1970-72 Cowl Induction Assembly

By Mark Meekins

During the 1970-1972 model years, there where 36,626 big block powered Super Sport Chevelles and El Caminos equipped with a special-performance hood option ... cowl induction. Listed as regular production option ZL2, this extra cost cowl induction system was designed to force cold air directly into the carburetor resulting in an increase in performance. This was achieved through a combination of two factors ... engine vacuum pressure and an electrical system. Both systems used separate "flapper doors" to contribute to and monitor the flow of air to the carburetor.

Bottom side of bare cowl induction hood. The opening closest to edge of hood is for outer flapper door. Second opening is for inner door or air valve assembly.

It was determined by Chevrolet engineers that rushing air contacting the windshield, particularly at the base of the glass, turns back towards the rear edge of the hood. This air pressure is heavier and colder and when combined with fuel yields and increase in horsepower. The cowl induction system is designed to draft this denser, colder air to the carburetor. A special air cleaner that was part of the cowl induction system insures the direction and concentration of the harnessed air flow.

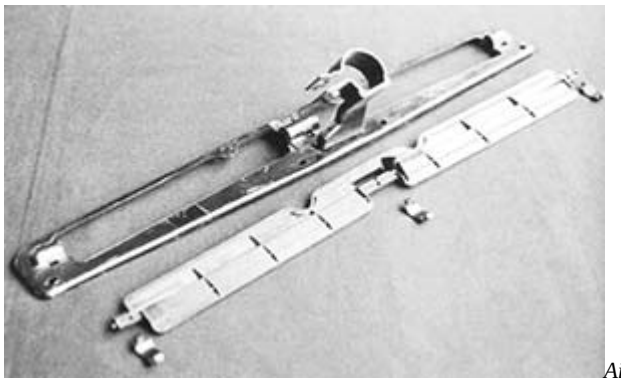
The cowl induction and regular SS hood have a large dome that is open on the backside of the hood. This area is covered with a wire mesh screen and catches the back draft of air forced rearward from the base of the windshield. This system is functional and is the primary induction system of the regular SS domed hood. It is an added bonus to the cowl induction hood.

The most visibly obvious part of the Chevelle cowl induction system is the flapper hood door. This door remains up, or open, under two circumstances ... when the engine is off or under WOT - wide open throttle conditions. This happens because there is either no vacuum pressure or the engine vacuum pressure drops under fast acceleration. The door remains down, or closed, when the vacuum pressure is high and consistent during normal engine operation.

A vacuum actuator (pod) has a rubber diaphragm that is connected to the hood door. Steady engine pressure pulls the arm of the actuator down, thus pulling the door closed. A hose on the actuator is connected to an in-line one-way flow valve. This valve allows engine pressure to travel in one direction. It also controls the opening and closing rate of the door, therefore cushioning the contact of the metal flapper door on the metal hood. The door will function without this valve, but its part of the vacuum system. Because it is a one-way flow valve, it is color coded for correct installation. The black side goes toward the hood and the gold side goes toward the engine. The hose on the gold side connects to a fitting on the intake manifold.

Vacuum pressure can be taken from the base of the carburetor or from the intake manifold. The intake manifold is the stock configuration for the cowl induction system. A variety of intake manifold fittings with various nipples are used depending on the cars equipment. One dedicated line goes to the break booster and the other to the cowl induction vacuum components. Additional lines

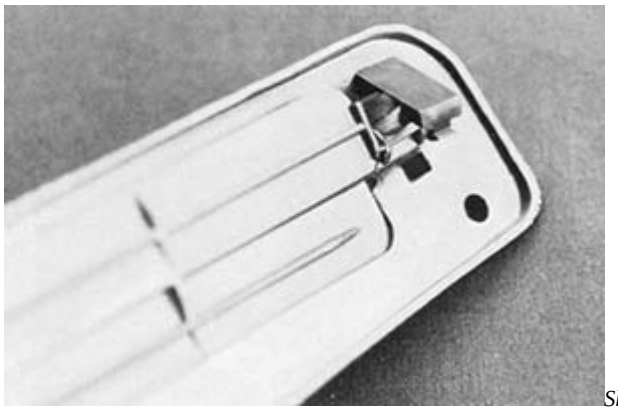
are incorporated into the fitting for cars equipped with a Turbo 400 transmission and/or air conditioning. Regardless of style, the fitting taps into engine vacuum pressure. Engine pressure is determined to a great extent, from the cam shaft duration. Depending on the lobes and duration, the vacuum drops dramatically under wide open throttle, resulting in a lessening of the tension on the actuator diaphragm which allows the door to open.



