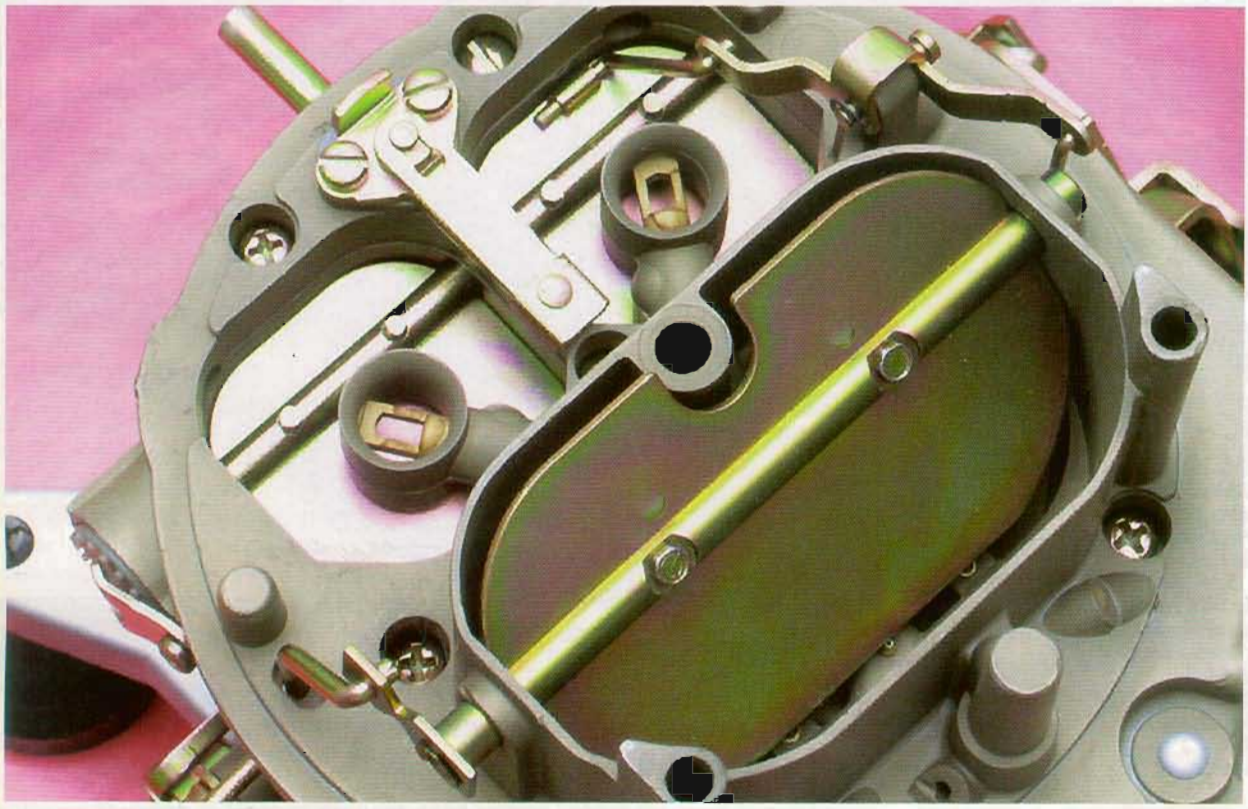
AUTOLITE/MOTORCRAFT 4300 AND 4300D



HISTORY AND INTRODUCTION

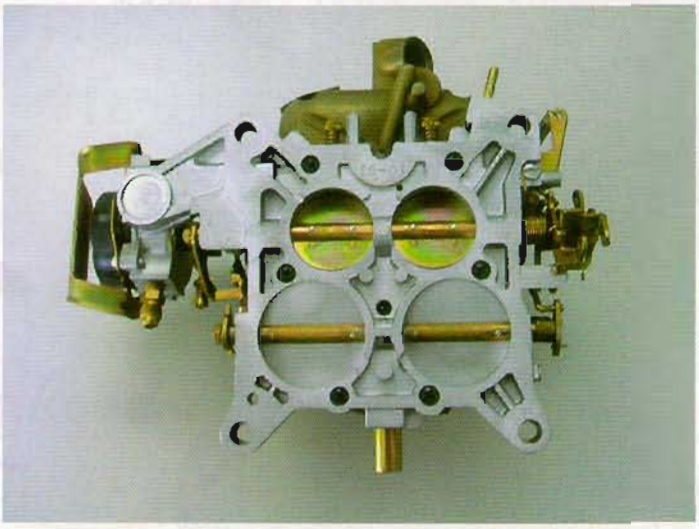
In the late 1960s emissions came to the forefront for all automobile manufacturers. California lead the way in attempting to clean up the air, but the other 49 states were also looking at improving vehicle emissions. As early as 1962, PCV (Positive Crankcase Ventilation) valves were used on many Ford engines. Their purpose was to burn the hydrocarbons present in the engine crankcases. With 1968 targeted as the first year with major Federal emission requirements, Ford was going to need a four barrel carburetor designed to be less offensive to the environment.

In 1967, the Autolite 4300 was introduced and overnight replaced the Autolite 4100 as the factory installed carburetor on almost all Ford 4V engine applications. The exceptions to the replacement were the 289 Hi-Po, and 428 Police Interceptor Galaxies which still used 4100's. The 390 GT only, Shelby GT350 (manual transmission) and GT500 received Holleys. As with any new product there can be a shakedown period as engineering is implemented to actual application and production. This was certainly true for the Autolite 4300. In 1967, Ford made one size of the carburetor rated at 441 CFM, and if you had a 289 that was about right. If you had a 390, you were under carbureted and if you had a 428 you were grossly under carbureted. To say the least "one size fits all" created some driveability and performance disappointments.

