

BRAKE SYSTEM

Article Text

1996 Toyota RAV4

For 1 1 1 1

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Wednesday, September 13, 2000 05:30PM

ARTICLE BEGINNING

1996 BRAKES
Toyota - Disc & Drum

RAV4

*** PLEASE READ THIS FIRST ***

WARNING: For warnings and procedures regarding vehicles equipped with Anti-Lock Brake Systems (ABS), see ANTI-LOCK BRAKE SAFETY PRECAUTIONS article.

DESCRIPTION & OPERATION

Hydraulic brake system uses a tandem master cylinder with a vacuum power assist servo. Vehicles are equipped with front disc brakes and rear drum brakes standard.

A load-sensing proportioning valve is used to regulate brake pressure between front and rear brakes. Rear brakes are self-adjusting.

Parking brake lever mechanically activates the rear brakes. A cable applies rear shoes.

BLEEDING BRAKE SYSTEM

BLEEDING PROCEDURES

CAUTION: DO NOT allow reservoir to run dry during brake bleeding procedure. Use only clean brake fluid. Ensure no dirt or other foreign matter contaminates brake fluid. DO NOT mix different types of brake fluid, as they may not be compatible. DO NOT spill brake fluid on vehicle, as it may damage paint. If brake fluid contacts paint, immediately wash with water.

1) If master cylinder is rebuilt or reservoir is empty, bleed master cylinder first. Bleed wheels in sequence. Start on wheel with longest hydraulic line, and work toward wheel with shortest hydraulic line.

2) Raise and support vehicle. Ensure brake fluid reservoir is at least half full during bleeding procedure. Connect one end of transparent vinyl tube to bleeder screw. Submerge other end of tube in a container half filled with clean brake fluid.

3) Have an assistant depress brake pedal several times and hold in depressed position. Loosen bleeder screw, and drain fluid into container. Tighten bleeder screw.

NOTE: Ensure brake pedal remains depressed until bleeder screw is tightened.

BRAKE SYSTEM

Article Text (p. 2)

1996 Toyota RAV4

For 1 1 1 1

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Wednesday, September 13, 2000 05:30PM

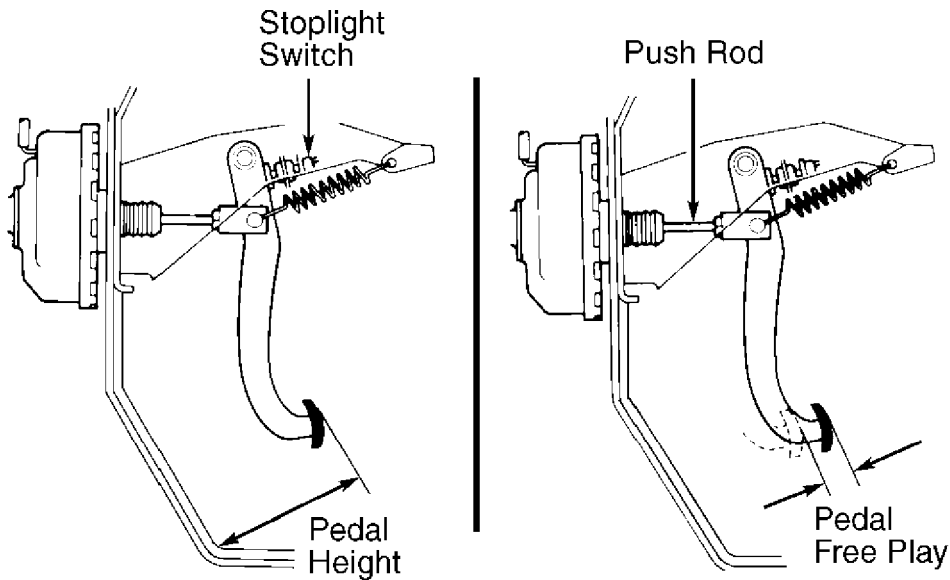
4) Refill brake fluid reservoir as necessary. Repeat step 3) until air is no longer discharged. Tighten bleeder screw to 74 INCH lbs. (8 N.m). Ensure fluid leakage is not present. Add fluid to reservoir. Repeat procedure for remaining wheels.

ADJUSTMENTS

BRAKE PEDAL HEIGHT

1) Brake pedal height is measured from face of pedal pad to asphalt sheet under carpet. To adjust clearance, loosen stoplight switch and lock nut on brake push rod. See Fig. 1.