Air valve frame, air valve door and three attaching clips. Wide side of air valve overlaps frame assembly on solenoid side of frame.

The ducted draft is drawn into a large circular opening molded into the bottom side of the hood. The pressurized air is contained in this opening by a rubber seal attached to a flange or cowl ring. The large cowl ring sits atop the air cleaner base and soft rubber flushes up against the bottom side of the hood when the hood is closed. The air is drawn into the carburetor from this enclosed chamber when the hood flapper door is open. Otherwise, when the door is closed the single snorkel of the air cleaner base draws the necessary air into the carburetor.

There is a spacer between the carburetor and the air cleaner base. This spacer uses two circular gaskets, between the spacer and carburetor and between the spacer and the air cleaner. It is



Shorter side of air valve overlaps frame that faces rearward. Air valve clips snap into slots.

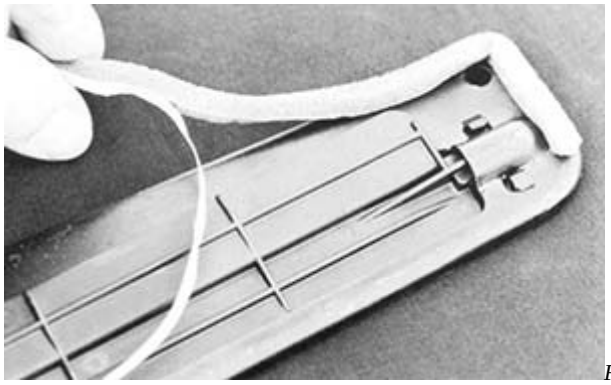
secured to the carburetor by a flange on the air cleaner stud. The purpose of this spacer is to raise the height of the air cleaner to press the cowl flange seal against the bottom of the hood. The new-for-1970 low rise intake manifold necessitated the use of a spacer to compensate for the lack of height on the 1970-1972 Chevelle and El Camino manifolds.

The electrical system of the cowl induction hood system operates an inner flap door which also directs the pressurized air from the base of the windshield to the hood's sealed area above the carburetor. This system is intended to work in conjunction with the vacuum setup, but tends to respond quicker than the vacuum-operated door when the accelerator pedal is depressed.

The correct name for the inner door is air valve. It is clipped to a frame assembly which is bolted to the bottom side of the hood just before the flapper door. The frame is mated to the hood with a

thin foam seal. An electric solenoid is secured to the frame and is attached to the air valve door by a plunger arm. The other electrical components include a relay mounted on the firewall and a hood switch attached to a bracket mounted in front of the accelerator pedal rod. This hood switch also serves as a kick down switch, or passing gear switch, for Turbo 400 cars. The cowl induction wiring harness has extra jumpers to accommodate the Turbo 400 harness.

All three electrical items are connected by a special wiring harness. To function properly, the grounded system must complete a circuit. This begins when the gas pedal throttle is sufficiently depressed and the pedal rod contacts and closes the switch. When the switch is closed, current flows from the ignition terminal. Of the fuse box through the field coil of the firewall mounted relay. The relays contacts shut, allowing current to flow from the accessory terminal of the fuse box to the air valve solenoid. The solenoid is energized and the plunger retracts, pulling open the hood air valve. The electronically-opened air valve directs additional cold air injected through the hood screen of the domed hood into the sealed area above the carburetor.



Foam seal for frame assembly has adhesive tape on one side. Material molds easily to conform around perimeter of frame. Notice chip tabs in slots of frame and wider side of air valve.

Both the vacuum and electric systems remain in a passive state unless called upon for duty. The electric system is guaranteed to work, but the condition of the motor could affect the vacuum pressure and operation of the hood flapper door. Properly sealing piston rings and a camshaft with short, low- duration lobes, as factory-installed, assures a quick response from the door. Racing cams with longer duration produce less vacuum which can cause the hood door to open at a much slower rate.

Regular production option ZL2, the 1970-1972 cowl induction hood package, is an eve-appealing and performance providing system.