

An Introduction to  
ABS 5.3  
System Diagnosis

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**Video Reference Booklet**

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# AN INTRODUCTION TO ABS 5.3 SYSTEM DIAGNOSIS

## CONTENTS

■	<b>INTRODUCTION</b> .....	3
	<b>OVERVIEW</b> .....	4
	<b>DIFFERENCES BETWEEN THE 5.3 AND THE 5.3i</b> .....	6
	<b>COMPONENT LOCATIONS</b> .....	7
	<b>OPERATION</b> .....	8
	Pressure Decrease .....	8
■	Pressure Hold .....	9
	Pressure Increase .....	9
	<b>DIAGNOSTICS</b> .....	10
	Using the New Select Monitor with the Service Manual .....	12
	Using the New Select Monitor for Diagnosis .....	14
	Example of a Troubleshooting Procedure .....	15
	Diagnosis Without the New Select Monitor .....	16
	Using the Trigger Option .....	16
■	<b>BRAKE BLEEDING</b> .....	18
	Sequence Control .....	18
	Checking the Pedal Stroke .....	19
	Commanding Sequence Control Without the Select Monitor .....	19
	<b>CONCLUSION</b> .....	19

# AN INTRODUCTION TO ABS 5.3 SYSTEM DIAGNOSIS

## INTRODUCTION

This Video Reference Booklet accompanies the videotape "An Introduction to ABS 5.3 System Diagnosis." It summarizes the information contained in the videotape.

This Booklet provides an overview of the ABS 5.3 system; it covers the differences between the 5.3 and the 5.3i, component locations, a brief overview of the operation of the ABS 5.3, diagnostics, and the brake bleeding procedure.

Before using this videotape and the Booklet, you should meet the following prerequisites:

1. You should be familiar with basic brake system diagnosis and repair, including the brake bleeding procedure.
2. You should know how ABS systems operate.
3. You should be familiar with Subaru Service Manuals and be able to read the electrical wiring diagrams.
4. You should know how to operate the New Select Monitor.

If you do not meet these prerequisites, talk to your supervisor or district technical manager to arrange for additional training.

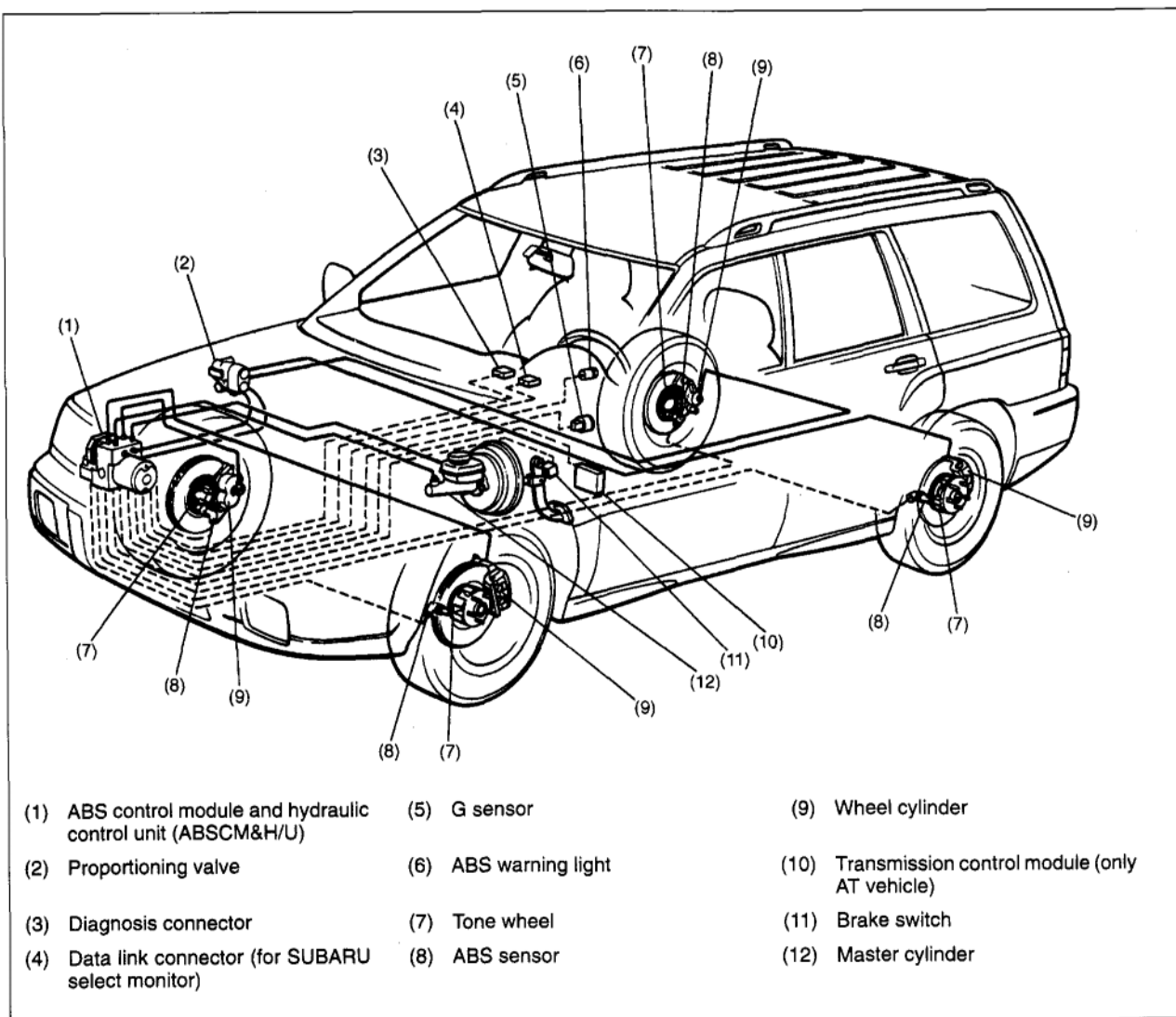
# AN INTRODUCTION TO ABS 5.3 SYSTEM DIAGNOSIS

## OVERVIEW

The ABS 5.3 is a four-sensor, four channel system. It controls the front wheels independently during ABS braking. It controls the rear wheels as a pair, as appropriate for whichever of the two wheels is turning more slowly.

The ABS 5.3 system has improved self-diagnostics and trouble code memory, and it can communicate with OBD-II testers, such as the New Select Monitor.

It was introduced in 1996 on Legacy vehicles equipped with ABS. More recently, an updated system, the ABS 5.3i, has been introduced. The 5.3i is used on the 1998 Forester, late 1997 Legacy, and late 1997 Impreza vehicles equipped with ABS.



