

Peach State Cadillac BRAKE Clinic Sunday, July 7, 2013

In the pilot's seat of his '55 Fleetwood Sixty Special, Kevin Garrison hovered in the air, a chopper pilot in a mint green "heavy duty." He texted Sandy, who was standing nearby observing the brake work being done under the car →

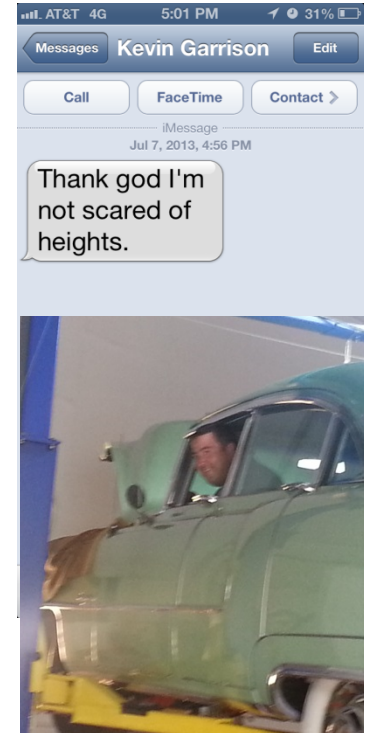
We started out earlier than usual, around noon on Sunday of the July Fourth weekend. Despite the clouds and drizzle we were into this because we were *inside* Bob Winchell's shop. Time for another famous *Peach State Cadillac Clinic!* It has been a few months, but we had a great turnout.¹ Kevin's 133-inch wheelbase Fleetwood made it a target-rich environment for our new instructional format. And Kevin got us off on the right foot with a platter of Subway hoagies and a box o' donuts. Filled the green cooler, and we're *set!*

Winch and Art Gardner did most of the hard work, hitting their noggins on suspension parts and knocking up their knuckles. But Kevin sweated almost as much, pulling wheels and cleaning parts. Several of us pitched in, handling the lights (whether they were needed or not), fetching tools, cleaning up spills, or telling lies about our wrenching prowess: "Say... Jay! Isn't that a FINE *fardenscraper?*" I installed mine with only a Macgillicuddy wrench and a bottle of Chivas!" Kevin had some spongy brakes despite his rebuilt master and booster, and that drove the strategy: We would pull the left side wheels and drums for inspection, and if all was well there, we would replace the original steel brake lines with stainless lines and the old hoses with new gear Kevin got at InLine Tube. While the wheels were coming off Jay would tutor us on brakes.

Brakes Tutorial: Jay gathered the gang around the front tire and explained the parts we examined:

- **Wheels:** Don't forget that the original studs on the left side are stamped with an "L" to indicate reverse threaded lugs on the Fifties cars. In 1959 or '60 Cadillac ended this practice. *Spin them off to the right!* Make sure your tire shop techs know this was common in the Fifties! You don't want a rookie twisting the studs off trying to loosen a lug! Inspect the wheels for cracks and rust. Note: If you're using wheel weights on the outside of the wheel, be aware that they are likely to bind on the wheel cover, jeopardizing the loss of said cover. Most wheels can be balanced with weights on the back side, or

with lead tape used on modern wheels. But if they must be weighted on the front, then find yourself some "Cadillac wheel weights" and use those. You can find them online sometimes.² Cadillac, unlike most other manufacturers of the day, used FULL wheel covers. A Chevy or a Ford had plenty of free wheel edge for a balancing weight, but Cadillac's covers went all the way to the edge. Believe



¹ We had sixteen show up today: Winch, Art, Jay and Kevin. Bill Greene, Sandy Partridge, Larry Reece, Bob Hendershott, George Erneston, Tom Di Nucci, Rob Kaufman, Stan Tucker, Frank Butler, Bill and Ann Marsh, Doug.

² http://www.chemco.ca/Products/Wheel_Balancing/CAX_wts.htm

me, if you have ever followed a Caddie that has thrown a wheel cover you know what I mean: you don't want to take a chance. It's awful to watch that cover bounce around inside the well, clanging away at the skirt and chrome trim, scarring those beautifully expensive whitewalls, and finally flying down the street. Might as well leave that cover in the gutter, since it will be uselessly battered afterwards.



