YAMAHA

2007

FZ6-N/S
FZ6-NA/SA
FZ6-NHG(W)
FZ6-SHG(W)
FZ6-NAHG/SAHG

SERVICE MANUAL

4S8-28197-E0

EAS20040

FZ6-N/S
FZ6-NA/SA
FZ6-NHG(W)/SHG(W)
FZ6-NAHG/SAHG
SERVICE MANUAL

EAS20070
NOTICE

This manual was produced by the Yamaha Motor Company, Ltd. primarily for use by Yamaha dealers and their qualified mechanics. It is not possible to include all the knowledge of a mechanic in one manual. Therefore, anyone who uses this book to perform maintenance and repairs on Yamaha vehicles should have a basic understanding of mechanics and the techniques to repair these types of vehicles. Repair and maintenance work attempted by anyone without this knowledge is likely to render the vehicle unsafe and unfit for use.
This model has been designed and manufactured to perform within certain specifications in regard to performance and emissions. Proper service with the correct tools is necessary to ensure that the vehicle will operate as designed. If there is any question about a service procedure, it is imperative that you contact a Yamaha dealer for any service information changes that apply to this model. This policy is intended to provide the customer with the most satisfaction from his vehicle and to conform to federal environmental quality objectives.
Yamaha Motor Company, Ltd. is continually striving to improve all of its models. Modifications and significant changes in specifications or procedures will be forwarded to all authorized Yamaha dealers and will appear in future editions of this manual where applicable.

NOTE:

- This Service Manual contains information regarding periodic maintenance to the emission control system. Please read this material carefully.
- Designs and specifications are subject to change without notice.

EAS20080
IMPORTANT MANUAL INFORMATION

Particularly important information is distinguished in this manual by the following.

⚠ The Safety Alert Symbol means ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!

⚠ WARNING Failure to follow WARNING instructions could result in severe injury or death to the vehicle operator, a bystander or a person checking or repairing the vehicle.

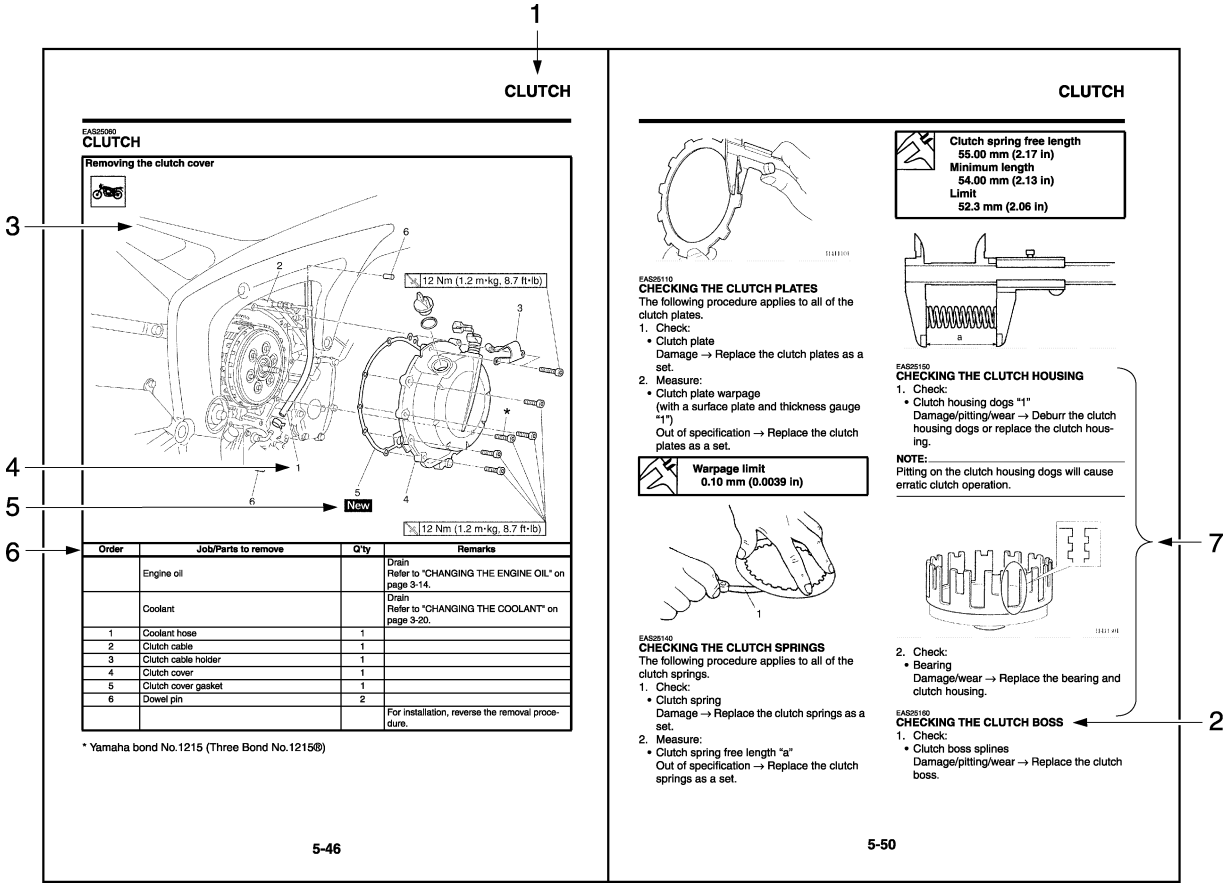
CAUTION: A CAUTION indicates special precautions that must be taken to avoid damage to the vehicle.

