



DISC BRAKE KIT

INSTALLATION INSTRUCTIONS

DISCLAIMER

WARNING: FOR OFFROAD USE ONLY

INSTALLATION OF ANY COMPONENT OR KIT SHOULD ONLY BE INSTALLED BY PERSONS EXPERIENCED IN THE INSTALLATION AND PROPER OPERATION OF VEHICLE BRAKE SYSTEMS. BEFORE OPERATING THE VEHICLE, TEST THE BRAKES UNDER CONTROLLED CONDITIONS. MAKE SEVERAL STOPS IN A SAFE AREA AT LOW SPEEDS. THIS PRODUCT SHOULD ONLY BE USED FOR LOW SPEED OFFROAD APPLICATION. ATTEMPTING TO USE THIS PRODUCT ON HIGHWAY CAN BE HAZARDOUS.

INTRODUCTION:

Thank you for purchasing the Spidertrax Disc Brake Kit. To begin, let's run down all the items that are included with this kit and explain their function. First, you should notice the two high quality aluminum caliper mounts. They are clear coat anodized to protect their surface from corrosion. The caliper mounts actually serve two purposes. They mount the calipers in place. In addition, they serve as the new rear bearing retainers. Next, with the elimination of the rear drums you will be left without a mounting surface for your rotors and wheels. That's where the pair of adapter plates come in. These are designed to bolt onto the flanged end of the axle shafts. The five outer holes on the adapter plate will be used to accept OEM Suzuki wheelstuds, which are included with this kit. You will also find all the necessary hardware that will be required to install the disc brakes. To recap, here are the items that you should have received with your kit:

- 2: Aluminum Caliper Mounts
- 2: Steel Adapter Plates
- 10: OEM Wheel Studs
- 8: 5/16-18 Grade 8 Bolts
- 8: 5/16-18 Nylocks
- 16: 5/16 Grade 8 Flat Washers
- 4: M12x1.25-30 Grade 8.8 Bolts
- 4: M12 Lock Washers
- 4: M12 Flat Washers

You must supply your own Suzuki Samurai front calipers and hoses ('87 and up) and Suzuki Samurai front rotors (87' and up). Using this kit by itself will leave you with no e-brake at the rear axle. Spidertrax offers an e-brake system that mounts to the output of the transfer case. It uses a 7" rotor and a mechanical spot caliper actuated by the stock e-brake handle.

In addition, the Disc Brake Kit will require the use of custom brake lines and a proportioning valve. Spidertrax offers a supplementary kit, the Brake Line Kit, which includes these items. Although we explain the brake lines and proportioning valve needed (later in these instructions), purchasing the Brake Line Kit will save much time and effort.

To learn more about brake systems, we recommend reading Brake Systems by Mavrigian and Carley.

PART 1: DISASSEMBLY OF DRUM BRAKES

1) Gather the front calipers, hoses, and rotors that were taken off the donor Suzuki Samurai (**Figure 1**). Inspect the pistons of the caliper to make sure they are in working order. To do this, grab a large c-clamp. Put the ridged end of the clamp on the inner brake pad and the screw end of the clamp on the brake hose mounting bolt. Tightening the c-clamp should collapse the piston. If the piston doesn't collapse, it may be seized in place due to corrosion and should not be used. Inspect the hoses for any cracks and dry rotting. Replace the hoses if they show any signs of wear. We recommend that the rotors be resurfaced at a local auto shop.



Figure 1

2) Now prepare the rear of the vehicle for disassembly. Chock the front wheels and loosen the rear lug nuts. Jack up the rear axle and support it with jack stands. Remove the wheels from the vehicle.

3) Make sure the e-brake is disengaged (e-brake lever should be in the down position). You will need to disconnect the e-brake cable from the vehicle. To start, remove both clevis pins located by the rear drum brakes. Follow the e-brake cable to the e-brake handle, removing all the supports that are present. Finally, remove the clevis pin at the e-brake handle. Keep in mind that the Spidertrax E-brake Kit utilizes the OEM e-brake cable so you may want to hold onto this.



Figure 2

4) Remove the four inner mounting nuts found on the drum. Using a slide hammer for assistance, remove the drum from the rear axle (**Figure 2**)

5) Now you will need to remove the brake shoes and springs from the backing plates (**Figure 3**). To remove the spring clips, push down on the open end with a flat head screw driver and rotate the holding pin 90 degrees with a pair of pliers. Once the clips are removed, pull the brake shoes out and towards each other. This releases the tension on the top and bottom springs. Remove the mechanical actuating lever from the packing



Figure 3

plate.

