ABS

SAFETY FIRST: Protective gloves and eyewear are recommended at this point.

ABS Component Location

1. Front Wheel speed Sensor
2. Front Wheel speed Sensor Rotor
3. Rear Wheel speed Sensor
4. Rear Wheel speed Sensor Rotor
5. ABS Indicator Light
6. ABS Hydraulic Unit
7. ABS diagnosis tool Connector (Near battery position)

Introduction to KYMCO Anti-Lock Brake System

ABS is designed to help prevent the wheels from locking up when the brakes are applied hard while running straight. The ABS automatically regulates brake force.

Intermittently gaining gripping force and braking force helps prevent wheel lock-up and allows stable steering control while stopping.

Brake control function is identical to that of conventional vehicle. The brake lever is used for the front brake and rear brake.

Although the ABS provides stability while stopping by preventing wheel lock-up, remember the following characteristics:

- ABS can not compensate for adverse road conditions, misjudgment or improper application of brakes.You must take the same care as with vehicle not equipped with ABS.
- ABS isn't designed to shorten the braking distance. On loose, uneven or downhill surfaces, the stopping distance of a vehicle with ABS may be longer than that of an equivalent vehicle without ABS. Use special caution in such areas.
- ABS will help prevent wheel lock-up when braking in straight line but it cannot control wheel slip which may be caused by braking during cornering. When turning a corner, it is better to limit braking to a light application of both brakes or not to brake at all. Reduce your speed before you get into the corner.
- The computers integrated in the ABS compare vehicle speed with wheel speed. Since non-recommended tires can affect wheel speed, they may confuse the sensors resulting in extended braking distance.

Caution: Use of non-recommended tires may cause malfunctioning of ABS and lead to extended braking distance. The rider could have an accident as a result. Always use the standard tires for this vehicle.

Notice:

- When the ABS is functioning,you may feel a pulsing in the brake lever. This is normal - you need not suspend applying the brakes.
- ABS does not function below speeds of approximately 10 kph or 7 mph.
- ABS does not function if battery is discharged or there is a battery power supply malfunction (ABS light will come on).

ABS Servicing Precautions

There are a number of important precautions that should be followed servicing the ABS system.

□ This ABS system is designed to be used with a 12V sealed battery as its power source. Do not use any other battery except for a 12V sealed battery as a power source.

□ Do not reverse the battery cable connections. This will damage the ABS hydraulic unit.

□ To prevent damage to the ABS parts, do not disconnect the battery cables or any other electrical connections when the ignition switch is ON or while the engine is running.

□ Take care not to short the leads that are directly connected to the battery positive (+) terminal to the chassis ground.

□ Do not turn the ignition switch is ON while any of the ABS electrical connectors are disconnected. The ABS hydraulic unit memorizes service codes.

□ Do not spray water on the electrical parts, ABS parts, connectors, leads and wiring.

□ Whenever the ABS electrical connections are to be disconnected, first turn off the ignition switch.

□ The ABS parts should never be struck sharply, as with a hammer, or allowed to fall on a hard surface. Such a shock to the parts can damage them.

□ The ABS parts cannot be disassembled. Even if a fault is found, do not try to disassemble and repair the ABS parts, replace the ABS unit with a new component.

□ The ABS has many brake lines, pipes, and leads. And the ABS cannot detect problems with the conventional braking system (brake disk wear, unevenly worn brake pads and other mechanical faults). To prevent trouble, check the brake lines and pipes for correct routing and connection, the wiring for correct routing, and the brakes for proper braking power. Be sure to check for fluid leaking, and bleed
the brake line thoroughly.

Caution

If any of the brake line fittings, including the ABS hydraulic unit joint nuts, or the bleed valve are opened at any time, the air must be bled completely from the brake line.

Do not ride the scooter with air in the brake line, or the ABS could malfunction.

□ The ABS indicator light may light if the tire pressure is incorrect, a non-recommended tire is installed, or the wheel is deformed. If the indicator light lights, remedy the problem and clear the service code.