2) Adjust pedal height by turning push rod. See BRAKE PEDAL SPECIFICATIONS table for correct specification. After setting pedal height, tighten lock nut on push rod. Adjust stoplight switch and tighten switch lock nut. See STOPLIGHT SWITCH.



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Fig. 1: Measuring Brake Pedal Height & Free Play
Courtesy of Toyota Motor Sales, U.S.A., Inc.

BRAKE PEDAL SPECIFICATIONS TABLE

Application	Free Play In. (mm)	Pedal Height In. (mm)
RAV4	.04-.24 (1.0-6.0)	6.2-6.6 (157-167)

BRAKE PEDAL FREE PLAY

1) Brake pedal free play is distance brake pedal travels before feeling resistance with engine stopped. To check pedal free play, depress brake pedal several times to exhaust vacuum from servo.

BRAKE SYSTEM

Article Text (p. 3)

1996 Toyota RAV4

For 1 1 1 1

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Wednesday, September 13, 2000 05:30PM

2) Depress pedal and measure travel until initial resistance is felt. See BRAKE PEDAL SPECIFICATIONS table. If free play is not within specification, adjust by turning push rod. See Fig. 1.

BRAKE PEDAL RESERVE DISTANCE

1) Pedal reserve distance is measured from face of pedal pad to asphalt sheet under carpet with brakes applied. Measure reserve distance with engine running and weight of 110 lbs. (50 kg) applied against pedal.

2) If measured reserve distance is less than specification, inspect brake system. See BRAKE PEDAL MINIMUM RESERVE DISTANCE SPECIFICATIONS table.

BRAKE PEDAL MINIMUM RESERVE DISTANCE SPECIFICATIONS TABLE

Application	In. (mm)
RAV4	2.95 (75)

LSPV (LOAD-SENSING PROPORTIONING VALVE) & BPV (BY-PASS VALVE)

NOTE: Vehicles do not use a Load-Sensing Proportioning Valve (LSPV) or By-Pass Valve (BPV).

PARKING BRAKE

NOTE: Rear brakes must be correctly adjusted before adjusting parking brake. See REAR BRAKE DRUM under REMOVAL & INSTALLATION.

Lever Stroke Adjustment

1) Pull on parking brake lever with weight of 44 lbs. (20 kg) to check parking brake adjustment. Count number of notches (clicks) until parking brake is fully applied. See PARKING BRAKE LEVER STROKE SPECIFICATIONS table. Adjust parking brake if travel is not within specification.

PARKING BRAKE LEVER STROKE SPECIFICATIONS TABLE

Application	Notches
RAV4	5-8

2) Remove center console or parking brake lever boot to uncover base of lever. Loosen adjusting cap. Turn adjusting nut on cable until lever travel is correct. Tighten adjusting cap. Install console or boot.

BRAKE BOOSTER PUSH ROD

BRAKE SYSTEM

Article Text (p. 4)

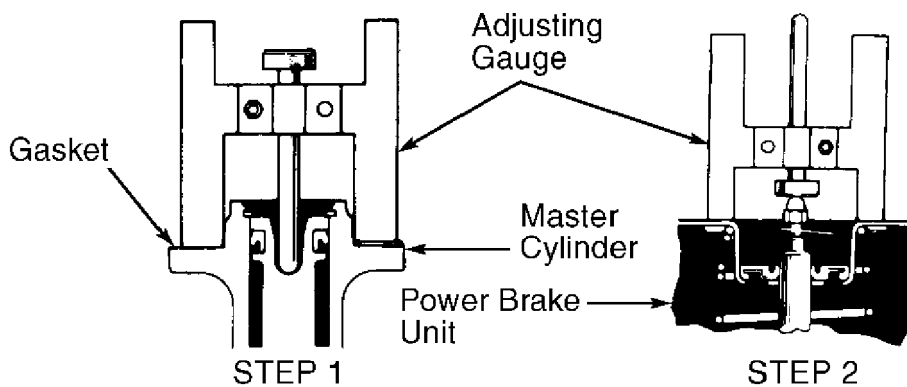
1996 Toyota RAV4

For 1 1 1 1

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Wednesday, September 13, 2000 05:30PM

1) Install Adjusting Gauge (09737-00010) on master cylinder with master cylinder gasket in place. Lower adjusting gauge pin until pin slightly touches master cylinder piston. Perform STEP 1. See Fig. 2. Turn adjusting gauge upside down and install on power brake unit.

