

Lecture - 21

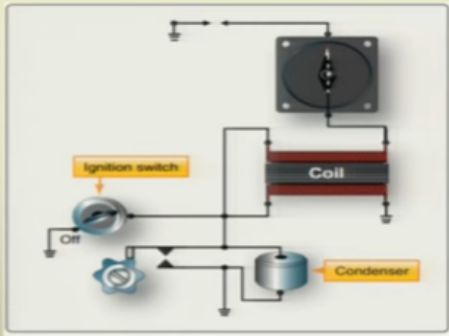
Ignition system condt...

With the ignition in the on position switch open. The opening of the breaker contact points interrupts primary current flow, resulting in rapid collapse of the primary coil field. Now, when your ignition

switch in on, in the on position, in that case your breaker contact points open, they will interrupt the primary current flow and resulting in rapid collapse of the primary coil field. When the ignition switch is, in the on position, the switch has no effect on the primary circuit. So when ignition switch is on, in that case, it as no control, no effect over the primary circuit. In case of off position as we have seen,

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- With the ignition switch in the OFF(closed) position, the primary current still has a path to ground. Thus the primary current is not interrupted even when the breaker points open.
- Since there is no interruption of the primary current when the contact points open, there is no sudden collapse of the primary coil flux and no high voltage is induced in the secondary coil to fire the spark plug in the cylinders.



in a previous slide, this will provide path to ground to provide the primary current path to ground. And primary current is not interrupted, even when the breaker points open.

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- The most commonly used switch on a reciprocating engine employing two magnetos has *four* positions:
 - OFF, LEFT, RIGHT, and BOTH.
 - *Switch in the OFF position*
Both magnetos are grounded and thus are inoperative.
 - *Switch in the LEFT position*
Only the left magneto operates
 - *Switch in the RIGHT position*
Only the right magneto operates
 - *Switch In the BOTH position*
Both magnetos operate
- The dual ignition systems are checked by placing the ignition switch in RIGHT and LEFT positions which allows the magnetos to be turned off one at a time.



You can see in the finger, this is the common type of the switch, which used in reciprocating engines. So, it has four positions, Off, Left, Right and Both. Switch in the OFF position, in case the switch is in the off position, you have both magnetos are grounded and thus are in operative .So, in OFF position you are both magnetos are grounded and they are in operative. In case switch in the left position, only the left magneto operates, switch in the right position, only the right magneto operates and switch in the both position, both magnetos will operate. The duel ignition systems are checked, by placing the ignition switch in right and left positions, which allows the magnetos to be turned off one at a time .So we will see in are further lectures, how we check the ignition systems, in case of duel ignition systems, they are checked by placing the ignition switch in right and left positions, which allows the magnetos to be turned off one at a time.

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Precaution

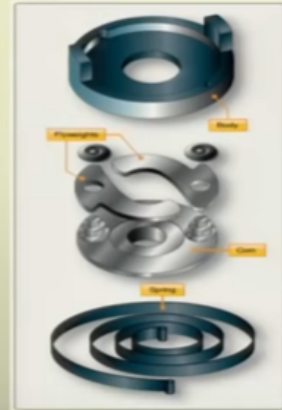
- While working with the magneto system the important point to be always keep in mind is :
- The magneto will be "hot" when the P-lead is disconnected or when there is a break in the circuit leading to the ignition switch.
- If the switch circuit is being repaired, it is important that the primary terminal of the magneto be connected to ground or that the spark plug leads be disconnected.

Now, sudden precautions are to be obsessed by working on the ignition systems. While working with the magneto system, the important point to be always kept in mind is; the magneto will be 'Hot' when the p-lead is disconnected or when there is a break in the circuit, leading to the ignition switch. So, magneto will be 'Hot' when the p-lead is disconnected or when there is a break in the circuit, leading to the ignition switch. If the switch circuit is being repaired, it is important that the primary terminal of the magneto be disconnected, be connected to ground or that, the spark plug leads be disconnected. So very important that in case if the switch circuit is being repaired, that case the spark plug leads should leads be disconnected.

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Impulse Coupling

- Initially when the engine is started, the engine turns over too slowly to permit the magneto to operate.
- The purpose of the impulse coupling is to give magneto a momentary high rotational speed and to provide a retarded spark for starting the engine.
- The impulse coupling is installed on the drive shaft of a magneto and comprises of the following:
 - shell
 - spring
 - Hub or cam (along with fly weights)
- The impulse coupling is a spring loaded mechanical linkage between the magneto shaft and the engine.
- It provides the high voltage necessary for ignition by 'winding up' and 'letting go' at the right instant for spinning the magneto shaft.