ABS 5.3i System

# AN INTRODUCTION TO ABS 5.3 SYSTEM DIAGNOSIS



1996/Early 1997 Legacy



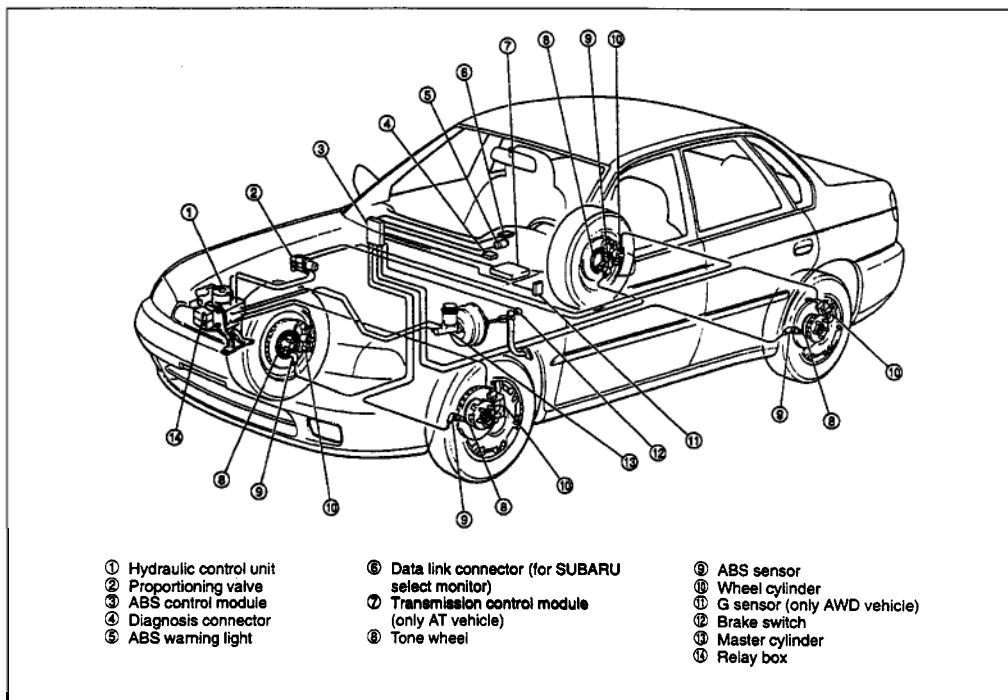
1998 Forester

90-94 Legacy				
	Hydraulic Unit	Computer Location	Long Term Memory?	Select Monitor?
NIPPON	Brake lines come into top of unit. Has brake bleeders on top of unit.	Under Passenger's Seat	No	No
BOSCH	Brake lines come in top of unit in shape of a square.	Under Passenger's Seat	No	No
ABS-2E	Brake lines come in top of unit lined up in straight line.	Under Passenger's Seat	Yes	No
95-Present Legacy				
	Hydraulic Unit	Computer Location	Long Term Memory?	Select Monitor?
ABS-2E	Brake lines come in top of unit lined in straight line.	Under Passenger's Seat	Yes	No
ABS/TCS 95 front wheel drive Legacy Auto only	Two brake lines come in top and two in side of unit.	Under Passenger's Seat	Yes	Yes
ABS 5.3	Motor stands upright, brake lines come in the side of the unit.	To the right of the glove box in the Legacy. To the left of the steering column in the Impreza.	Yes	Yes
ABS 5.3i	Motor lies down, brake lines come in the top in the shape of a square.	Computer part of the Hydraulic unit.	Yes	Yes
<p>1993-97 Impreza – ABS-2E                      1997 Impreza – ABS 5.3                      1998 Impreza – ABS 5.3i                      1992-96 SVX – Nippon                      1998 Forester – ABS 5.3i</p>				

## ABS Applications

# AN INTRODUCTION TO ABS 5.3 SYSTEM DIAGNOSIS

## DIFFERENCES BETWEEN THE 5.3 AND THE 5.3i



ABS 5.3 System

Although the ABS 5.3 and 5.3i systems are similar in most ways, there are a few important differences.

On the ABS 5.3, the ABS control unit is located behind and to the right of the glove box. With the 5.3i, the ABS control unit is mounted on the Hydraulic Control Unit (HCU).

The Select Monitor can communicate only with the ABS 5.3. The New Select Monitor can communicate with both the 5.3 and 5.3i, using the appropriate cartridges.



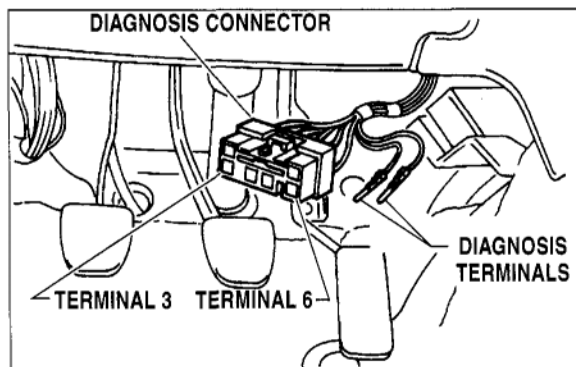
Select Monitor (Left) and  
New Select Monitor (Right)

# AN INTRODUCTION TO ABS 5.3 SYSTEM DIAGNOSIS

## COMPONENT LOCATIONS

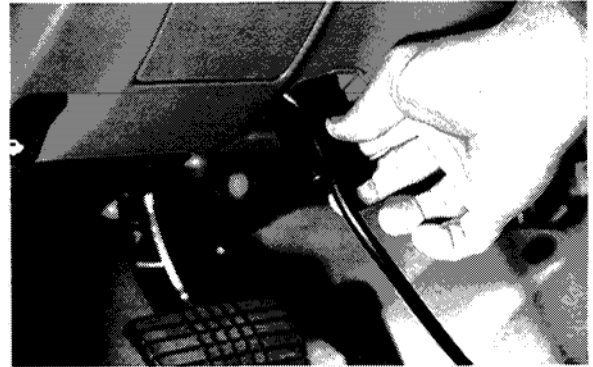
Most of the ABS 5.3 and 5.3i components are located in the engine compartment. The HCU is located under the hood at the front right corner. It contains the solenoid valves used to control hydraulic pressure to the wheels during ABS braking, as well as the motor pump assembly and the relays. In the 5.3i version, the ABS control unit is mounted on the HCU, instead of behind the glove box.

For both models, the G sensor is located under the center console. It senses acceleration and deceleration, so that the ABS control unit can compare the actual speed of the vehicle with the speed reported by the wheel speed sensors.



Diagnosis Connector

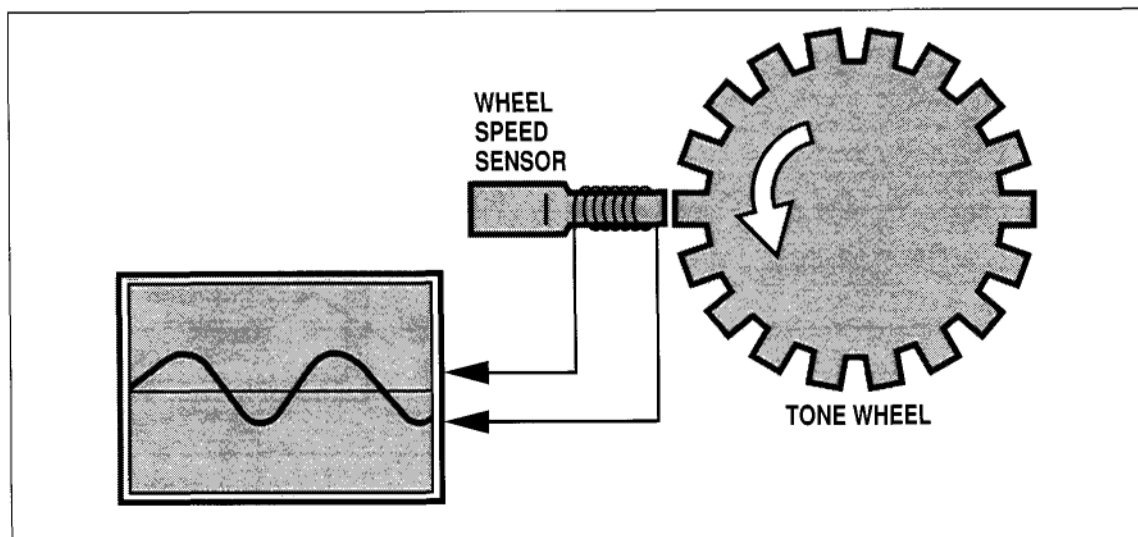
The diagnosis connector is located above the accelerator pedal. It can be used to manually read and clear trouble codes.