6) Unscrew the brake line attached to the back of the backing plate. Remember that brake fluid will leak out of this line once it is removed. Therefore, you should place a container under the line.

7) Remove the four mounting bolts that hold the backing plate to the housing. Use the slide hammer to separate the axle shaft from the housing (**Figure 4**). The backing plate acts as a bearing retainer for the axle shaft, so make sure you remove the backing plate before attempting to remove the axle shaft.

8) Its time to remove the backing plate from the axle shaft. The backing plate doesn't just slide off since it is sandwiched between the rear bearing and the axle flange. There are two ways to approach the removal, either one works fine. The first option is to have a machine shop press off the rear bearing thus removing the backing plate. Keep in mind a new retainer ring will have to be used when the bearing is replaced. The second option is to cut the backing plate off of the axle shaft. Use a bench vise to secure the backing plate and carefully cut it off with a Sawzall.

9) The brake line setup will be different after you install the disc brakes. You must remove all steel brake lines that are present on the rear axle housing.



Figure 4

PART 2: OVERVIEW OF NEW BRAKE LINE SETUP

1) Notice in the title we are calling this section an “overview” of the brake line setup. We recommend using Spidertrax’s Brake Line Kit, but if you choose to run your own setup this section will give you the guidelines of what you need to do. **If you purchased the Brake Line Kit, skip Part 2 and follow the instructions included in the Brake Line Kit. After installing the Brake Line Kit, continue the Disc Brake installation at Part 3.**

2) The pictures in the Brake Line Setup section show the brake line installation on a ‘94 Samurai. Note that ‘86-‘88 Samurai’s use a different type of brake line setup then the ‘88.5-‘95. Also note all Samurai fittings are metric.

‘88.5-’95 Brake Line Setup

3) First, run a short brake line off the rear brake tab (**Figure 5**). This tab secures the brake hose coming down from the frame to the rear axle. Next , use a tee connection to split the line to both calipers.

4) You will have to run brake lines from the tee connection to both ends of the housing. Notice the end of the lines (where the brake caliper hose attaches) should bend back slightly (**Figure 6**). This is so the brake line does not hit the u-bolts. Be sure that if you are running an SPOA the brake line should also come down slightly to clear the leaf spring. Finally the end of the brake line should not pass the inner u-bolt. We used the existing brake line fasteners (located on the housing) to support the new brake lines.



Figure 5



Figure 6

‘86-’88 Brake Line Setup

3) The installation for the ‘87 will differ slightly then the ‘94 shown above. First there are two hoses coming down to the rear axle. Route a single brake line to either side of the housing. The original brake line can be reused by trimming and flaring them to the correct length.

4) Although **Figure 6** shows the setup on the ‘94 vehicle, you can still notice the end of the lines (where the brake caliper hose attaches) should bend back slightly. This is so the brake line does not hit the u-bolts. Be sure that if you are running an SPOA the brake line should also come down slightly to clear the leaf spring. Finally the end of the brake line should not pass the inner u-bolt. We used the existing brake line fasteners (located on the housing) to support the new brake lines.

Proportioning Valve

1) A proportioning valve is a must for this brake system to function properly. Refer to the section on the next page that corresponds to your vehicle. For all vehicles we are using a Stainless Steel Brakes (SSB) proportioning valve available though most automotive retailers.

‘88.5-’95 Proportioning Setup

2) **Figure 7** (next page) shows the brake line needed to install the proportioning valve. This brake line will have a metric fitting on one end for the master cylinder and a standard fitting for the proportioning valve. The proportioning valve will sit just above and to the front of the master cylinder (**Figure 8** next page).

3) First, you will need to disconnect the brake line from the master cylinder that feeds the rear brakes. This is the line closest to the firewall.

4) Cut the flare off the end of this line and remove the metric fitting (try to cut off as little as possible to make re-

installation easier). Replace the metric fitting with a standard 3/16 flare fitting and flare the line.

5) Use the metric end to attach the new brake line to the master cylinder. **Figure 8** illustrates how to run this line. Loop the line underneath the master cylinder and around to the proportioning valve. The proportioning valve will sit on top and in front of the master cylinder. Connect the standard end of the new line to the **IN** of the proportioning valve.



Figure 7



Figure 8

6) Connect the existing brake line with the new standard fitting (from step 4) to the **OUT** of the proportioning valve. The line will have to be bent slightly to reach the proportioning valve.

