

The End Wrench®

A Publication for Professional Repair Technicians from Subaru N.E.W. Horizons Dealers www.endwrench.com

SUBARU 

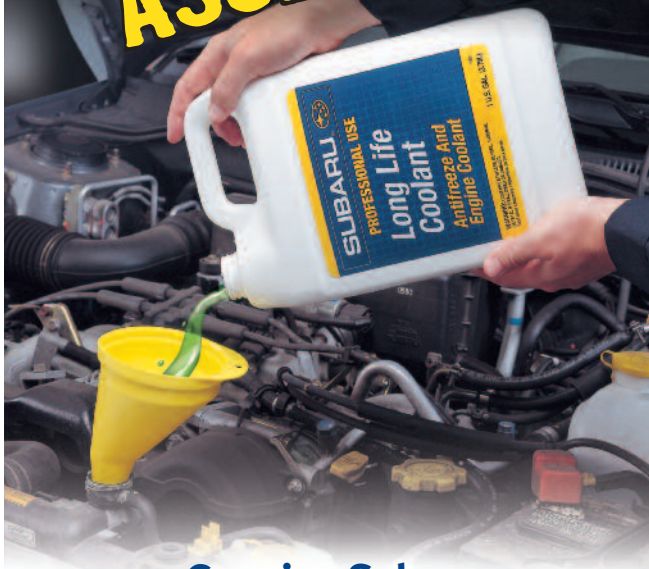
Summer 2002 Number 19 \$6

Subaru Brakes



Information Inside

LIQUID ASSETS



Genuine Subaru Automotive Chemicals.

When it comes to the fluids and other chemicals you put in a car, there's only one way to be sure you're meeting the same high standards



of original Subaru equipment: insist on Genuine Subaru Automotive Chemicals.

Subaru offers a full line of quality tested products, all approved for use in Subaru vehicles. From coolant to brake cleaner and R-134a refrigerant, these premium products are engineered to assure maximum performance and trouble-free driving. And the new distinctive packaging guarantees you're using Genuine Subaru Automotive Chemicals.



To find your local dealer, call **1-800-SUBARU3** or visit us online at www.subaru.com. Or for helpful technical tips and Subaru-specific techniques, check out www.endwrench.com.



Put "True Blue" Into Every Subaru

The best way to protect your customers' automotive investment and performance is to reach for Genuine Subaru Automotive Chemicals. That bright blue label ensures you're using specially formulated products that meet exacting O.E. specifications.

For example, in tests the Factory Fill Coolant didn't show the pitting and corrosion that occurred with competitive coolants. In fact, every chemical in the line is designed to be



Original Equipment Parts/
Professional Service

the best product for the repair and maintenance of Subaru vehicles. They're also competitively priced so you can use them regularly, bank some nice profits and enjoy peace of mind knowing you're giving your customers the best they can get.

Genuine Subaru Automotive Chemicals



ITEM	CONTENTS	PART #	UNIT MSRP
AEROSOLS			
Brake Cleaner	18 oz.	SOA868V9100	\$ 3.15
N/C Brake Cleaner	14 oz.	SOA868V9110	\$ 3.15
Carburetor Cleaner	11.3 oz.	SOA868V9120	\$ 2.73
Glass Cleaner	18 oz.	SOA868V9130	\$ 2.73
Aerosol Fuel Injector Cleaner	7 oz.	SOA868V9140	\$ 15.08
Application Tool for Fuel Injector Cleaner		SOA868V9410	\$232.22
Application Tool Adapters		SOA868V9420	\$ 77.33
Pour Fuel Injector Cleaner	16 fl. oz.	SOA868V9150	\$ 5.67
Top Engine Cleaner	11 fl. oz.	SOA868V9160	\$ 2.73
Application Tools for Top Engine Cleaner		SOA868V9430	\$ 33.72
Throttle Plate Cleaner	4 oz.	SOA868V9170	\$ 1.68
Silicone Lubricant	12.5 oz.	SOA868V9200	\$ 2.94
FLUIDS			
Factory Fill Coolant*	1 gal.	SOA868V9210	\$ 12.38
Brake Fluid*	12 fl. oz.	SOA868V9220	\$ 2.83
Factory Fill Windshield Washer Concentrate	16 fl. oz.	SOA868V9230	\$ 2.53
Factory Fill Auto Transmission Fluid/Power Steering Fluid*	32 fl. oz.	SOA868V9240	\$ 3.22
REFRIGERANT			
R-134a Refrigerant	30 lbs.	SOA868V9310	\$188.78

* Required for warranty repairs.

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Caution:
Vehicle servicing performed
by untrained persons could
result in serious injury
to those persons or others.

Information contained in this publication is intended for use by trained, professional auto repair technicians ONLY. This information is provided to inform these technicians of conditions which may occur in some vehicles or to provide information which could assist them in proper servicing of these vehicles.

Properly trained technicians have the equipment, tools, safety instructions, and know-how to perform repairs correctly and safely. If a condition is described, DO NOT assume that a topic covered in these pages automatically applies to your vehicle or that your vehicle has that condition.

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The End Wrench®
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A Publication for Professional Repair Technicians from Subaru N.E.W. Horizons Dealers

inside

4 Subaru Brake Systems



Subaru vehicles are equipped with a sophisticated braking system that may or may not include ABS. This overview provides information on Subaru brake systems, including the unique Hill-Holder™ system.

8 O.E. PRO Corner



Our commitment to help you keep your customers satisfied and coming back to you for their Subaru service and repairs has not changed. In fact, there are more parts being offered under the Subaru O.E. PRO banner than ever.

16 Subaru Brake Fluid Change



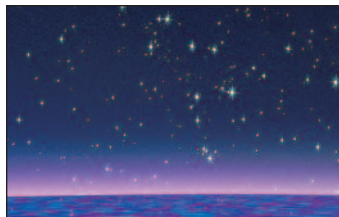
Periodic brake fluid flushing and replacement extends the service life of brake system components and ensures proper system operation. This article explains fluid change procedures for Subaru vehicles.

22 Insider Info

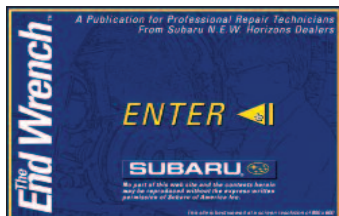


An assortment of Subaru service bulletins and time-saving tips, this time with a brake service slant.

26 Subaru N.E.W. Horizons Dealer Listings



Subaru N.E.W. Horizons Dealers have been recognized for their outstanding performance in serving the wholesale market. They provide you with a direct wholesale parts hotline and also maintain a large inventory of competitively priced Genuine Subaru Parts.



www.endwrench.com

Whether you need quick reference to an article about Subaru repair or part numbers for the cylinder heads in a 1996 Subaru Legacy, you'll find the information you need when you visit the new *End Wrench* Web site at www.endwrench.com.

Subaru Brake Systems

Front Disc Brakes

The front brakes are ventilated disc types which feature high heat dissipation and superb braking stability. In addition, the front brake quickly restores the original braking performance even when wet.

The brake disc, which is externally mounted, is secured together with the disc wheel using the hub bolts, to facilitate removal or installation when servicing the vehicle.

The inner brake pad is provided with an indicator which indicates pad wear limits.



Front Caliper and Disc

Pad Wear Indicator

A wear indicator is provided on the inner disc brake pads. When the pad wears down to 1.5 mm (0.059 inch) the tip of the wear indicator comes into contact with the disc rotor, and makes a squeaking sound as the wheel rotates. This indicates that the pad needs to be replaced.

Rear Drum Brakes

The rear drum brake is a leading-trailing type. When fluid pressure is applied to the wheel cylinder, the piston moves to expand the leading and trailing shoes while the lower shoe return spring joint acts as a pivot. Thus, the shoes come in contact with the inner surface of the drum, producing braking action.

When brakes are applied during the forward movement, the tip of the brake leading shoe lining is pressed against the inner surface of the drum so as to oppose the drum direction. This increases the braking force. The trailing shoe, however, undergoes a force that pushes back so that braking force applied to the trailing shoe decreases.

The above shoe operation is reversed

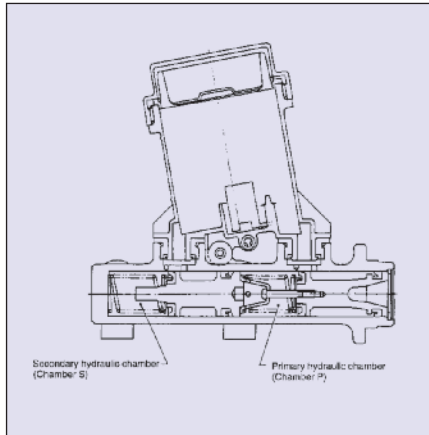
while the vehicle is backing up, with the braking force exerted on the trailing shoe greater than that on the leading shoe. It follows that there is no difference in braking force between the directions in which the vehicle moves.

Automatic Adjuster

The brake lining-to-drum clearance is automatically compensated for by the automatic adjuster. When the brake shoe is contracting after expansion, the adjuster lever rotates the adjuster assembly's screw to lengthen adjuster assembly so that the clearance is maintained at the specified value.

Master Cylinder

The master cylinder has a sealed reservoir tank to extend the service life of the brake fluid. The fluid level indicator is built into the reservoir tank for easy



Master Cylinder

and correct monitoring of the fluid level when adding brake fluid.

Brake Fluid Level Indicator

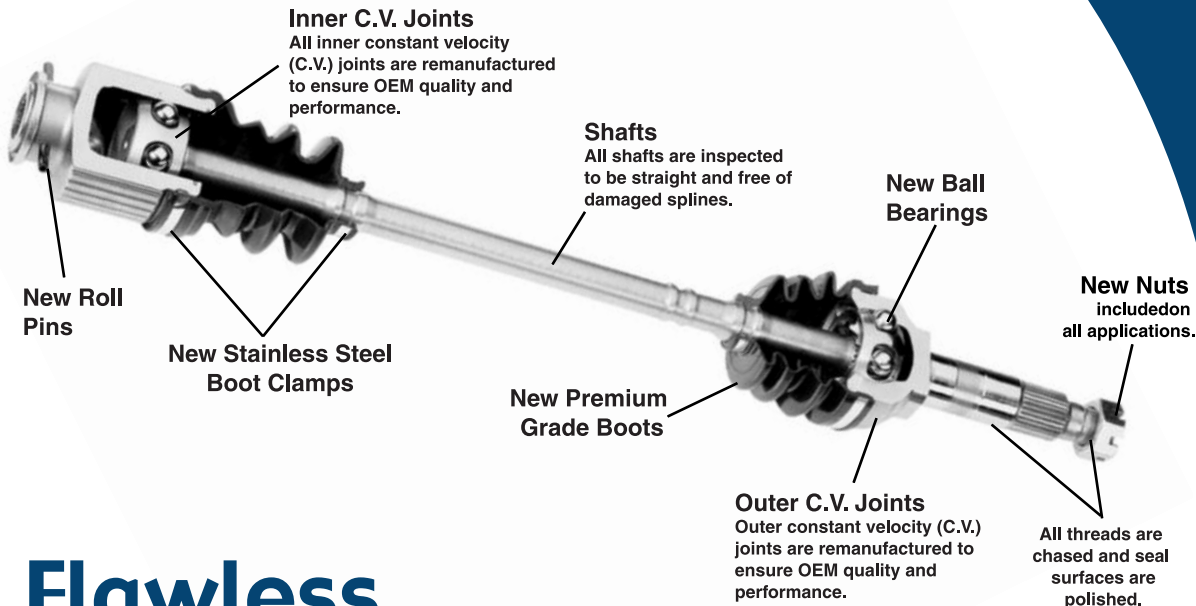
Under normal conditions, the float remains above the reed switch, and the magnetic force

from the permanent magnet in the float is unable to activate it. Therefore, the circuit is kept open, and the warning light remains off. The float lowers as the brake fluid level lowers, and if it falls below the specified fluid level — approx. 30 mm (1.18 in) below the MAX level line, the reed switch will be activated by the permanent magnet, closing the circuit. In this event, the warning light comes on and warns the driver of a reduction of the brake fluid level.