Connecting Cable to Data Link Connector

The Data Link Connector (DLC) is located under the dash panel on the driver's side. It allows the New Select Monitor to communicate with several of the vehicle's systems, including the ABS.

At each wheel, there's a speed sensor and a tone wheel. The tone wheel provides a magnetic pulse to the wheel speed sensor, which the ABS control unit uses to determine the speed of rotation of the wheel.



Wheel Speed Sensor and Tone Wheel



# AN INTRODUCTION TO ABS 5.3 SYSTEM DIAGNOSIS

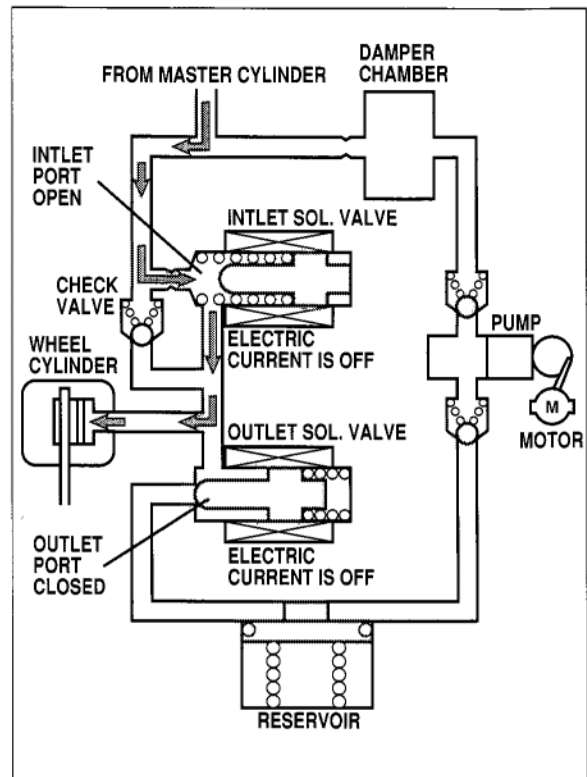
## OPERATION

Hydraulic fluid is directed from the master cylinder to the brake calipers at each wheel, where the HCU controls brake fluid flow by means of eight solenoid valves. There is an inlet valve and an outlet valve for each wheel. During normal braking, the inlet valve is open and the outlet valve is closed.

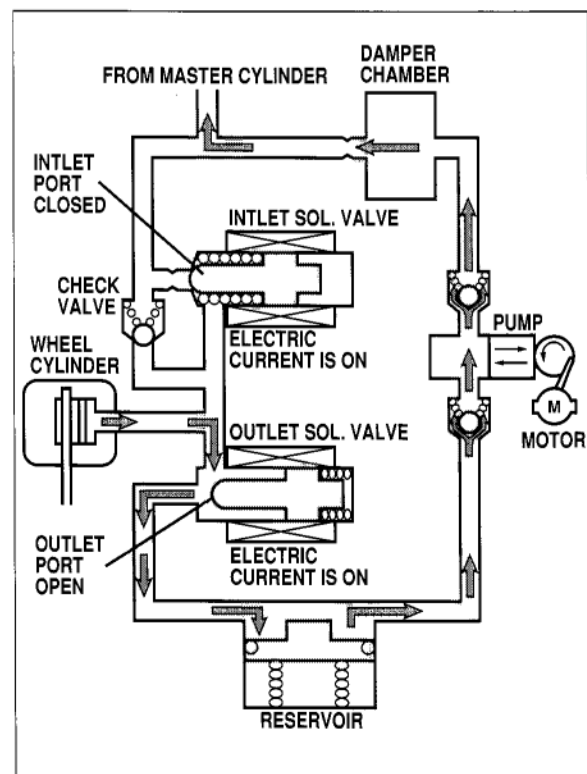
There are three ABS modes: Pressure Decrease, Pressure Hold, and Pressure Increase. When the ABS control unit senses that one or more of the wheels is starting to lock up, it activates the ABS system and controls braking for the affected wheel, in these ABS modes. It also activates the motor-pump assembly.

### Pressure Decrease

In the Pressure Decrease mode, the HCU closes the inlet solenoid valve, shutting off pressure from the master cylinder to the brake caliper at the affected wheel. At the same time it opens the outlet solenoid valve, releasing brake fluid pressure from the caliper, reducing braking at that wheel.



Hydraulic System - Normal Braking



Hydraulic System - Pressure Decrease

# AN INTRODUCTION TO ABS 5.3 SYSTEM DIAGNOSIS

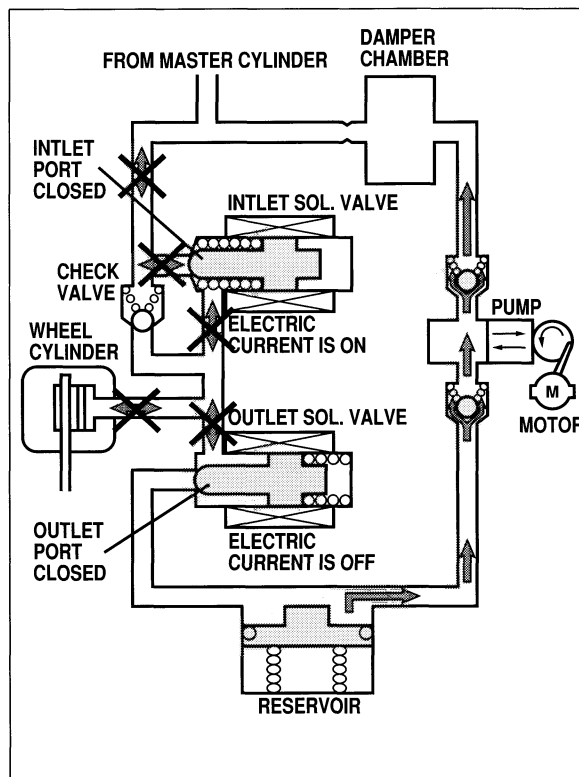
## Pressure Hold

In the Pressure Hold mode, the HCU closes the inlet and outlet solenoid valves for the affected wheel. The solenoids hold the pressure in the caliper constant. The HCU uses Pressure Hold when wheel speed is optimal.

