

## Bob's Resource Website (2007) Studebaker Disk Brakes

*The rebuild info is below*

*The first section is an information dump of Studebaker Disk Brakes.*

Technically, the original Bendix disk brake system is of a superior design, to the Turner and Steel-Tech systems. It has a massive, rigid caliper bridge, fixed to the spindle and straddles the rotor and allows a piston to apply brake pressure to each side. Each piston rides on a steel pin, fixed in the caliper housing. The base of the piston has the guide, which is a small spring that binds on the pin. The spring extends slightly when you apply the brakes and retracts the pad, the same amount, when the pressure is released. This action of pulling the pad away from the rotor, contributes to less pad wear, less rolling resistance and cooler rotors, as well as a self-adjuster mechanism. Another feature is, that the pads/pistons will only extend a fixed amount, preventing a pad from wearing down to the steel. A worn pad can never contact and gall the rotor. When the limit is reached, the braking effect diminishes. So, if the original Avanti disk brakes start to pull, they may be telling you to change the pads.

The very same brake system was being used on Ferrari, Aston-Martin and Jaguar, of the period. They are still manufactured, today, in stainless steel, to the exact same specifications. The company is named Hye-dra-cyl, in St. Charles, MO.

Bendix disk brake technology was, naturally, developed on the race track and used metallic pads, which have a some traits that many don't like. Metallic pads have to be 'warmed' up a bit to function properly. They do work, from a cold start, but you might experience a lack of expected effectiveness, until you apply them a couple times. Organic pads have the same, general degree of effectiveness from cold to warm, but have a performance limit, called heat fade. When organic disk brake pads were first used in passenger cars, the pad composition would tend to trap the heat, generated from hard braking, at the rotor. The high temperatures would glaze the pads and with the solid rotor, making the Bendix system and others like it, prone to heat fade. Using metallic brake pads will wick the heat away from the rotor and to a large degree, prevent this 'heat' fade. Brakes with metallic pads will never drop below 80% effectiveness, not matter hot they get and these were the OEM pad on the 1963 Avanti. Developmental testing showed the Bendix brakes maintained a superior braking action, even though the temperatures exceeded 1000 degrees.

Solid disk rotors, used on race cars today, are drilled, slotted or grooved to help alleviate high temperatures and most always use metallic or now, more exotic pads. The, original, Bendix rotors were cast of "gray iron" and can withstand a lot of abuse. On occasion, they can get scored, but with general use and decent maintenance, will remain usable for quite a while. Replacing the pads is a simple exercise that takes around an hour, at most. The original rotors on my car had 140K miles on them, when removed, and had no scarring nor were they ever turned. Most all, modern passenger car, disk brake systems, use a floating caliper and a vented rotor, made of a softer alloy. Vented rotors were developed to counter brake fade and generally, always, use organic pads. The rotation of the vented disk, will draw cool air into an opening, near the spindle, and force it out the vents between the disk sides. The airflow will also draw in moisture and will eventually rust the vents closed, contributing to their demise. These "floating" systems can only rely on the small amount of rotor wobble or wheel bearing run out to move the pads away, when the brakes are released. Some modern calipers, now, have a piston seal, that twists on application and when released, return to normal profile, providing some pad return. Basically, the floating caliper systems of the 70's and 80's were cheaper to manufacture and are more quickly installed in the factory. They have no requirements for shims to adjust clearances etc. They have fewer parts and are effective. but a properly

maintained Bendix disk brake system works fine and will easily, match the braking effectiveness of these aftermarket systems.

(\*) 1) It is very important, that when rebuilding the Bendix calipers, you remove the piston, with air pressure, applied to the fluid line recess. Prying the piston out of the cylinder will inevitably, bend the guide pin and render it useless.

2) On reassembly, be sure to adjust your wheel bearings before shimming the calipers.

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The original Dunlop-Bendix caliper pistons are 2.125" diameter and have the number 2780516 on the piston housing. There's also the size, in numerics, near the pipe outlet, but it's too small to really be legible.



In the late 60's, it became known that there was a larger size piston that could fit the calipers, which was used on the Toyota Crown. Toyota Part# 47740-30011/ kit # 04479-30012

This piston was 2.25" in diameter, bolted right up to the bridge and used the same pads.

Using the larger diameter piston on an Avanti can be beneficial, due to the higher hydraulic pressure, exerted on the pads. You

can upgrade the master cylinder easily to larger than stock. The down side is if these are used on a Hawk, the 1" bore,



master cylinder, isn't large enough to supply the caliper pistons without excessive pedal travel and there's not much out there, with a larger bore, to replace it with.

### Rebuild Procedure

Clean crud

dip in light acid solution to derust

neutralize with a (base) baking soda/water solution

rinse in clean water

rinse again with alcohol to absorb excess water, trapped internally



check cylinder for pits, etched out by the acid dip.



