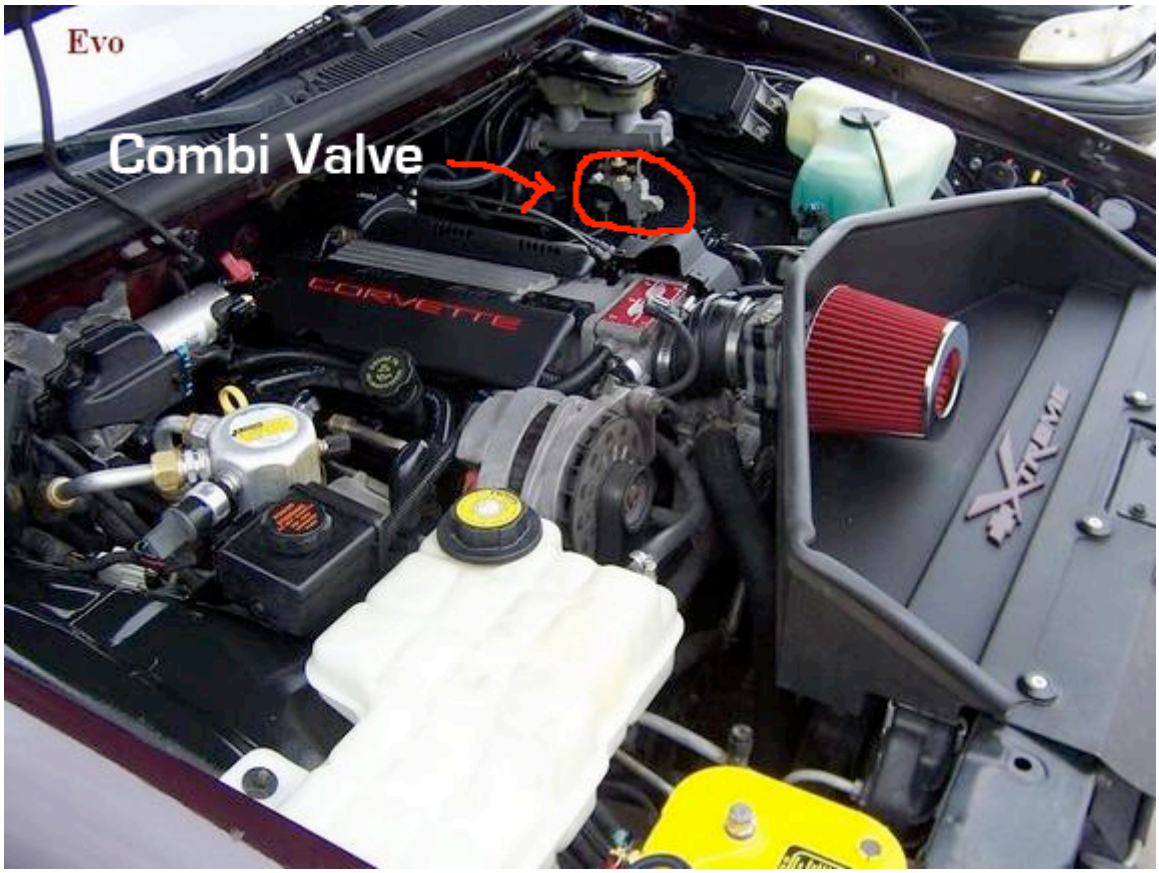
PROFORGED
SEVERE DUTY CHASSIS PARTS

Impala SS / Caprice Brake Bolt Modifications

Background



The combination valve in the Impala SS / Caprice (pictured above) performs the following functions:

1. Front/rear brake bias (also called proportioning)
2. Metering (delay) of front brakes
3. Shuttle switch for hydraulic failure of front or rear brakes.

Because the Impala was made in such small numbers, GM didn't bother to design a specific combi valve for the SS. The bean counters at GM installed the exact same brake

proportioning valve in the 1991-93 Caprice (drum rear brakes) as the 1994-96 Impala SS/Caprice 9C1 (4 wheel disc brakes). This causes two problems:

1. **Proportioning.** Disc brakes have much greater braking power than drum brakes, so cars with rear drum brakes use a mechanism to reduce the pressure to the rear drums - this way, the front brakes do most of the work. Factory brake proportioning is 95% front and 5% rear, which is ideal for cars with drum rear brakes. In a 4-wheel disc car, however, you want the rear brakes to do more than 5% of the work (because the brakes are much more capable). The result of the 95% front / 5% rear proportioning in a 4-wheel disc car is accelerated front pad wear and excessive brake dive under heavy braking. The rear pads are just along for the ride and last practically forever. The brake proportioning is controlled by a 19mm hex bolt on the front of the combi valve (see photo below).