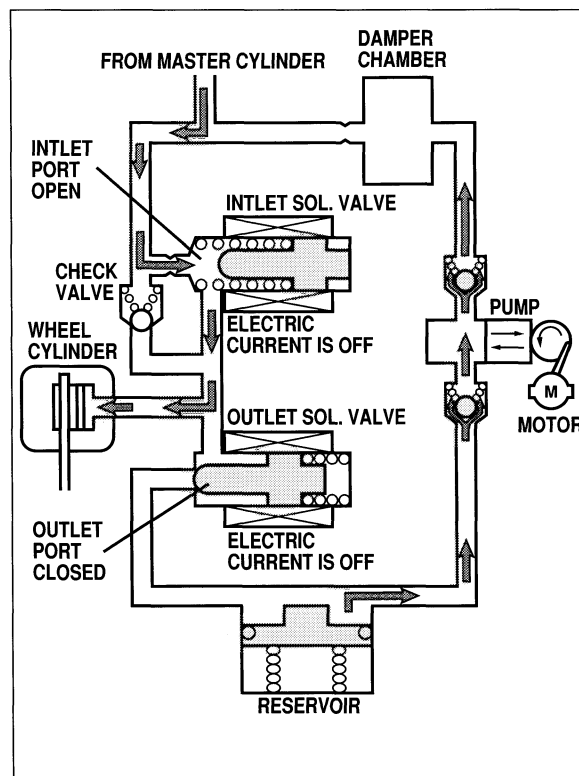
## Pressure Increase

In the Pressure Increase mode, the HCU opens the inlet solenoid valve and closes the outlet valve. The motor-pump assembly assists the master cylinder in applying brake fluid pressure to the caliper of the affected wheel.

For more detailed information on how the ABS 5.3 system operates, see the Service Manual, Part M, "Mechanism and Function," Section 4-4.



Hydraulic System – Pressure Hold



Hydraulic System – Pressure Increase

# AN INTRODUCTION TO ABS 5.3 SYSTEM DIAGNOSIS

## DIAGNOSTICS

The ABS 5.3 system has extensive self-diagnostic capabilities. When the ignition switch is turned from “Off” to “On,” the ABS system performs an electrical self-check and illuminates the ABS warning light for 1 1/2 seconds. If there are no electrical problems, the system then turns the light off.



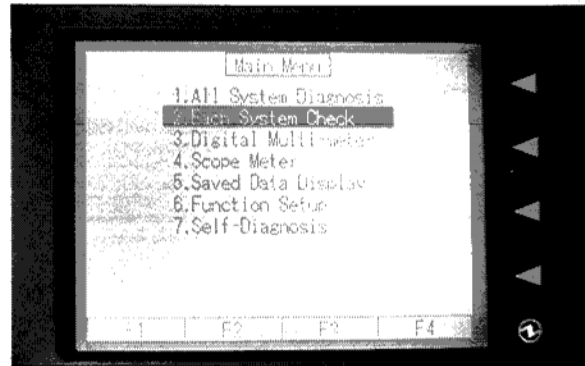
**ABS Warning Light**

The ABS 5.3 system performs a second check when vehicle speed reaches 3 mph (if the brake has not been applied) or 8 mph (if the brake has been applied). During this second self-check, the ABS system operates its motor pump for 0.2 second and exercises the solenoids.

If the ABS control unit does not detect any problems it keeps the ABS warning light off. If the control unit does find a problem, it turns the ABS warning light on and stores one or more trouble codes. The ABS system then remains passive even if a wheel begins to lock up.

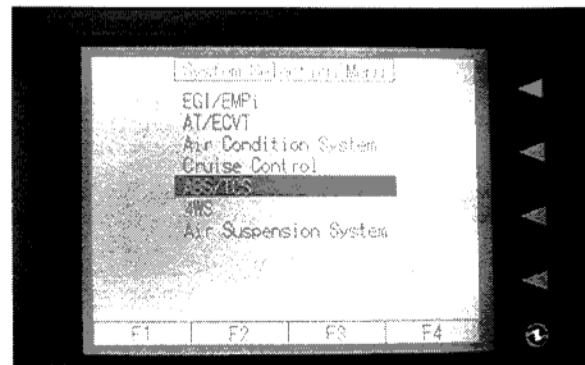
If the problem involves one of the wheel speed sensors, with the ABS 5.3i, the system waits until the next ignition cycle before turning the ABS warning light on. If, at the next ignition cycle, the ABS system sees the same wheel speed sensor problem again, it turns on the ABS warning light and the system stays passive.

Otherwise, the ABS system assumes there is no problem.



**New Select Monitor – “Each System Check” Selected**

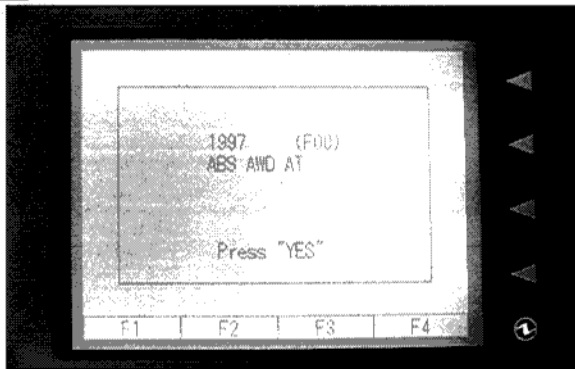
If a vehicle with an ABS 5.3 or 5.3i system has an ABS warning light that stays on, you can use the New Select Monitor to read its trouble codes. Simply plug in the New Select Monitor, turn the ignition switch to “On,” and select “Each System Check” from the main menu.



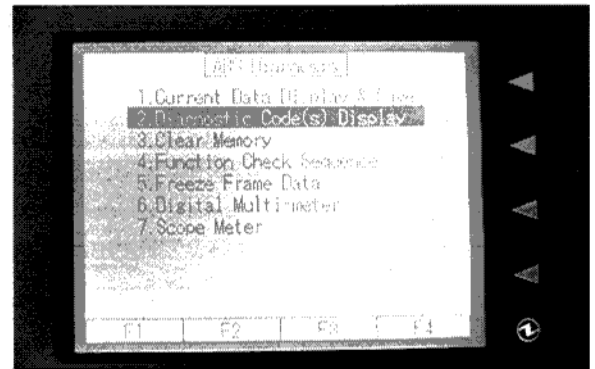
**New Select Monitor – “ABS/TCS” Selected**

Next, select “ABS/TCS.”

# AN INTRODUCTION TO ABS 5.3 SYSTEM DIAGNOSIS



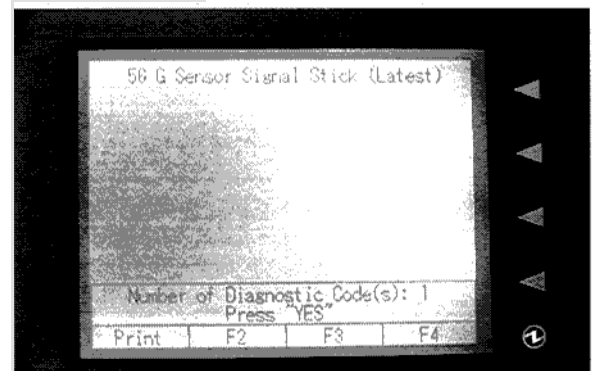
**New Select Monitor – “ABS AWD AT?”**



**New Select Monitor – “Diagnostic Code(s) Display” Selected**

The New Select Monitor now asks you whether the vehicle has all-wheel drive and automatic transmission. Press the “Yes” button, then select “Diagnostic Code(s) Display.” The New Select Monitor will display the trouble codes stored in the ABS memory, beginning with the most recent. Be sure to write down any trouble codes you find.