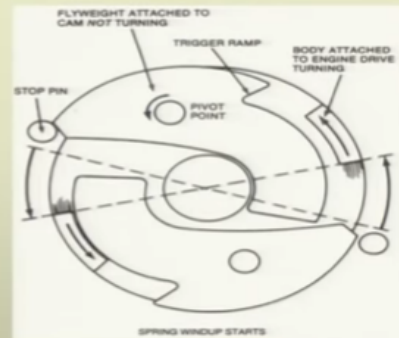


Now, another important unit, in the ignition systems is impulse coupling. Initially when the engine is started, the engine turns over too slowly, to permit the magneto to operate. So now, initially you're your engine is crank. The cranking speed is too slow, to permit the magneto to operate. The purpose of the impulse coupling is to magneto, is to give magneto, a momentary high rotational speed and to provide, a retarded spark for starting the engine. So the basic purpose of the impulse coupling is provide magneto, a very high momentary rotational speed and to provide a retarded spark, for starting the engine. The impulse coupling is installed on the drive shaft of a magneto and comprises of the following. Shell, spring, Hub or cam along with fly weights. So here, you can see this is the body, then you have the fly weights here, this is the cam and this is the spring. So impulse coupling there is a varies sprats, fly weights, cam, body, spring. It is a spring loaded, is a mechanical linkage, between the magneto shaft and the engine. So basically, this is a spring loaded, is a mechanical linkage, between the magneto shaft and the engine. And we have seen, they basic purpose of the impulse coupling is to provide the a higher rotational speed, to the magneto and also to provide a, rite aid spark for starting the engine. It provides the high voltage necessary for ignition, by 'Winding up' and 'letting go' at the right instant, for spinning the magneto shaft.

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Impulse coupling in START position

- With the magneto fitted with an impulse coupling, the shell of the coupling is rotated by the engine drive while the rotating magnet remains stationary.
- This causes the spring in the coupling to wound up.

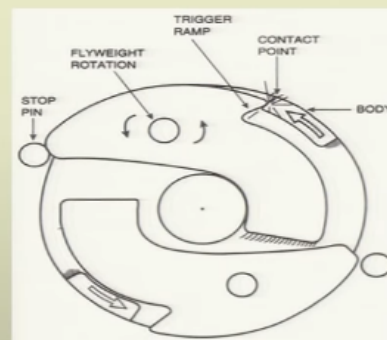


Now, let us see the position of the coupling. Impulse coupling in start position, you can see in the figure here, these are the fly weights and this is the stop pin in the magneto body and these are your fly weights and this is the body here, which is attach to engine drive. This body attach to engine drive an here, these are your fly weights, these are your pivot points of the fly weights, this is the stop pin, this is there magneto housing and these, this is your trigger ramp, on both sides. So with the magneto fitted with an impulse coupling, the shell of the coupling is rotated by the engine drive, while the rotating magnet remains stationary. So, on magnetos which fitted with an impulse coupling, when the shell of the coupling is rotated, by the engine drive, the rotating magnet remains stationary. So in that case, the rotating magnet is the stationary. But, the shell of the coupling is rotating, by the engine drive. This causes the spring in the coupling to wound up. So, when this body is moving is be, is be rotated, the shell of the coupling is rotated, in that case, the spring in the coupling will wound up.

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Impulse coupling in RELEASE position

- At the instant when the magneto is supposed to fire, the body contacting the trigger ramp releases the fly weights causing the flyweights to rotate on the pivot point and disengage from the stop pin.



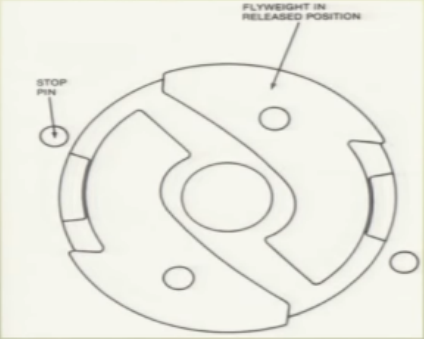
At the instant when the magneto is supposed to fire. So, at that very instant when the magneto is supposed to fire, the body which is contacting the trigger ramp, it is see here, this case the body release it have moved, it was, it as rotated with the drive, this is staching that trigger ramp, in this privies picture, if you see this is body was away from the trigger ramp. In the second picture, now the

body since it is rotated and the magneto, the rotating magneto was stationary, they body as moved. Now it is stitching the trigger, trigger ramp. It is contacting the trigger ramp. Because of this contact; that trigger ramp, will release the fly weights because of the contact of the body and the trigger ramp, the fly weights will get released and it will cause fly weights to rotate, on the pivot point. Now because of this per share, by the body on the trigger ramp, the fly weights will, rotate on the pivot point and disengage from the stop pin. So, at the instant when the magneto is supposed to fire, the body which is contacting the trigger ramp will release the fly weights, causing fly weights to rotate on the pivot point and disengage from the stop pin.