□ When the ABS operates, the ABS makes noise and the rider feels the reaction force on the brake lever and brake pedal. This is a normal condition. It informs the rider that the ABS is operating normally.

□ Service codes detected once by the ABS hydraulic unit will be memorized in the ABS hydraulic unit. Therefore, after maintenance work is finished, be sure to erase the service codes. Do not erase the service codes during troubleshooting. Wait until all the checks and repair work is finished to prevent duplication of previous service codes and unnecessary maintenance work.

□ Before delivering the scooter to the customer, be sure to erase any service codes which might be stored in the ABS hydraulic unit. Test run the scooter at a speed of more than 6 kph (4 mph) to see that the ABS indicator light does not come on. Finally, test run the scooter at a speed of more than 30 km/h (20 mph) and brake suddenly to see that the scooter stops without loss of steering control and the ABS operates normally. (The reaction force generated is felt in the brake lever and
pedal.) This completes the final inspection.

ABS Troubleshooting Outline

When an abnormality in the system occurs, the ABS indicator light lights up to alert the rider. The service codes stored in memory are not erased until the DTCs have been cleared after the fault has been corrected. Therefore, after correcting the problem always erase the service codes.

Even when the ABS is operating normally, the ABS indicator light may light up under the conditions listed below. Turn the ignition switch OFF to stop the indicator light. If the scooter runs without erasing the service codes, the light may light up again.

□ After continuous riding on a rough road.

□ When the ABS has been subjected to strong electrical interference.

□ When tire pressure is abnormal. Adjust tire pressure.

□ When a tire different in size from the standard size is being used. Replace with standard size.

□ When the wheel is deformed. Replace the wheel.

Much of the ABS troubleshooting work consists of confirming continuity of the wiring. The ABS parts are assembled and adjusted by the manufacturer, so there is no need to disassemble or repair them. Replace the ABS hydraulic unit if needed.

The basic troubleshooting procedures are listed below.

□ Carry out pre-diagnosis inspections as a preliminary inspection.

