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Cold Stalling Due to Carburetor Icing

Courtesy of Esso Standard Oil Company

Repeated "cold" stalling has occurred for years in automotive engines, sometimes happening a number of times, consecutively, immediately after the engine has been started, or even after the automobile has been driven for some distance. This phenomenon is most frequent in cool humid weather.

The causes of cold stalling in city type operation have been definitely established to be an ice formation similar to frost, occurring in the carburetor, on the throttle plate as a result of the refrigerating effect of the gasoline as it is vaporized in the throat of the carburetor. The temperature of the mixture as a result of this vaporization may be reduced by as much as 25°F below that of the outside air temperature. This results in chilling the air-fuel mixture and the metal parts of the carburetor in the vicinity of the throttle plate.

Automotive Carburetor Ice Formation

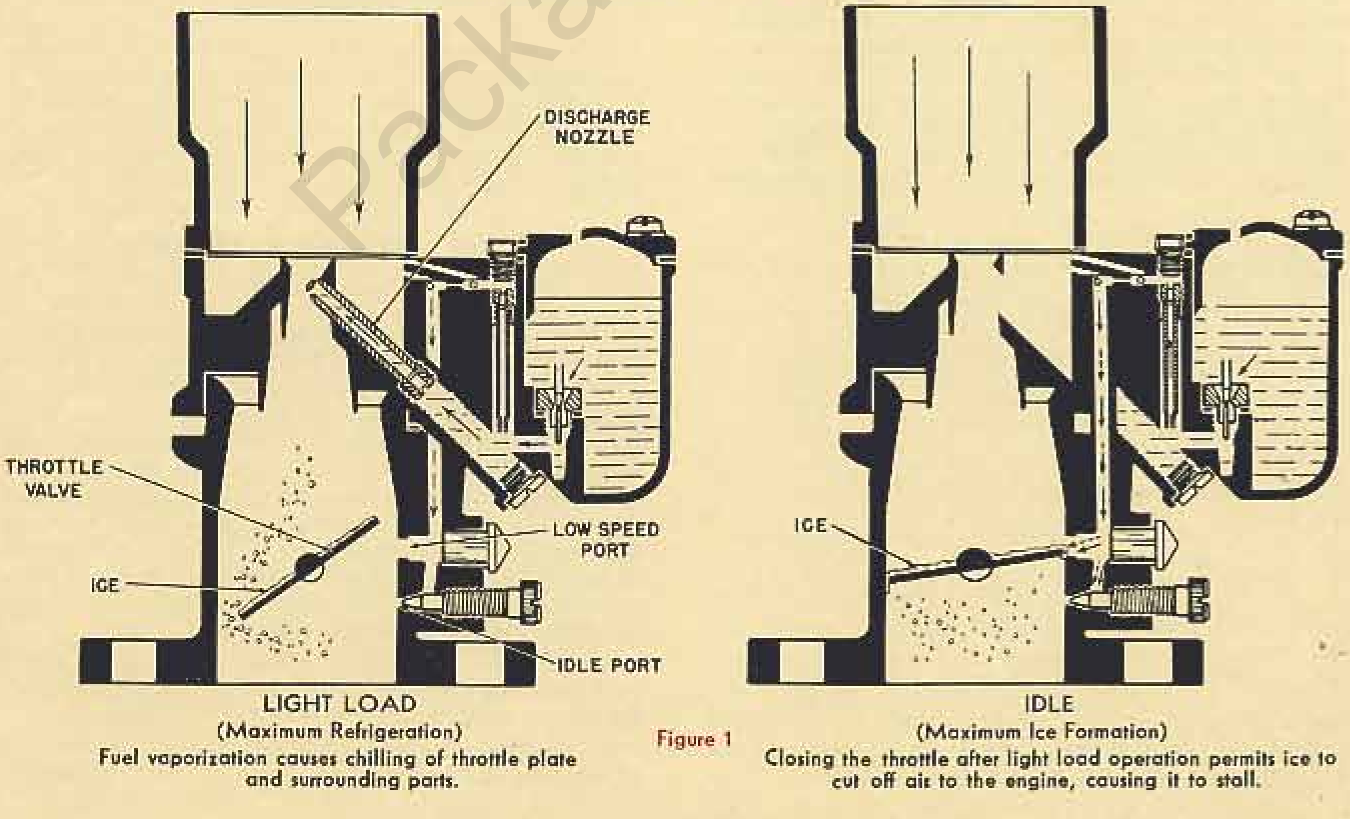


Figure 1

Within the range of 65 to 100% relative humidity, enough water is carried through the carburetor with the incoming air to form enough ice or snow on the throttle plate to completely stop the flow of air-fuel mixture through the carburetor when the throttle plate is in the idle position (Figure 1.)