NOTE: A NOTE provides key information to make procedures easier or clearer.

EAS20090
HOW TO USE THIS MANUAL

This manual is intended as a handy, easy-to-read reference book for the mechanic. Comprehensive explanations of all installation, removal, disassembly, assembly, repair and check procedures are laid out with the individual steps in sequential order.

- The manual is divided into chapters and each chapter is divided into sections. The current section title is shown at the top of each page “1”.
- Sub-section titles appear in smaller print than the section title “2”.
- To help identify parts and clarify procedure steps, there are exploded diagrams at the start of each removal and disassembly section “3”.
- Numbers are given in the order of the jobs in the exploded diagram. A number indicates a disassembly step “4”.
- Symbols indicate parts to be lubricated or replaced “5”.
  Refer to “SYMBOLS”.
- A job instruction chart accompanies the exploded diagram, providing the order of jobs, names of parts, notes in jobs, etc “6”.
- Jobs requiring more information (such as special tools and technical data) are described sequentially “7”.

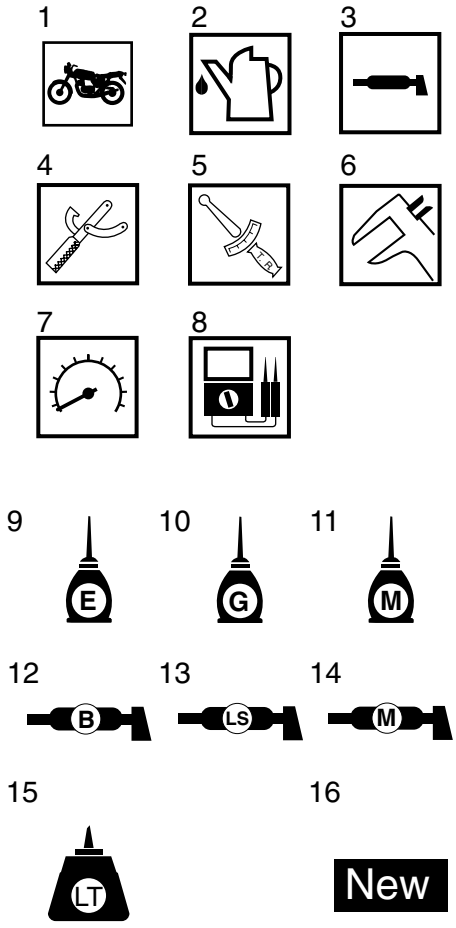


EAS20100
SYMBOLS

The following symbols are used in this manual for easier understanding.

NOTE:

The following symbols are not relevant to every vehicle.