For every trouble code, the Service Manual provides a step-by-step troubleshooting procedure.



**New Select Monitor – ABS Trouble Code Displayed**

## Typical Troubleshooting Procedure

### AJ: TROUBLE CODE 56 DETECTION OF G SENSOR STICK

#### — DETECTION OF G SENSOR STICK —

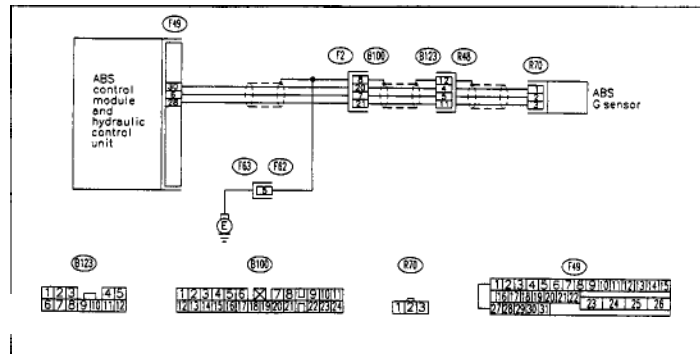
#### DIAGNOSIS:

- Faulty G sensor output voltage

#### TROUBLE SYMPTOM:

- ABS does not operate.

#### WIRING DIAGRAM:



**10AJ1 : CHECK ALL FOUR WHEELS FOR FREE TURNING.**

**10AJ2 : CHECK OUTPUT OF G SENSOR USING SELECT MONITOR.**

CHECK

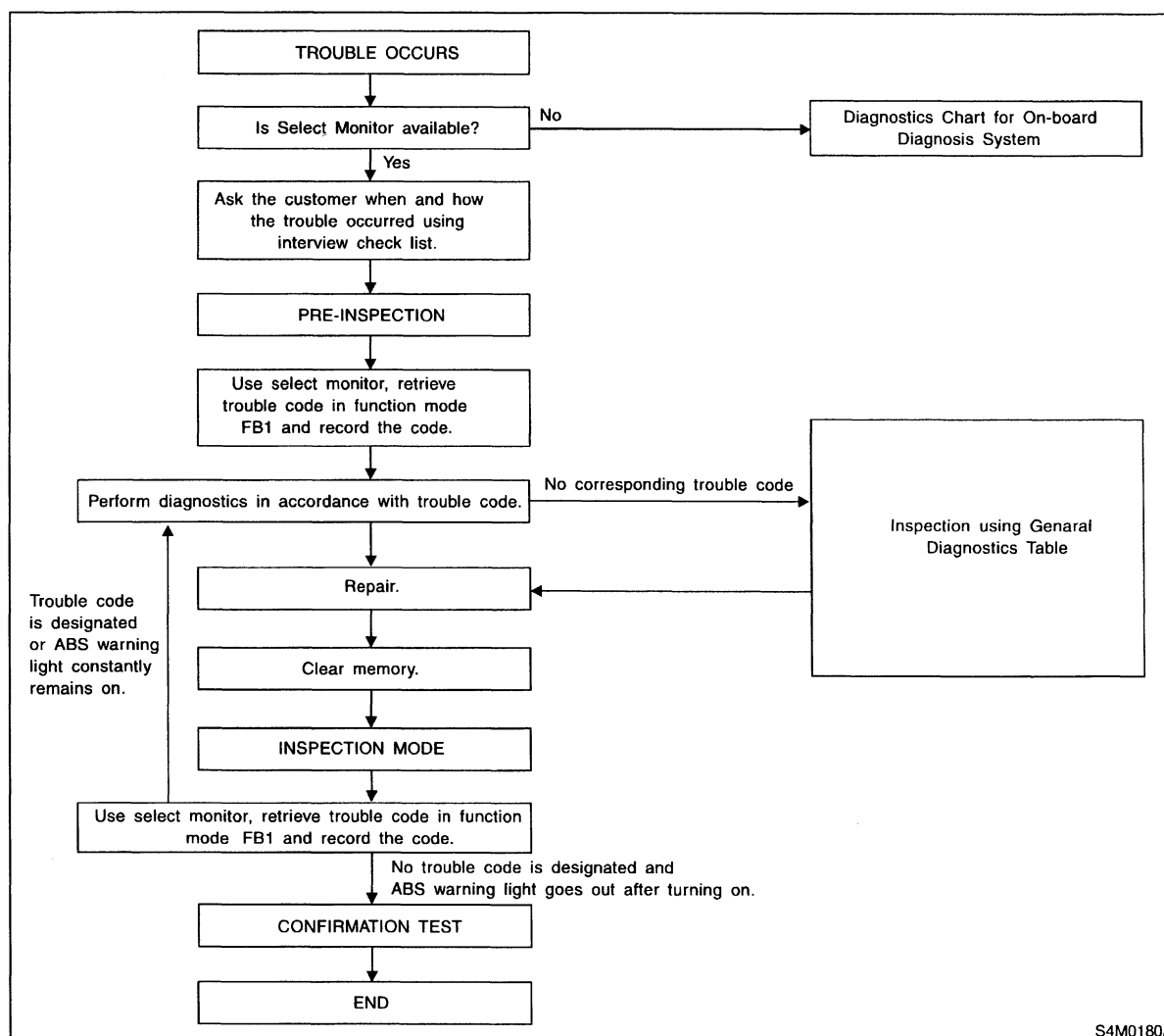
# AN INTRODUCTION TO ABS 5.3 SYSTEM DIAGNOSIS

## Using the New Select Monitor with the Service Manual

To use the New Select Monitor with the Service Manual, follow the procedure titled "Diagnostics Chart with Select Monitor." It's found in the Service Manual, Part T, "Troubleshooting," Section 4-4.

### 10. Diagnostics Chart with Select Monitor

#### A: BASIC DIAGNOSTIC CHART



S4M0180A

Diagnostics Chart with Select Monitor

# AN INTRODUCTION TO ABS 5.3 SYSTEM DIAGNOSIS

Before beginning diagnosis, this Chart directs you to ask the customer when and how the problem occurred. To assist the service advisor with gathering the information needed, the Service Manual provides a list of additional interview questions. The service advisor should ask these questions, and write down all the information the customer provides.

Next, the Chart directs you to perform a pre-inspection on the vehicle, to verify that

the problem exists, and to check for any obvious causes, such as low battery voltage, low brake fluid, brake drag, a worn brake pad or rotor, or tire problems.

The pre-inspection also includes a check of the ABS electrical system: turn the ignition switch from "Off" to "On." If the ABS warning light does not come on or comes on and stays on, there is an electrical problem.

## **B: CHECK LIST FOR INTERVIEW**

Check The Following Items About The Vehicle's State.

