



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

COIMBATORE-35.



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Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai.

DEPARTMENT OF AUTOMOBILE ENGINEERING

COURSE NAME : 19AUB204 – AUTOMOTIVE ELECTRICAL AND ELECTRONICS ENGINEERING

II YEAR / IV SEMESTER

Unit 2 – Starting and Ignition System

Topic : Advance Mechanisms



SPARK ADVANCE MECHANISM



- ❖ The spark advance mechanism plays a critical role in optimizing the performance, efficiency, and emissions of internal combustion engines.
- ❖ There are several types of spark advance mechanisms that have been used in internal combustion engines over the years.
- ❖ These mechanisms vary in complexity, effectiveness, and application.





CENTRIFUGAL ADVANCE MECHANISM



- ❖ The centrifugal advance mechanism is a common type of mechanical advance mechanism used in older ignition systems, particularly in distributor-based setups.
- ❖ It adjusts the ignition timing based on engine speed (rpm) to optimize engine performance and efficiency.
- ❖ The centrifugal advance mechanism typically consists of weights, springs, and an advance mechanism housed within the distributor.
- ❖ The distributor shaft is connected to the engine's camshaft and spins at a speed proportional to engine rpm.



CENTRIFUGAL ADVANCE MECHANISM



- ❖ Inside the distributor, there are two or more flyweights mounted on pivots.
- ❖ These flyweights are typically connected to the distributor shaft and rotate with it.
- ❖ As engine speed increases, the centrifugal force acting on the flyweights causes them to move outward against the force of the springs.
- ❖ The springs attached to the flyweights exert a force inward, opposing the centrifugal force.
- ❖ The tension of these springs determines the rate at which the advance mechanism responds to changes in engine speed.
- ❖ Higher tension springs cause the advance mechanism to activate at higher engine speeds.



CENTRIFUGAL ADVANCE MECHANISM



- ❖ The movement of the flyweights actuates the advance mechanism, which in turn adjusts the position of the distributor's breaker plate.
- ❖ This alters the timing of the spark relative to the position of the distributor rotor and the engine's pistons.
- ❖ As engine speed increases, the flyweights move outward, causing the advance mechanism to rotate the breaker plate in the direction of engine rotation.
- ❖ This advances the timing of the spark, allowing it to occur earlier in the engine's cycle.



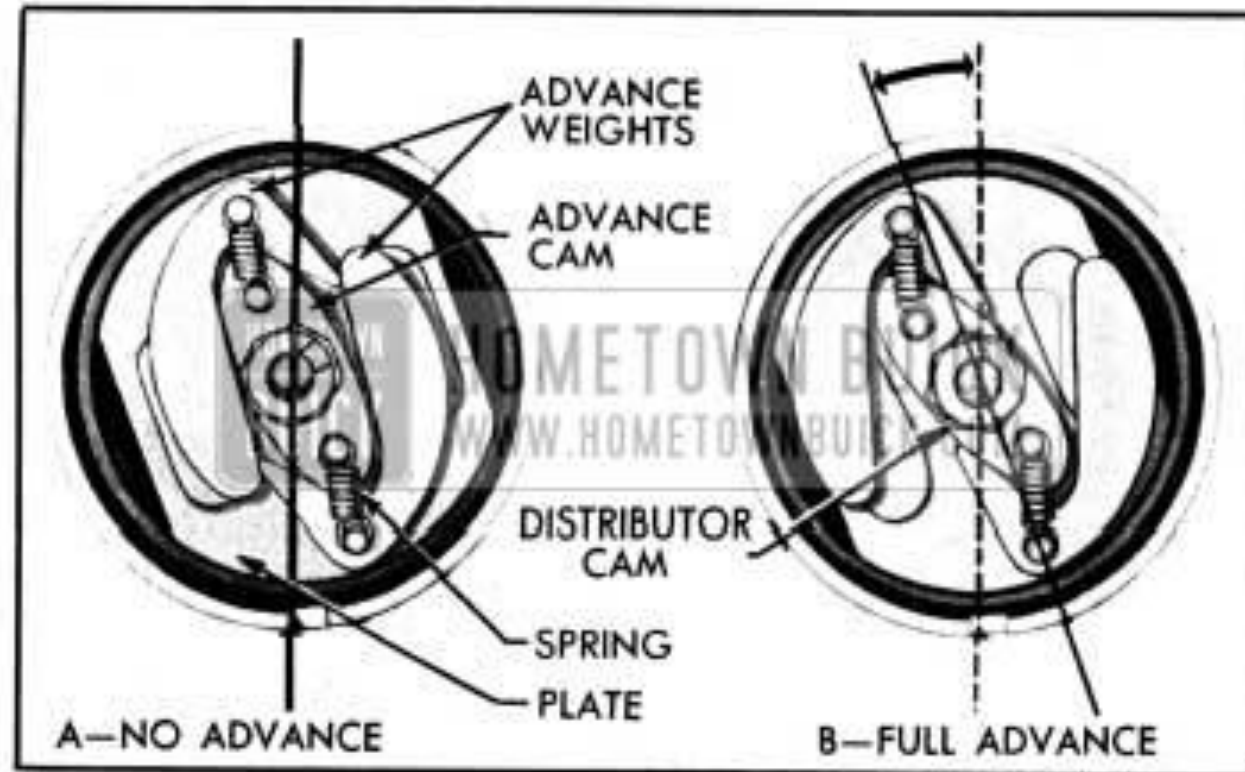
CENTRIFUGAL ADVANCE MECHANISM



- ❖ By advancing the timing as engine speed increases, the centrifugal advance mechanism ensures that the air-fuel mixture ignites earlier in the compression stroke as engine speed increases.
- ❖ This optimizes combustion efficiency and allows the engine to produce more power at higher rpm.