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Impulse coupling in RUNNING position

- As the flyweights rotate on the pivot point and disengage from the stop pin, the spring unwinds giving the rotating magnet a rapid rotation in the normal direction.
- The rapid rotation of the rotating magnet causes the magneto to produce a strong spark at the spark plug.
- In the engine running position the centrifugal force holds the flyweights in the release position and the magneto fires in its normal advanced position.



Now, what will be the position of the impulse coupling in running position? As the fly weights rotate on the pivot point and disengage from the stop pin, the spring unwinds, giving the rotating magnet, a rapid rotation in the normal direction. So, as the fly weights disengage, the springs unwind and it will give the rotating magnet, a rapid rotation in the normal direction. The rapid of the rotating magnet, causes the magneto to produce a strong spark, at the spark plug. So this rapid of the rotating magnet will cause the magneto, to produce a strong spark, at the spark plug. In the engine, running position, the centrifugal force holds the flyweights in the release position. So here, you can see the centrifugal force, because of the centrifugal force, the flyweights are in the release position. And the magneto fires in its normal advanced position. So, in the running position, the magneto spring in the normal advanced position and the fly weights released.

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- The impulse coupling holds back the magneto rotation during engine start-up thus furnishing a *retard spark* during engine starting.
- The impulse coupling spring holds the magneto *in the advance spark position* during normal operation.
- If during operation the spring breaks, the magneto will continue to operate but will be in the retard spark position causing late firing of spark plugs fed by this magneto.

The impulse coupling holds back the magneto rotation, during engine start-up, thus furnishing a retard spark, during engine starting. So during the engine starting, the magneto the impulse coupling holds back the magneto rotation and will furnishing a retard spark, during starting. The impulse coupling spring holds the magneto in the advance spark position, during normal operation .So during normal operation, the magneto in the advance spark position, during starting condition, the magneto is the furnishing a retard spark .Now in case, if during operation the spring breaks, the magneto will continue to operate. But, will be in the retard spark position, causing late firing of spark plugs, fed by this magneto. So, now in case, during operation the spring breaks, in that case also the magneto will continue to work. But will be provide are retard spark and will, result in late firing of spark plugs, which fed by this magneto.

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Spark Plugs

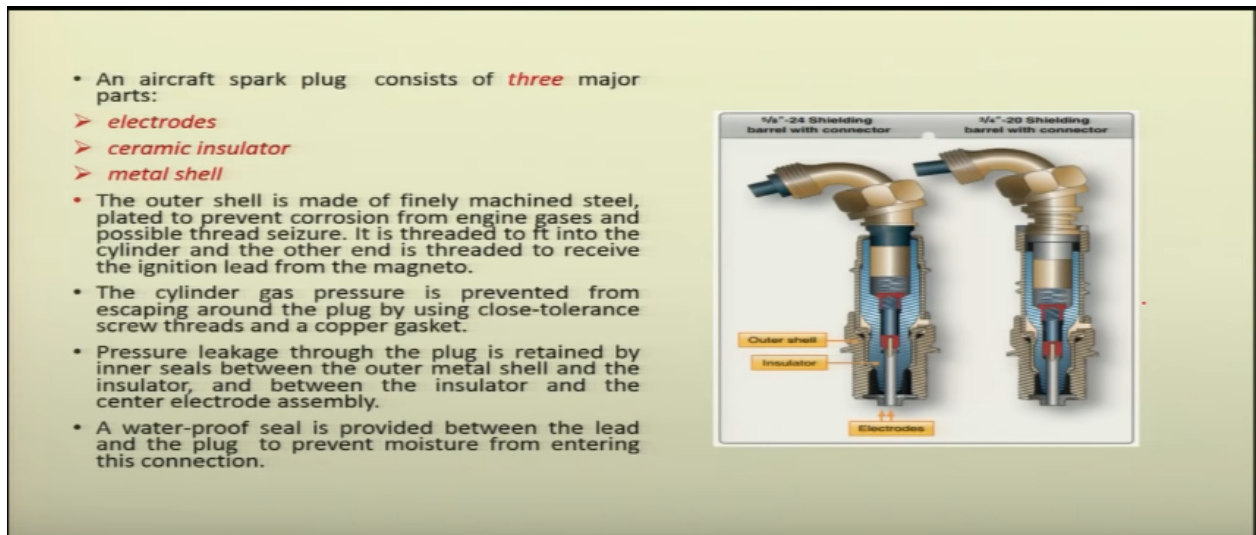
- The *purpose* of the spark plug is to convert the high voltage electric energy produced by the magneto to heat energy to ignite the fuel air mixture in the engine cylinders.
- The spark plug provides an air gap across which the high voltage of the ignition system produces a spark to ignite the mixture.