'86-'88 Proportioning Setup

2) The '86-'88 Samurai uses a "split diagonally" brake system which circuits the front left brake with the rear right brake and the front right brake with the rear left brake. The '88.5-'95 Samurai uses a "split front-to-rear" brake system where one piston in the master cylinder controls the front brakes and the other piston controls the rear brakes. The Spidertrax Disc Brake Kit utilizes the split front-to-rear system similar to the '88.5-'95 models. By segregating the front and rear brakes, you are

able to bias the rear brakes using a proportioning valve.

3) You will need to follow the lines from the master cylinder to the first manifold on the front passenger frame rail. This manifold is shown in **Figure 9**. This is off an '87 Samurai.

4) Looking first at **Figure 9** for reference, remove the top right brake line and the bottom left brake line. **Figure 10** shows these lines removed.

5) Now reverse the location of the two lines and re-install. There should be no need to cut and flare these lines. Carefully bend these lines so they can be reversed. Completed, your manifold should resemble **Figure 11** (next page).



Figure 9



Figure 10

This is now a "split front-to-rear" brake circuit. Be sure that the repositioned brake lines are out of the way of the clutch lever.

6) Now you will need to install the proportioning valve. You will need to disconnect the brake line from the master cylinder that feeds the rear brakes. This line is the one **furthest** from the firewall.

7) Cut the flare off the end of this line and remove the metric fitting (cut off as little as possible to make re-installation easier). Replace the metric fitting with a standard 3/16 flare fitting and flare the line.

8) **Figure 7** shows the brake line needed to install the proportioning valve. This brake line will have a metric fitting on one end for the master cylinder and a standard fitting on the other for the proportioning valve.

9) Use the metric end to attach the new brake line to the master cylinder. Loop the line underneath the master cylinder and around to the proportioning valve. The proportioning valve will sit on top and in front of the master cylinder. Connect the standard end of the new line to the **IN** of the proportioning valve. This is different to the way the '88.5-'95 is run because your new brake line will be attached to the port on the master cylinder **furthest** from the firewall. You can

refer to **Figure 8** for reference on the location of the proportioning valve; however, keep in mind that your new brake line will be connected to the master cylinder port furthest from the firewall.

10) Connect the existing brake line with the new standard fitting (from step 7) to the **OUT** of the proportioning valve. The line will have to be bent slightly to reach the proportioning valve.

PART 3: INSTALLATION OF DISC BRAKES

1) First we will apply a coat of anti-seize to the ends of the axle housing flange (**Figure 12**). Even though the caliper mounts are anodized, mating steel to aluminum can advance corrosion. Adding anti-seize is just an extra precaution.

2) With the rear axles free from the drum backing plates, slide the axles into the housing. Use a rubber mallet to assure the axles are seated properly in the housing.

3) Locate the 8 5/16"-18 grade eight bolts, the matching 8 nylocks, and the 16 grade eight washers included in this kit. Use this hardware to fasten the aluminum caliper mounts to the end of the housing (**Figure 13**). The Spidertrax logo engraved on the caliper mount should face the center of the axle housing. The 5/16"-18 bolts should be inserted from the outside of the axle housing. Use two washers per bolt (one on the head and one on the nut side). Recommended torque is 20-25 lb-ft.

4) Next locate the 10 OEM Suzuki wheel studs provided in the kit along with the two steel adapter plates. Press the 10 wheel studs into the adapter plates. There is no front or back to the adapter plate.

5) Place the adapter plates on the end of the axles shafts (**Figure 14** next page). The 4 original nuts and lock washers used to mount the drums will be reused to mount the new adapter plates.



Figure 13

6) Put the Suzuki rotor onto the adapter plate.

7) The caliper will now be positioned on the caliper mounts. Be sure to use new brake pads with the installation of the caliper. The caliper piston should be retracted in order to fit over the rotor. Slide the caliper over the rotor and line up the mounting holes with that of the caliper mount (**Figure 15** next page). Locate the 4 M12-1.25x30mm bolts along with the 8 flat and lock washers. Slide the lock washer onto the bolt followed by the flat washers. Insert the bolts through the caliper mount and tighten to 70-75 lb-ft.

8) Attach the brake hose to the steel brake line on the axle housing.

9) Remount the rear wheels and lower the vehicle

10) Finally check over all installed brake lines and fittings. You may have leaked gear oil during the removal of the axle shafts. Be sure that you have the proper amount of gear oil in the axle housing.



