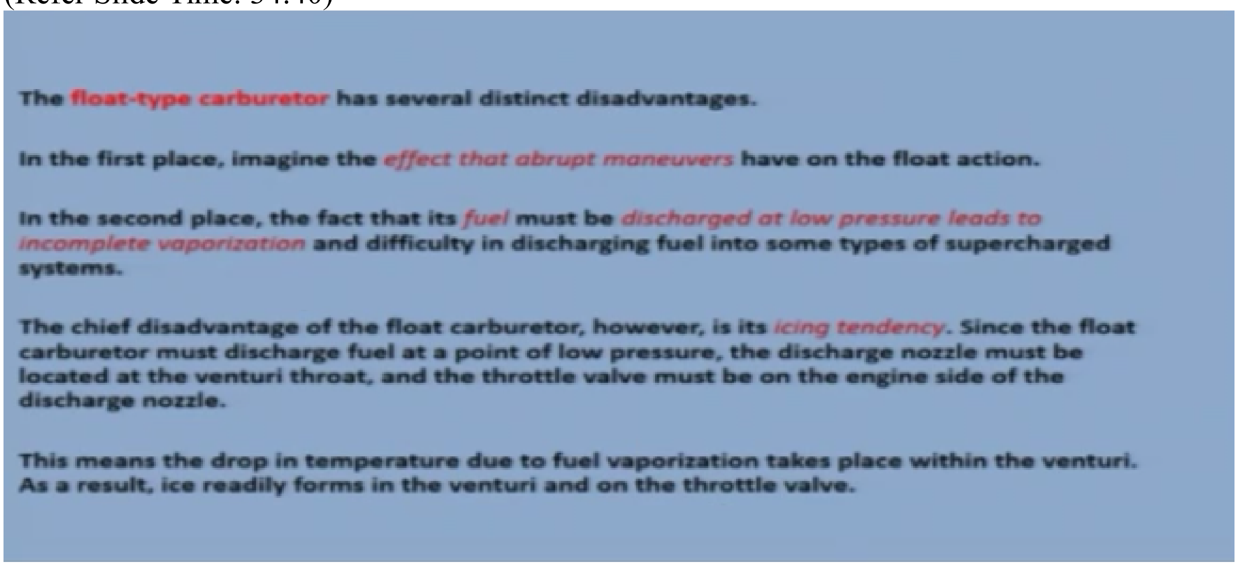

Now we have seen about the float type carburetor, the float type carburetor it is a basically a simple carburetor, but there are various disadvantages also in this carburetor, the first is there are effects on the float, because of the abrupt maneuvers, the floats get affected.

Secondly the fuel is being discharged at low pressure, since the main discharge nozzle is in the low pressure of the venturi, in the low pressure side in the venturi, so this leads to incomplete vaporization, so incomplete vaporization is one disadvantage, effect of abrupt maneuvers on floats is one disadvantage, and one of the main disadvantage is the ice formation, the icing tendency in the carburetor, so this float type carburetor has these disadvantages and the float type carburetor is now replaced by pressure carburetors, by fuel injectors, so in our next class we are going to see how the fuel injector functions. Thank you.

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