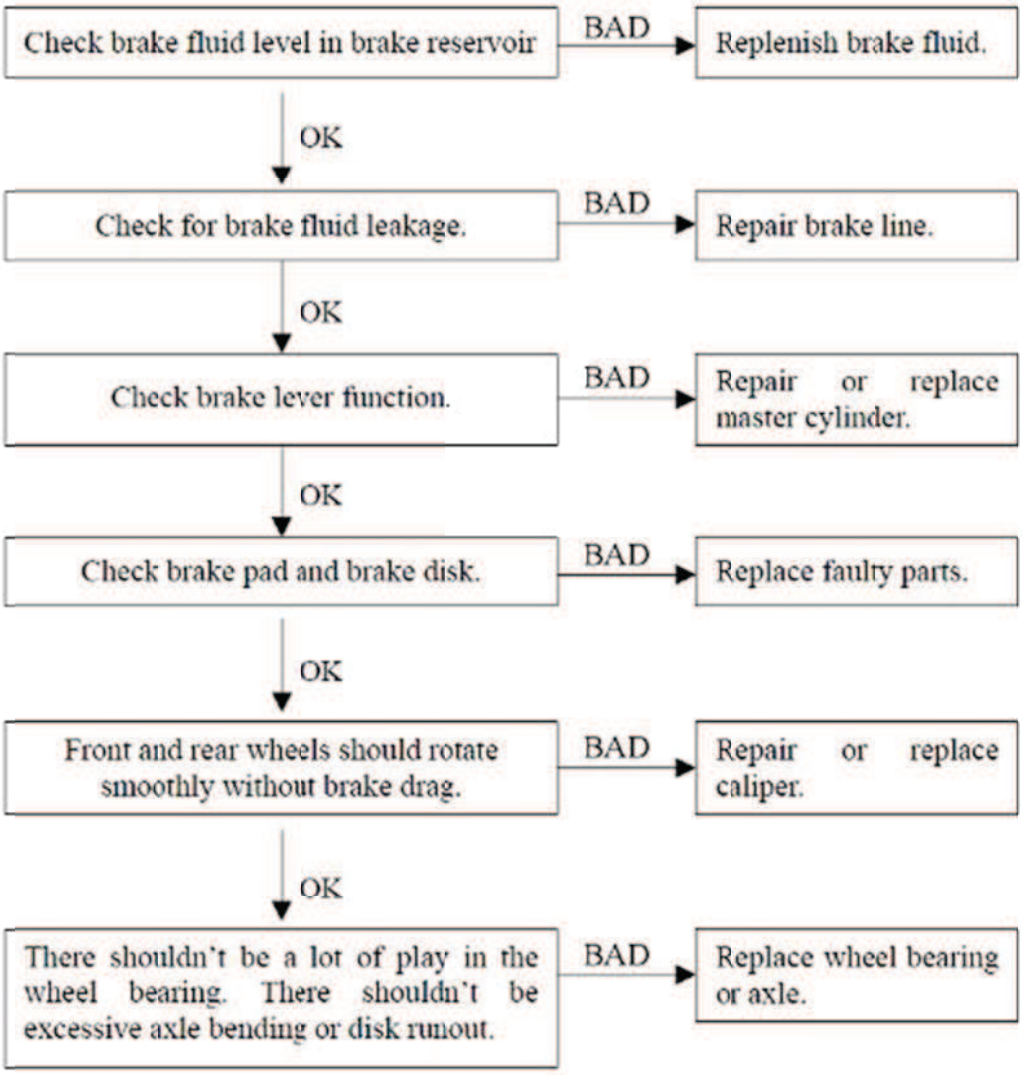
□ Check wiring and connections from the ABS hydraulic unit connector to the suspected ABS part, using the diagnosis tool.
Special tool - Diagnosis tester: 3620A-LEB2-E00

□ Visually inspect the wiring for signs of burning or fraying. If any wiring is poor, replace the damaged wiring.

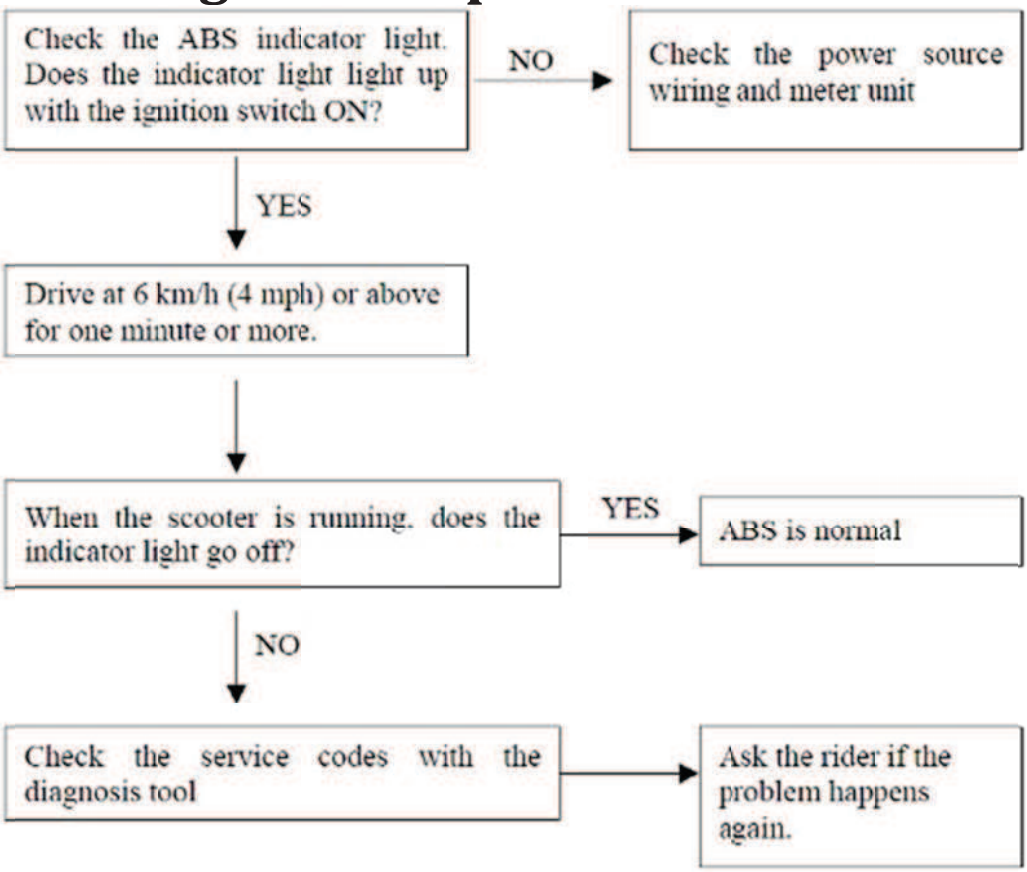
□ Pull each connector apart and inspect it for corrosion, dirt and damage. If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it.