CENTRIFUGAL ADVANCE MECHANISM





VACUUM ADVANCE MECHANISM



- ❖ The vacuum advance mechanism is another type of mechanical advance mechanism used in older ignition systems, particularly in distributor-based setups.
- ❖ Unlike the centrifugal advance mechanism, which adjusts ignition timing based on engine speed, the vacuum advance mechanism responds to changes in engine load and operating conditions.
- ❖ The vacuum advance mechanism consists of a diaphragm, a vacuum port, a vacuum chamber, and a linkage connected to the distributor.



VACUUM ADVANCE MECHANISM



- ❖ The vacuum port is typically connected to the intake manifold or carburetor, where it can sense changes in engine vacuum.
- ❖ The vacuum advance diaphragm is a flexible membrane that responds to changes in engine vacuum.
- ❖ It is typically located within a sealed vacuum chamber attached to the distributor.
- ❖ The vacuum port is exposed to the intake manifold or carburetor, where it senses changes in engine load and operating conditions.
- ❖ When the throttle is opened, engine vacuum decreases, and when the throttle is closed or partially closed, engine vacuum increases.



VACUUM ADVANCE MECHANISM



- ❖ The vacuum chamber is connected to the vacuum port and houses the vacuum diaphragm.
- ❖ As engine vacuum changes, the pressure differential across the diaphragm causes it to move, actuating the vacuum advance mechanism.
- ❖ The vacuum advance mechanism is connected to the distributor's breaker plate or advance mechanism via a linkage.
- ❖ When the diaphragm moves in response to changes in engine vacuum, it adjusts the position of the distributor's breaker plate, thereby altering the timing of the spark.



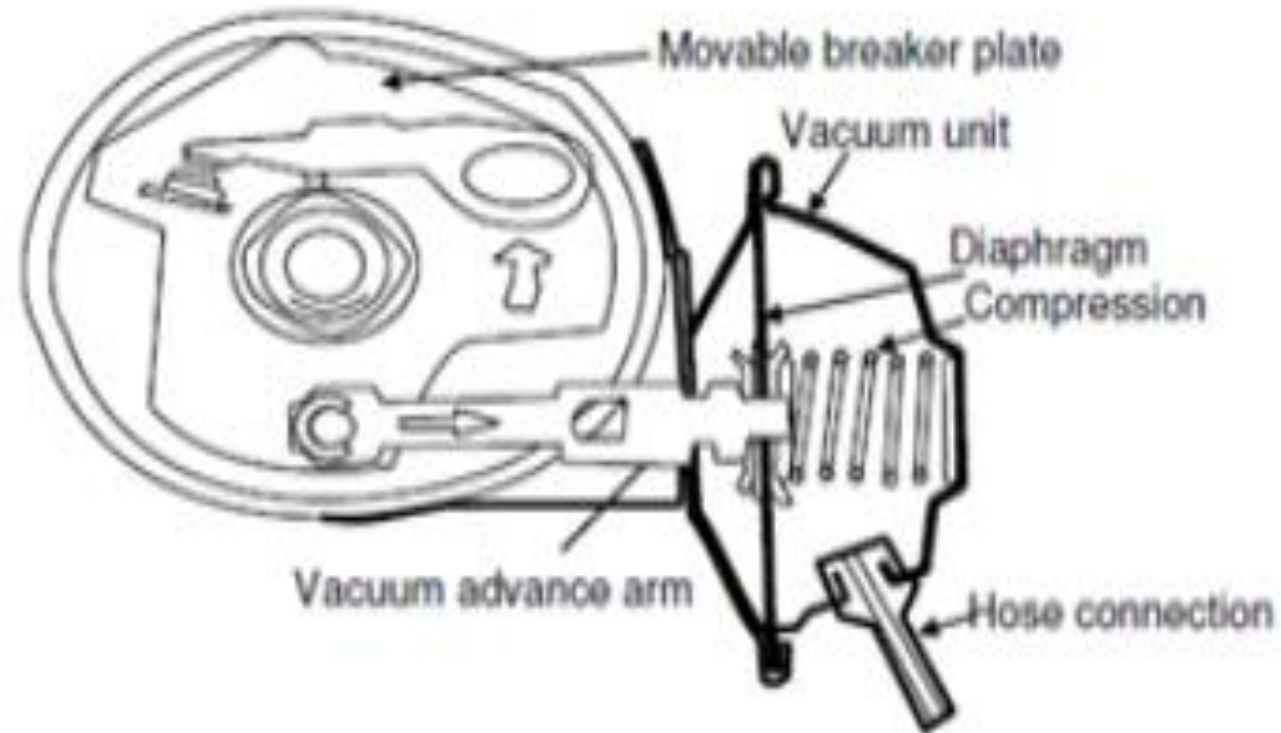
VACUUM ADVANCE MECHANISM



- ❖ When engine vacuum is high (e.g., during deceleration or cruising), the vacuum advance mechanism advances the timing of the spark.
- ❖ This helps improve engine efficiency and fuel economy by ensuring that the air-fuel mixture ignites earlier in the combustion stroke.
- ❖ Conversely, when engine vacuum is low (e.g., during acceleration or heavy load conditions), the vacuum advance mechanism may retard the timing of the spark.
- ❖ This helps prevent engine knock and detonation by delaying ignition timing under high-load conditions.



VACUUM ADVANCE MECHANISM





THANK YOU !!!