1. Serviceable with engine mounted
2. Filling fluid
3. Lubricant
4. Special tool
5. Tightening torque
6. Wear limit, clearance
7. Engine speed
8. Electrical data
9. Engine oil
10. Gear oil
11. Molybdenum-disulfide oil
12. Wheel-bearing grease
13. Lithium-soap-based grease
14. Molybdenum-disulfide grease
15. Apply locking agent (LOCTITE®)
16. Replace the part

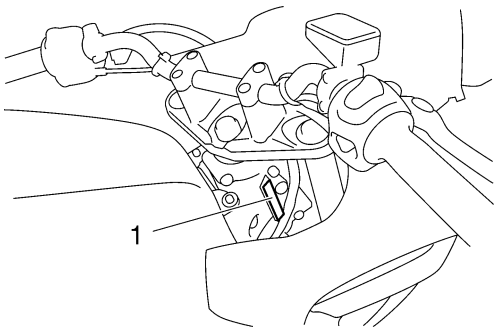
EAS20110

TABLE OF CONTENTS

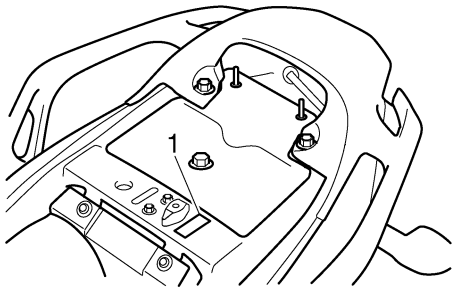
GENERAL INFORMATION

EAS20130
IDENTIFICATION

EAS20140
VEHICLE IDENTIFICATION NUMBER
The vehicle identification number “1” is stamped into the right side of the steering head pipe.



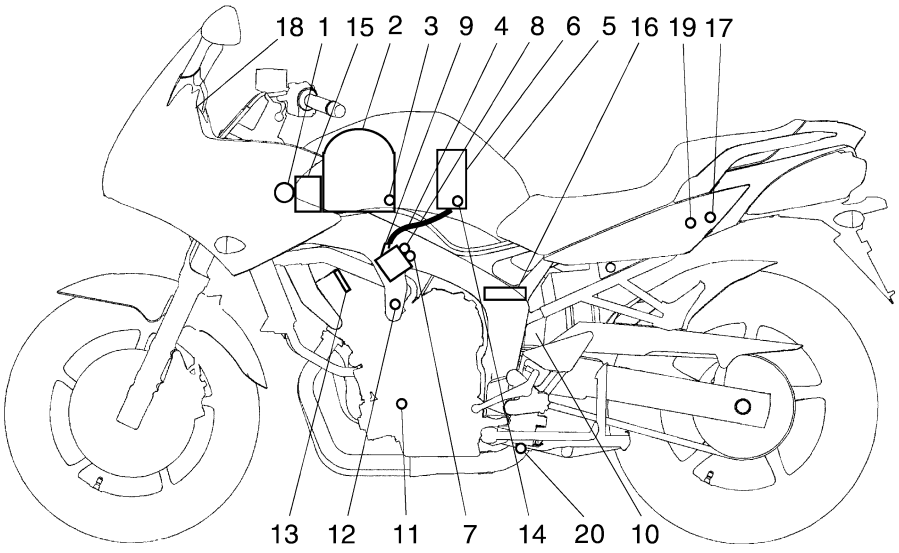
EAS20150
MODEL LABEL
The model label “1” is affixed to the frame. This information will be needed to order spare parts.