2) Measure clearance between power brake unit push rod and adjusting gauge pin head. Measured clearance should be zero. Perform STEP 2. See Fig. 2. If clearance is not zero, adjust brake booster push rod length until push rod lightly touches adjusting gauge pin head.



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Fig. 2: Adjusting Brake Booster Push Rod
Courtesy of Toyota Motor Sales, U.S.A., Inc.

REAR DRUM BRAKE SHOES

NOTE: All rear drum brakes have a self-adjuster which is activated when brake pedal is applied with vehicle traveling in reverse.

To set initial lining-to-drum clearance, raise and support rear of vehicle. Release parking brake. Remove rear wheels and brake drums. Measure brake drum inside diameter and brake lining diameter. Measured clearance between linings and braking surface of drum should be .024" (.60 mm). Turn brake adjuster to obtain specified clearance. Install brake drum and wheel and adjust brakes (if necessary).

STOPLIGHT SWITCH

Remove lower instrument panel and air duct (if necessary). Loosen lock nuts. Turn switch until clearance between threaded end of switch and pedal stop is .02-.09" (.5-2.3 mm). See Fig. 1. Check brake pedal height and brakelight operation.

TESTING

POWER BRAKE UNIT

BRAKE SYSTEM

Article Text (p. 5)

1996 Toyota RAV4

For 1 1 1 1

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Wednesday, September 13, 2000 05:30PM

Functional Test

1) Start engine. Turn ignition off. Depress brake pedal several times. Depress pedal firmly and hold pressure for 15 seconds. If pedal sinks, master cylinder, wheel cylinder, caliper or brakeline is faulty.

2) Start engine with pedal depressed. If pedal sinks slightly, vacuum unit is working properly. If pedal height does not vary, booster or check valve is faulty. Replace as necessary.

Leak Test

1) Depress brake pedal with engine running. Turn ignition off. If pedal height does not vary while depressed for 30 seconds, vacuum booster is okay. If pedal height changes, check for air leaks.

2) With engine stopped, depress brake pedal several times using normal pressure. Pedal should be low when first depressed. On consecutive applications, pedal height should gradually rise. If pedal height does not increase, check for air leaks.

REMOVAL & INSTALLATION

*** PLEASE READ THIS FIRST ***

NOTE: Location and number of anti-rattle springs, anti-squeal shims, pad support and guide plates vary between models. Note component locations during removal process for reassembly reference.

FRONT DISC BRAKE PADS

NOTE: Pushing piston into caliper bore will force fluid back into master cylinder reservoir. Remove reservoir cap when compressing caliper piston.

NOTE: Always change pads on one wheel at a time. Opposite piston may be pressed out by fluid pressure.

Removal & Installation

1) Raise and support vehicle. Remove front wheel. Install 2 lug nuts to hold rotor in place. Remove lower caliper bolt. Rotate caliper upward. Suspend caliper aside with wire.

2) Remove springs, pads, shims, wear indicators and support plates. See Fig. 3. To install, reverse removal procedure. Tighten lower caliper bolt to specification. See TORQUE SPECIFICATIONS. Check reservoir fluid level.