However, the warning light may be lighted momentarily even when the brake fluid surface is still above the specified level, if the vehicle body momentarily tilts or swings more than normal.

Brake Booster

The brake booster is a tandem type that utilizes two small diam-



Flawless

Fit . . . Finish . . . and Performance!

Why take chances with inferior aftermarket axles that may have damaged threads, collapsed clip rings or smashed ends? Genuine Subaru front wheel drive axles are remanufactured using the industry's latest machine technologies. High quality components, plus rigorous final inspection and testing assures a replacement axle that installs quickly and performs flawlessly. Competitive pricing and the Genuine Subaru Parts Limited Warranty provide value and protection to you and your customers.

Use the full line of Subaru Replacement Parts including brake calipers, automatic transmissions, starters and alternators.

Remanufactured by

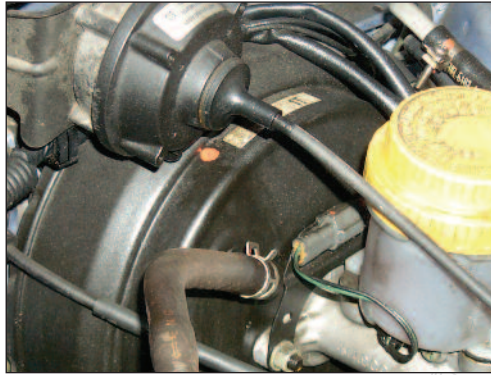


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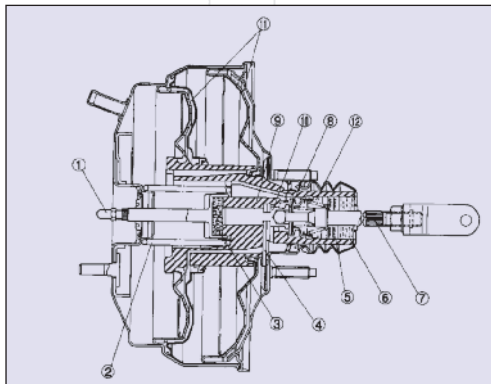


Subaru Brake Systems

eter diaphragms to provide high brake boosting effects.



Brake Booster



Brake Booster Cutaway

1. Push rod
2. Return spring
3. Reaction disc
4. Key
5. Filter
6. Silencer
7. Operating rod
8. Poppet valve
9. Valve body
10. Plunger valve
11. Diaphragm plate
12. Valve return spring

Operation

Brake Booster "Off"

The plunger valve comes in contact with the poppet valve so that atmospheric air passing through the filter and silencer is shut out by the atmospheric valve (of the poppet valve).

The plunger valve is moved to the key at the right by the return spring so that the poppet valve is held at the right. Since the vacuum valve of the valve body and the poppet valve are

kept away from each other, passage A is linked with passage B and the constant-pressure chamber is also linked with the variable-pressure chamber. At this point, pressure differential does not occur between the two chambers; the diaphragm plate is moved back to the right by return spring tension.

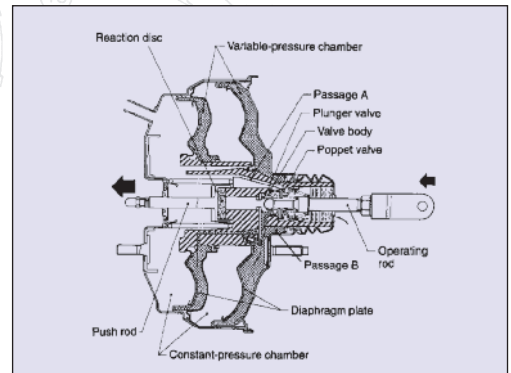
Brake Booster "On"

When the brake pedal is depressed, the operating rod pushes the plunger valve so that the poppet valve comes in contact with the vacuum valve of the valve body. This shuts off the circuit between passages A and B, as well as the circuit between the constant- and variable-pressure chambers.

Further movement of the plunger valve moves the atmospheric valve away from it so that atmospheric air is directed to the variable-pressure chamber via passage B. This produces a pressure differential between the constant- and variable-pressure chambers.

As a result, the diaphragm and its plate are moved to the left as a single unit.

The power applied to the diaphragm plate by the pressure differential is then transmitted to the reaction disc via a hub, as well as to the push rod, and produces a booster output.



Brake Booster On

Brake Booster Under Medium Load

The poppet valve comes in contact with the plunger valve and valve body when a force pushes the center of the reaction disc (at the contact portion of the plunger valve) via the operating rod and plunger valve. This occurs when brake pedal depression is balanced with a force pushing the plunger valve (via the push rod and reaction disc) due to the reaction force of oil pressure

Continued on page 10.

Install with Confidence

Genuine Subaru Remanufactured Parts have it all—precise fit, superior performance and the uncompromising safety of original equipment—all at prices you and your customer will like. There are applications available for a variety of repairs, and all of them, including the Subaru remanufactured front axles below, are best for your customers and your business.



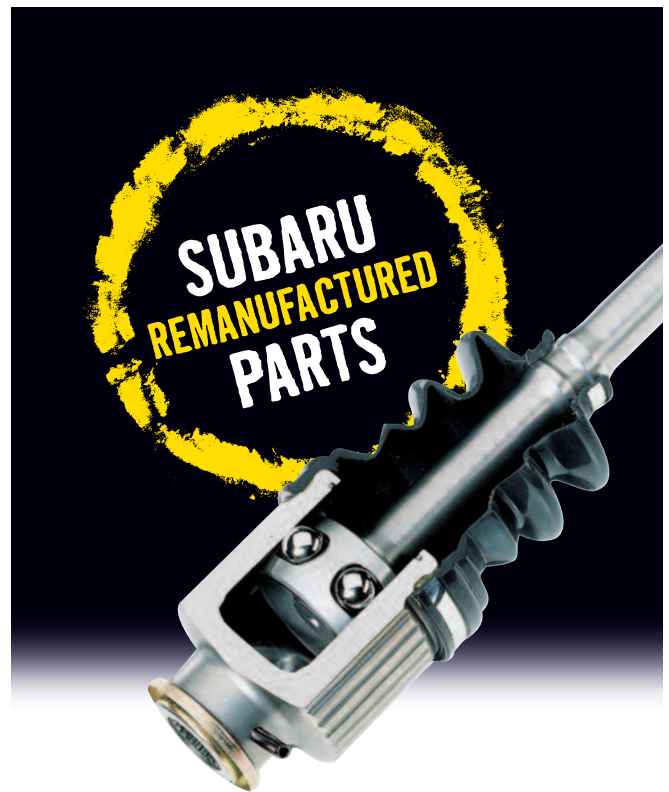
Genuine Subaru Remanufactured Axles

All applications MSRP \$139.95 (net of core)



Vehicle Application	Axle Shaft Reman. No.	Axle Shaft FHI Number
COUPE, SEDAN, WAGON		
80-84 (2WD)	SOA925H700R1	723221055
80-84 (4WD)	SOA925H800R1	723221392
HATCHBACK		
80-89 (2WD)	SOA925H700R1	723221055
80-89 (4WD)	SOA925H800R1	723221392
BRAT		
82-89 (4WD)	SOA925H800R1	723221392
3 DOOR, 4 DOOR, STATION WAGON		
85 (2WD) MT, AT, SPI	SOA925H100R1	23221GA234
87-89 (2WD) MT, SPI		
85-87 (4WD) MT, AT, Carb		
85 (2WD) MT, AT, Carb	SOA925H200R1	23221GA244
86 (2WD) MT, CARB		
86-89 (2WD) AT, SPI		
85-89 (2WD, 4WD) AT, Turbo	SOA925H300R1	23221GA373
88-89 (4WD) AT, SPI		
85-89 (2WD, 4WD) MT, Turbo	SOA925H400R1	23221GA593
LOYALE		
90-94 (2WD) M/T	SOA925H100R1	23221GA234
92-94 (4WD) MT, 3AT		
90-94 (2WD) 3AT	SOA925H200R1	23221GA244
90-91 (4WD) MT, 3AT	SOA925H300R1	23221GA373
90 (2WD, 4WD) AT, Turbo		
90-94 (2WD, 4WD) MT, Turbo	SOA925H400R1	23221GA593
XT COUPE		
85-87 (2WD, 4WD) MT, 3AT	SOA925H100R1	23221GA234
88-91 (2WD, 4WD) MT		
88-89 (2WD, 4WD) 3AT, Turbo	SOA925H300R1	23221GA373
85-89 (2WD, 4WD) MT, 4EAT, Turbo	SOA925H400R1	23221GA593/941
88-91 (2WD, 4WD) 4EAT		
LEGACY		
90-94 (2WD) All	SOA925H500R1	28021AA530/560
90-94 (4WD) MT, AT, Turbo	SOA925H600R1	28021AC290
95-96 (2WD, 4WD) AT **		
95-99 (4WD) MT **		
IMPREZA		
93-96 (2WD, 4WD) AT **	SOA925H600R1	28021AC290
93-97 (4WD) MT **		
95-97 (2WD) MT **		

** Remanufactured axle shafts shall not be used for warranty repairs performed under the Powertrain warranty.



As good as new—guaranteed!

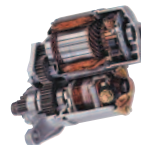
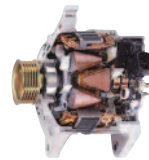
Why take chances with inferior aftermarket parts? Genuine Subaru

Remanufactured Parts are remanufactured by Subaru suppliers to perform as well as original installed parts, and to meet the latest, most stringent

OEM specifications. Plus they're backed by the same Genuine Subaru Parts Limited Warranty as the originals, which protects your customers—and your reputation. Don't ask for trouble.

Ask for Subaru Remanufactured Parts including axle shafts, brake calipers, automatic transmissions, starters and alternators. To find your local dealer, call

1-800-SUBARU3 or visit us online at www.subaru.com



SUBARU
Genuine Parts



Original Equipment Parts/
Professional Service

O.E.PRO: Maintaining that Special Subaru All-Wheel Ride

One of the pleasures of Subaru all-wheel-drive is the confidence and control that drivers enjoy when moving through curves, powering over rain-slick roads or traveling on uncharted dirt lanes. Having “power transferred from the wheels that slip to the wheels that grip” wherever one drives has helped keep countless Subaru owners satisfied and safe.



What’s more, wherever they go, owners have also come to respect the reliability of their Subaru braking systems as well. In fact, Subaru vehicles have been known for years for the quality of their brakes.

Running brake service specials in the summer makes good sense, too. Americans put their cars through their paces like no other time of the year. Long car vacation trips, blistering hot stop-and-go traffic jams and sudden stops during summer storms all put above average strain on braking systems.

As an independent repair specialist, you have the skills and the parts to keep the Subaru reputation for quality brake systems going strong. And O.E.PRO offers more Genuine Subaru parts than ever to do every brake job right at prices to please you and your customers. You’ve got Automotive Chemicals including regular and non-chlorinated brake cleaners and brake fluid for the brake fluid checks, flushing and replacement you’ll be doing.

There are Genuine Subaru maintenance parts such as brake pads, discs, shoes and drums for smooth, sure and controlled stops. And, there’s a wider selection of Genuine Subaru Remanufactured Caliper applications available, too – all ready for quick installation and savings all around.