Coming to spark plugs. The purpose of the spark plug is to convert, the high voltage electric energy produced by the magneto, to heat energy, to ignite the fuel air mixture in the engine cylinders. So, the high voltage energy, electric energy, which is produced by the magnetos, this will be converted to heat

energy, to ignite the fuel air mixture in the engine cylinders. The spark plug provides an air gap across which, the high voltage of the ignition system produces a spark, to ignite the mixture. The spark plug will provide in air gap across which, the high voltage produces a spark, to ignite the mixture. So here in the figure, you can see this is your central electrode and here, you can find the gap, between the electrodes and this gap is the to provide spark.

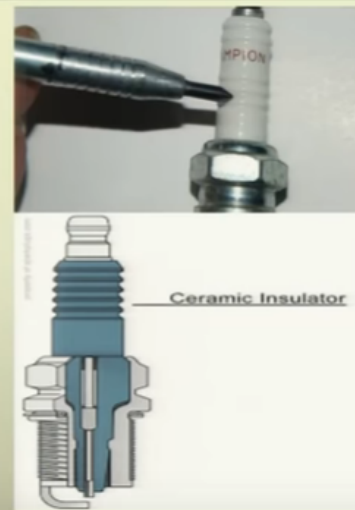
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An aircraft spark plug consists of three major parts. Electrodes, you can see in the figure, here you have the electrodes, then you have the insulator and then, you have the outer shell or the metal shell. So three main parts, central is a electrode, then you have insulator and then, you have the outer shell. The outer shell is made of finely machined steel, plated to prevent corrosion, from engine gases and possible thread seizure. So the outer shell is made of finely machined steel. And it's also plated, to prevent corrosion and possible thread seizure. It is threaded to it into the cylinder and the other end, is threaded to receive the ignition lead, from the magneto. We will see actually, how spark plug connected one and is threaded to be screwed, in said the engine cylinder, there is other end also the threaded to the see the ignition lead, of ignition honours . Cylinder gas pressure is prevented from escaping around the plug by using, close tolerance screw threads and a copper gasket. Now because there is high pressure, in the engine cylinder and spark plug are screwed in the cylinder, we have to prevent pressure loss that is prevented by providing closed all then screw sets and a copper gas. Pressure leakage through the plug, is retained by inner seals, between the outer metal shell and the insulator. So, between the outer shell and insulator you have inner seals and also between insulator and the center electrode, in order prevented the Pressure leakage, screw the spark plug, you have inner seals provided, between outer shell and insulator and between insulator and electro. A water proof seal is provided between the lead and the plug to prevent moisture from entering this connection. So, between the lead and plug that case also you have water proof see, which prevent moisture from entering this connection.

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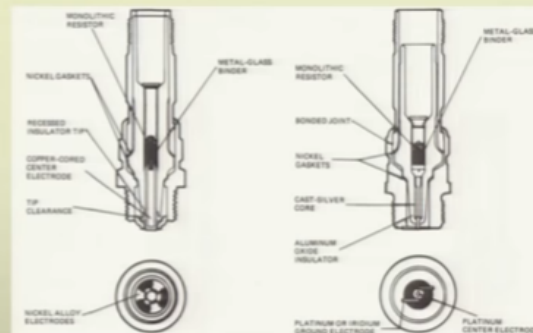
- The purpose of the insulator is to provide a protective core around the electrode and transfer heat from the insulator tip or nose to the engine cylinder.
- The insulator is made from *aluminum oxide ceramic* which has excellent dielectric strength, high mechanical strength, and thermal conductivity.
- Spark plugs used in different engines vary in terms of:
 - *heat range*
 - *reach*
 - *massive electrode, fine wire electrode (Iridium/platinum),*
 - *or any other characteristic required as per installation requirements for different engines.*



The purpose of the insulator in see here, insulator is provided a protective core around the electro. Here you see this is a electrode and you have insulator a rounded, the purpose of insulator, is provided a protective core around the electro and transfer heat, from the insulator tip or nose to the engine cylinder. And it transfer heat, from the none tip, from the insulator tip, engine cylinder. Others the insulator is made from aluminum oxide ceramic, this made from aluminum oxide ceramic, which has excellent dielectric strength, high mechanical strength and thermal conductivity. Now this is made of aluminum oxide ceramic and has various property. Spark plug used; in different engines vary in terms of heat range, reach, massive electrode, fine wire electrode or any other characteristic required, as per installation requirements for different engines. To the different type spark plug we used or engines they are of different heat ranges, different reach different types like massive electrode, fine wire electrode or any other characteristic required, as per installation requirements.