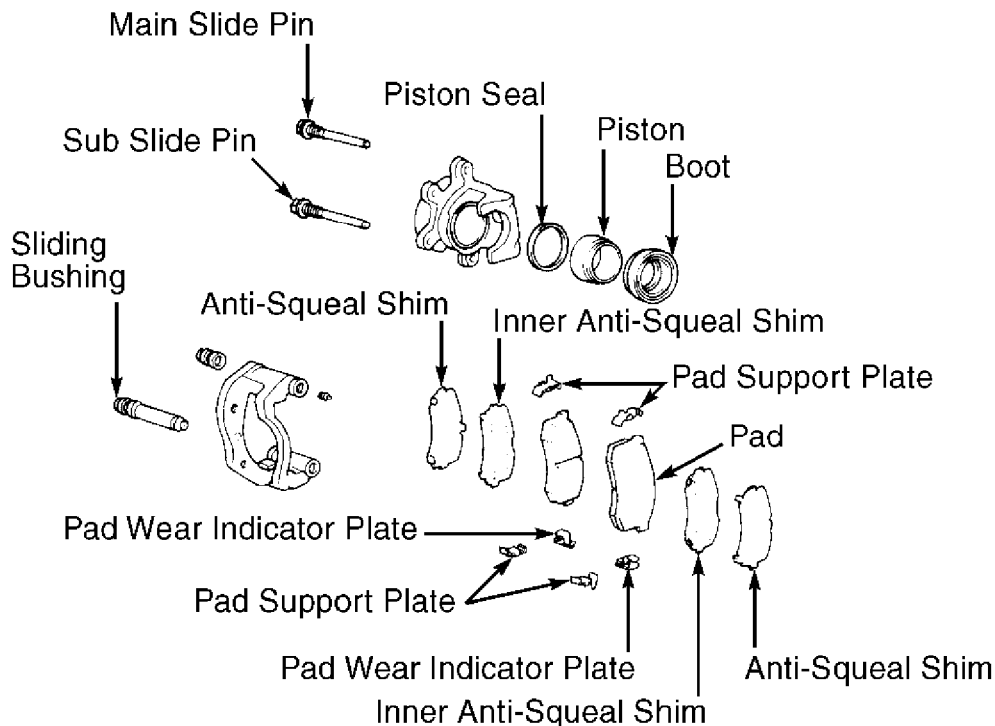
BRAKE SYSTEM

Article Text (p. 6)

1996 Toyota RAV4

For 1 1 1 1

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Fig. 3: Exploded View Of Front Brake Caliper (2WD - Typical)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

FRONT BRAKE CALIPER

Removal & Installation

1) Raise vehicle and remove wheels. Disconnect flexible brake hose from caliper. Plug hose to prevent fluid spillage. Remove caliper mounting bolts or slide pins as necessary.

2) On models with fixed main pin, pivot caliper up to clear edge of rotor. Slide caliper off main pin. On all other models, remove caliper from knuckle or torque plate. To install, reverse removal procedure. On units with fixed main pin, install boot end in groove of main pin.

FRONT BRAKE ROTOR

Removal & Installation

Remove caliper assembly with hose connected. Support caliper from frame with wire. Remove torque plate from knuckle. Slide rotor off hub assembly. To install, reverse removal procedure. Tighten all bolts to specification. See TORQUE SPECIFICATIONS.

REAR BRAKE DRUM

Removal

Ensure parking brake is released. Raise and support vehicle. Remove wheel. Remove set screws from brake drum (if equipped). Pull drum from axle flange. It may be necessary to loosen brake shoe

BRAKE SYSTEM

Article Text (p. 7)

1996 Toyota RAV4

For 1 1 1 1

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Wednesday, September 13, 2000 05:30PM

adjuster before removing drum.