### **1. THE STATE OF THE ABS WARNING LIGHT**

ABS warning light comes on.	<input type="checkbox"/> Always <input type="checkbox"/> Sometimes <input type="checkbox"/> Only once <input type="checkbox"/> Does not come on <input checked="" type="checkbox"/> When / how long does it come on?		
Ignition key position	<input type="checkbox"/> LOCK <input type="checkbox"/> ACC <input type="checkbox"/> ON (before starting engine) <input type="checkbox"/> START <input type="checkbox"/> On after starting (Engine is running) <input type="checkbox"/> On after starting (Engine is stopped)		
Timing	<input type="checkbox"/> Immediately after ignition is ON <input type="checkbox"/> Immediately after ignition starts		
	<input type="checkbox"/> When advancing		km/h to km/h MPH to MPH
	<input type="checkbox"/> While traveling at a constant speed	km/h	MPH
	<input type="checkbox"/> When decelerating		km/h to km/h MPH to MPH
	<input type="checkbox"/> When turning to right	Steering angle :	deg
		Steering time :	sec
	<input type="checkbox"/> When turning to left	Steering angle :	deg
		Steering time :	sec
	<input type="checkbox"/> When moving other electrical parts		
	<ul style="list-style-type: none"> <li>• Parts name :</li> <li>• Operating condition :</li> </ul>		

**Check List for Interview**

# AN INTRODUCTION TO ABS 5.3 SYSTEM DIAGNOSIS

## 11. General Diagnostics Table

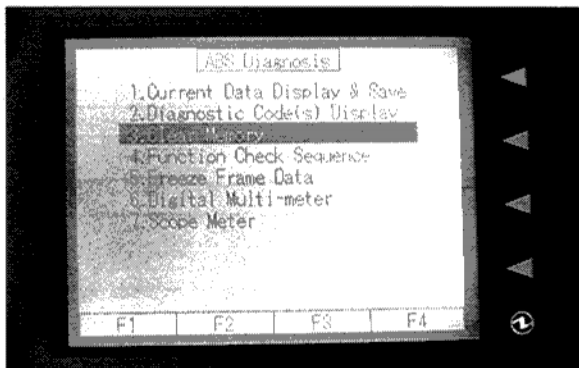
### A: SYMPTOMS AND PROBABLE CAUSES

Symptom		Probable faulty units/parts
Vehicle instability during braking	Vehicle pulls to either side.	<ul style="list-style-type: none"> <li>● ABSCM&amp;H/U (solenoid valve)</li> <li>● ABS sensor</li> <li>● Brake (caliper &amp; piston, pads)</li> <li>● Wheel alignment</li> <li>● Tire specifications, tire wear and air pressures</li> <li>● Incorrect wiring or piping connections</li> <li>● Road surface (uneven, camber)</li> </ul>
	Vehicle spins.	<ul style="list-style-type: none"> <li>● ABSCM&amp;H/U (solenoid valve)</li> <li>● ABS sensor</li> <li>● Brake (pads)</li> <li>● Tire specifications, tire wear and air pressures</li> <li>● Incorrect wiring or piping connections</li> </ul>
	Long braking/stopping distance	<ul style="list-style-type: none"> <li>● ABSCM&amp;H/U (solenoid valve)</li> <li>● Brake (pads)</li> <li>● Air in brake line</li> <li>● Tire specifications, tire wear and air pressures</li> <li>● Incorrect wiring or piping connections</li> </ul>
	Wheel locks.	<ul style="list-style-type: none"> <li>● ABSCM&amp;H/U (solenoid valve, motor)</li> <li>● ABS sensor</li> <li>● Incorrect wiring or piping connections</li> </ul>
	Brake dragging	<ul style="list-style-type: none"> <li>● ABSCM&amp;H/U (solenoid valve)</li> <li>● ABS sensor</li> <li>● Master cylinder</li> <li>● Brake (caliper &amp; piston)</li> </ul>

**General Diagnostics Table**

If there are one or more trouble codes stored, the Chart directs you to retrieve them using the Select Monitor, and perform your diagnosis using the procedure specified for the trouble codes found, making the appropriate repairs.

If there are no trouble codes, the Chart directs you to continue your inspection using the "General Diagnostics Table" at the end of Section 4-4.



**New Select Monitor – "Clear Memory" Selected**

After you have finished your repair, the Chart tells you to clear the trouble codes from memory using the New Select Monitor, then road test the vehicle and see if any new trouble codes are set.

If a new trouble code is set, the Chart tells you to diagnose the problem according to the trouble code diagnostic procedures in the Service Manual.

When there are no more trouble codes, the Chart directs you to confirm that your repair has fixed the problem, and that the ABS warning light does not come back on.

### Using the New Select Monitor for Diagnosis

Not only does the New Select Monitor allow you to read trouble codes, it also helps with diagnosis. For example, let's assume the vehicle has a trouble code 56 - Detection of G-Sensor Stick. Note that the New Select Monitor doesn't just tell you the code number - it also tells you which one of the four possible problems has caused the ABS control module to set Code 56.

# AN INTRODUCTION TO ABS 5.3 SYSTEM DIAGNOSIS

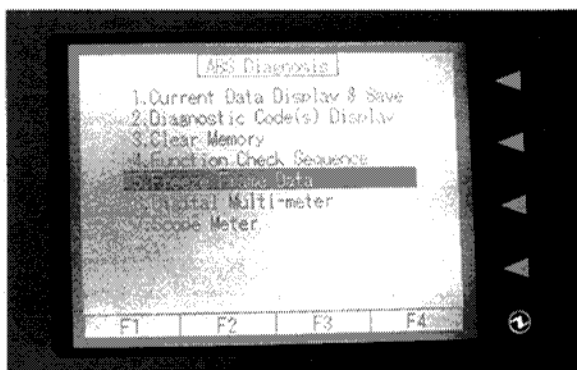
The Service Manual, Part T, "Troubleshooting," Section 4-4 provides the diagnostic procedure for trouble code 56, Detection of G-Sensor Stick. Be sure you're looking at the diagnostic procedure for the actual problem in this case; there are three other diagnostic procedures for trouble code 56!

Whenever a trouble code is set, the ABS 5.3 system stores the values of its inputs and outputs. Before going further with the diagnostic procedure, you can look at the data display and see what the values were, at the time the trouble code was set.

To do this, select "Each System Check," as before, then select "ABS/TCS."

When the New Select Monitor asks whether the vehicle has all-wheel drive and automatic transmission, if the vehicle is equipped with automatic transmission, press the "Yes" button.

Now, select option #5, "Freeze Frame Data."



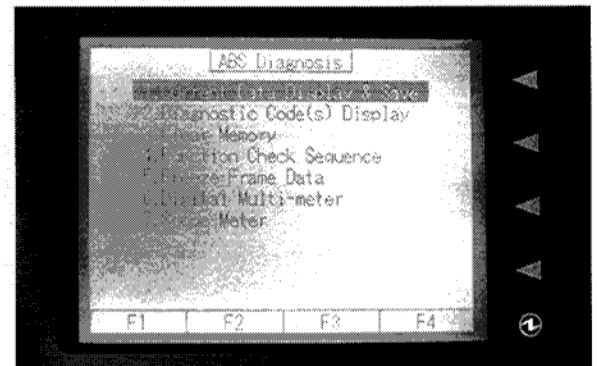
**New Select Monitor – "Freeze Frame Data" Selected**

From the Freeze Frame Menu, select "Data Display." The New Select Monitor will now give you values for 11 different parameters at the time the DTC was set. In this

example, Code 56, you would at least want to know what the G-sensor voltage was, when the code was set. You would also want to take note of any other values that are unusual.

## Example of a Troubleshooting Procedure

Let's look at the troubleshooting procedure described in the Service Manual for Code 56 - Detection of G-Sensor Stick. As a first step, the diagnostic procedure directs you to "check all four wheels for free turning." It asks, "Have the wheels been turning freely, such as when the vehicle is lifted up?" If so, it tells you the system is normal - you should just erase the trouble code.