This accumulation of ice under open throttle conditions is generally not noticeable. However, upon returning to small throttle openings or to closed throttle position, as would be the case in coming to a complete stop, ice accumulation is often sufficient to completely close off the air passage at the throttle plate. This results in the condition known as cold stalling. This condition seldom hampers restarting of the engine inasmuch as the throttle is returned to the open position for this operation.

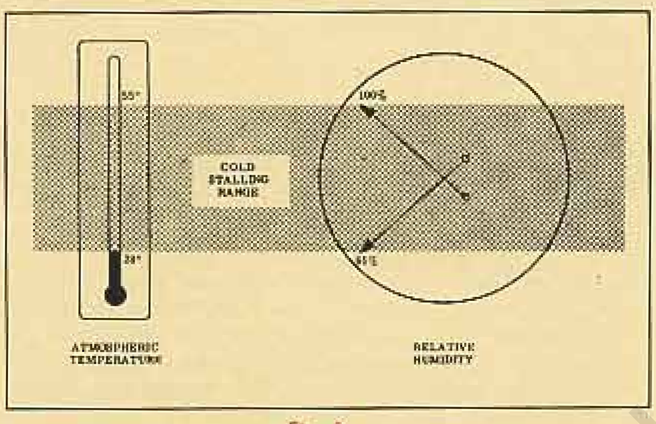


Fig. 2

The common occurrence of carburetor icing which results in cold stalling is *not* freezing due to cold weather nor is it due to moisture in the gasoline tank or lines. It occurs principally during cool humid weather which may or may not be rainy, and at temperatures *above* freezing. It has been established that cold stalling can occur at any temperature between 28 and 55°F when the relative humidity is between 65 and 100% (Figure 2). The most critical combination is a temperature of approximately 40°F together with the relative humidity of 100%, although the trouble will occur frequently enough to be bothersome under any of the combinations of temperature and humidity just mentioned and illustrated in Figure 2.

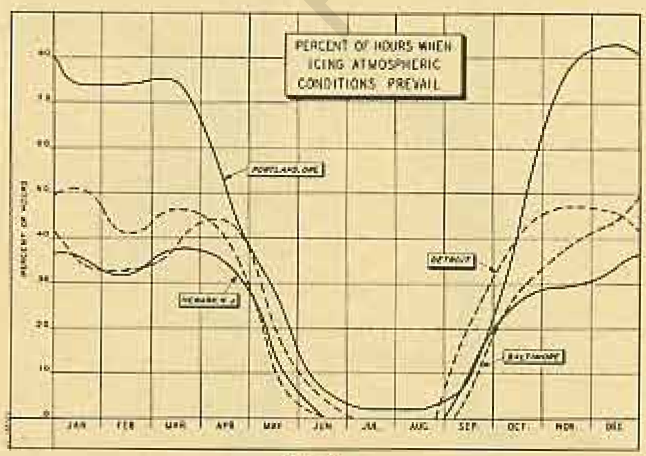


Fig. 3

Weather Bureau figures show that atmospheric conditions producing this problem are prevalent during all but midsummer months for most areas in the United States. Certain areas are, of course, more critical. As indicated in Figure 3, conditions suitable for cold stalling may be encountered for as much as 40 to 70% of the time throughout a considerable portion of the year.

Prevention of Cold Stalling

Carburetor icing is a familiar phenomenon in aircraft engines, and special heaters to eliminate the difficulty are now standard equipment on aircraft. Such equipment, however, has not been generally applied to passenger car engines. Research, therefore, has been concentrated on the action of gasoline as it affects the problem.

Although cold stalling has existed for years, modern premium grade gasolines have accentuated the problem. Paradoxically, it is the desirable qualities of today's gasolines that contributes most to carburetor icing. The higher volatility of modern fuels provides quicker starting, faster warm-up, and greater engine "pep". These properties, plus better acceleration and more uniform fuel distribution from cylinder to cylinder, give better engine performance than was possible with the gasolines of a few years ago.