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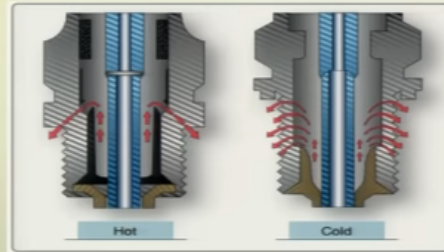
- The **massive-electrode** are so named because of the size of the center and ground electrodes.
- Massive electrode type spark plug is a **resistor type** that reduces electrode erosion.
- The center electrode comprises of a **copper core with a nickel-alloy sheath**.
- The center electrode is sealed against gas leakage by a metal-glass binder.
- **Fine wire spark plugs** are similar in construction to the massive-electrode plug except for the electrodes.
- The center electrode of the fine wire spark plug is made of **platinum**, and the two ground electrodes are constructed of either **platinum or iridium**. The use of platinum and iridium ensures maximum conductivity and minimum wear.



The massive electrode are so, named because of the size of the center and ground electrodes. In the figure if you see, the left figure, the massive electrode, spark plug, you can see the electrode center, because of the size of the electrode, center electrode and ground electrodes, you see this termed as the massive electrode. Massive electrode type, spark plug is a resistor type that reduces electrode erosion. This is basically, are resistor type of spark plug. The center electrode, comprises of a copper core, with a nickel alloy sheath. So, center electrode this is made of copper core and its nickel alloy sheath arounded. The center electrode is sealed against, gas leakage, by a metal glass binder. So, again provision is there provided gas leakage and to the shield center electrode shield by a metal glass binder, in the right figure if you see. this figure these for you are, fine wire spark plug, are similar in construction to the massive electrode plug, except for the electrodes. Here in the if figure if you observe. The electrode center is as compared to massive electrode you can see this is a fine wire electrode, the all most the a similar in construction except center electrode. The center electrode of the fine wire spark plug is made of platinum. So, this in case of fine wire electrode, center electrode is made of platinum and the two ground electrodes are constructed, of either platinum or iridium. So, these two ground electrodes, they can be constructed of either platinum or iridium. There is a center electrode, is of platinum material, use of platinum and iridium, ensures maximum conductivity, minimum wear. So, platinum and iridium, they have properties that ensures maximum conductivity and minimum wear

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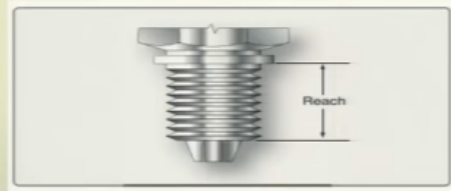
- The heat range of a spark plug is a measure of its ability to transfer the heat from the firing end of the spark plug to the cylinder head.
- The plug must operate hot enough to burn off carbon deposits at the same time also remain cool enough to prevent a preignition condition.
- One of the important factor in determining the plug's heat range is the length of the nose core.
- *Hot plugs* have a *long insulator nose* that creates a long heat transfer path;
- *Cold plugs* have a relatively short insulator to provide a rapid transfer of heat to the cylinder head.
- High-compression engines tend to use colder range plugs while low-compression engines tend to use hot range plugs.



The heat range, of a spark plug, is a measure of its ability, to transfer the heat, from the firing end of the spark plug, to the cylinder head. So, basically it is a measure of its ability to transfer the heat, from the firing end of the spark plug, to the cylinder head. The plug must operate, hot enough, to burn off, carbon deposits, at the same time, it suit also remain cool enough, to prevent a preignition condition. So, they are requirement of spark plug, where we need to be hot enough, to burn off, carbon deposits whrer is at the same time, it the also need to remain cool to prevent any, preignition short of condition. One of important factore, in determining the plug's heat range, is the length of the nose core. So, the length of the nose core is very important, in determining the plug's heat range. Hot plugs, have a long insulator nose. So, you can see here is hot plugs, this a hot plug you have a long insulator nose that creates a long heat, transfer path. Because of this long path is creates a long insulator nose, it creates a long a long heat, transfer path. You can see heat transfer path, this is long, this is your hot plug. Cold plugs have a relatively, short insulator path, you can see, cold plugs have a relatively, short insulator path to provide, a rapid transfer of heat to the cylinder head. So, this well provide a rapid transfer, of heat to the cylinder head. High compression engines, tend to use colder range plugs, while low compression engines trend to use, hot range plugs. So, high compression engines, well use cold plugs, while as low compression engines, well use hot range plugs.