- *Drums:* Rear drums come off by loosening two bolts holding the drum to the axle. Front drums come off by removing the cup, removing the cotter pin, and twisting off the axle nut (reverse threaded too!). You should see a coiled spring around the perimeter of the drum. LEAVE IT ALONE! It's there to absorb some of the vibration. Trying to take one off can be dangerous to your health, and getting it back on is dangerous to your sanity. Inspect the inner surface to make sure it is not "scored" by the brake shoes. Scored drums have grooves worn into the inside surface, and that weakens the braking. A brake shop can smooth out those grooves on a lathe, provided the shop has the proper gear for an older car. (My '58's front drums have conical races, and the shop could not mount them on their lathes.) Also examine the drum for how much "meat" there is left – that is, how thick are the sidewalls? If your drums have been turned so many times the sidewalls are thin, they will need to be replaced. Replacement drums are getting harder to find, and prices lately will run you a Benjamin.



- *Shoes and brakes:* In the photo at right we see the front drum off, with the newly greased spindle exposed. Behind the backing plate you can see the frame rail because the lower inner fender has been removed. (That was some work, since you can get to a few of the bolts from behind the wheel, but a few more are located in the engine bay – up and down on the lift.) You should be able to see that Kevin's shoes were nearly new. The cylinder is at the top, and the adjusting wheel is at the bottom. This is



the wheel you're turning when you stick your adjustment tool through the slot on the backing plate

back home. It's a dirty job, but to get a good look at the parts here you should spray them with brake cleaning fluid and wipe it all down. (Not on the surfaces of the shoes!) You're looking for fluid leaks, bad springs, worn connectors, worn shoes. Kevin's were in good shape. There are two types of shoes: those bonded with an adhesive, and those riveted on – obviously the riveted types will score your drums worse when badly worn than the glued-on shoes, but they both can screech and lose their grip as they wear down to the metal frame. For a shopping comparison, Rock Auto charges \$39/pair for Raybestos shoes part # 127PG.

- **Wheel Cylinders:** The brake cylinders are small pistons that expand when hydraulic fluid is pressed into them, transferring pressure from the pedal through the lines and hoses to the cylinders. When the cylinder expands it shoves the shoes at the top outward, engaging them with the inside of the drum. The adjusting wheel tightens or loosens the brake's framework, placing the shoes in closer contact with the inside surface of the drum. The cylinder is compromised when it leaks fluid. Often you will see a wet drum or brake backing plate, or even see drips down the back sides of the tires. Pulling back the rubber end caps, inspect the cylinder for leaks. New cylinders can be bought at parts stores, and rebuild kits are common online. For comparison shopping Rock Auto charges \$32 apiece for Raybestos cylinders part # WC4803. Rebuild kits cost about \$3 apiece. Kevin's were fine.

- **Steel lines and rubber hoses:** Kevin had been advised in a previous clinic to get the original steel lines replaced, because they rust from the inside out, and you can't tell where leaks are coming from. Better to just replace the lines



once, and with stainless they will last a lifetime. Kevin bought his pre-bent stainless brake lines at Inline Tube for roughly \$180: www.inlinetube.com. They ship in what's called a "shipping bend": That means any lines over 6 feet long are wrapped around a barrel at the warehouse, and you have to straighten the bend on the floor. Inline Tube marks the tubes with labels where the bends are *supposed* to go. The main line from front to back is a long one, as shown above with Kevin at the front end and Winch out back. There were two rubber hoses and four pieces of stainless steel brake line in the kit Kevin bought. He needed one more hose that we simply could not find



on a Sunday at the auto parts stores (pictured above). Raybestos part #bh5931 costs \$16 at Rock Auto: <http://www.rockauto.com/catalog/moreinfo.php?pk=306122&cc=1320624>

There is a steel line that runs across the rear axle to the passenger side's backing plate, shown in the photo below. The line attaches with a brass compression fitting just below the bleeder valve.