The O.E.PRO Parts Program is one-stop shopping for the best parts at the best prices. And that’s a break you can always use!



New Packaging and Quality Performance Can Stack Up to Extra Sales of Auto Chemicals

You never know what’s going to initiate a sale. When a customer comes into your shop looking for service in one area, a poster or display of an entirely unrelated product can remind him or her of a lingering problem that you can solve easily. So, out of nowhere, you make an unexpected extra sale.

Nowhere is that more true than with automotive chemicals. Naturally you order your regular supply of Subaru brake fluid, brake cleaner, engine cleaner and silicone lubricant for the steady work that comes through your service bays, but have you considered putting up a small display of Genuine Subaru Automotive Chemicals that your customers can purchase for themselves? A stack of Subaru Factory Fill Coolant is sure

to catch the eye of any Subaru owner. The same goes for Subaru factory fill windshield washer concentrate and fuel injector cleaner. You'll find a full list of chemical part numbers and pricing on the inside front cover.

With their bright new blue packaging to present the brand, O.E.-quality performance and competitive pricing, Genuine Subaru Automotive Chemicals can help make your customers' rides smoother and safer while turning out to be surprising retail performers in their own right. So start stacking!

Subaru ProRally Team Wins at Pikes Peak! Finishes First Against All Open Class Cars

It is one of the highest roads in the continental U.S. It is 12.5 miles long. It features 156 nerve-wracking turns and it ends up at 14,110 feet above sea level. This year, Mark Lovell and Steve Turvey of Subaru Rally Team USA



finished the challenging Pikes Peak course in first place overall, topping all challengers in the SCCA ProRally Open Class.

The ecstatic pair became the first British citizens to secure a class win at the famed "race to the clouds." As the first Open Class competitors to tackle the course on race day, Lovell and Turvey set a blistering pace that would never be challenged. In fact, the team's winning Subaru finished less than four seconds behind a much more powerful Unlimited Class Ford vehicle.

"That was the toughest 12 miles I've ever driven," exclaimed Lovell. "We faced

so many unknowns, but the team did a fabulous job with the engine mapping and our Pirelli engineers gave us an excellent tire with tremendous grip. What an incredible result, absolute magic!"

Being able to share such fantastic finishes in one of the most famous races in the United States with your performance-oriented customers is sure to get them excited about the Genuine Subaru Performance Parts you can offer them. From short throw shifters to performance gauge packs, they can feel like they're part of the winning Subaru performance team.

SEMA is Racing Your Way

Gentlemen, start your engines and rev up for this year's Specialty Equipment Market Association show in Las Vegas, November 5–8. Explore a building filled with exhibits featuring exciting performance products, accessories, hot cars including lots of Subaru WRX and Baja vehicles, plus much more. See you there!

Subaru Brake Systems

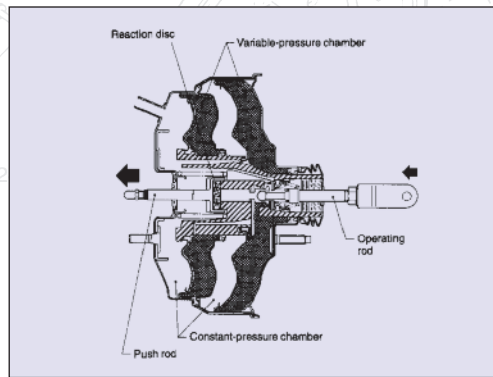
delivered from the master cylinder.

As a result, pressure differential is maintained between the constant-pressure chamber and variable-pressure chamber unless the pedal depression force is changed.

Brake Booster Under Full-Load Conditions

When pedal depression increases to such an extent that the variable-pressure chamber is maintained at atmospheric pressure, the maximum pressure differential acts on the diaphragm plate.

Further pedal depression does not act on the diaphragm plate but rather on the push rod.



Full Load Conditions

Brake Booster Released

When the force of brake pedal depression decreases, the forces acting on the reaction disc and plunger valve are unbalanced, so that the plunger valve is moved to the right.

The plunger valve then comes in contact with the atmospheric valve of the poppet valve to shut off the passage between the variable-pressure chamber and atmospheric air and, at the same time, moves the poppet valve back. Movement of the poppet valve opens the vacuum valve so that passages A and B are linked with each other.

Air from the variable-pressure chamber is then delivered to the constant-pressure chamber. This eliminates any pressure differential between the two chambers. As a result, the diaphragm plate is pushed back to the 'release' position by the return spring.

Brake Booster With No Vacuum

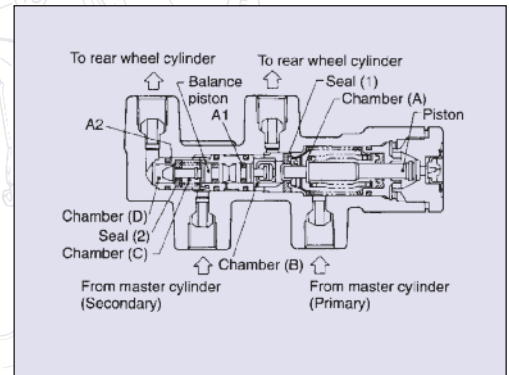
When the brake pedal is depressed while the constant- and variable-pressure

chambers are held at atmospheric pressure, the operating rod moves to the left. This moves the plunger valve which in turn pushes the hub via the key.

The reaction disc (which is built into the hub) then moves the master cylinder piston via the push rod. At this point a boosting force does not occur, but oil pressure is produced by movement of the master cylinder piston. As a result, the system serves as a hydraulic brake.

Proportioning Valve (Non-ABS Models)

The proportioning valve for dual piping systems is adopted for controlling the braking force.



Proportioning Valve

Operation During Normal Conditions

When the fluid pressure in the master cylinder is low (the fluid pressure before the split point), the piston is pressed by the spring load and the valve remains inoperative. As a result, the fluid pressure in the master cylinder is held equal to the fluid pressure in the rear wheel cylinder.

When the master cylinder fluid pressure rises, the piston in the primary circuit is moved right-ward against the spring load, and brought into contact with the seal (1). The master cylinder fluid pressure chamber (chamber A) is therefore cut off from the rear wheel cylinder fluid pressure chamber (chamber B), and the fluid pressure to the rear wheel cylinder is thus controlled. (The pressure at this moment is the split point pressure.)

If the fluid pressure in chamber A rises further, the piston is moved left-ward, off the seal (1), and this causes the



Genuine SUBARU MAINTENANCE PARTS



Built to keep every Subaru running at peak performance

Many things can rob a vehicle of its power, including dirt, dust, heat, friction and contaminants. Without regular maintenance by a trained professional, even the best-designed vehicles can lose that “new car” feeling.

Install the best. Genuine Subaru Maintenance Parts are specifically engineered to precise specifications to fit right, to perform better and to last longer. Take the materials in Genuine Subaru brake pads, for example. They're specially formulated to be compatible with the rotor surface to help prevent brake chatter, noise and excessive heat buildup, which can impair stopping effectiveness.

The hidden cost of off-brand parts

Why try to save a few pennies on non-genuine parts that can cost car owners a lot more over time in poor performance, faster wear and possibly even damage due to poor fit or not being up to OE specifications?

Whether you need belts, hoses and spark plugs or filters, brake pads and shoes, your local Subaru dealer keeps a ready supply of frequently needed parts at prices competitive with off-brand parts. Keep your customers' cars running smoothly for years to come with Subaru Genuine Maintenance Parts.



fluid pressure in chamber B to rise. The piston is then moved rightward, and brought into contact with the seal ① again. After this, the piston repeats this contact with the seal ① in this way, thereby controlling the fluid pressure in the rear wheel cylinder.

When the fluid pressure in chamber B is controlled in the secondary circuit, the balance piston is moved rightward by the fluid pressure difference between chamber B and chamber C, and brought into contact with the seal ②, and the fluid pressure in chamber D is controlled. Since sectional areas A1 and A2 are equal, the balance piston is pushed by equal forces from the right and left. If the fluid pressure rises in chamber B, the balance piston performs control to equalize the fluid pressure in chamber D and chamber B by repeating open-close operation with the seal ②.

Failure Of Primary Circuit

If the primary circuit fails, the fail-safe piston and balance piston are moved rightward by the fluid pressure in the master cylinder in the secondary circuit until the piston contacts the plug. In this case, the balance piston remains off the seal ②, and no split point is created in the graph. That is, the fluid pressure in the secondary side rear wheel cylinder is equal to the fluid pressure in the master cylinder.

Failure of Secondary Circuit

If the secondary circuit fails, the balance piston is moved leftward by the fluid pressure in chamber B until the end of the piston contacts the stopper. Since sectional area A1 is greater than A2, the piston remains unmoved even after the master cylinder fluid pressure has reached the split point, and the piston is kept off the seal ①. Hence, no split point is created in the

graph, and the rear wheel cylinder fluid pressure of the primary circuit is kept equal to the master cylinder fluid pressure.

Proportioning Valve (ABS models)

Operation During Normal Conditions

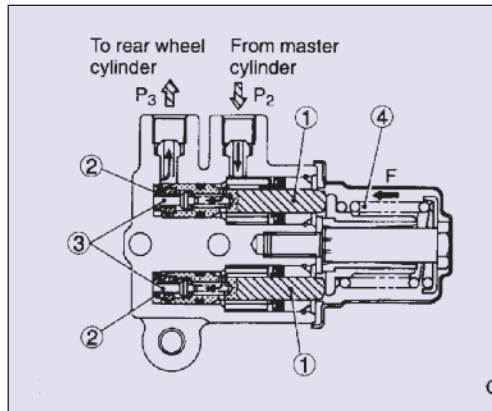
Operation before the split point:

- Piston ① is held by spring ④ so that valve ③ is kept away from valve seat.
- Under this condition, fluid pressure “P₃” to rear wheel cylinders equals fluid pressure “P₂” from master cylinder.

Operation near the split point:

- Force “f₁”, applied to piston ① by spring, is spring force “F.” In other words, “f₁” = ½ “F.”
- Force “f₂” is also applied to piston ① in the direction opposite to spring force “F” due to fluid pressure “P₂” generated by master

Subaru Brake Systems



ABS Proportioning Valve

cylinder according to cross sectional area "A".

- Spring force " f_2 " increases correspondingly with fluid pressure " P_2 ". When " f_2 " is greater than piston ① moves in direction opposite to spring force "F." This causes valve ② to come in contact with valve seat ③, blocking the fluid passage.

Immediately before the fluid passage is closed, fluid pressure " P_2 " is held equal to pressure " P_3 ." When brake pedal is depressed to increase fluid pressure " P_2 ," piston moves in the same direction as spring force "F," opening fluid passage.

However, since fluid passage is closed again immediately after pressure " P_2 " equals " P_2 ", pressure " P_3 " is held at a value of less than pressure " P_2 ."

Hill-Holder™

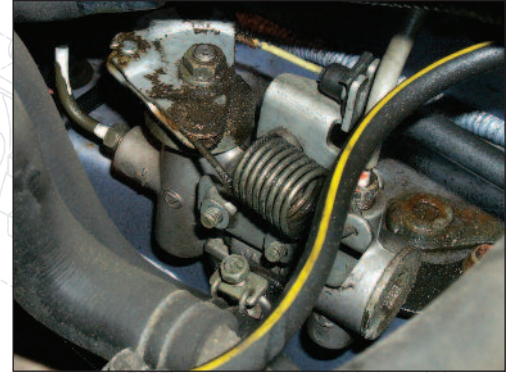
The Hill-Holder™ is a device to make starting on an uphill road easier and permits even a driver not yet familiarized with starting by use of the parking brake to start the vehicle smoothly.