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- The spark plug *reach* is the threaded portion of the spark plug that is screwed in the spark plug bushing of the cylinder.
- Proper reach spark plug ensures electrode end of spark plug at the right position to fire.
- Long reach spark plugs extend into the combustion chamber and its threads will be exposed to carbon. If carbon clings to spark plug threads, it can become a source of pre-ignition and will also make it very difficult to remove the spark plug.
- Use of improper reach spark plugs can become a cause of improper combustion and can also result in spark plug seizure.
- It is thus very important to use the approved spark plugs recommended by the manufacturer for the engine.



The spark plug reach, is the threaded portion of the spark plug that is screwed in the spark, plug bushing of the cylinder. Now you see this is threaded portion, this is reach. We have read earlier that spark plug as to thread hence, screwed inside the engine cylinder. That is a other threaded in, is there receive the in machine lead. So, this and wish's, which goes inside engine cylinder that threaded portion, of the spark plug, is the reach that is spark plug. The spark plug reach, is the threaded portion, you can see, this is a threaded portion, spark plug that is screwed in the spark, plug bushing of the cylinder. Proper reach spark plug ensures, electrode end of spark, at the right position to fire. So, this is very important that you have the right reach of spark plugs; you are using, the right reach spark plugs. So, that electrodes are right position, to fire engine cylinder. Incase long reach spark plug extend, into the combustion chamber. And its threads will be exposed to carbon. So, in case we have using long reach spark plugs, they will extend, into the combustion chamber. And its threads will be exposed to carbon. And if carbon clings to spark plugs threads, it can become, a source of preignition and will also make it very difficult, to remove the spark plug. So, it's very important. That we use of right reach, of the spark plug, incase long reach spark plugs are use that condition spark plug will extend, into the combustion chamber. And its threads will be exposed to carbon. And if carbon clings to spark plugs threads, it can become, a source of preignition and will also, make it very difficult, to remove the spark plug. Use of improper reach spark plug, can become, a cause of improper combustion and can also result in spark seizure. So, improper reach spark plug, they have various, problems they can lead to improper combustion and can also spark seizure. It is very important to use the approved spark plugs, recommended by the manufacturer for the engine.

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Ignition system troubleshooting

Symptom	Probable Cause	Solution
Hard starting	Worn or fouled spark plugs; arcing ignition lead	Inspect and replace or repair as necessary
	Impulse Coupling not operating properly	Remove and check for binding, worn or broken impulse coupling parts.
	Impulse Coupling is magnetized	Remove and demagnetize or replace impulse coupling. Inspect engine for magnetized components and demagnetize all such components
	Retard contact assembly in retard (dual contact) magneto not operating electrically. Engine may kick back during cranking due to advance timing of ignition	Retard points may not be closing due to improper adjustment, or may not be electrically connected in the circuit due to a poor connection. Inspect retard points to see if they close. Check for proper contact at the "SWITCH" and "RETARD" terminals of retard (dual contact assembly) magneto and at the vibrator. Check wiring.

Now this was all about, the ignition system basic ignition system reciprocating engine. We have seen various part, we have seen basic theory involve, we have seen the items, units of the ignition system red above the switch, which controls, ignition system we have red above magneto basic theory of the magneto. We have seen different parts the magneto like magnetic circuit roader then we have seen primary circuit, where we saw the primary called, we saw breaker quoted point's we saw capacitor we seen the function of the items then we saw secondary circuit how is magneto was operating Then we have seen the ignition honours, how the ignition honours is acting has the conducting path, for the high voltage, developed in the vegnato then, we saw the spark plugs, the different types of spark plugs, the purpose of the spark plugs and the importance, of using the right type of spark plug, has recommended by the manufacturing. This was all about the basic ignition system, during the course of maintenance, during the course of operation, we main encounter, several snugs, we main encounter several problem, both during flying, during ground operation, during maintenance some of the problems, have been summed up hear and let us see, what are go problems, we face in the ignition system, what are probable causes and what may be the solution for them. So, the first problem in case, if we are facing, hard starting. So now, if you are facing, a hard starting problem, what may be the cause? The causes may be worn or foul spark plugs or arcing ignition lead. So, your spark plugs, or worn out or foul or your ignition lead arcing. Second reason may be impulse coupling, is not operating properly. In case, impulse coupling is not operating properly then also, you may face hard starting. Third probable cause is impulse coupling is, magnetized. Now your impulse coupling is magnetized that may also lead to hard starting. Another cause retard contact assembly in retard magneto not operating electrically. Engine may kick back during cranking due to advance timing of ignition. This also, one of the cause