□ Check the wiring for continuity.

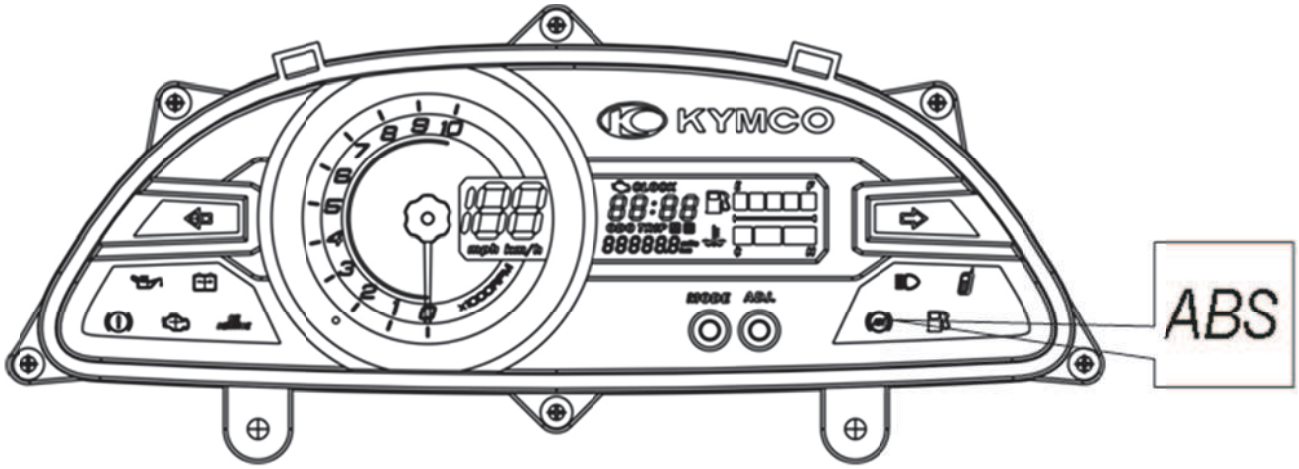
Pre-diagnosis Inspection 1



Pre-diagnosis Inspection 2



Meter Instruments (For models equipped with ABS)



The ABS indicator light is on the right side of the meter. This light will comes on when the ignition switch is turned on and goes off shortly after the vehicle starts moving it stays off as long as the system is ok.

If something is wrong with the ABS the indicator comes on and remains it. When the indicator light is on the ABS doesn't function, but the conventional brake system will still work normally.

ABS Indicator Light Is Unlit (When The Ignition Switch Turned To ON)

1st step test.

Check the terminal voltage between the Pink lead terminal of the meter connector and ground. Turn the ignition switch ON.