However, higher volatility means that there are more lower-boiling components in the gasoline. These fractions evaporate more quickly, producing the refrigerating effect described in previous paragraphs. A less volatile fuel would minimize the cold stalling problem, but at a sacrifice of easy starting, quick warm-up, and generally better engine performance achieved with modern gasoline.

Attempting to Eliminate Cold Stalling

The preceding article on carburetor icing is to familiarize you with this condition. If the cold stalling is caused by carburetor icing, do not attempt to eliminate a condition over which the serviceman has no control. The only thing that may be done is to make sure the engine is tuned to Factory specifications.

Cowl and Body Shake

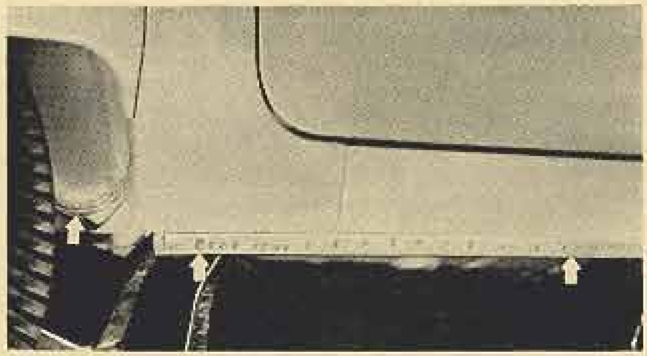
24th Series Convertible

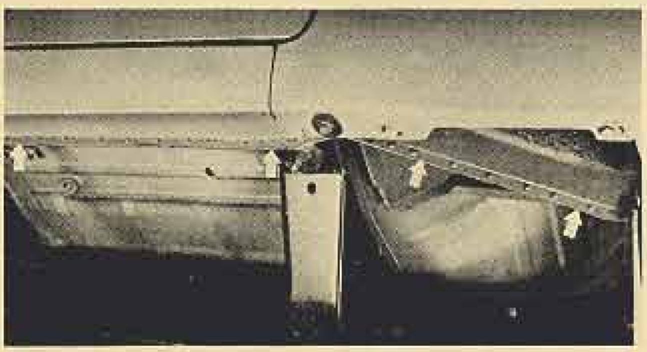
Excessive cowl and body shake and excessive body rattles may be encountered in a 24th Series convertible when driving over rough or choppy roads.

This condition rarely is found in a "hardtop" model because the arch-like roof panel binds the various body panels into a single unit and tends to stiffen the body in the same manner as a cover stiffens a box. Because a convertible body does not have the additional reinforcement provided by a solid top, it is subject to a twisting or weaving action which sometimes results in excessive cowl and body shake if one or more non-standard conditions exist.

In a few instances it was found that the side sill panels and body panels were not properly welded to the floor panel or that the welds were broken.

The arrows in the two illustrations show the location of the welds.





When a body shake condition exists, the welds should be inspected for number of welds and spacing between welds, which is approximately 1½". A feeler gauge or a thin bladed screwdriver can be inserted between the panel flanges to check for broken welds.

The rewelding operation can be accomplished by clamping the panel edges together with vise grip pliers and then spot welding the lower edges of the panels each side of the pliers. Continue this operation wherever welding is necessary. The welding can be done with either an electric arc welder or an acetylene torch.

Other requirements to eliminate body shake are:

(1) Wheel and tire balance, both front and rear.

(2) Shock absorbers must be in good condition.

(3) Propeller shaft must run true and be perfectly balanced.

(4) Correct body bolt torque (25 to 35 ft. lbs.).

(5) Correct radiator core cradle to frame bolt torque (25 to 30 ft. lbs.).

(6) Correct bonnet fit and properly operating locking mechanism.

(7) Sufficient frame welds and in good condition.

(8) Body frame work and bracing welds in good condition.

It is not always a simple matter to determine the cause of body and cowl shake, as the source of the trouble may not always be confined to a single condition. Occasionally the source of trouble may be spread out over a combination of non-standard conditions.

In some very rare cases, the weld failure condition at the floor panel may be found in the Mayfair and Sedan models.