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Symptom	Probable Cause	Solution
	Magneto improperly timed to engine	Check magneto-to-engine timing according to the Engine Manufacturer's instructions. Inspect contact assemblies according to instructions and replace parts as necessary.
	Main contact assembly out of adjustment (internal timing off).	Check magneto internal timing according to instructions
	Retard points opening too late	Check timing of retard points according to instructions
Engine Roughness	Worn or fouled spark plugs	Install new spark plugs.
	Worn ignition leads.	Check plug leads for continuity and breakdown
	Worn or fouled magneto contact assemblies.	Check magneto contact assemblies for burning, melting or contamination according to instructions
	Carbon tracked distributor block	Replace distributor block

Another cause magneto improperly time to engine. Is very important thing: that magneto should be properly time, in case if it is, not properly time then also, we may face hard starting. Main contact assembly out of adjustment now, in case, your main contact assembly is out of adjustment then also, we face hard starting. And retard points opening too late. So, various reasons, of hard starting.

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Ignition system troubleshooting

Symptom	Probable Cause	Solution
Hard starting	Worn or fouled spark plugs; arcing ignition lead	Inspect and replace or repair as necessary
	Impulse Coupling not operating properly	Remove and check for binding, worn or broken impulse coupling parts.
	Impulse Coupling is magnetized	Remove and demagnetize or replace impulse coupling. Inspect engine for magnetized components and demagnetize all such components
	Retard contact assembly in retard (dual contact) magneto not operating electrically. Engine may kick back during cranking due to advance timing of ignition	Retard points may not be closing due to improper adjustment, or may not be electrically connected in the circuit due to a poor connection. Inspect retard points to see if they close. Check for proper contact at the "SWITCH" and "RETARD" terminals of retard (dual contact assembly) magneto and at the

Let us see, the solutions one by one, in case, if the spark plugs or worn or foul or the ignition leads or arcing then, we need to inspect and replace or repair or necessary. In case the spark plugs are worn out then, we need to replace the spark plugs, in case the spark plugs or foul, we need to remove them, we need to clean them properly as for the recommendations of the manufacturer, we need to set the gap, right as for the recommendation and install them back. And in case, the ignition lead is arcing, we need to see, if it is to be replace. Second probable cause was, impulse coupling not operating properly. In that case, we need to remove and check for binding. Worn or broken impulse coupling Parts. We need to remove the impulse coupling; we need to check, in case if there is an binding, in case if it is one out or any parts or broken. So, in that case your impulse coupling is either to be service or to be replaced, as required. Third cause was impulse coupling is magnetized; in that case we need to remove the impulse coupling and demagnetize it, or replace the impulse coupling. So in that case,

either we remove it and replace it to the new impulse coupling all we remove it and demagnetize it. Inspect engine for demagnetize components and demagnetize such components. Another reason was retard contact assembly in retard magneto not operating electrically. In this case we need to see: that the retard points may not be closing due to improper adjustment or may not be electrically connected in the circuit, due to a poor connection. So the adjustment may be improper or the connection may be poor. Inspect, retard point to see if they close, check for proper contact at the “SWITCH” and “RETARD” terminals, of retard magneto and at the vibrator, Check wiring. So this is about, “RETARD” terminals and retard points and the vibrators, we need to check the wiring.

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Symptom	Probable Cause	Solution
	Magneto improperly timed to engine	Check magneto-to-engine timing according to the Engine Manufacturer's instructions. Inspect contact assemblies according to instructions and replace parts as necessary.
	Main contact assembly out of adjustment (internal timing off).	Check magneto internal timing according to instructions
	Retard points opening too late	Check timing of retard points according to instructions
Engine Roughness	Worn or fouled spark plugs	Install new spark plugs.
	Worn ignition leads.	Check plug leads for continuity and breakdown
	Worn or fouled magneto contact assemblies.	Check magneto contact assemblies for burning, melting or contamination according to instructions
	Carbon tracked distributor block	Replace distributor block