Terminal Voltage
Standard: About 8V

If the terminal voltage correct, replace the meter assembly.

2nd step test.

Disconnect the meter connector.

Check for continuity between the Pink lead terminal of the main harness side connector and ground.

If there is the continuity in the lead, replace or repair the main harness.

3rd step test.

Disconnect the ABS hydraulic unit connector.

Check for continuity between the Pink lead terminal of the main harness side connector and Pink lead terminal of the main harness side connector.

If there is the continuity in the lead, replace the ABS hydraulic unit.

If there is not the continuity in the lead, replace or repair the main harness.

ABS Indicator Light lights (When the scooter is running, - no service code)

1st step test.

Disconnect the ABS hydraulic unit connector and meter connector.

Check for continuity between the Pink lead terminal of the main harness side connector and Pink lead terminal of the main harness side connector.

If there is the continuity in the lead, replace the ABS hydraulic unit.

If there is not the continuity in the lead, replace or repair the main harness.

Solenoid Valve Inspection (Service Code 13,14,17,18)

1st step test.

Recheck the service code indication: erase the service code, perform the pre-diagnosis inspection 1 and 2. and retrieve the service code.

If the ABS indicator light lit, faulty solenoid valve in the ABS hydraulic unit. Replace the ABS hydraulic unit.

If the ABS indicator light unlit. ABS system is normal.

ABS solenoid valve relay inspection (service code 19)

1st step test.

Check the ABS solenoid valve relay fuse (40A).

Front, Rear Wheel Rotation Difference Abnormal (service code 25)

1st step test.

Check the following and correct the faulty part.

1. Incorrect the tire pressure

2. Tire not recommended for the scooter were installed (incorrect tire size).

3. Deformation of the wheel or tire.

4. Sensor rotor for missing teeth and clogging with foreign matter.

If the all parts are correct move on to the 2nd step.

2nd step test.

Recheck the service code indication: erase the service code, perform the pre-diagnosis inspection 1 and 2, and retrieve the service code.

If the ABS indicator light lit, faulty ECU in the ABS hydraulic unit. Replace the ABS hydraulic unit.

If the ABS indicator light unlit. ABS system is normal.

ABS Motor Relay Inspection (service code 35)

1st step test.

Check the ABS motor relay fuse (40A).

Front Wheel Rotation Sensor Signal Abnormal (service code 42)

1st step test.

Measure the clearance between the front wheel rotation sensor and sensor rotor.

Standard: 1 mm (0.04 in.)

If the measurement is over standard, check each part for deformation and looseness and correct accordingly. Recheck the clearance.

Check that there is iron or other magnetic deposits between the sensor and sensor rotor, and the sensor rotor slots for obstructions.

Check the installation condition of the sensor for looseness.

Check the sensor and sensor rotor tip for deformation or damage (example chipped sensor rotor teeth).

Front Wheel Rotation Sensor Wiring Inspection (service code 43)

1st step test.

Disconnect the ABS hydraulic unit connector and front wheel sensor connector.

Short the white/brown and red-green lead terminals of the main harness side connector with a jumper lead, and check for continuity between the white/brown and red green lead terminals of the main harness side connector.

If there is not the continuity in the lead, replace the rear wheel rotation sensor.

Rear Wheel Rotation Sensor Wiring Inspection (service code 44)

1st step test.

Measure the clearance between the rear wheel rotation sensor and sensor rotor.

Standard: 1 mm (0.04 in.)

If the measurement is over standard, check each part for deformation and looseness and correct accordingly. Recheck the clearance.

Check that there is iron or other magnetic deposits between the sensor and sensor rotor, and the sensor rotor slots for obstructions.

Check the installation condition of the sensor for looseness.

Check the sensor and sensor rotor tip for deformation or damage (example chipped sensor rotor teeth).

Rear Wheel Rotation Sensor Wiring Inspection (service code 45)

1st step test.