When pressing down the clutch pedal with the brake pedal depressed in order to start the vehicle on an uphill road, this device holds the brake temporarily upon taking your foot off the brake pedal (until the clutch pedal is released). Therefore, smooth starting is enabled by usual engagement of the clutch while depressing the accelerator pedal.

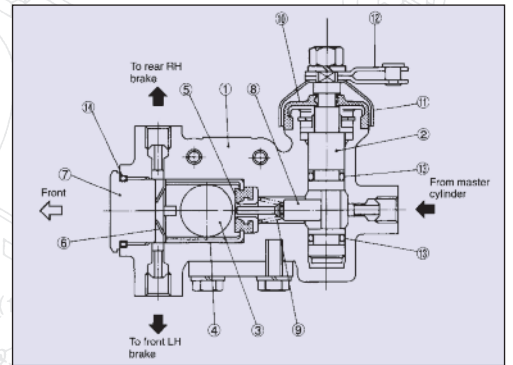
Note: Models with ABS/TCS are not equipped with the Hill-Holder™.

Pressure Hold Valve (PHV)

PHV (Pressure Hold Valve) is connected to one of the service brake pipes and pushrod ② is pushed in and/or pulled out by cam shaft ② interlinked with the clutch pedal to change the clearance between ball ③ and seal ⑤, thereby opening and/or closing the hydraulic circuit.



Pressure Hold Valve



Pressure Hold Valve Cutaway

Normally, on a flat road, ball ③ is located at the front and the valve is kept opened regardless of the position of the pushrod. (This status is the same as on a downhill road.)

When stopping the vehicle on an uphill road by depressing both brake and clutch pedals, the ball rolls toward the rear and, at the same time, the push rod retracts to close the valve, so that hydraulic pressure is maintained. Even when taking your foot off the brake pedal, the hydraulic pressure is maintained so far as the clutch pedal is kept depressed. In this status, when engaging the clutch ordinarily while depressing the accelerator pedal, the maintained hydraulic pressure is released simultaneously with the generation of driving force to permit smooth starting.



Genuine SUBARU ENGINE COMPONENTS



...offer superior fit, reliability and value.

Restoring an engine's performance with Genuine Subaru engine components is a smart decision. Our new components are far more reliable—and precise—than rebuilt alternatives. Rebuilt engine components are based on existing parts that have failed in service—for example, a rebuilt cylinder head from a core broker or junkyard. Why take chances with inferior aftermarket parts that not only don't meet the exacting standards met by Genuine Subaru Parts but that actually may fail again?

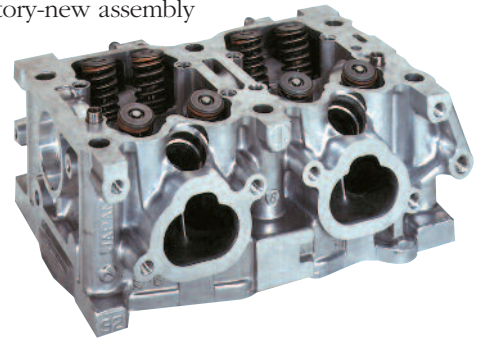
A wide selection of readily available parts

Whether you need an all-new replacement short block, oil or water pump, a clutch disk, camshaft or cam belt or other Genuine Subaru engine component, your local authorized Subaru dealer has a ready supply. You can order only those parts you need, restore an engine to

like-new performance and offer your customers faster turnaround.

Save time with pre-assembled cylinder heads

You can save on labor on your engine work by using pre-assembled Genuine Subaru cylinder heads. Each factory-new assembly is fully leak-tested and comes complete with all-new parts, including the cylinder head itself, valves, springs, seals and retainers. Plus, each assembly, like all Genuine Subaru engine components, is fully warranted and ready for installation. In fact, these components can save you time and money during installation compared to non-genuine parts that may require a force-fit. With Subaru Genuine Parts, you know you're getting the best—whether you're replacing a component or rebuilding an entire engine.



Genuine Subaru Head Assemblies

Years	Part #	Notes	MSRP
LEONE/LOYALE			
85-87	SOA4786060	RH Carb	\$ 333.25
85-87	SOA4786040	LH Carb	\$ 333.25
86-94	SOA4786070	RH SPI	\$ 333.25
86-94	SOA4786050	LH SPI	\$ 333.25
LEONE/LOYALE TURBO			
85-90	SOA4786090	RH	\$ 399.92
85-90	SOA4786080	LH	\$ 399.92
LEGACY			
90-94	SOA4786010	RH & LH	\$ 428.50
95	SOA4786010	RH A/T	\$ 428.50
95	SOA4786130	LH A/T	\$ 428.50
96	SOA4786140	RH & LH 2.2 M/T	\$ 428.50
96	SOA4786140	RH 2.2 A/T	\$ 428.50
96	SOA4786150	LH 2.2 A/T	\$ 428.50
96	SOA4786200	RH 2.5	\$ 457.07
96	SOA4786210	LH 2.5	\$ 457.07
97-98	SOA4786160	RH & LH 2.2 M/T	\$ 428.50
97-98	SOA4786160	RH 2.2 A/T	\$ 428.50
97-98	SOA4786170	LH 2.2 A/T	\$ 428.50
97-98	SOA4786180	RH 2.5	\$ 457.07
97-98	SOA4786190	LH 2.5	\$ 457.07
LEGACY TURBO			
91-94	SOA4786020	RH	\$ 671.36
91-94	SOA4786030	LH	\$ 671.36

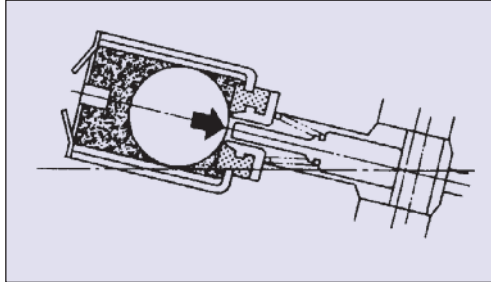
All MSRPs are Net of Core

Years	Part #	Notes	MSRP
IMPREZA			
93	SOA4786100	RH 1.8 Calif. Spec.	\$ 399.93
93	SOA4786110	LH 1.8 Calif. Spec.	\$ 399.93
93	SOA4786120	RH 1.8 49 State Spec.	\$ 399.93
93	SOA4786110	LH 1.8 49 State Spec.	\$ 399.93
94-95	SOA4786100	RH 1.8	\$ 399.93
94-95	SOA4786110	LH 1.8	\$ 399.93
95	SOA4786010	RH 2.2 A/T	\$ 428.50
95	SOA4786130	LH 2.2 A/T	\$ 428.50
96	SOA4786120	RH & LH 1.8 M/T	\$ 399.93
96	SOA4786100	RH 1.8 A/T	\$ 399.93
96	SOA4786110	LH 1.8 A/T	\$ 399.93
96	SOA4786140	RH & LH 2.2 M/T	\$ 428.50
96	SOA4786140	RH 2.2 A/T	\$ 428.50
96	SOA4786150	LH 2.2 A/T	\$ 428.50
97-98	SOA4786160	RH & LH 2.2 M/T	\$ 428.50
97-98	SOA4786160	RH 2.2 A/T	\$ 428.50
97-98	SOA4786170	LH 2.2 A/T	\$ 428.50
98	SOA4786180	RH 2.5	\$ 457.07
98	SOA4786190	LH 2.5	\$ 457.07
FORESTER			
98	SOA4786180	RH	\$ 457.07
98	SOA4786190	LH	\$ 457.07

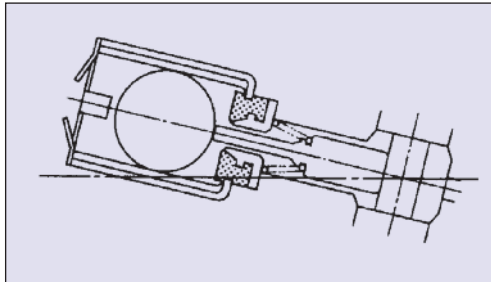
Subaru Brake Systems

Activating Condition:

This device is activated only when depressing the clutch and brake pedals with the vehicle stopped on an uphill road. When stopping the vehicle on an uphill road, the ball rolls toward the rear to seal the port and therefore the hydraulic pressure is maintained even by releasing the brake pedal.



Activating Condition



Inactive Status

Inactive Status:

The Hill-Holder™ is not activated under any conditions other than above.

While driving:

During acceleration or normal driving, the clutch pedal is not depressed, so the pushrod is located outside the port. Hydraulic pressure can not be maintained.

During deceleration:

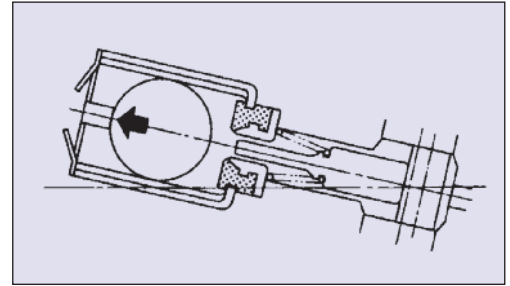
Even when depressing the clutch pedal, the ball is kept at the front by decelerating force. Hydraulic pressure is not maintained.

When stopping:

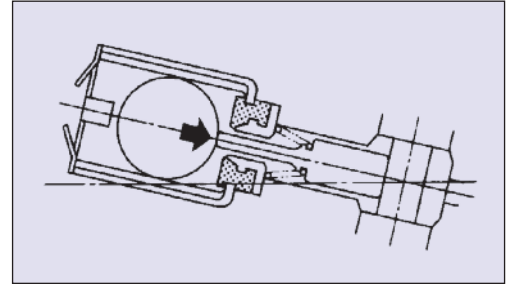
Even when stopping on an uphill road, hydraulic pressure is not maintained unless the clutch pedal is depressed.

On a flat road:

The Hill-Holder™ is not designed to operate on a flat road, except for reversing.



During Deceleration



When Stopping

Operational Precautions

- The Hill-Holder™ is a device used to facilitate starting on an incline. When stopping on an incline, therefore, you must keep the brake pedal depressed or pull the parking brake.
- The Hill-Holder™ may not be activated on a slope of an extremely small incline.
- If the brake is not held sufficiently upon releasing the brake pedal with the clutch pedal depressed, press down the brake pedal a little more strongly once again.
- If the clutch pedal is depressed again in the course of the starting operation, the brake may be released. In this case, depress the brake pedal again (the brake is released when returning the clutch pedal halfway).
 - Before you leave the driver's seat, be sure to pull the parking lever and confirm that the vehicle is kept stopped upon releasing the clutch pedal.
- When reversing the vehicle on a flat road, the following may be felt. These are caused by the activation of the Hill-Holder™, and do not constitute abnormality.
 - a. Brake effect remains even after releasing the brake pedal if depressing the clutch and brake pedals when reversing the vehicle.
 - b. A slight shock may be felt when starting the vehicle after stopping the reverse movement.



Genuine SUBARU REPLACEMENT MUFFLERS



...offer perfect fit and function.

Unlike typical generic mufflers, ONLY Genuine Subaru Replacement and Performance Muffler Assemblies offer these unique advantages...

Welded, one-piece assembly

A Genuine Subaru Replacement Muffler Assembly is a complete, all-welded, one-piece unit that ensures easy and precise installation and fit—the same exact fit as the assembly supplied on the vehicle as original equipment. They eliminate the need to deal with the all-too-common combination of leak-prone pipe adapters; cumbersome multiple clamps; and adaptable hangers that never fit quite right.

Fully aluminized steel construction

A Genuine Subaru Replacement Muffler Assembly is a heavy-duty, integrated unit of thicker materials than typical aftermarket mufflers. Special corrosion-resistant

aluminized steel construction allows for long life. Sound absorbing materials help subdue sound without hampering performance—unlike typical replacement mufflers with few baffles to suppress exhaust noise.