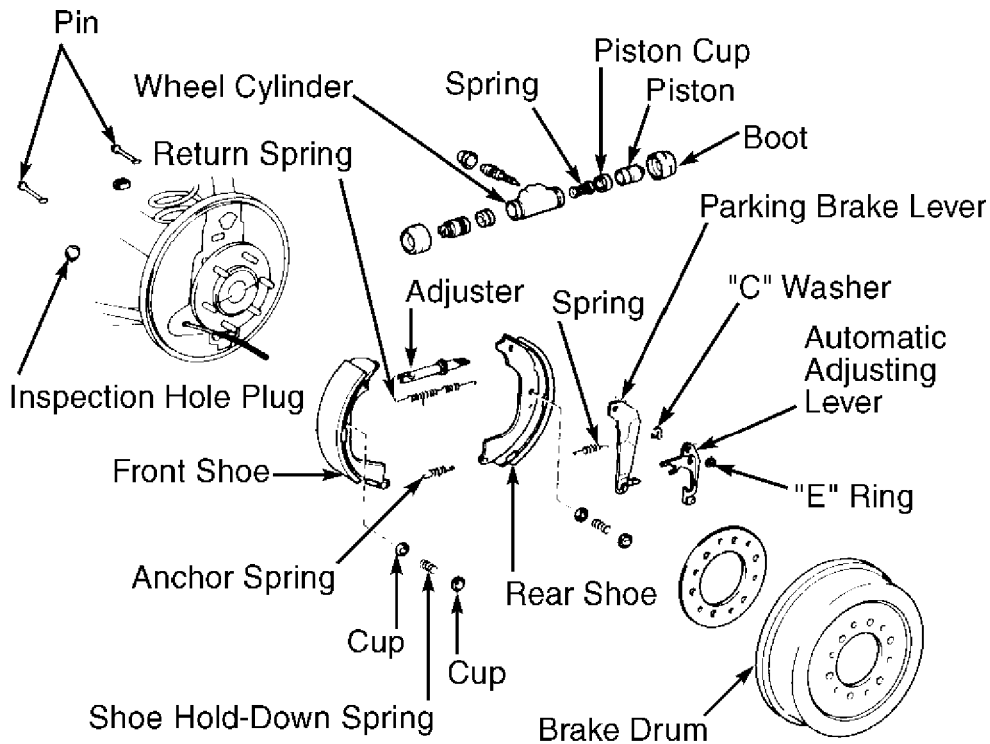
Installation

Measure inside diameter of brake drum and diameter of brake shoes. Turn brake adjuster until difference between diameters is .024" (.60 mm). Install brake drum and adjust brakes, if necessary.

REAR DRUM BRAKE SHOES R & I

Removal

Remove brake drum, tension spring and hold-down springs. See Fig. 4. Remove tension spring from bell crank. Remove brake shoes and disengage parking brake lever.



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Fig. 4: Exploded View Of Typical Rear Drum Brakes
Courtesy of Toyota Motor Sales, U.S.A., Inc.

Installation

Position brake shoes over wheel cylinders with front return spring hooked on inner side of shoe. Install hold-down springs. To complete installation, reverse removal procedures. Adjust brake shoes.

REAR WHEEL CYLINDER

Removal & Installation

With brake drum and shoes removed, disconnect hydraulic line from wheel cylinder. Remove mounting bolts and remove wheel cylinder. To install, reverse removal procedure. Adjust brakes and bleed system. See BLEEDING BRAKE SYSTEM.

BRAKE SYSTEM

Article Text (p. 8)

1996 Toyota RAV4

For 1 1 1 1

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REAR AXLE BEARING & OIL SEAL

Removal & Installation (2WD)

1) Remove axle shaft cotter pin and lock cap. While apply brakes, remove axle shaft nut. Raise and support rear of vehicle.

2) Remove wheel. Remove brake drum. See REAR BRAKE DRUM. Remove brake shoes. See REAR DRUM BRAKE SHOES R & I. Remove parking brake cable from backing plate. Disconnect brake fluid line from wheel cylinder.

3) Remove 4 bolts securing hub, bearing, backing plate and axle to suspension arm. Remove components as an assembly. Using puller, remove bearing from hub. Remove inner bearing race from outside of hub. To install, reverse removal procedure.

Removal & Installation (4WD)

1) Remove axle shaft cotter pin and lock cap. While apply brakes, remove axle shaft nut. Raise and support rear of vehicle. Remove wheel. Remove brake drum. See REAR BRAKE DRUM. Mark drive shaft and differential side gear flange for installation reference. Remove 4 drive shaft flange bolts. Remove drive shaft.

2) Remove ABS speed sensor. Remove brake shoes. See REAR DRUM BRAKE SHOES R & I. Remove parking brake cable from backing plate. Disconnect brake fluid line from wheel cylinder.

3) Remove 4 bolts securing hub, bearing and backing plate to suspension arm. Remove components as an assembly. Using puller, remove bearing from hub. Remove inner bearing race from outside of hub. To install, reverse removal procedure.

MASTER CYLINDER R & I

Removal

Unplug sensor lead. Drain brake fluid from reservoir. Disconnect and plug hydraulic lines. Remove master cylinder-to-power brake unit nuts. Remove master cylinder.

Installation

If master cylinder has been overhauled or replaced, check and adjust power brake unit push rod. See BRAKE BOOSTER PUSH ROD under ADJUSTMENTS. To install, reverse removal procedure. Bleed brake system. See BLEEDING BRAKE SYSTEM.

POWER BRAKE UNIT

Removal & Installation

Remove master cylinder assembly from vehicle. See MASTER CYLINDER R & I. Disconnect vacuum hose. Disconnect push rod clevis at brake pedal. Remove power brake unit from vehicle. To install, reverse removal procedure.

LSPV & BPV (LOAD-SENSING PROPORTIONING VALVE & BY-PASS VALVE)

BRAKE SYSTEM

Article Text (p. 9)

1996 Toyota RAV4

For 1 1 1 1

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NOTE: Vehicles do not use a Load-Sensing Proportioning Valve (LSPV) or By-Pass Valve (BPV).