EAS20170
FEATURES

EAS4S81003
OUTLINE OF FI SYSTEM

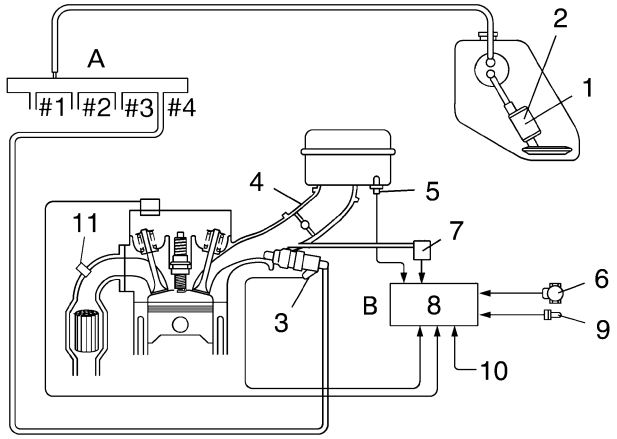
The main function of a fuel supply system is to provide fuel to the combustion chamber at the optimum air-fuel ratio in accordance with the engine operating conditions and the atmospheric temperature.
In the conventional carburetor system, the air-fuel ratio of the mixture that is supplied to the combustion chamber is created by the volume of the intake air and the fuel that is metered by the jet used in the respective carburetor.
Despite the same volume of intake air, the fuel volume requirement varies by the engine operating conditions, such as acceleration, deceleration, or operating under a heavy load. Carburetors that meter the fuel through the use of jets have been provided with various auxiliary devices, so that an optimum air-fuel ratio can be achieved to accommodate the constant changes in the operating conditions of the engine.
As the requirements for the engine to deliver more performance and cleaner exhaust gases increase, it becomes necessary to control the air-fuel ratio in a more precise and finely tuned manner. To accommodate this need, this model has adopted an electronically controlled fuel injection (FI) system, in place of the conventional carburetor system. This system can achieve an optimum air-fuel ratio required by the engine at all times by using a microprocessor that regulates the fuel injection volume according to the engine operating conditions detected by various sensors.
The adoption of the FI system has resulted in a highly precise fuel supply, improved engine response, better fuel economy, and reduced exhaust emissions. Furthermore, the air induction system (AI system) has been placed under computer control together with the FI system in order to realize cleaner exhaust gases.



1. Ignition coil
2. Air filter case
3. Intake air temperature sensor
4. Fuel delivery hose
5. Fuel tank
6. Fuel pump
7. Intake air pressure sensor
8. Throttle position sensor
9. Fuel injector
10. Catalytic converter
11. Crankshaft position sensor
12. Coolant temperature sensor
13. Spark plug
14. Pressure regulator
15. Battery
16. ECU
17. Fuel injection system relay
18. Engine trouble warning light
19. Lean angle sensor
20. O_2 sensor

EAS4S81004
FI SYSTEM

The fuel pump delivers fuel to the injector via the fuel filter. The pressure regulator maintains the fuel pressure that is applied to the injector at only 250 kPa (2.5 kg/cm^2). Accordingly, when the energizing signal from the ECU energizes the injector, the fuel passage opens, causing the fuel to be injected into the intake manifold only during the time the passage remains open. Therefore, the longer the length of time the injector is energized (injection duration), the greater the volume of fuel that is supplied. Conversely, the shorter the length of time the injector is energized (injection duration), the lesser the volume of fuel that is supplied.
The injection duration and the injection timing are controlled by the ECU. Signals that are input from the throttle position sensor, crankshaft position sensor, intake air pressure sensor, intake temperature sensor, coolant temperature sensor and O_2 sensor enable the ECU to determine the injection duration. The injection timing is determined through the signals from the crankshaft position sensor. As a result, the volume of fuel that is required by the engine can be supplied at all times in accordance with the driving conditions.

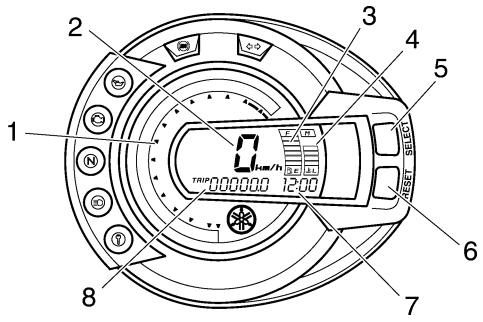


1. Fuel pump
2. Pressure regulator
3. Fuel injector
4. Throttle body
5. Intake air temperature sensor
6. Throttle position sensor
7. Intake air pressure sensor
8. ECU
9. Coolant temperature sensor
10. Crankshaft position sensor
11. O_2 sensor