Specifically designed for your customers' cars.

A Genuine Subaru Replacement Muffler Assembly is designed for each Subaru vehicle application—not “cross-fitted” to multiple makes and rigged with adapters. All mounting parts precisely match the original Subaru assembly for easy, safe, no-rattle replacement.

Competitively priced and backed by warranty from Subaru.

Each Subaru Muffler offers the quality of original equipment at a price that matches or beats aftermarket mufflers. And each is backed by the Genuine Subaru Parts Limited Warranty that covers the entire, integrated unit – not just the muffler itself—including welded-on pipes, clamps and hardware. Contact your dealer for complete warranty details.

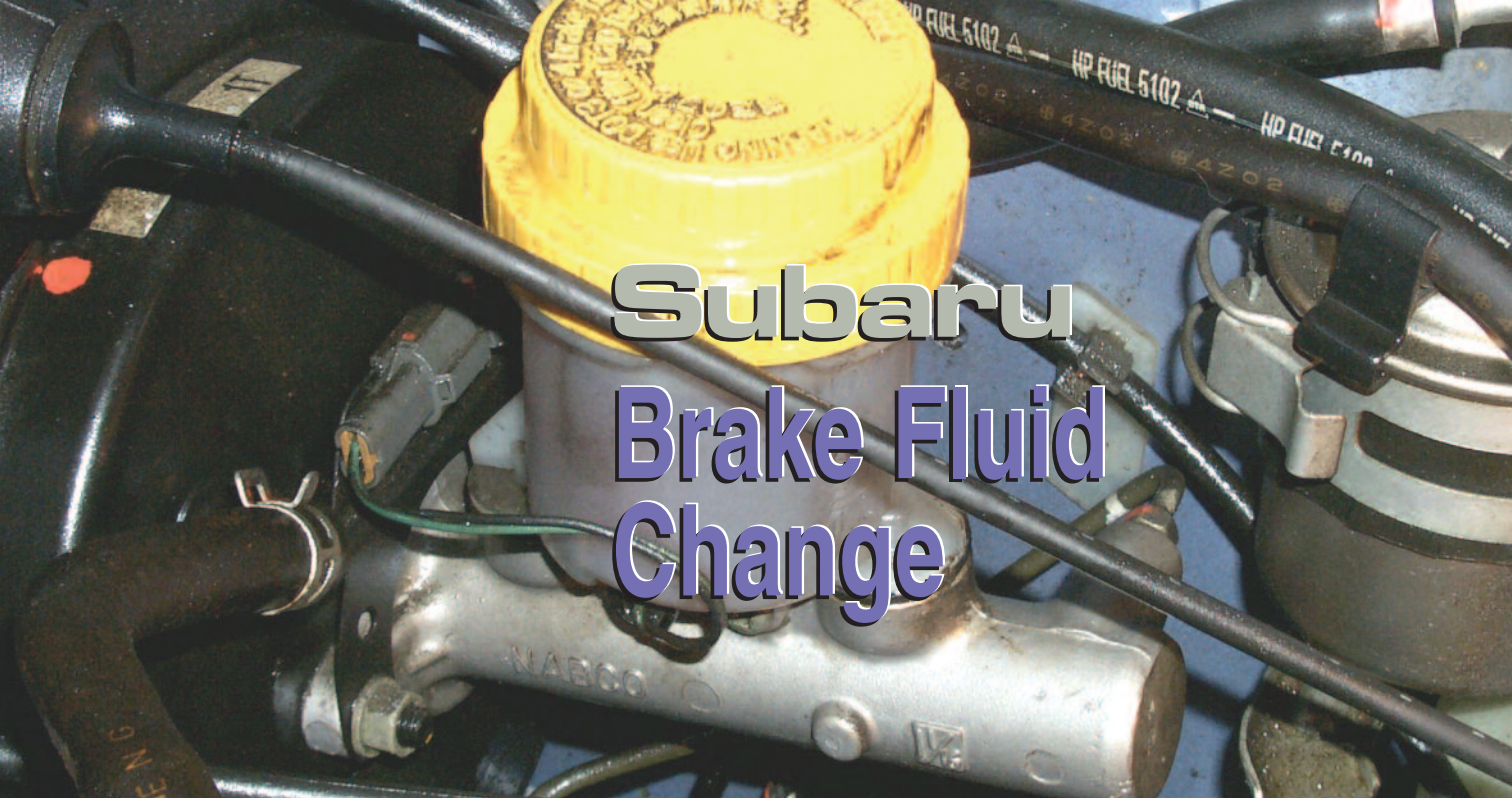
Genuine Subaru Replacement Mufflers

Now Includes Performance Mufflers 1996–2001

Application	New Part Number	Previous Part Number	MSRP
82-87 BRAT	SOA8375100	SOA5225119	\$ 89.95
80-84 STATION WAGON & 4-DOOR SEDAN			
81-89 HATCHBACK	SOA8375200	SOA5225119	\$ 89.95
87-94 JUSTY	SOA8375300	744304451	\$ 89.95
85-93 LEONE/LOYALE SEDAN	SOA8375600	44301GA211	\$ 69.95
85-90 LEONE/LOYALE SEDAN-TURBO		44301GA221	
86-90 LEONE/LOYALE 3-DOOR	SOA8375600	44301GA211	\$ 69.95
86-90 LEONE/LOYALE 3-DOOR-TURBO		44301GA221	
85-94 LEONE/LOYALE WAGON	SOA8375700	44301GA231	\$ 69.95
85-90 LEONE/LOYALE WAGON-TURBO		44301GA241	
85-87 XT (THRU 12/86) INCL. TURBO	SOA8375800	44304GA321	\$ 129.95
87 XT TURBO (FROM 1/87)		44304GA341	
87-91 XT (FROM 1/87)		44304GA361	
87-91 XT6			
90-94 LEGACY (2WD) WAGON	SOA8375500	44304AA080	\$ 129.95
90-94 LEGACY (2WD) SEDAN	SOA8376000	44304AA110	\$ 129.95
90-94 LEGACY (4WD) SEDAN	SOA8375900	44304AA120	\$ 129.95
90-94 LEGACY (4WD) WAGON	SOA8375400	44304AA130	\$ 129.95
93-96 IMPREZA 1.8L (2WD)	SOA8376100	44305FA061	\$ 129.95
93-96 IMPREZA 1.8L (4WD)	SOA8376200	44305FA071	\$ 129.95
95-97 LEGACY (2WD) 2.2L WAGON	SOA8376800	44305AC110	\$ 129.95
95-97 LEGACY (2WD) 2.2L SEDAN	SOA8377100	44305AC090	\$ 129.95
95-97 LEGACY (AWD) 2.2L SEDAN	SOA8377000	44305AC100	\$ 129.95
95-97 IMPREZA (ALL) 2.2L; 97 1.8L (ALL)	SOA8377200	44305FA100	\$ 129.95
Genuine Subaru Performance Mufflers			
96-99 LEGACY GT SEDAN	SOA8376300	44305AC421	\$ 375.00
96-99 LEGACY GT WAGON	SOA8376400	44305AC411	\$ 375.00
98-01 IMPREZA RS COUPE & SEDAN	SOA8376500	44305FA100, 110	\$ 375.00
00-02 LEGACY GT SEDAN	SOA8377300	44300AE14A	\$ 375.00
00-02 LEGACY GT WAGON	SOA8377400	44300AE10A	\$ 375.00

IMPORTANT NOTE: Federal and California law prohibits use of these parts in making repairs covered under emissions-related warranties extended on the vehicle at the time of its original purchase. No claims under those warranties will be honored unless OEM parts are used.





Subaru Brake Fluid Change

General Rules For Effective Brake Bleeding

1. Start with the brakes connecting to the secondary chamber of the master cylinder.
2. The time interval between two brake pedal operations (from the time when the pedal is released to the time when it is depressed another time) shall be approximately 3 seconds.
3. The air bleeder on each brake shall be released for 1 to 2 seconds.

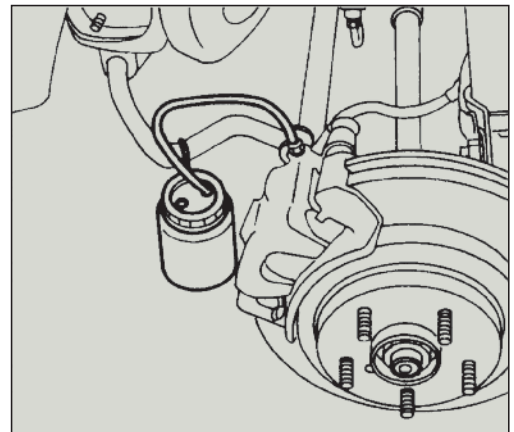
Bleeding Procedure

Caution: Fresh DOT 3 or 4 brake fluid, such as Genuine Subaru Brake Fluid P/N SOA868V9220, must be used.

- Cover bleeder with waste cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.
- Avoid mixing different brands of brake fluid to prevent degrading the quality of the fluid.
- Be careful not to allow dirt or dust to get into the reservoir tank.

Note: During bleeding operation, keep the brake reserve tank filled with brake fluid to eliminate entry of air. Brake pedal operating must be very slow. For convenience and safety, it is advisable to have two men working.

- Make sure there is no leak from the joints and connections of the brake system.
- Fit one end of vinyl tube into the air bleeder and put the other end into a brake fluid container.
- Slowly depress the brake pedal and keep it depressed. Then, open the air bleeder to discharge air together with the fluid.
- Release air bleeder for 1-2 seconds.
- Next, with the bleeder closed, slowly release the brake pedal.
- Repeat these steps until there are no more air bubbles in the vinyl tube.
- Allow 3-4 seconds between two brake pedal applications.



Bleeder Hose



Genuine SUBARU PERFORMANCE PARTS



...make the Subaru Impreza 2.5 RS and WRX thrill rides.

The exacting performance standards of Subaru

Performance Tuning (SPT) components are now available in more parts applications. We've applied our trophy-winning racing experience to our full line of performance parts for Impreza 2.5 RS back to 1998 as well as new parts for the exciting new WRX. Drivers looking for quicker steering response, racing-quality shift action and quicker acceleration will find these SPT parts deliver winning performance without compromise.

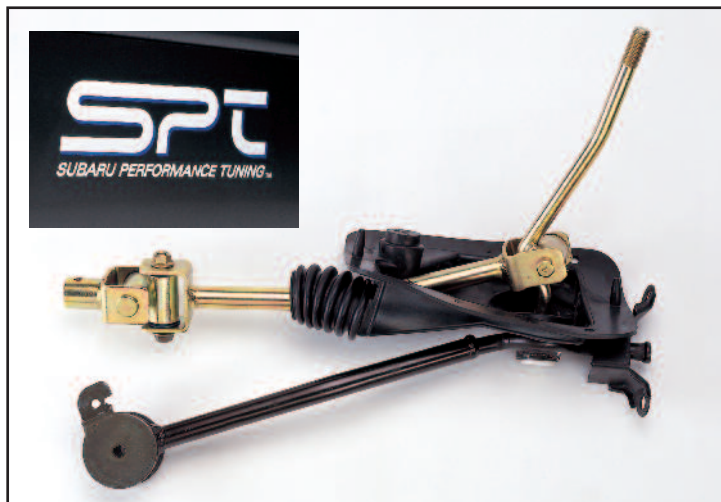
Subaru enthusiasts will love the extra kick!

These components significantly enhance the driving experience, adding responsiveness and style that will thrill the most ardent Subaru driver – especially drivers of the new Impreza WRX. Plus, you can offer your customers performance styling “goodies” such as high-tech carbon fiber shift knobs and interior accent

trim kits, performance gauge packages, front end covers, SPT decals and more.