This line runs to the left and joins a junction box at the driver's side wheel, circled in the shot below. This shot gives you a better look at the fitting on the driver's side backing plate, and the bleeder valve above it. That brass junction, covered on Kevin's car with some after-market undercoating, ties the passenger side brake into the long line going toward the brake master, and connects a short piece of tubing to the driver's side backing plate. Below, Art looks over the newly cleaned brass block and the new steel line's connection to the wheel. Note: Cadillac went from leaf to coil springs in the rear for the 1958 model year.



Up front, the line connects to a second junction near the steering box. That block was spotlighted in the shot at the bottom of page 2. Another short line runs from there up to the brake master.

- *Master Cylinder:* Remember, Cadillac used both Delco Morraine and Bendix Treadlevac masters and boosters. The rebuild kits are different. Kevin's was already rebuilt, so we are skipping this here. We have written about masters and boosters before. For reference, Rock Auto charges \$9 for the kit on a Delco Morraine, and \$12 for the Bendix kit. I would recommend Midwest Brakes if you're looking for someone to rebuild your master and booster assemblies. <http://www.midwestbrake.com/>

Replacing the brake lines: Winch and Art mainly used open-ended wrenches and a line wrench for this job. I saw a brief encounter with a tubing bender at one particularly reluctant length of tube. They used a rubber mallet for the wheel covers, a tire iron for the lugs, vice grips for the fender skirt, and a brake lever tool to adjust the brakes toward the end. Oh, and we had several lights, both flashlights and shop lights. Art used the bench vise to hold his steel tubing while he worked with bends and fluid, too. And we had a bleeder tool too. The MVT (Most Valuable Tool)? Gotta be the two-post lift! I bet that lift was up and down fifteen times; it was priceless. Don't make me do this on the ground from above or on my back – too old and too stiff! Speaking of priceless. Here's a shot from under the car while Kevin and Hendershott help wrestle that long stainless line into the undercarriage. What's Stan doing, an impression of Pirates of the Caribbean? Argh, Matey!

- *Stainless lines:* Art worked on the rear lines and block while Winch worked with Kevin on the front end, which is harder to get to behind the wheel and under the master cylinder. Art made a good observation from years working on the mid-Fifties Cadillacs:



Work the lines into the block first, then bolt it down. That makes it easier to finish the proper bends. Stainless is much harder than mild steel, which makes it harder to bend and harder to seat into the compression fittings. In either form of steel, however, the manufacturer's instructions suggest to tighten, loosen and wiggle around each connection a few times to make sure the flanged end of the tube seats properly. If it's not in the joint squarely it will not seat well. If it's not seated well it will leak air:

Soft pedal or eventually pedal to the FLOOR! With the front and back sections in place, Winch and Art worked the long line under and through the frame, under the clips and generally into place. It's a job, and their patience showed! Finally, while the rest of us (well, Hendershott and Reece) caught our breath, Winch and Art snugged up the final joints.

- *Hoses:* There's a rubber hose at each corner, and generally speaking if you replace the steel lines you want to replace the



rubber hoses. However, we were missing one. After a careful cleaning and inspection Winch re-used the rear driver's side hose until Kevin can find a replacement.

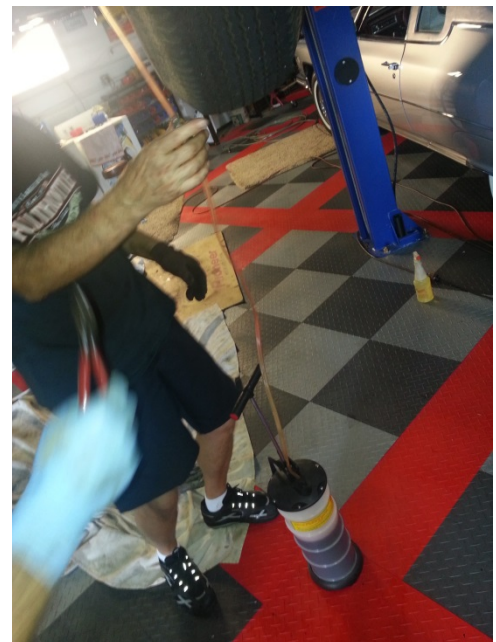
- *Refilling fluids:* We used DOT 3 fluid, which is standard fare for the older Cadillacs. Newer cars use DOT 5 silicon fluid, but it eats rubber fittings in the older cars, and requires retrofitting all rubber components and lines. Remember, brake fluid is caustic as hell. It will eat up your paint in a few seconds, and imagine what it does to an eyeball. Right Art? So, Kevin had to be extra careful filling the master cylinder in the engine bay (shown at right). That's the filler tube on the master circled at right. Kevin wrapped towels around the area to keep from spilling DOT 3 on the paintwork. This took about four or five re-fills throughout the bleeding process.