Disconnect the ABS hydraulic unit connector and rear wheel sensor connector.

Short the light-blue/brown and black/red lead terminals of the main harness side connector with a jumper lead, and check for continuity between the light-blue brown and black/red lead terminals of the main harness side connector.

If there is not the continuity in the lead, replace the rear wheel rotation sensor.

Power Supply Voltage Abnormal (under-voltage) (service code 52)

1st step test.

Disconnect the ABS diagnosis connector and ABS hydraulic unit connector.

Check for continuity for the black lead terminal of the main harness side connector.

2nd step test.

Connect the ABS diagnosis connector and ABS hydraulic unit connector.

Check the battery terminal voltage, connect the diagnosis tool to the ABS diagnosis connector.

Turn the ignition switch ON.

Battery terminal voltage
Standard: 9.6V or more

3rd step test.

Inspect the following parts.

Battery, ignition switch, main harness and main fuse 10A.

4th step test.

Recheck the service code indication: erase the service code, perform the pre-diagnosis inspection 1 and 2, and retrieve the service code.

If the ABS indicator light lit, faulty ECU in the ABS hydraulic unit. Replace the ABS hydraulic unit.

If the ABS indicator light unlit, ABS system is normal.

Power Supply Voltage Abnormal (over-voltage) (service code 53)

1st step test.

Disconnect the ABS diagnosis connector and ABS hydraulic unit connector.

Check for continuity for the black lead terminal of the main harness side connector.

2nd step test.

Connect the ABS diagnosis connector and ABS hydraulic unit connector.

Check the battery terminal voltage, connect the diagnosis tool to the ABS diagnosis connector.

Turn the ignition switch ON.

Battery terminal voltage
Standard: 16.6V or less

3rd step test.

Inspect the following parts.

Battery, ignition switch, main harness and main fuse 10A

4th step test.

Recheck the service code indication; erase the service code, perform the pre-diagnosis inspection 1 and 2, and retrieve the service code.

If the ABS indicator light lit, faulty ECU in the ABS hydraulic unit. Replace the ABS hydraulic unit.

If the ABS indicator light unlit. ABS system is normal.

ECU Inspection (service code 55)

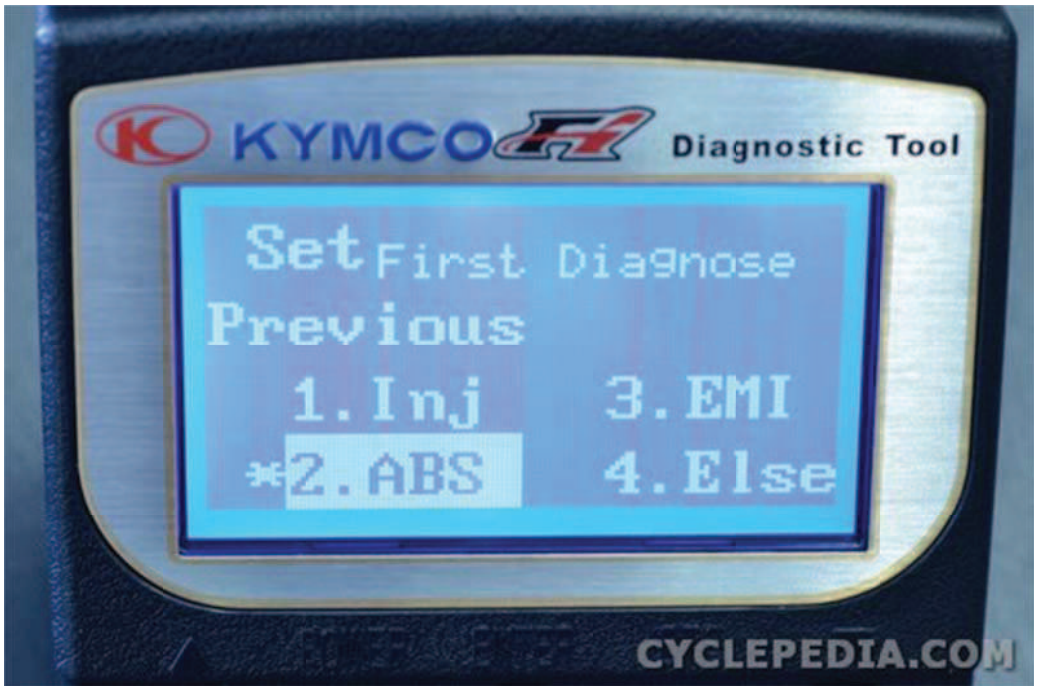
1st step test.