A. Fuel system
B. Control system

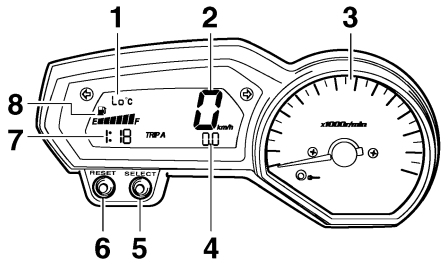
EAS4S81005
INSTRUMENT FUNCTIONS
Multi-function meter unit

A



A. FZ6-N/FZ6-NA/FZ6-S/FZ6-SA
1. Tachometer
2. Speedometer
3. Fuel meter
4. Coolant temperature display
5. “SELECT” button
6. “RESET” button
7. Clock/air intake temperature/CO adjusting mode tachometer display
8. Odometer/tripmeter/fuel reserve tripmeter/ tachometer

B



B. FZ6-NHG(W)/FZ6-NAHG/FZ6-SHG(W)/ FZ6-SAHG
1. Coolant temperature display/air intake temperature display
2. Speedometer
3. Tachometer
4. Odometer/tripmeter/fuel reserve tripmeter
5. “SELECT” button
6. “RESET” button
7. Clock
8. Fuel meter

EWA4S81002

⚠ WARNING

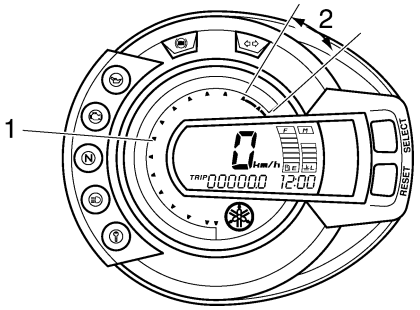
Be sure to stop the vehicle before making any setting changes to the multi-function meter unit.

The multi-function meter unit is equipped with the following:
- a speedometer (which shows the riding speed)
- a tachometer (which shows engine speed)
- an odometer (which shows the total distance traveled)
- two tripmeters (which show the distance traveled since they were last set to zero)
- a fuel reserve tripmeter (which shows the distance traveled since the left segment of the fuel meter started flashing)
- a clock
- a fuel meter
- a coolant temperature display
- an air intake temperature display
- a self-diagnosis device
- an LCD and tachometer brightness control mode

NOTE:
- Be sure to turn the key to “ON” before using the “SELECT” and “RESET” buttons.
- For the U.K. only: To switch the speedometer and odometer/tripmeter displays between kilometers and miles, press the “SELECT” button for at least two second. (FZ6-N/FZ6-NA/FZ6-S/FZ6-SA)
- For the U.K. only: To switch the speedometer and odometer/tripmeter displays between kilometers and miles, press the “SELECT” button for at least one second. (FZ6-NHG(W)/FZ6-NAHG/FZ6-SHG(W)/FZ6-SAHG)

Tachometer

A



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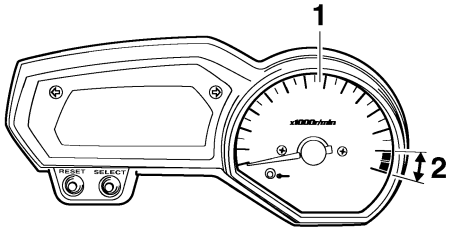

A. FZ6-N/FZ6-NA/FZ6-S/FZ6-SA

B. FZ6-NHG(W)/FZ6-NAHG/FZ6-SHG(W)/ FZ6-SAHG
1. Tachometer
2. Tachometer red zone.

The electric tachometer allows the rider to monitor the engine speed and keep it within the ideal power range.
When the key is turned to "ON", the tachometer needle will sweep once across the r/min range and then return to zero r/min in order to test the electrical circuit.