By the way, Art and Jay have worked out a method they think saves some time. They plug one end of each longer tube, then clamp it in the vise and fill it with DOT 3 by pouring it down a straw. Art figures this saves a lot of pumping on the bleeder equipment. Winch didn't seem so sure about the technique.

By the way, now is the time to get the wheels back on!

- *Bleeding brakes:* Some guys swear by allowing a brake shop to do the bleeding with their equipment. Others suggested the Might Vac, a tool used to suck the air from the lines using a pump at the bleeder valves on each wheel. That's Winch bleeding the air from the system using his pump. The canister is filling up with dirty, old brake fluid. The new stuff goes in nearly clear. To bleed the system of air, you start at the wheel farthest from the master cylinder, and work your way toward the master. The master's filler cap should be ON, to permit a vacuum to build. It has a small hole to allow



the fluid to be drawn toward the pump. After the first round of bleeding Kevin climbed in behind the wheel to help pump the brake pedal while the guys searched for leaks. They found a couple of joints where the stainless lines had not been fully seated, so they loosened each connection and wiggled it around before re-tightening it. Refill the master. After the second round of bleeding we heard some air gurgling at a joint that had not been tightened. We had lost track of which ones were tightened... After a third round of pumping and tightening, the system was secure. Each round required us to lower the car so we could reach the master cylinder's fill tube.

- *Adjusting the brakes:* This is the final step. In order to get the drums back on easily it had made sense to loosen the brake shoes with the star wheel (i.e., bring them together, and *away from* close proximity to the drum). The drums went back on readily enough. But now, with the drums back on, it's time to get those shoes back out where they belong. The basic procedure is to pop out the rubber plug in the hole for the brake adjusting tool to find the adjustment wheel. Then you tighten the brakes using the lever in the hole, moving it up until the wheel no longer spins freely. Then you back the star wheel down two or three clicks so that the shoes are sitting close to the spinning drum without touching it. If the curves in the surfaces of the shoes are not matching the inside curvature of the drum it may take an extra step to get them worn into place: Some guys ask a brake shop to grind them to fit better. Other guys drive around with the brake pedal partially depressed, wearing them down the old fashioned way – through friction. Now would be the time to adjust the emergency brake too, by tightening the adjustment on the emergency brake line. This draws the rear brakes to a stop in case of emergency, or when used as a parking brake. Winch offered one last tip: Occasionally you should USE that emergency brake, just to make sure it's engaging. Those rear brakes account for 30-40% of your stopping power!



Once again, Peach State CLC comes through with a winner. The Cadillac Clinic! You simply cannot beat this kind of fellowship. And we have such experience right here – in the form of Winch and Art and Jay, but also in our other members too – that there's no reason anyone should drive around blind to what's going on underneath their cars. A few hours of watching and learning is all it takes to appreciate how to keep these fine old cars in good shape. Plus, it's a genuinely good time hanging out with the guys!

Our next clinic is being scheduled now. We will announce it once we have a date. It'll cover one of these:

- fuel delivery (e.g., lines, pump, filters, carb adjustments, etc.), OR
- ignition (e.g., distributor points and condenser, plugs, plug wires, coil, etc.), OR
- suspension and steering (e.g., linkage, ball joints, tie rod ends, shocks and springs).

Why not join us? Just let Doug know if you're interested!

-- Doug Bailey 07-09-13