You'll love the extra business

This line of Subaru Performance Tuning Parts can help foster a loyalty among your performance enthusiasts, customers who frequently put more money into their cars. And, over time, that can put more money into your business.



Genuine Subaru Performance Parts

Up to 2001 Impreza 2.5 RS

Description	Part #	MSRP
Rear Differential Protector	B0310SS000	\$ 68.95
Short Throw Shifter	C1010FA000	\$260.00
Titanium Shift Knob (Sti)	C1010FA100	\$149.95
Carbon Fiber Shift Knob-M/T	C1010FA140	\$175.00
Carbon Fiber Parking Brake Lever	C1010FC121	\$295.00
Strut Tower Brace (Steel)	E4010FA000	\$144.95
Strut Tower Brace (Carbon Fiber)	E4010FA100	\$629.00
Gauge Pack (Performance)	H5010FA034	} \$595.00
Gauge Pack Housing (Gray)	H0017FC9100E	
Carbon Fiber Patterned Trim A/T	J1310FA130	\$149.00
Carbon Fiber Patterned Trim M/T	J1310FA140	\$149.00
Carpeted Floor Covers	J5010FS0010E	\$ 69.95
Front End Cover-Hood	M0010FS111	\$ 44.95
Front End Cover-Full	M0010FS140	\$119.95
SPT Decal Set (Blue)	SOA588N400	\$ 59.95
SPT Decal (Silver/Blue)	SOA588N450	\$ 59.95
Intermediate Pipe and Muffler	SOA8377500	\$495.00
*SPT Struts from KYB®	SOA837Z1100	\$575.00
*SPT Springs from EIBACH®	SOA855Z1100	\$279.95

Genuine Subaru Performance Mufflers

All Applications MSRP \$375.00



Application	Part #
96-99 LEGACY GT SEDAN	SOA8376300
96-99 LEGACY GT WAGON	SOA8376400
98-01 IMPREZA RS COUPE & SEDAN	SOA8376500
00-02 LEGACY GT SEDAN	SOA8377300
00-02 LEGACY GT WAGON	SOA8377400

For additional details about the complete lineup of SPT parts and applications for WRX or '98 and later Impreza 2.5 RS models, contact your local authorized Subaru dealer.

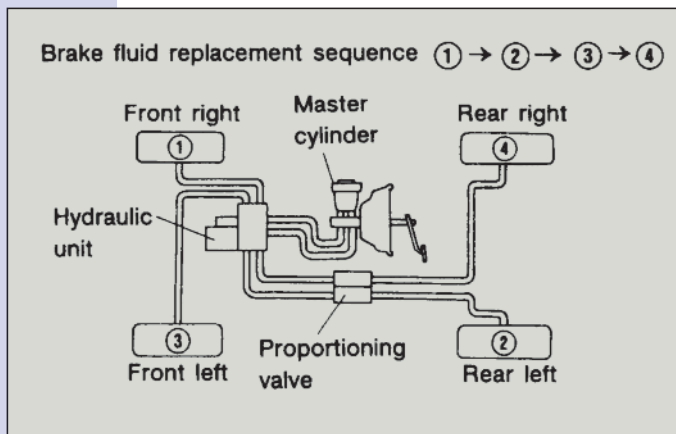
* Sold “as is” without any warranty coverage. Intended for off-highway application only. May bring vehicle out of compliance with safety and/or emissions standards. Can only be lawfully installed by end user. See dealer for complete details.

Subaru Brake Fluid Change

Caution: Cover bleeder with waste cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.

Note: Pump the brake pedal slowly.

- Tighten the air bleeder securely when no air bubbles are visible.
- Perform these steps for the brakes connecting to the secondary chamber of master cylinder, first, and then for the ones connecting to the primary chamber.
- With all procedures completed, fully depress the brake pedal and keep it in that position for approximately 20 seconds to make sure there is no leak evident in the entire system.



Fluid Replacement Sequence

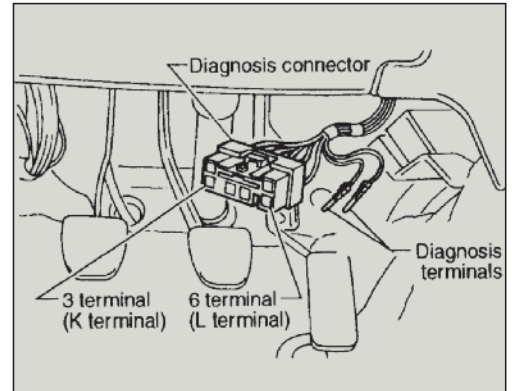
- For models with ABS, perform sequence control.

Sequence Control (ABS models)

Under the sequence control, after the hydraulic unit solenoid valve is driven, the operation of the hydraulic unit can be checked by means of the brake tester or a pressure gauge.

Sequence Control Operational Guidelines

- Connect diagnosis terminals to 3 terminals (K) and 6 terminals (L) of the diagnosis connector located under the driver's side of the instrument panel.
- Set the speed of all wheels at 2 MPH or less.
- Within 0.5 seconds after the ABS warning lamp goes out, immediately



Diagnostic Connector

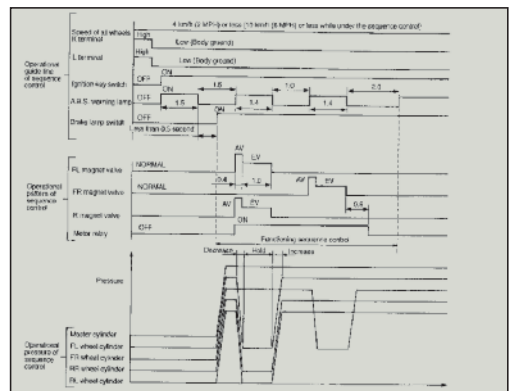
after the ignition switch is turned to on, depress the brake pedal and hold.

Caution: Do not depress the clutch pedal.

Note: When the ignition switch is set to on, the brake pedal must not be depressed. The engine must not operate.

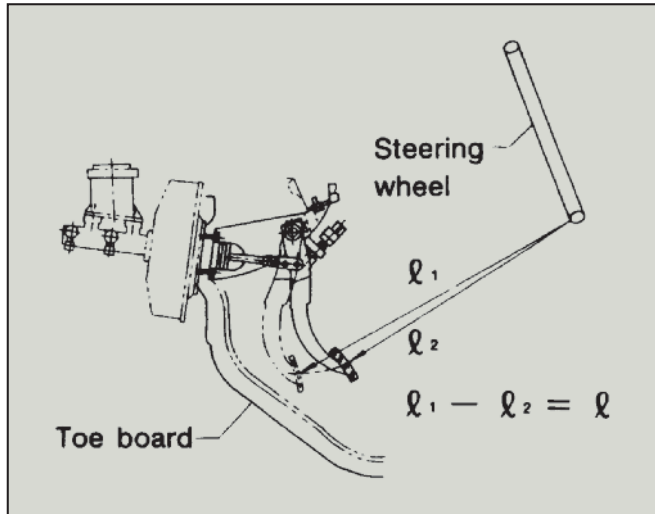
Conditions For Completion Of Sequence Control

- When the speed of at least one wheel reaches 6 MPH, the operation is returned to the normal control mode.
- When the L terminal is separated from ground, the operation is returned to the normal control mode.
- When the K terminal is separated from ground, the operation goes to the trouble code display mode.
- When the brake pedal is released during sequence control and the braking lamp switch is set to OFF, the operation is returned to the normal control mode.



Sequence Control

- After completion of the sequence control, the operation is returned to the normal control mode.
- Check the pedal stroke.
- While the engine is idling, depress the brake pedal with a 110 lb load and measure the distance between the brake pedal and steering wheel.
- With the brake pedal released, measure the distance between the pedal and steering wheel again.
- The difference between the two measurements must be more than specified.



Brake Pedal Pressure Test

Specified pedal stroke:
Without ABS: 90 mm (3.54 in)
With ABS: 95 mm (3.74 in)

Models without ABS: If the distance is more than specifications, there is a possibility that air is in the brake line. Bleed air from the brake line.

Models with ABS: If the distance is more than specifications, there is a possibility air is in the inside of the hydraulic unit. Therefore, air must be bled from the inside of the hydraulic unit to the brake pipes in accordance with the bleeding sequence control.

- Add brake fluid to the required level (MAX level) of reserve tank.
- As a final step, test run the vehicle at low speed and apply brakes relatively hard 2 -3 times to ensure that brakes provide normal braking action on all four wheels without dragging and uneven braking.

Bosal gives you genuine Subaru

Bosal direct-fit exhaust systems are genuine Subaru OEM Service Parts. And when we say direct fit, we mean direct fit! No cutting, bending, or welding means faster and better installations. When you choose Bosal Exhaust, you'll get the fit, performance, and durability your customers expect.

Bosal Performance

Available exclusively through the Subaru Dealer Network. Bosal Performance Mufflers with high-flow capacity, high performance sound, and oversize polished stainless steel tips. For Impreza RS Coupe and Legacy GT Sedans and Wagons.

bosal

Bosal Exhaust for Subaru. Available through your local Subaru

Subaru Brake Fluid Change

Brake Fluid Replacement

To maintain the brake fluid characteristics, replace the brake fluid according to maintenance schedule or earlier than that when used in severe condition.

Caution: Fresh DOT 3 or 4 brake fluid, such as Genuine Subaru Brake Fluid P/N SOA868V9220, must be used.

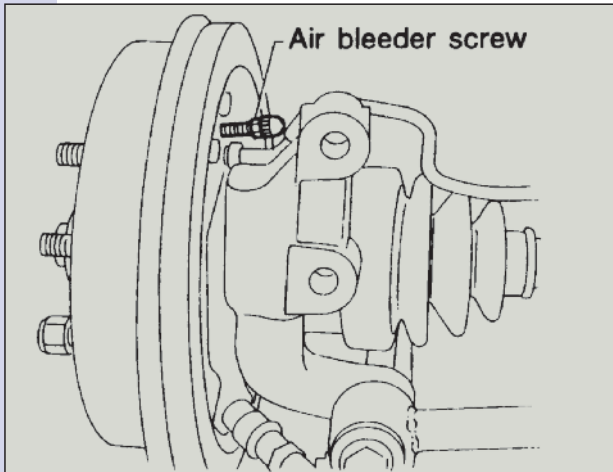
Replacement

- Cover bleeder with waste cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.
- Avoid mixing different brands of brake fluid to prevent degrading the quality of the fluid.
- Be careful not to allow dirt or dust to get into the reservoir tank.

the air bleeder of and insert the other end of the tube into a container to collect the brake fluid.

- Instruct your co-worker to depress the brake pedal slowly two or three times and then hold it depressed.
- Loosen bleeder screw approximately 1/4 turn until a small amount of brake fluid drains into container, and then quickly tighten screw.
- Repeat the previous two steps above until there are no air bubbles in drained brake fluid and new fluid flows through vinyl tube.

Caution: Add brake fluid as necessary while performing the air bleed operation, in order to prevent the tank from running short of brake fluid.



Air Bleeder Screw



Master Cylinder

Note: During bleeding operation, keep the brake reserve tank filled with brake fluid to eliminate entry of air. Pump the brake pedal slowly. For convenience and safety, it is advisable to have two men working.