PRODUCT DEVELOPMENTS

By 1968, with another year of engineering, Ford introduced not only a somewhat improved version of the 4300 but also a larger sized carburetor in addition to the original 441 CFM unit. The new size was 600 CFM and offered only on the ThunderBirds, Lincoln, and Mark III with either a 429 or 460 V-8. Several design improvements also occurred from 1967 to 1968, dealing with curb idle adjustment methods. In 1969, the 4300 small bore was only offered on the 351W (Windsor). The large size was introduced to 390 (and 390 GT) and 429 V-8s. In 1970 more 2-barrel Ford engines were brought out, the discontinuance of the small bore 4300 happened. The large model was now available on the 351C (Cleveland) in Torino, Montego, Cougar, and Mustang and also on 429 and 460 power plants. From 1972 to 1974, the 600 CFM size was only on 429 and 460 V-8s. At the end of production in 1974 the 4300 was discontinued and replaced by the Motorcraft 4350.

THE 4300 "D" SPREAD BORE



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With emission requirements tightened and fuel prices on the rise, the days of a big-block performance, factory engine were numbered. The introduction of 351 CJ and Boss 351 engines happened in mid-1971. To obtain the extra performance with fewer cubic inches, Ford also introduced the Autolite 4300D carburetor. It was, by design, a "spread bore," meaning the secondary throttle plates were substantially larger than the primary throttle plates and bore. The 4300D was rated at 715 CFM. Alas, the design still had a few kinks in it and many people discarded the "D" for something else. Unfortunately, because of the unique bore configuration, this also meant changing the intake manifold. No Holley will bolt on and allow the secondaries to work!

By 1972 all of the "B" and "F" car lines (i.e., Torino/Montego, Mustang/Cougar) with 351C 4-barrel calibrations had the spread bore version and this was true through 1974. Unleaded fuel, catalytic convertors, and emissions were the only topic in 1975 and Ford engineering had no 4-barrel passenger or pickup engine except the 460 after 1974 until the early 1980s.

IDENTIFICATION

With all of the various sizes of carburetors produced, the numerous calibrations produced within a given model year, and eight years of 4300 production, to recognize a carburetor installed on a given engine is important. Without the exact correct calibration, the engine will, in most cases, not perform as well as it could and driveability problems will become more apparent. As with all FoMoCo Autolite and Motorcraft carburetors from 1960-1974, the engineering number can be found stamped into the carburetor. The location of this stamping is on the driver's side front toe of the carburetor. As the carburetor sits on the engine—the lowest part (i.e., the base or mounting flange) at the drivers side front, facing the fender will have the number. Another place to find this same number is on the carburetor tag. This is an unreliable source as tags could have been swapped. More commonly, the tag is missing. ALWAYS check the "toe" of the carburetor.

FUNCTIONALITY

The 4300 varies from many other four barrel carburetors in several ways. Unlike its predecessor, the Autolite 4100, it has only one float bowl. The primary design advantage is to reduce hydrocarbon emissions due to evaporation of fuel —both while the engine is running and also when shut off. The operation of the secondaries is similar to the Rochester Quadrajet. The secondary throttle plates are controlled by a link to the primary throttle shaft, allowing them to be "mechanically" opened. Above the throttle plates are another set of air valve butterflies. When the secondary throttle plates are opened, the air valves are exposed to intake manifold vacuum causing them to also open. How far these air valves open is ultimately controlled by how far the secondary throttle plates are open.

Initially the air valves act like a "choke" allowing fuel to flow to the vacuum (low pressure) area between the two sets of plates. As the air valves begin to open, air rushes into the secondary area and ultimately to the intake manifold. This velocity of air further opens the air valve plates, and also creates venturi vacuum action in this part of the carburetor, allowing more fuel to be discharged. This operational description is a simplified explanation. Many other factors enter into the operation and will not be discussed. In actuality, this secondary system is a blend between vacuum and mechanical secondaries. By design it will not usually deliver a smooth increase in power like vacuum secondaries, but properly calibrated, functions quite well.

THE ENGINEERING PROBLEMS

During the carburetor's production from 1967 until 1974, several driveability problems were universally encountered with 4300 carburetors, and unfortunately Ford never really solved them. These problems were a hesitation on acceleration, a big "bog" or lag on hard acceleration, flat spots and surges at low speeds, and hard starting when hot.

The 4300 was calibrated leaner than many other models, particularly during low speed operation. Unfortunately the technology available today in ignition systems, camshaft design and other related components had not yet been developed. This lean running and the lack of other technical developments led to the flat spots, surges, and contributed to the hesitation. As a footnote to the lean condition, changing the main metering jets has no effect on the driveability problems—except that fuel economy goes from good to unacceptable. The big bog or lag on hard acceleration is a combination of accelerator pump and secondary air valve design and operation. Again, an instantaneous lean condition is created. The hot starting problem is related to float bowl fuel levels. At factory specifications, there simply is not enough room left in the float bowl to allow for percolation—the expansion of fuel as it warms up after the engine is shut off. This fuel then spills into the primary bore and pools in the intake manifold. This causes a hot start flooded condition. Lowering the float level seems the obvious answer, but this adjustment changes the earlier discussed "lean" running conditions and makes them worse. All of these engineering problems have prompted people to replace 4300s with other carburetors.

Fortunately, there is an answer besides replacement. Pony Carburetors has developed internal calibrations and specifications that solve ALL of the driveability problems without sacrificing any fuel economy. Many years ago, Pony Carbs had the same problem with these after rebuilding and restoration. Through hours of engineering and testing the problems got solved.

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