Figure 11



Figure 12

PART 4: BLEEDING THE BRAKES

1) It is best to have a partner when bleeding the brake system. One should sit in the vehicle and actuate the brake pedal (Driver), and the other will control the bleed screw (Bleeder). The Bleeder, who is under the vehicle, will give the order when to press the brake pedal. Good communication is key.

2) The Driver can fill the master cylinder with brake fluid. Keep an eye on the fluid level during this procedure to make sure it does not go below the minimum.

3) The Bleeder can crack all 4 bleeder screws on the calipers to allow the system to gravity bleed. Once a caliper drips fluid close its bleeder screw.



Figure 14



Figure 15

4) Starting with the rear driver side caliper, the Bleeder will give the command to the Driver to pump the brake pedal. After several pumps, the Bleeder will give the command to hold the pedal down firmly. At this point the Bleeder will crack the bleeder screw to release pressure in the line. The Bleeder first tightens the bleeder screw and then instructs the driver to release the brake pedal. The Bleeder will notice that a mixture of fluid and air will come out of the bleeder screw. When air is present in the fluid being released it tends to spray rather than stream. This process should be repeated for the rear driver side caliper until NO air is present.

5) Repeat step 4 on the remaining calipers in the following order: rear passenger, front passenger, front driver. Remember that the Driver needs to keep an eye on the fluid level in the reservoir.

6) At the conclusion of the brake bleeding procedure the Driver should have a firm brake pedal, meaning all the air has been removed from the system. With the new rear disc brakes, the brake pedal will travel slightly further before resistance is felt.

PART 5: CALIBRATION OF THE PROPORTIONING VALVE

1) Properly calibrating your proportioning valve is critical for your new brake system. Without the proportioning valve, the brakes will distribute their power 50% in front and 50% in rear. This is usually not the case in a brake system since it requires more braking power in the front than in the rear. Generally when you use the 50% front and 50% rear braking power the rear brakes may lock up prematurely and the vehicle will slide sideways uncontrollably. The proportioning valve will allow you to reduce the rear braking power and thus increase the front braking power, say 60% front and 40% rear for example. We cannot tell you where to set the dial on the proportioning valve since the degree of proportioning depends on the size of tires and the type of suspension that is on your vehicle. What we will do in this section is explain the calibration procedures that are required to properly set the proportioning valve to your vehicle. We will be using Stainless Steel Brakes (SSB) proportioning valve available through most automotive retailers and also included in the Spidertrax Brake Line Kit.

2) First, rotate the proportioning dial counterclockwise completely. This will “decrease” the braking power to the rear to the full capacity of the proportioning valve. Thus, with the SSB proportioning valve, the brakes will be proportioned 70% in front and 30% in rear. Find yourself an open lot to perform the braking test. Make sure that you have a pavement surface that is dry and without a lot of gravel and loose rocks. In addition, be sure your tires are filled with the proper tire pressure. Drive the vehicle slowly and use the brakes to make sure they are actuating. It’s a good idea to find two other people to help calibrate the brakes. Have one person driving the vehicle with the other two watching the vehicle from the outside. Also, make sure you are wearing your seatbelt and that you are clear of other cars and people.

3) Next, drive the vehicle approximately 20 mph and attempt to lock the tires. Be sure to apply the brakes abruptly. One person will be watching the driver side and one person will be watching the passenger side. Each person will record what happens to the front and rear tire on their side. They may see three different situations: the front and rear tires lock simultaneously and equally, the front tire locks completely with the rear tire slightly chirping (on the verge of locking), or the front not locking at all and the rear locking completely. They should not see the driver side rear locking without the passenger side rear locking simultaneously. If this occurs, it may be due to a bad caliper or improper brake bleeding. If the front does not lock and the rear locks completely, the vehicle will slide sideways so be careful. This should not happen if the proportioning dial is initially set as described in step 2 above.

4) In the "ideal situation", the front brakes will lock completely with the rear just on the verge of locking or locking secondary to the front. The vehicle should brake in a straight line and should not slide or pull. You will need to repeat the test, turning the valve in 1/4 turn clockwise increments, until you get the "ideal situation".

5) In our testing, the '94 stock Samurai was set 1/4 turn clockwise from the setting in step 2. However, some guys have found that with certain types of suspensions and tires, the proportioning valve can almost be entirely opened (all the way clockwise). Again, it depends on the vehicle.

6) Once you have achieved the "ideal situation", described in step 4, continue to drive the vehicle in the open lot to get familiar with the new braking power. Keep in mind that the feel of the brake pedal will be a little different as well. If you have any hesitation about the brakes working properly, you should contact us. Contacting us via email is preferred but you can also contact us by phone.

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