Recheck the service code indication; erase the service code, perform the pre-diagnosis inspection 1 and 2, and retrieve the service code.

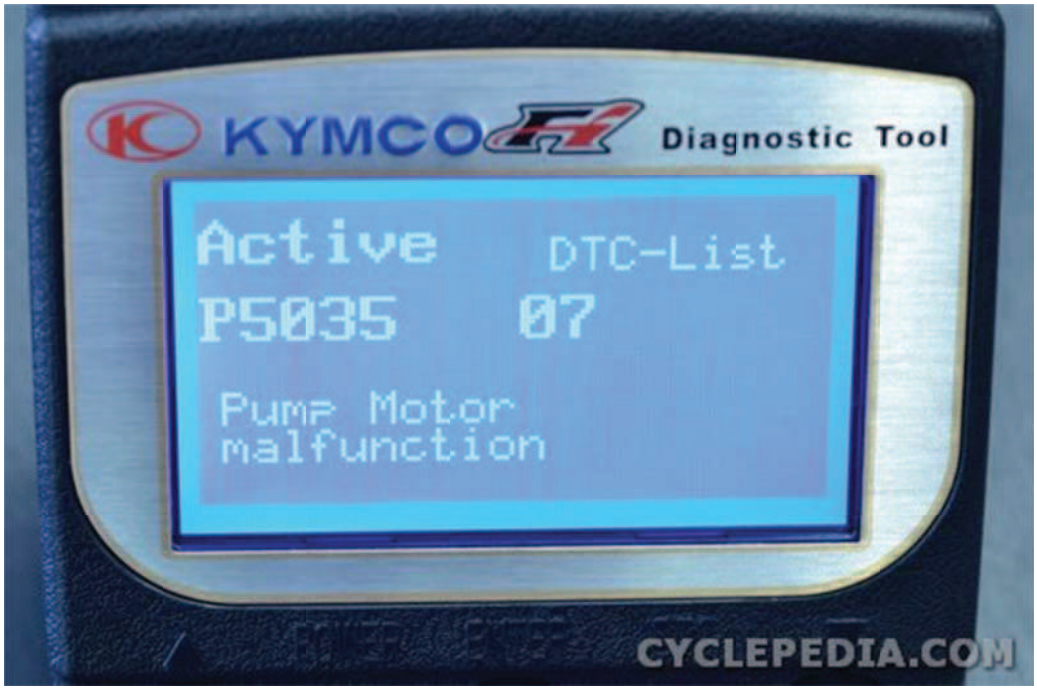
If the ABS indicator light lit. faulty ECU in the ABS hydraulic unit. Replace the ABS hydraulic unit.

If the ABS indicator light unlit, ABS system is normal.