- The amount of brake fluid required for the total brake system is approximately 16.9 US fl oz.
- Either jack-up vehicle and place a safety stand under it, or lift-up vehicle.
- Remove both front and rear wheels.
- Draw out the brake fluid from reserve tank with syringe.
- Refill reservoir tank with recommended brake fluid.
- Install one end of a vinyl tube onto

- After completing the bleeding operation, hold the brake pedal depressed, tighten the screw and install the bleeder cap. Bleeder screw tightening torque: 5.8 ± 0.7 ft-lb.
- Bleed air from each wheel cylinder using the same procedures as described above.
- Depress brake pedal with a force of approximately 294 N (30 kg, 66 lb) and hold it for approximately 20 seconds. At this time check pedal to see if it shows any unusual movement.
- Visually inspect bleeder screws and brake pipe joints to make sure that there is no fluid leakage.
- Install wheels, and drive vehicle for a short distance (1 to 2 miles) to make sure the brakes are operating properly.

Call Your Subaru Dealer For Incredible Savings

These savings apply for accessory items your customers may not have thought about when they purchased their Subaru. These amazing savings are for a limited time and while supplies last.

ACCESSORY BLOWOUT SPECIALS

Part Number	Description	Application	Original MSRP	Blow Out Price	% Disc.
F O R E S T E R					
65560FC010GA	Luggage Compartment Cvr - Beige	Forester '01	\$118.95	\$49.00	59%
E7210FS200AG	Rear Hatch Spoiler - Acadia Green	Forester '01	\$274.00	\$69.00	75%
J1010FC070AG	Sport Grille - Acadia Green	Forester '01	\$239.95	\$69.00	71%
J1010FC070SM	Sport Grille - Silverthorn Metallic	Forester '01	\$239.95	\$69.00	71%
J1010FC070AW	Sport Grille - Aspen White	Forester '01-'02	\$239.95	\$69.00	71%
J1010FC070BD	Sport Grille - Black Diamond	Forester '01-'02	\$239.95	\$69.00	71%
J1010FC070SG	Sport Grille - Sierra Gold Metallic	Forester '01-'02	\$239.95	\$69.00	71%
J1010FC070SR	Sport Grille - Sedona Red	Forester '01-'02	\$239.95	\$69.00	71%
65560FC000GA	Luggage Compartment Cvr - Beige	Forester '98-'00	\$118.95	\$39.00	67%
J1310FC010	Woodgrain Kit Manual Transmission	Forester '98-'00 - L, S	\$182.00	\$69.00	62%
H5010FC001	Gauge Pack - Compass, Temp, Alt	Forester '98-'00	\$299.00	\$99.00	67%
J5010FS331	Cargo Tray	Forester '98-'01	\$69.95	\$19.00	73%
H5010FC015	Perf. Gauge Pack - Oil Temp, Volts, Vac	Forester '98-'02	\$530.00	\$199.00	62%
H0017FC910DC	Gauge Pack Housing - Beige	Forester '98-'02	\$65.00	\$29.00	55%
E7710FC200VB	Brush Guard (Black)	Forester L, S+ '01-'02	\$346.00	\$99.00	71%
E7710FC200MF	Brush Guard (Grey)	Forester S '01-'02	\$346.00	\$99.00	71%

IMPREZA & OUTBACK SPORT

J1010FA200	Splash Guard Kit (Wagon)	Impreza '93-'01	\$59.95	\$19.00	68%
F5510FS011	Cargo Net (Wagon)	Impreza '97-'01	\$25.95	\$9.00	65%
J5010FS202	Cargo Tray (Wagon)	Impreza '97-'01	\$69.95	\$19.00	73%
H7110FS001	Remote Keyless Entry	Impreza '98	\$76.95	\$29.00	62%
J5010FS001GA	Carpeted Floor Mats - Beige	Impreza '98-'01	\$69.95	\$19.00	73%
J5010FS001ND	Carpeted Floor Mats - Gray	Impreza '99-'01	\$69.95	\$19.00	73%
J1310FA130	Carbon Fiber Trim Kit Automatic Trans	Impreza RS '98-'00	\$335.00	\$149.00	56%
J1310FA140	Carbon Fiber Trim Kit Manual Trans	Impreza RS '98-'00	\$335.00	\$149.00	56%
H6310FS300	Tweeter Speaker Kit	Impreza '99-'01	\$79.95	\$29.00	64%
H0017FC910DC	Gauge Pack Housing - Beige	Impreza '98-'01	\$65.00	\$29.00	55%
H5010FC001	Gauge Pack - Compass, Temp, Alt	Impreza '98	\$299.00	\$99.00	67%

LEGACY & OUTBACK

J5110LS000OB	Illuminated Vanity Mirror/Visor-Gray	Legacy '00-'02 - Brighton, L, OBK	\$97.00	\$49.00	49%
J5110LS000GF	Illuminated Vanity Mirror/Visor-Beige	Legacy '00 - OBK	\$97.00	\$49.00	49%
E7210LS000WP	Rear Hatch Spoiler (Wagon) - Winestone Pearl	Legacy '00-'01	\$275.00	\$69.00	75%
J1310LS000	Woodgrain Patterned Door Switch Trim	Legacy '00-'02 - except Brighton	\$85.00	\$19.00	78%
E3610AC011	Roof Visor Sedan	Legacy '95-'99	\$105.00	\$29.00	72%
E5618AC010	Rear Under Spoiler (Wagon)	Legacy '95-'99 - Brighton, L	\$115.00	\$49.00	57%
E7210AS020DS	Rear Deck Spoiler (Sedan) - Deep Sapphire	Legacy '95-'99	\$335.00	\$49.00	85%
E7210AS020GW	Rear Deck Spoiler (Sedan) - Glacier White	Legacy '95-'99	\$335.00	\$49.00	85%
H6300AS010	Tweeter Speaker Kit	Legacy '95-'99	\$74.95	\$15.00	80%
J1010AC060	Splash Guard Kit (Sedan)	Legacy '95-'99 - L	\$64.95	\$19.00	71%
H4610AC000MS	Map Light - Gray	Legacy '96-'99 - Brighton	\$30.75	\$8.00	74%
J1310AC020	Woodgrain Trim - Radio Bezel	Legacy '96-'99	\$32.00	\$8.00	75%
J1310AS000	Woodgrain Kit MT Gear Shift/Window Switches	Legacy '96-'99 - L, OBK	\$54.00	\$29.00	46%
J1310AS010	Woodgrain Kit AT Gear Shift/Window Switches	Legacy '96-'99 - L, OBK	\$91.00	\$29.00	68%
H6710AC000	Dual Power Outlet Socket	Legacy '97-'99	\$15.50	\$8.00	48%
J1010AC070	Splash Guard Kit (Wagon)	Legacy '95-'99 - Brighton, L	\$64.95	\$19.00	71%

Limited quantities available. Offer valid while supplies last. Prices exclude installation costs. Actual prices are set by dealer. Dealer may not have all items in stock but can order items for you. Ask about other accessories like CD players, CD changers, fog lamps and ski and bike attachments. See dealer for details.

Brush Guard

Sport Grille

Carbon Fiber Kit

Woodgrain Kit

Rear Under Spoiler

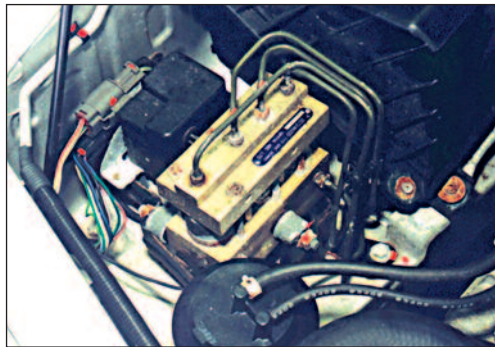
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Identifying ABS Systems

Since its first introduction, Subaru has utilized a variety of different ABS systems. Each of the systems have different diagnostic and/or service procedures, therefore, it is important that you are able to identify which system you are dealing with.

The 90-94 Model Year Legacy vehicles had three different types of ABS. They were Nippon, Bosch (known as ABS-2S) and the ABS-2E system.

The Nippon system has the brake lines coming into the top of the unit and is distinctive due to the fact that it has brake bleeder nipples on the top of the hydraulic unit cylinder head. The Bosch system looks very similar to the Nippon, with the brake lines coming in the top of the unit, but the lines are in a more square pattern and there are no brake bleeders on the cylinder head. Both of these systems have no long-term memory (once you turn the key off, all codes are erased from memory) and can display only one diagnostic code at a time from the LED on the computer under the passenger's seat.



ABS 2E

The ABS-2E system can be identified by the fact that the brake lines come into the top of the hydraulic unit with all four pipes in a straight line. This system can display three diagnostic codes at a time from the dash light and has a long-term memory. The computer is also under the passenger seat.

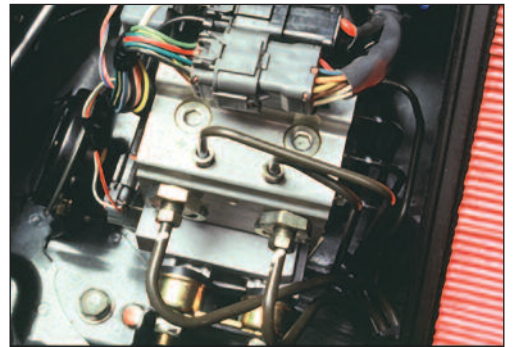
None of these systems (Nippon, Bosch nor the ABS-2E) communicate with the Select Monitor.

The 1995 model year and later Legacy, Forester and Impreza vehi-

cles have four different types of ABS systems. The ABS-2B system, the ABS/TCS system, the ABS 5.3 system and the ABS 5.3i system.

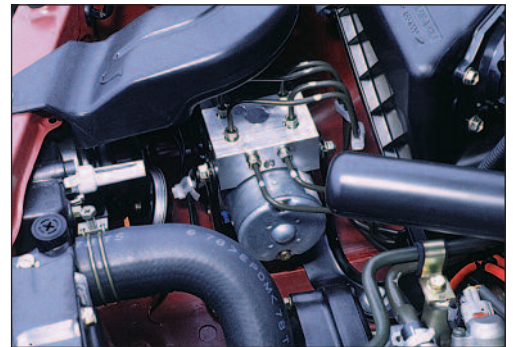
The ABS-2E system is the same as for the earlier Legacy vehicles. The brake lines enter the top of the hydraulic unit all in a straight line and the computer displays only three codes at a time on the dash light with no available Select Monitor communication. The computer is under the passenger's seat.

The ABS/TCS system was used on 1995 front wheel drive Legacy automatics with traction control and for that year only. The hydraulic unit has two brake lines coming in the top and two in the side. This system does communicate with the Select Monitor and it has a long-term memory. The computer is under the passenger's seat.



ABS 5.3

The ABS 5.3 system has the motor for the hydraulic unit sticking straight up with two brake lines going in the top of the unit and four out the side. This system does communicate with the Select Monitor. The computer is to the right of



ABS 5.3i

the glove box in Legacy vehicles and to the left of the steering column in Impreza vehicles.

The ABS 5.3i system has the motor for the hydraulic unit in a horizontal position and the four brake lines coming into the top of the unit in the shape of a square. The system does communicate with the Select Monitor and has a long-term memory. The computer is part of the hydraulic unit.

ABS/TCS Code 57

After alternator replacement, if you encounter a vehicle that begins to display an ABS/TCS Code 57 during subsequent engine starting, the situation may be due to the sensitivity of the ABS/TCS control unit. The alternator circuit, through the low brake fluid monitoring circuit, is used to tell the ABS/TCS control unit the engine is running. If the ABS/TCS control unit is

overly sensitive to changes in this circuit, Code 57 may be produced when the vehicle is started. The rapidity with which the ignition key is turned on influences whether the code is produced or not. If the key is turned on very quickly, the code may show up. If it is turned on more slowly, the code will not show up. Code 57 can be eliminated either by slowing down how fast the operator turns the ignition key or by replacing the ABS/TCS control unit with a unit that is specially designed to be more tolerant to changes on that circuit.