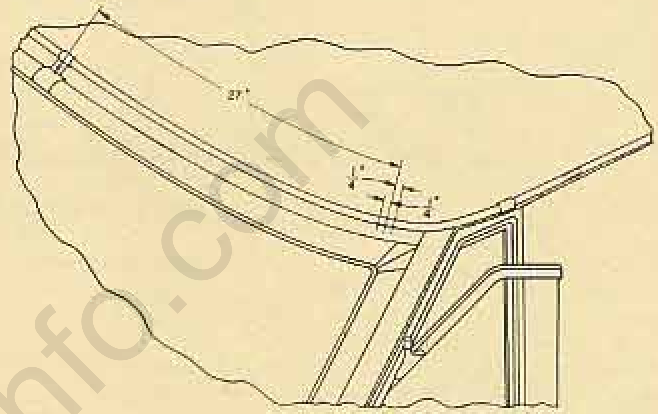
Roof Drip Gutter

Mayfair

You may find an occasion where an owner will complain of a water leak from water that has accumulated in the rain gutters.

When the car stands on level ground during a rain, the gutters at the front corners of the roof fill with water and do not drain off. After the owner gets into the car, lowers the windows, opens the vent windows while driving, and when turning either to right or left, the water runs over the top of the gutters and through the windows and into the car.

This can be corrected by drilling three 3/16" holes through the rain gutter at each front corner to allow the water to drain off.



The illustration shows the measurements to be used in locating the points to drill.

(a) Measure 27" from the screw head that attaches the moulding clip at the center of the windshield. Use a flexible rule and follow the curve of the rain gutter. Mark the location to drill.

(b) Drill a 3/16" hole through the rain gutter from the top.

CAUTION: Be sure to drill at an angle so that the drill will not strike or mar the upper windshield chrome moulding when the drill goes through.

(c) Drill a 3/16" hole, ¼" each side of the hole you have just drilled. Be sure to use the measurements shown so that the water will drain down over the windshield and not over the vent window and weatherstrip.

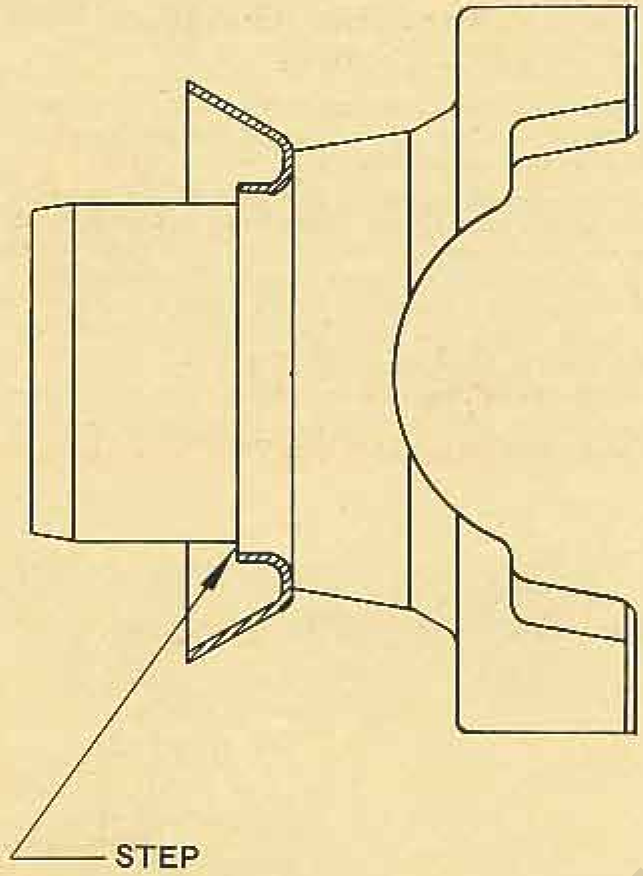
(d) Perform this operation on both front corners of the rain gutter. Remove any burrs with a file and touch up the paint if necessary.

Differential Driving Pinion Flange

Reports have been received of differential pinion seals leaking due to scratches on the seal surface of the pinion flange.

It was found that the dust shield was scratching the seal surface when the shield was pressed on. This was due to the hole in the dust shield being the same diameter as the pinion flange seal surface.

All pinion flanges now in production will have a .010 raised step machined for the dust shield. This



will eliminate the possibility of scratching the seal surface.