Use Pyro-Putty Metal paste to fill any pits. Wet sand with 220 and they will be like new again.

Fill piston spring recess with brake fluid. This is very important, as even though there are vent holes, the piston sits sideways and air can get trapped inside, if you only fill and bleed the system. If air gets trapped in here, you'll never get a solid pedal

Lubricate and install the piston seal

Wet the inside of the bore with some brake fluid.

Place piston over pin and press lightly until you can pick up the entire assemble with your fingers. This indicates the pin has started into the piston recess.

Use a rubber mallot and piece of wood between your mallot and the piston. Protect the external pad retainer from damage.

Tap the piston toward the bore until the seal is slightly pinched between the two. The bore has a bevel to make it easier for the seal to enter, but it still needs help.

Use a blunt tool to press the seal into the bore hile pushing down on the piston.

Press the piston halfway into the bore, as you have to install the boot now. Some boots have a steel retainer ring to hold it onto the circumference of the cylinder , some do not.

Once the boot is in place, press the piston all the way into the bore. It's ready for installation in the bridge.

These can be installed in the up or down position, usually up so you can read the embossed stampings.



Remember the outer piston on each side uses the bleeder at the top , when mounted and this end has a ball check (BB) under the bleeder valve.

The crossover line goes from the lower port on the outside piston, across the rotor and up to the top of the inside piston. The brake line goes to the bottom of the inside piston.

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(Click images for larger size)





Correct way to  
disassemble the  
piston



Disassembled  
cylinder



Note the check  
ball inside the  
port



The Pyro- Putty  
does a nice job  
resurfacing the  
cylinders



Here are two  
more shots of the  
fill



Click on this pic.  
Be SURE to fill  
the retractor  
pocket with fluid  
BEFORE you  
install the piston.  
If you miss this,  
you'll have a  
difficult time  
getting a hard  
pedal, when  
bleeding the  
system





Press the piston down on the pin, until you can pick it up and it holds by itself. This way you know it's started onto the pin correctly



Click on this Pic. Be careful, when tapping the piston in, that you don't damage the pad retainer



Once the seal is onto the cylinder bevel, you might have to coax it in with a blunt tool. Be careful you DON'T gouge or damage the side that rides on the wall. This is the sealing surface.



Once the seal is down on the wall a bit, stop to install the boot



The boot is stretched over the piston and fits in a groove around the cylinder wall. DO NOT put brake fluid on the boot



Some boots have a spring wire retainer





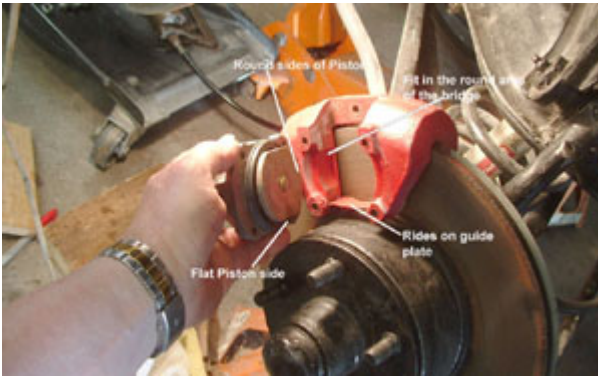
The small diameter of the boot fits onto the neck of the piston



Clean out the pipe ports with a 3/8 X 24 bottom tap



The flat sides of the piston have to be aligned to ride on the pad guide plate properly. Failure to align the piston will result in the guide plate being driven into the rotor each time you apply the brakes, which will be disastrous....



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<----Note the alignment in the caliper bridge  
When the piston is fully retracted, you can easily bolt it up crooked. The pads will slide in and you won't know the difference until you use the brakes.



A little paint and they're like new



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Just waiting for the new crossover pipes.....



A couple more hints... The inside short pipe, from the brake hose to the caliper can be installed easier, if you remove the brake hose fastener clip and allow the female end to be moved around. The short pipe is a tight fit and you don't want to cross thread this.

..... If you've had the entire system off the car and are now reassembling everything, the inside piston assembly can likely be interfered with by the "L" shaped brake hose bracket, which is fastened under the 3/4" caliper bolt, with the shims under it. Loosen this bolt before you install the inside caliper, so you can move it a bit.

..... Some cars require 2 lock washers on those spindle bolts to prevent the end of the threaded section from hitting the rotor.

..... Use Lok-Tite on everything, except the crossover pipes.

..... The crossover line goes from the lower port on the outside piston, across the rotor and up to the top of the inside piston. The brake line goes to the bottom of the inside piston. If you get this wrong, the pipe will be contacted by the wheel and rub a hole in it.

..... Remember the outer piston on each side uses the bleeder at the top, when mounted and this end has a ball check (BB) under the bleeder valve.

Questions? [Email Me](#)

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