Magneto improperly timed to engine, in that case, we need to check the magneto to engine timing, according to the engine manufacturer’s instructions. Inspect contact assemblies according to instructions and replace parts as necessary. So we need to time the engine, as for the manufacturer’s recommendation and further required, we can inspect the contact assemblies and replace the parts as required. In case main contact assembly it out of adjustment, internal timing is of then, we need to check the magneto internal timing according to the instructions. This timing is very, important both internal timing and external timing, timing to engine as well as the internal timing the as part of a regular maintenance, as part of a regular inspections schedules, it is part of inspections, where, we need to check the weather the magneto is, properly time to engine. Retard points opening too late, check timing of Retard points, according to instructions. Now, this was about, the probable causes, of hard starting of engine. Second, problem which may be encounter is rough, engine operation. Engine is operating rough, then what may be the reason? Worn or foul spark plug, this may be the first reason, then worn ignition leads, your leads or worn out, your spar, spark plugs or worn out or foul, your ignition leads or worn, worn or fouled magneto contact assembly. Now, magneto contact points, they may be worn out or foul carbon tracked distributor block. Now, let us carbon tracking on the distributor block, in that case also, you may have rough engine operation. So, let us see the solutions, for all these causes, in case your spark plug or worn out or foul, in case if they are worn out, they need to be replace with new once, in case they are foul, we need to clean them and set the gaps correct and install them back. In case the ignition leads or worn out, check the plug leads for continuity and break down. In case, your magneto contact assemblies or worn or foul, in that case also, the magneto contact assemblies, for burning, melting or contamination should be checked, according to the instruction. So, the magneto contact assemblies, we should inspect them, weather their burnt out, melt or

contamination, in that case, whatever needs to be done, we need to either, do the maintenance action or replace, replace it completely. Carbon tracked distributor block, it is better, to replace the distributor block.

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Symptom	Probable Cause	Solution
Magneto Drop-off Check Out of Limits	Magneto to engine timing incorrect.	Check magneto-to-engine timing according to the Engine Manufacturer's instructions. Inspect contact assemblies according to instructions
	Contact assemblies not opening properly	Inspect contact assemblies for proper opening according to instructions
	Main contact assembly out of adjustment (internal timing off).	Check magneto internal timing according to instructions in accordance with instructions
	Faulty plugs or leads.	Check plugs and leads.
	No drop-off noted -- open switch connection.	Check capacitor according to instructions
Radio Noise	Carbon tracked distributor block	Replace distributor block
	Faulty spark plugs	Replace spark plugs
	Frayed shielding at spark plug terminal, magneto cover, or intermediate point on harness lead.	Replace ignition lead
	Inadequate shielding ground at spark plug terminal or magneto cover.	Remove and replace inner ferrule according to instructions

Another problem is, of magneto drop of, check out of limits. So, your magneto drop is out of limits, let us see, what are the reasons? Magneto to engine timing is incorrect: that may be the first reason, contact assemblies or not operating properly: that may be a the another reason, main contact assembly out of adjustment, or your internal timing is of, faulty plugs or leads, not is an other reason, no drop of noted open switch connection and carbon tracked distributor block. So, there are several reasons for several causes, of magneto drop out of limits. So let us see, one by one, in case your magneto to engine timing is incorrect, then that case, we need to time the engine, as for the manufacture's recommendation. In case the contact assemblies or not, opening properly, in that case also, as for the manufacture's, inspect, instruction, we need to inspect the contact assemblies and take, appropriate action, of either, cleaning it, or replacing it. Main contact assembly is, out of adjustment that is your internal timing is of then, in that case also, we need to check the magneto internal timing, as for the manufacture's instruction. Now, your plugs, spark plugs or faulty or your leads or faulty, in that case, if the plugs leads cleaning, we need to clean them and install them back and in case, if they are to be replaced, we need to replace the plugs or the leads, in case if they are faulty. No drop of noted open switch connection. In case, there is no drop and that is the open switch, then we need to check the capacitor, according to the instruction. And in case, if the distributor block is having carbon tracked in that case, we need to replace the distributor block. So, these are the probable causes and solutions, for magneto drop of out of limits, an other problem that may be encounter is radio noise. So, what are the probable causes, let us see, first is faulty spark plugs, second is, frayed shielding, at spark plug terminal, magneto cover, or intermediate points on harness lead. Third is inadequate shielding ground at spark plug terminal or magneto cover. So, various reasons, for radio noise, in case if you have faulty spark plugs, then in that case, we need to replace the spark plugs, in case there is frayed shielding, at spark plug terminal, magneto cover, or intermediate points on harness lead, it is better to replace the ignition lead. And in case, if we have inadequate shielding ground at spark plug terminal or magneto cover, we need to remove and replace the inner ferrule, according to instruction. So, has for the manufacturer's instructions, we need to inspect, we need to perform, proper inspections, maintenance sections and take the corrective actions accordingly. So, this was about, the ignition

system, we have seen, the various illits used in the ignition system, we have seen the various problems, faced in the ignition system. Now, in our next, video we will see these parts physically, how these parts operate and how they are fitted, on in aircraft.
Thank you.