ABS Diagnostic Tool



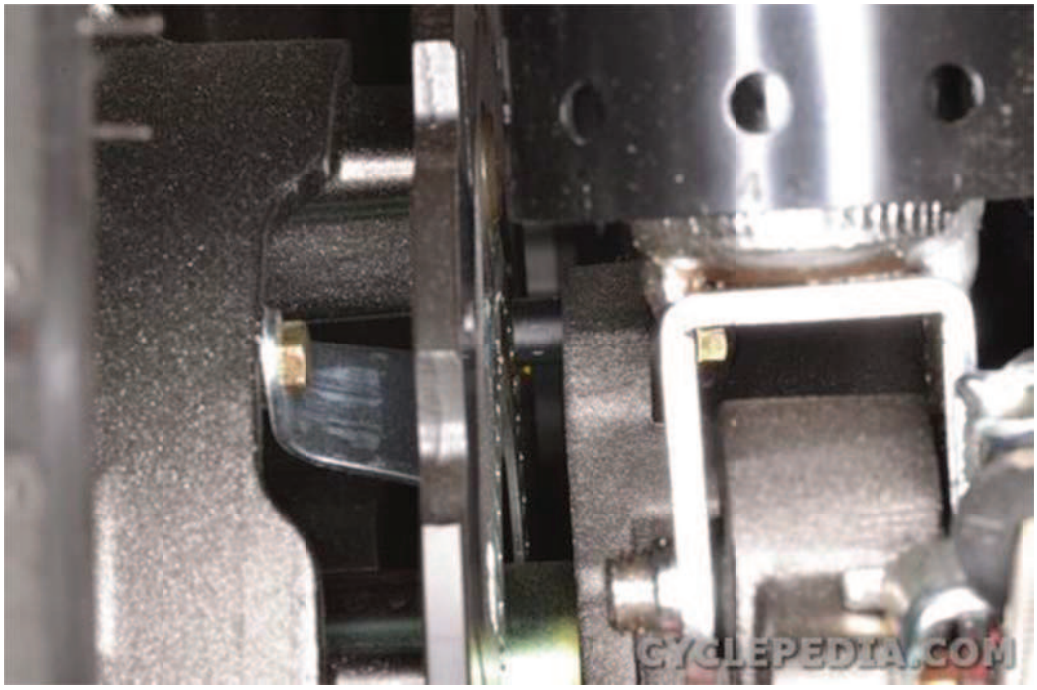
Connect the diagnostic tool and set the ECU to the ABS. See the Diagnostic Tool topic for more information.



Check and clear the ABS DTCs in the same manner as the fuel injection DTCs.

Bosch ABS8m DTC LIST ‡		
Code NO (Diagnostic Tool 3620A-LEB2-E00)	DTC (PDA)	description ‡
01	5013	Rear Inlet Valve malfunction (EV) ‡
02	5014	Rear Outlet Valve malfunction (AV) ‡
03	5017	Front Inlet Valve malfunction (EV) ‡
04	5018	Front Outlet Valve malfunction (AV) ‡
05	5019	Valve Relay malfunction (Failsafe relay) ‡
06	5025	Deviation between Wheel speeds (WSS_GENERIC) ‡
07	5035	Pump Motor Malfunction ‡
08	5042	Front wheel speed sensor malfunction-Plausibility ‡
09	5043 ‡	Front wheel speed sensor Disconnection/gnd Short/Battery Voltage Short
10	5044 ‡	Rear wheel speed sensor malfunction - Plausibility ‡
11	5045 ‡	Rear wheel speed sensor Disconnection/gnd Short/Battery Voltage Short
12	5052 ‡	Power Supply Malfunction (Under Voltage) ‡
13	5053 ‡	Power Supply Malfunction (Over Voltage) ‡
14	5055 ‡	ECU malfunction ‡

When using the DATA Analyze feature of the diagnostic tool with the ABS system the front and rear wheel speed sensors should show speed when the wheels are rotated.



Inspect the wheel speed sensors, rotors, wires, and connectors if the speed doesn't show correctly.

Check the speed sensor to rotor clearance with a feeler gauge and make sure that it is 0.3 - 1.2 mm (0.0012 - 0.048 in).

ABS Unit

Note the markings on the ABS unit for the brake Front (F) and Rear (R) brake hose positions.

Do not attempt to disassemble the ABS unit.

If the ABS unit must be replaced the new unit should come filled with brake fluid. Install the new component immediately so that the brake fluid doesn't drain out.