**New Select Monitor – "Current Data Display and Save" Selected**

If not, the procedure tells you to use the Select Monitor to check the voltage output of the G sensor. Select Option 1, "Current Data Display and Save" and use it to read the G-sensor voltage. Depending on whether the voltage reading is correct or not, you would then troubleshoot the sensor or the circuit, following the diagnostic procedure in the Service Manual.

By the way, when the diagnostic procedure tells you to check a connector, pay particular attention to it.



# AN INTRODUCTION TO ABS 5.3 SYSTEM DIAGNOSIS

## Diagnosis Without the New Select Monitor

In addition to diagnosis using the Select Monitor, the Service Manual also provides a procedure for diagnosis of the ABS 5.3 without the Select Monitor. In this case, with the ignition switch "Off," you would ground terminal 6 of the diagnosis connector, using one of its grounding wires; turn the ignition switch to "On"; and count the ABS warning light blink codes. Then follow the procedure outlined in "Diagnostics Chart for On-board Diagnosis System."



Diagnosis Connector – Pin #6 Grounded

## Using the Trigger Option

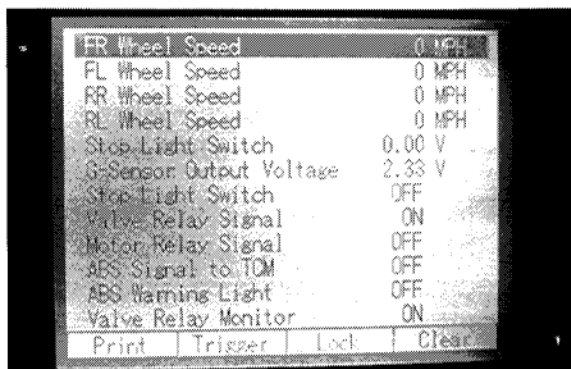
One of the most useful features of the New Select Monitor is the trigger option. When you're troubleshooting an intermittent problem, this feature can be particularly useful, if you can duplicate the problem. The ABS control unit stores the values of the parameters at the moment a trouble code is set, in its internal memory. The New Select Monitor, however, can store data on the parameters before, during, and after a trouble code is set.

From the Main Menu, select "2. Each System Check."

From the System Selection Menu select "ABS/TCS."

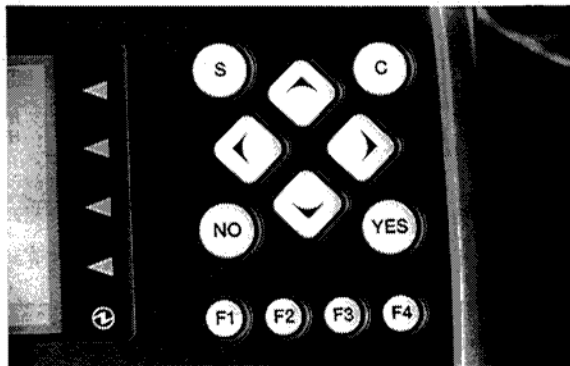
The New Select Monitor will now ask you whether the vehicle has automatic transmission ("ABS AWD AT") Press "Yes."

To set up the New Select Monitor for the Trigger option, select "1. Current Data Display and Save," at the "ABS Diagnosis" menu. At the Data Display Menu select "12 Data Display." The system will now display the ABS parameters.



New Select Monitor – ABS Parameters and Trigger Option

Using the S or "scroll" key, scroll the lower command line so that the Trigger option appears. Select the Trigger option, using the F2 key.



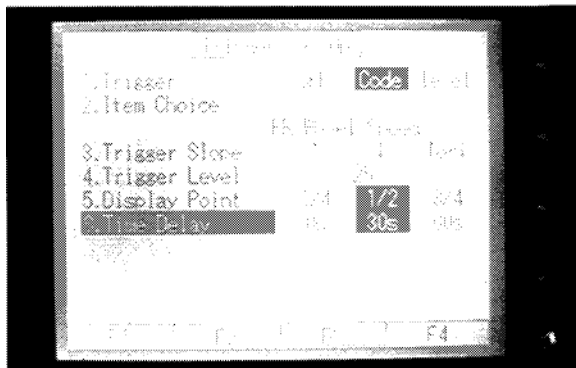
New Select Monitor Keypad

# AN INTRODUCTION TO ABS 5.3 SYSTEM DIAGNOSIS

Next, set up the Trigger. At the Trigger Set-Up Menu, set the New Select Monitor so it captures data when a code is set. At the “Trigger” line, highlight “Code,” using the right arrow key, then press the down arrow key to enter this selection.

Set the Display Point at “1/2,” so that the point when the trouble code was set will be displayed in the middle of the screen.

Set the Time Delay so that the New Select Monitor will continue monitoring data for an additional 30 seconds after the code was set. This will allow you to see what the values of the parameters were during the period before the trouble code was set, until 30 seconds after. Press the “Yes” key when you have finished setting up the Trigger function.



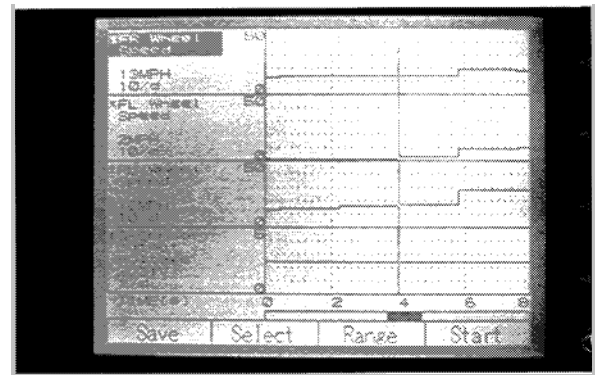
**New Select Monitor – Trigger Set-Up Menu**

Press “C” to return to the Data Display Menu. Press “C” again to get to the ABS Diagnosis Menu.

Now, at the “Current Data Display and Save” menu, select “12. Data Display” and then select the parameters whose values you want to save when the trouble code is set, using the “Yes” key and the down arrow key to indicate the parameters you want. You can set the New Select Monitor to save data on up to 16 parameters. Use

the Select key (F2) to activate the Trigger mode.

Drive the car on the road and duplicate the conditions under which the trouble code was set. The New Select Monitor will beep when it has stopped recording.



**New Select Monitor – Data Displayed Before, During, and After Trouble Code Was Set**

For example, the New Select Monitor might show that a trouble code was set when the wheel speeds were increasing, but the G-sensor voltage remained the same, 2.31 volts. Ordinarily, G-sensor voltage should drop below 2.3 volts when the car is accelerating, and should rise above 2.3 when the car is decelerating. Using this information, you could then troubleshoot the sensor and the circuit to see why the voltage remained constant.