A new dust shield Part No. 443187 that has a larger diameter hole will be used with the flanges that have the raised step. Part No. 309525 dust shield is retained to use with flanges without the raised step.

Reverse Gear Jump-Out

R-11 Overdrive

Reverse gear jump-out has been reported on a few 23rd Series cars when equipped with R-11 overdrive and 24th Series overdrive equipped cars, but has only been found where the reverse operation was for long distances.

It was generally found that when in reverse gear, the first and reverse shift fork detent ball was not fully engaged in the detent groove because of insufficient overtravel; therefore, the spring on the overdrive shift rail would work the reverse gear out of mesh. This correction has been made in production.

In checking the detent ball for full engagement, it is suggested the following procedure be used:

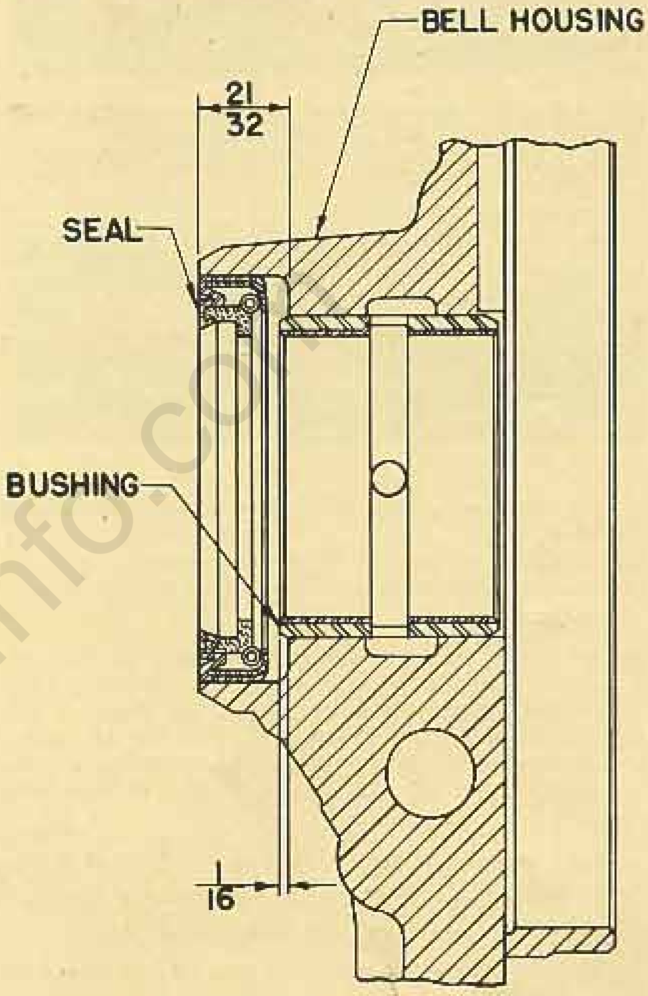
(a) Disconnect the low and reverse shifter rod from the lever at the transmission.

(b) Move the lever to the rear as far as it will go.

(c) Release the lever and it should jump forward a slight amount.

This determines that the lever has gone beyond the detent and has returned far enough to fully engage the ball in the detent groove.

If the detent does not fully engage as described, disassemble the overdrive assembly far enough to remove the reverse plunger, shift rail and fork. Grind .030" off the forward end of the plunger. This is the end that contacts the reverse shift fork pad in the transmission. The extra clearance will allow the shift fork to move further toward the rear and the detent to fully engage. Please refer to your Service Manual on page 7, figure 16, transmission and overdrive section for illustration of the reverse plunger.



Ultramatic Bell Housing and Bushing Assembly

25th Series

A change in production has been made in the bell housing and bushing assembly. The depth of the oil seal hole in the bell housing was increased from 19/32 to 21/32 of an inch. This permits the bell housing bushing to extend out 1/16 of an inch beyond the face of the bell housing at the oil seal end. See accompanying illustration.

This change was made in conjunction with the bell housing oil seal drain hole, Service Counselor, Vol. 25, No. 14, December, 1951, to increase the oil drain back area.

When replacing a bushing in the new type bell housing it is important to remember that the bushing extends 1/16 of an inch beyond the face of the bell housing instead of flush with the face as previously.

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