2. **Metering.** Drum brakes take time to "energize." Cars with rear drum brakes use a mechanism to delay the onset of the front brakes so that all 4 brakes engage simultaneously. This "metering function" allows the return springs in the rear drums to be stretched to the point of drum/brake-lining contact before engaging the front brakes. In a 4-wheel disc car - like the Impala SS and Caprice 9C1 - this delay is unnecessary and hurts the reaction speed of your brakes, ultimately resulting in longer stopping distances. In a hard stop, the front brakes will not engage at the same time as the rear brakes. The brake metering is controlled by a 19mm hex bolt on the rear of the combi valve (see photo below).

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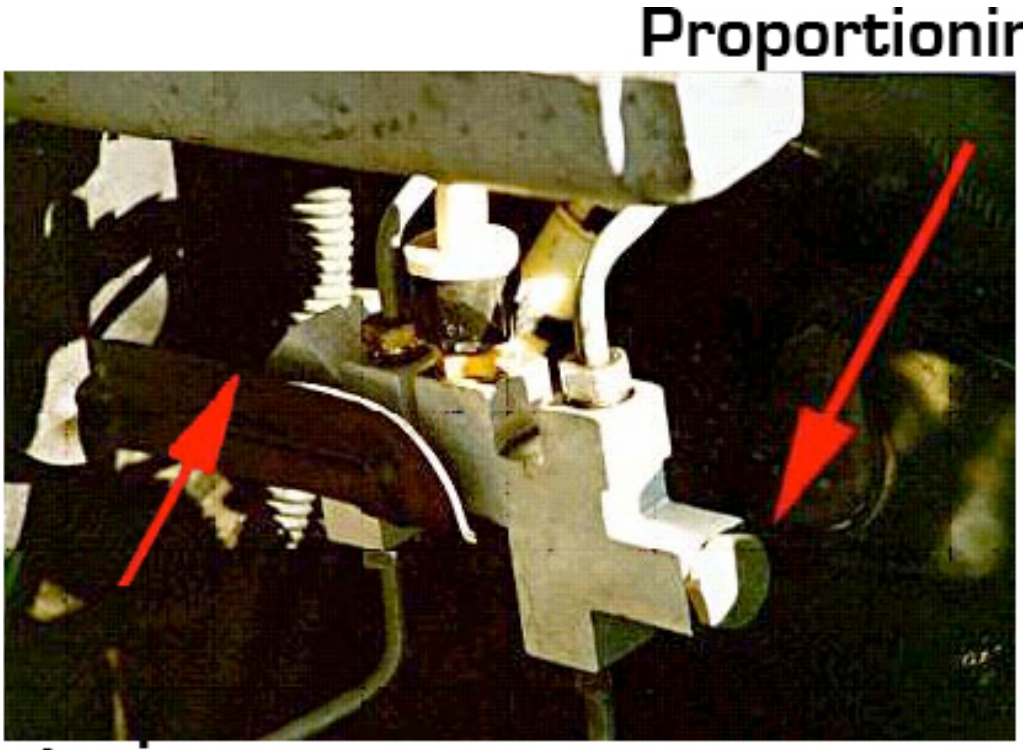
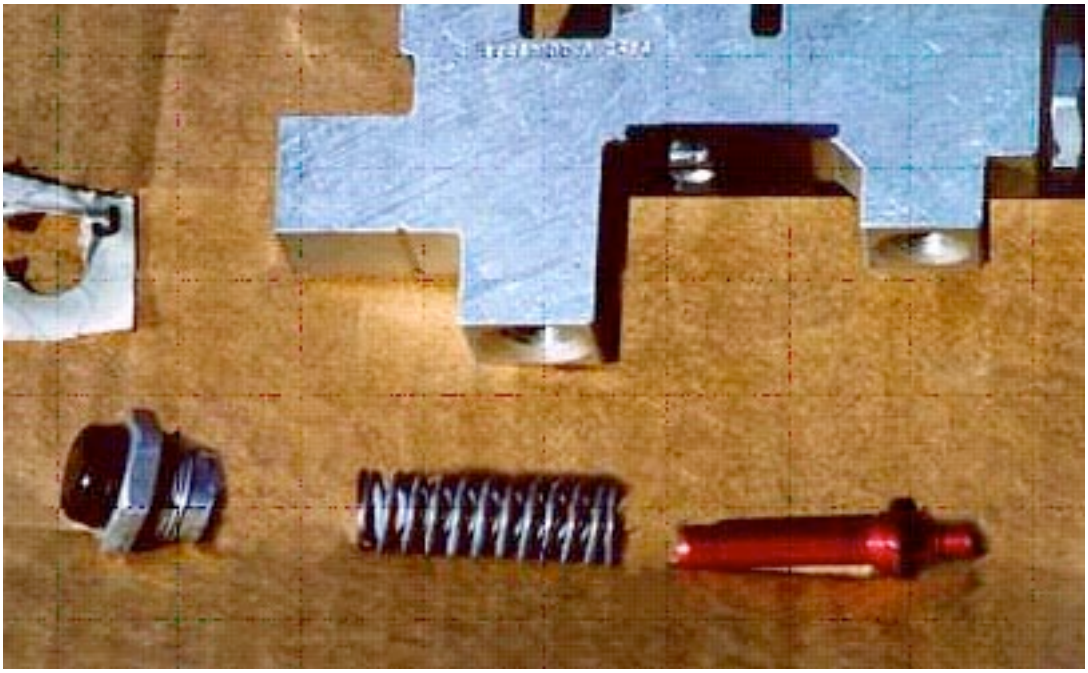