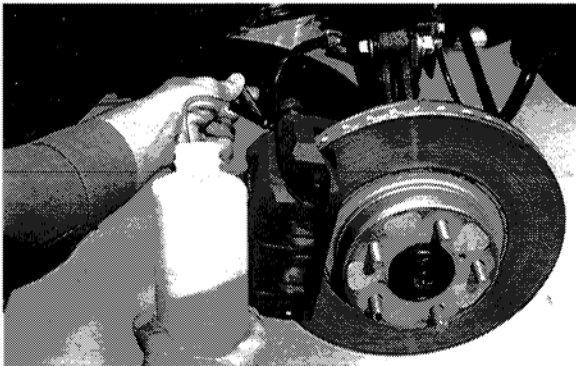
# AN INTRODUCTION TO ABS 5.3 SYSTEM DIAGNOSIS

## BRAKE BLEEDING

You will need to perform the brake bleeding procedure any time air gets into the system or after major service is performed, such as replacing the HCU or the master cylinder.

When bleeding the brakes, be sure to follow all the cautions and notes in the Service Manual, Part W, "Service Procedures," Section 4-4.

First, bleed the brakes the conventional way, in the order specified in the Service Manual. Put one end of a vinyl tube on the air bleeder port and the other end into a container of brake fluid.



Setup for Bleeding Brakes

Have a helper slowly depress the brake pedal and keep it depressed, while you open the air bleeder for 1 to 2 seconds. Then close the bleeder and slowly release the brake pedal. After 3 to 4 seconds repeat the procedure. Continue in this fashion until there are no more air bubbles in the fluid flowing out of the brake.

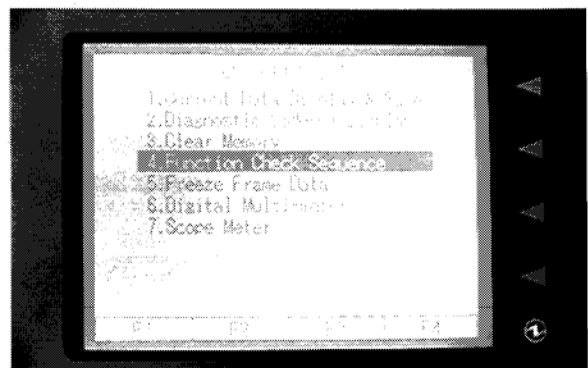
Then tighten the bleeder screw to a torque of 5.8 +/- 0.7 ft.lb. (8 +/- 1 N·m).

When all four brakes have been bled, depress the brake pedal and keep it in that position for about 20 seconds to make sure there is no leak in the system. Then proceed to Sequence Control.

## Sequence Control

With an ABS system, once you have bled the brakes in the conventional way, you have to activate Sequence Control to push air out of the HCU into the brake lines. Otherwise, air trapped in the HCU will get into the lines and the customer may return, complaining that the brakes have become "spongy." During Sequence Control, the HCU turns on the motor-pump assembly and commands Pressure Decrease, Pressure Hold, and Pressure Increase for each caliper.

Using the New Select Monitor, command Sequence Control, as follows. At the "ABS Diagnosis" menu, select "4. Function Check Sequence" and follow the directions displayed on the New Select Monitor's screen. Command Sequence Control twice, in order to ensure that you have expelled all air from the HCU. Then bleed the brakes again, the conventional way, to remove any air pushed out of the HCU into the brake lines.



New Select Monitor – "Function Check Sequence" Selected

# AN INTRODUCTION TO ABS 5.3 SYSTEM DIAGNOSIS

## Checking the Pedal Stroke

Now, check the pedal stroke. With the engine idling, depress the brake pedal with the brake pedal effort gauge, at 110 lb. of force, and measure the distance between the brake pedal and the steering wheel.

Release the brake pedal and measure it again. For a vehicle with ABS, brake pedal travel should not exceed 3 3/4 in. (95 mm). If the travel is more than that, there may still be some air inside the HCU. Perform the brake bleeding procedure again, using Sequence Control and conventional bleeding.



**Using the Brake Pedal Effort  
Gauge to Measure Travel**

When bleeding is complete, add brake fluid to the required level indicated on the brake fluid reservoir by the line labeled "MAX."

Finally, road test the vehicle at a low speed and apply the brakes hard, two or three times, to ensure that they work properly.

## Commanding Sequence Control Without the Select Monitor

You can also command Sequence Control without the Select Monitor. To do this, with the ignition switch "Off," ground terminals 3 and 6 of the diagnosis connector, using the connector's grounding wires.

Turn the ignition switch "On" and, within a half second after the ABS warning light goes off, depress the brake pedal and hold it. The ABS will go into Sequence Control and purge air from the HCU.

## CONCLUSION

Effective diagnosis requires a logical, step-by-step approach. Be sure to use the appropriate Service Manual, the New Select Monitor, and this Video Reference Booklet to look for trouble codes, perform diagnosis, and bleed air from the system. That way, you should have no trouble with the ABS 5.3.

# AN INTRODUCTION TO ABS 5.3 SYSTEM DIAGNOSIS

Mark your answers to the following questions and mail the quiz to Subaru Video Training Program Headquarters.

Name \_\_\_\_\_

Dealer \_\_\_\_\_

Dealer Code \_\_\_\_\_

1. The ABS 5.3 is a \_\_\_\_\_ -sensor, \_\_\_\_\_ -channel system.
  - a. 4;2
  - b. 4;3
  - c. 3;4
  - d. 4;4
2. On the ABS 5.3i system, the ABS control unit is mounted...
  - a. Behind and to the right of the glove box.
  - b. Under the dash panel on the driver's side.
  - c. On the Hydraulic Control Unit (HCU).
  - d. Above the accelerator pedal.
3. The New Select Monitor, with appropriate cartridges, can communicate with:
  - a. The ABS 5.3 only.
  - b. Both the ABS 5.3 and 5.3i.
  - c. The ABS 5.3i only.
  - d. Neither the ABS 5.3 nor 5.3i.
4. During the Pressure Decrease mode...
  - a. The inlet valve on the HCU is open and the outlet valve is closed.
  - b. The inlet and outlet valves on the HCU are open.
  - c. The inlet valve on the HCU is closed and the outlet valve is open.
  - d. The inlet and outlet valves on the HCU are closed.
5. With the ABS 5.3i, if the ABS system detects a wheel speed sensor problem, it...
  - a. Turns the ABS warning light on.
  - b. Keeps the ABS system passive, even if one of the wheels begins to lock up.
  - c. Waits until the next ignition cycle, and if it sees the same wheel speed sensor problem again, turns on the ABS warning light and keeps the ABS system passive.
  - d. None of the above.
6. According to the Service Manual, before beginning diagnosis of an ABS 5.3 problem, you should:
  - a. Ask the customer when and how the problem occurred.
  - b. Perform a pre-inspection of the vehicle's brake system.
  - c. Check the ABS self-diagnostic system to see if it's working properly.
  - d. All of the above.
7. Without the New Select Monitor, it's impossible to read ABS trouble codes.
  - a. True.
  - b. False.
8. The New Select Monitor can be used to store data about the values of various ABS 5.3 system inputs and outputs before, during, and after a trouble code is set.
  - a. True.
  - b. False.
9. When a vehicle equipped with ABS 5.3 is accelerating, its G-sensor voltage should:
  - a. Drop below 2.3 volts.
  - b. Rise above 2.3 volts.
  - c. Remain constant, at approximately 2.3 volts.
  - d. None of the above.
10. At 110 lb. of force, with the engine idling, the brake pedal travel should not exceed:
  - a. 2 1/2 in. (64 mm).
  - b. 3 1/4 in. (83 mm).
  - c. 3 3/4 in. (93 mm).
  - d. 4 1/2 in. (114 mm).