ABS 5.3i ABS Warning Light Operation

Similar to an Airbag Control Unit Connector, the ABS 5.3i Control Unit connector has a shorting clip that shorts two harness wires together whenever the connector is

disconnected from the Anti-lock Brake System Control Module and Hydraulic Unit. Shorting these two wires together will turn on the ABS warning light, warning the driver that the ABS is not functional.

ABS System Check

The ABS Electronic Control Unit checks all system components, including the Hydraulic Control Unit, each time the vehicle is started. When the Hydraulic Control Unit is operating during this checking period, the owner/technician may hear a noise/buzzing coming from the engine compartment. They may also feel the brake pedal pulsating slightly if their foot is on the brake pedal. This pulsating of the brake pedal may be more noticeable when backing down a slight grade (sloping driveway). It may also be felt when moving forward. The check is not performed

Continued on page 24.

The Genuine Way To Stop A Subaru!

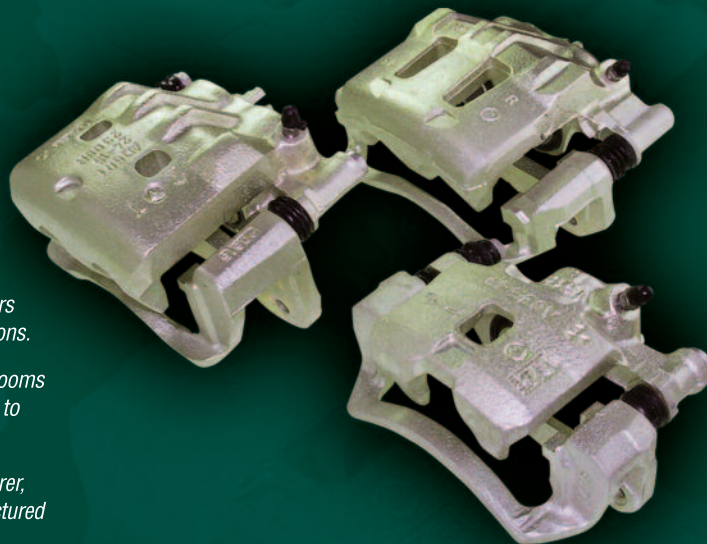
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until a speed sensor input is received by the ABS Electronic Control Unit. This is a normal function and no repairs should be attempted.

Brake Judder And Noise

A special grease, P/N K0777YA010, is available for brake judder and noise complaints. The grease has good durability against heat and water when compared to PBC grease. It should be applied between the brake pad and the shim. The grease has been added production and is included in genuine Subaru brake pad kits.



Brake Grease with Shims

There are two important things to remember when addressing brake judder and noise complaints:

1. Use an “on the car” type brake lathe to cut the rotors and adjust lateral run-out of the machine to less than .002 inch.
2. Don't replace or cut the rotor in case of a brake noise condition. Replace the brake pads and apply the new brake grease between the brake pad and shim only.

Brake Noise...What Is Normal?

One of the most common concerns that any vehicle owner perceives as a problem is brake noise when stopping the vehicle. Industry-wide, the question pops up: “What is considered to be an ‘acceptable’ level of brake noise?”

The disc brake systems used on vehicles today are designed and developed to meet many different, but very strict requirements. This must be accomplished while providing an optimum level of performance under a wide range of vehicle and environmental operating conditions.

The brake pads selected must be a balanced choice. There is a fine line between a quiet brake pad and one that will provide optimum performance under extreme braking conditions. Consequently, when a change is made in the pad formulation (whether it is meant to provide longer pad life, shorter stopping distances, noise reduction or a change in pedal effort), a trade-off must be made in one area or another. An example of pad formulation change would be the industry's switch from asbestos to semi-metallic brake linings.

Brake friction materials generate noise and heat in order to dissipate energy, a necessary physical reaction. When this occurs, brake dust and vibration of the brake pad within the caliper is generated. These factors can be changed by other environmental and road conditions such as ambient temperature, moisture, road salt, mud, etc.

It is important to remember that all brakes make noise. The frequency at which the noise becomes audible to us will vary. Any effort to eliminate an intermittent brake noise, which is considered normal, is usually temporary at best. This is not to say, however, that all brake noises should arbitrarily be considered normal. Brake noise should be diagnosed as outlined in the appropriate model year service manual.

ABS-2E Control Units and ABS Code 23

If you are working on a vehicle that displays a continuous and immediate ABS warning light (even after trying to clear codes), has no codes in memory (even though the ABS light is on) until the vehicle is driven, and records a code 23 (left front wheel sensor) after driving, check to see if anyone has previously worked on the ABS system and could possibly have installed the incorrect ABS computer.

The ABS-2E system has different computers for two and all wheel drive vehicles. The terminal locations in the harness for the left front wheel sensor differ between two and all wheel drive vehicles. If the incorrect computer is

installed, the computer does not look at the correct wires for the signal coming from the wheel sensor, resulting in the ABS light and code 23. Check your parts catalog information for the correct part number application. The notes identify which is for two or all wheel drive vehicles.

5.3 ABS System Component Relocation

Due to wiring changes associated with the 5.3 ABS system, the ABS components on some 1996 and later Subaru Legacy vehicles have been relocated (vehicles produced after November 1995). Among the relocated components are the ABS Control Unit, Cruise Control Unit, LSi Security Module, and Transmission Control Unit.

The ABS Control Unit has been relocated to the right of the glove box. This is the area where the

Cruise Control Unit was previously located. The cruise control module is now located under the driver's side dash, left of the steering column, near the TCU (Transmission Control Unit) location. This is also the new location for installing the cruise control computer during a dealer installed cruise installation. The bracket mounting the module also has changed. The LSi security module has been relocated behind the radio on the passenger's side.

The Transmission Control Unit is still located near the steering column. It has just been moved a little closer to the engine compartment bulkhead.

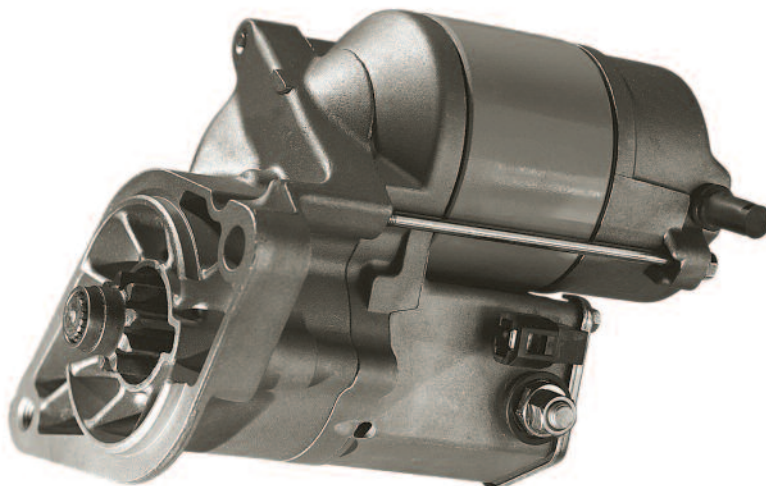
Note: These relocations only apply to vehicle equipped with ABS 5.3 wiring. Other vehicles will have the components in the locations where you are accustomed to finding them.

Intermittent Wheel Sensor Codes In Early Legacy ABS Systems (Non-ABS-2E)

Accumulations of metal filings, road dirt, mud, etc., on individual wheel speed sensors can cause wheel sensor codes to be reported by the ABS control unit and light the dashboard ABS light. This can occur especially after fairly rapid maneuvering of the vehicle to the left right at moderate speeds (i.e., tight S-turn exit ramps or parking lot maneuvering). Before extensive testing or replacement of these components, check and clean these areas. Examine the air gap and the condition of the tone wheels and test drive the vehicle. If the code reappears, continue your diagnosis. If it does not, cleaning may have repaired the condition.

Continued on page 30.

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1996 Subaru Legacy Equipped With ABS 5.3 System

1996 Subaru Legacy models equipped with the new ABS 5.3 system have the ABS electronic control unit located behind the glove box and not under the passenger seat as on other Subaru Legacy models.

The 5.3 system is also compatible with the Subaru Select Monitor, which allows you to access trouble codes when diagnosing the system.

Before searching for the electronic control unit, determine which system is installed in the vehicle. One way of telling is by looking at the Hydraulic Control Unit on the 5.3 system (still located behind the right front headlight). It is noticeably different from the Hydraulic Control Units used on previous systems.

The ABS 5.3 system was first installed in Subaru Legacy vehicles starting with late October/early November 1995 production.

ABS/TCS Equipped Legacy Vehicles

On FWD Subaru Legacy vehicles equipped with the ABS/TCS system, one of the following conditions may cause the BRAKE and ABS/TCU warning lights on the dash to light: low brake fluid level or alternator not charging. These conditions will also cause the ABS system to revert to a conventional braking system.

Low Brake Fluid Level This will cause the ABS to shut down because the system believes there is insufficient fluid in the brake system to allow the ABS system to operate properly.

Alternator Not Charging The ABS system uses the alternator output signal to tell the ABS control unit the car is running, so the ABS control unit needs the alternator output signal to turn the system on. If there is no output from the alternator, the ABS control unit never turns the system on so it won't work.

Brake Fluid Basics

There are three types of brake fluid: DOT 3, DOT 4 and DOT 5. Incorrect brake fluid application may result in degraded braking performance as well as

system component damage. The more commonly used DOT 3 and 4 brake fluids are of the polyglycol variety, while DOT 5 is silicone based. Subaru recommends only DOT 3 or 4 brake fluid.

Polyglycol-based fluid is hygroscopic, which means it absorbs moisture from the air. This quality allows any moisture absorption to be dispersed throughout the system, eliminating any concentration of water that could lead to localized corrosion.

This characteristic, however, has its disadvantages. Over time, the level of moisture absorption may reach as much as 7-8 percent, which causes the fluid to become contaminated. This condition will drastically reduce the boiling point of the brake fluid, and lower the temperature at which it evaporates. Once vapor has formed, pockets of air are created in the hydraulic lines, causing brake pedal travel to increase. This is due to the fact that the air must first be compressed before any fluid starts to move. The minimum boiling point established for DOT 3 fluid is 401° F, while DOT 4 is 446° F.

Silicone brake fluid, classified as DOT 5, can be easily identified by its purple color. Silicone does not absorb water but rather repels it. This means there is no contamination from moisture absorption and less chance of internal corrosion. In addition, silicone-based brake fluid has a boiling point of over 500 degrees.

In order to realize the benefits of DOT 5 brake fluid, the system must contain 100 percent silicone-based fluid. This means that DOT 5 brake fluid cannot be installed in a system already using DOT 3 or DOT 4. Because these different types of fluid will not mix, all of the polyglycol-based fluid will be concentrated into one part of the system. At this point, any moisture that is present in the fluid cannot be dispersed through the system. This localized moisture concentration will certainly cause problems.

It is nearly impossible to remove all the brake fluid from a system, and even with power bleeding — 2-3 percent of the old fluid will remain. Since the two types of brake fluid are not compatible, stick with Subaru's DOT 3 or 4 recommendations.

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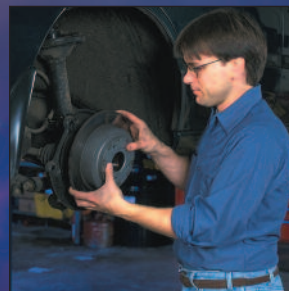
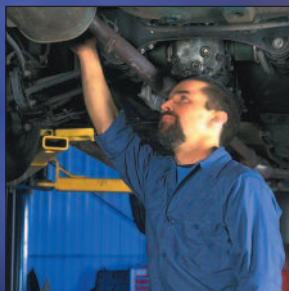
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