OVERHAUL

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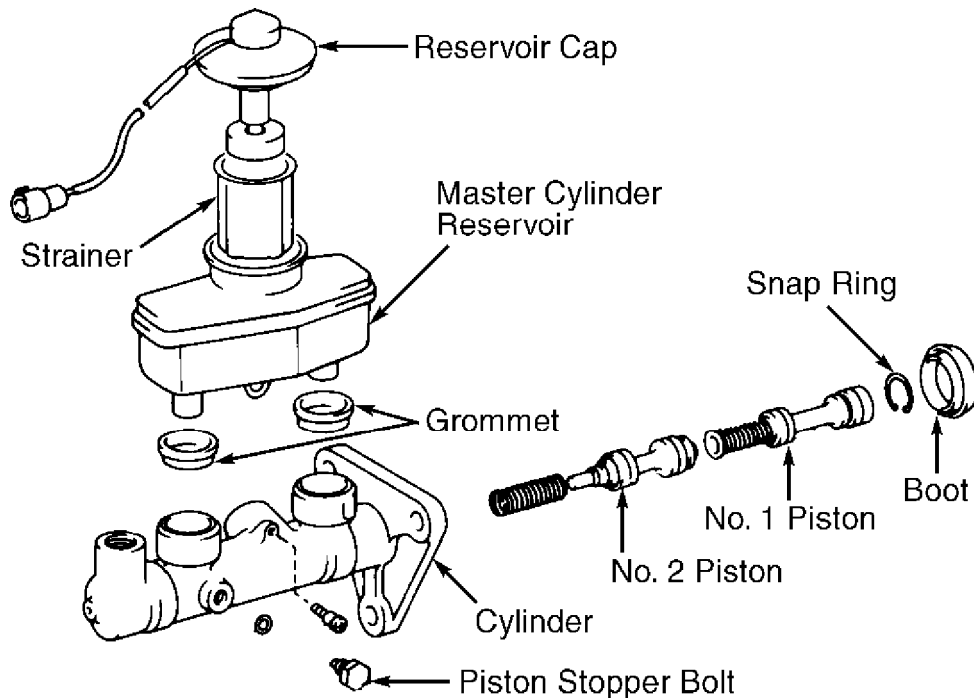
NOTE: When overhauling caliper, if piston bores are pitted or scored beyond repair by light honing, replace entire assembly.

FRONT BRAKE CALIPER

NOTE: When overhauling front brake calipers, see Fig. 3.

MASTER CYLINDER

NOTE: For exploded view of master cylinder assembly, see Fig. 5.



96A21170

Fig. 5: Exploded View Of Master Cylinder Assembly (Typical)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

DISC BRAKE SPECIFICATIONS

DISC BRAKE SPECIFICATIONS TABLE

Application	In. (mm)
Standard Disc Thickness	.709 (18.00)

BRAKE SYSTEM

Article Text (p. 10)

1996 Toyota RAV4

For 1 1 1 1

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Minimum Refinish Disc Thickness630 (16.00)
Maximum Disc Runout0020 (.05)
Standard Pad Thickness472 (12.00)
Minimum Pad Thickness039 (1.00)

DRUM BRAKE SPECIFICATIONS

DRUM BRAKE SPECIFICATIONS TABLE

Application	In. (mm)
Standard Diameter	9.00 (228.6)
Maximum Refinish Diameter	9.08 (230.60)
Standard Lining Thickness197 (5.00)
Minimum Lining Thickness039 (1.00)
Brake Shoe Clearance024 (.60)

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS TABLE

Application	Ft. Lbs. (N.m)
Brake Hose-To-Caliper	22 (30)
Caliper Mounting Bolts/Slide Pins	21 (28)
Caliper Torque Plate-To-Knuckle Bolts	79 (107)
Master Cylinder Outlet Fittings	11 (15)
Wheel Lug Nuts	76 (103)

INCH Lbs. (N.m)

Brake Bleeder Screw	73 (8.3)
Master Cylinder Piston Stopper Bolt	89 (10)
Master Cylinder Reservoir Set Screw	16 (1.8)
Master Cylinder-To-Booster Nuts	115 (13)
Rear Wheel Cylinder-To-Backing Plate Bolt	89 (10)

END OF ARTICLE