Solutions

Fortunately for all of us Impala SS / Caprice 9C1 owners, there are solutions for these two problems. The Proportioning problem (problem #1 above) is solved by replacing the stock 19mm hex bolt on the front of the combi valve with a nifty little piece called the Stealth Brake Bolt. The stock bolt is vented and holds a spring and red aluminum plunger in place (see below). The Stealth Brake Bolt replaces the stock vented bolt and the spring and red aluminum plunger are discarded. It's that simple - after that is done, your brakes are now proportioned at approximately 65% front and 35% rear!



The Metering problem (problem #2 above) is solved by replacing the 19mm hex bolt on the rear of the combi valve with a different bolt, commonly referred to as the "Bolt II" Metering Bolt. The stock metering bolt is aluminum and is comprised of an integral hex nut, rubber o-ring, and a male threaded section. It is a solid bolt and is machined to have two stepped, concentric metal solid cylinders. The innermost metal cylinder is the longest part and it serves as a mechanical stop for the brake safety shuttle switch (should it engage due to a hydraulic failure), as well as serving to reduce the brake fluid volume in the front-brake section of the combination valve. The outermost cylinder also serves to reduce the brake fluid volume in the front-brake section of the combination valve, but its main purpose is an inexpensive metering valve. When the bolt is screwed into the combi valve assembly, the outermost cylinder covers 50% of the orifice used to feed the front brake line with brake fluid pressure. **This can be a bit of a confusing description - the main point is that part of the stock metering bolt covers a hole, causing a brake fluid flow restriction and causing the delay in engagement of the front brakes.**

To solve this metering problem, the stock bolt is removed and discarded, and replaced with a new bolt that is modified to remove the flow restriction. Alternatively, the stock bolt can be modified to remove the flow restriction, but I won't cover this here for liability reasons.

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Instructions

Stealth Brake Bolt Instructions

Tools needed:

Ratchet
19m hex socket
Adjustable wrench
Needle nose pliers
Paper towels

Procedure

1. Place some paper towel or a shop rag underneath the combi valve.

2. Remove the rubber vented cap and paper tag from the stock bolt (located on the front of the combi valve).

3. Use the adjustable wrench to hold the combi valve body. Loosen the stock bolt (located at the front of the combi valve) with the ratchet. Be careful not to bend the brake lines.

4. Remove the bolt by hand and use the needle nose pliers to extract the spring and red aluminum valve. Be sure that the red aluminum valve has a black plastic "doughnut" at one end. If not, you will have to remove it from the combi valve with a paper clip or other suitable tool. Discard the spring and red valve.

5. Hold the combi valve body with the adjustable wrench and install the new Stealth Brake Bolt.

6. Reinstall the rubber vent cap and paper tag (to retain stock appearance).

7. BLEED THE BRAKES (procedure not covered here) and check for leaks, especially around the Stealth Brake Bolt.

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"Bolt II" Metering Bolt Instructions

Tools needed:

Ratchet
Shallow 19mm socket
Adjustable wrench
Brake fluid
Plastic bags
Paper towels
Shop rag
Turkey baster (found in utensil aisle at grocery store or Walmart)

Procedure

1. Place paper towels inside plastic bags. Place plastic bags underneath back of combi valve to catch brake fluid.

2. Use the adjustable wrench to hold the combi valve body. Loosen the stock bolt (located at the rear of the combi valve) with the ratchet. Be careful not to bend the brake lines.

3. Remove the bolt by hand and discard. Replace it with the new "Bolt II" Metering Bolt.

around the Stealth Brake Bolt.
4. Remove the cover of the master cylinder reservoir and remove the old brake fluid using the turkey baster, down to almost to the bottom of the front and rear reservoir. Wipe the remaining "sludge" from the bottom of the reservoirs.

5. Refill each reservoir halfway, and bleed the brakes (procedure not covered here).

6. Check for leaks, paying close attention to the new bolt that you just installed.

7. Replace the master cylinder reservoir cover.

8. Start the car and press the brake pedal. The pedal should be hard and feel tight.

9. Re-check for leaks.