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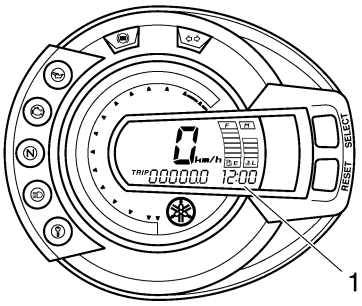
CAUTION:

Do not operate the engine in the tachometer red zone.
Red zone: 14000 r/min and above

Clock mode

A



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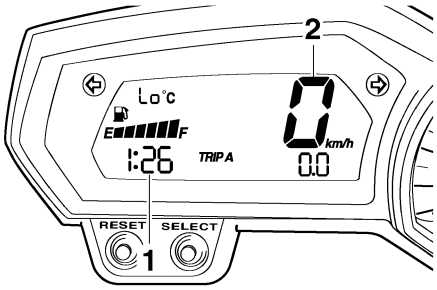
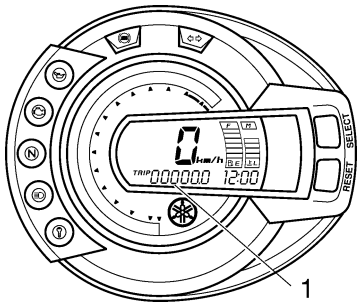


A. FZ6-N/FZ6-NA/FZ6-S/FZ6-SA
B. FZ6-NHG(W)/FZ6-NAHG/FZ6-SHG(W)/ FZ6-SAHG
1. Clock
2. Speedometer

The clock is displayed when the key is turned to "ON". In addition, the clock can be displayed for 10 seconds by pushing the "SELECT" button when the main switch is in the "OFF" or "LOCK" position.
To set the clock
1 Turn the key to "ON".
2 Push the "SELECT" button and "RESET" button together for at least two seconds.
3 When the hour digits start flashing, push the "RESET" button to set the hours.
4 Push the "SELECT" button, and the minute digits will start flashing.
5 Push the "RESET" button to set the minutes.
6 Push the "SELECT" button and then release it to start the clock.

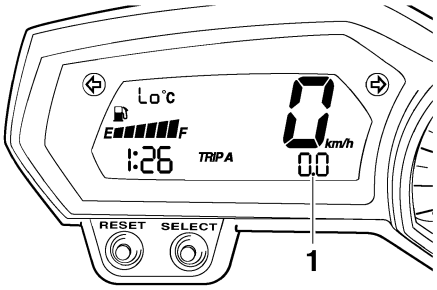
Odometer and tripmeter modes (FZ6-N/FZ6-NA/ FZ6-S/FZ6-SA)



1. Odometer/tripmeter/fuel reserve tripmeter/ tachometer

Push the "SELECT" button to switch the display between the odometer mode "ODO" and the tripmeter modes "TRIP A" and "TRIP B" in the following order:
"ODO" → "TRIP 1" → "TRIP 2" → "TRIP F" → "E" → "ODO"
When the fuel amount in the fuel tank decreases to 3.6 L (0.90 US gal) (0.79 Imp.gal), the bottom segment of the fuel meter will start flashing, and the odometer display will automatically change to the fuel reserve tripmeter mode "TRIP F" and start counting the distance traveled from that point. In that case, push the "SELECT" button to switch the display between the various tripmeter and odometer modes in the following order:
"TRIP F" → "E" → "ODO" → "TRIP 1" → "TRIP 2" → "TRIP F"
To reset a tripmeter, select it by pushing the "SELECT" button, and then push the "RESET" button for at least one second. If you do not reset the fuel reserve tripmeter manually, it will reset itself automatically and the display will return to the prior mode after refueling and traveling 5 km (3 mi).

Odometer and tripmeter modes (FZ6-NHG(W)/ FZ6-NAHG/FZ6-SHG(W)/FZ6-SAHG)

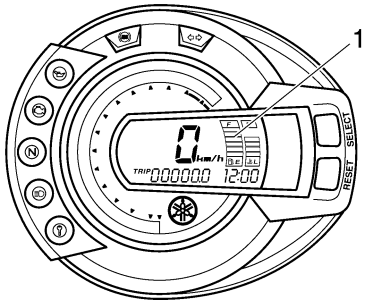


1. Odometer/tripmeter/fuel reserve tripmeter

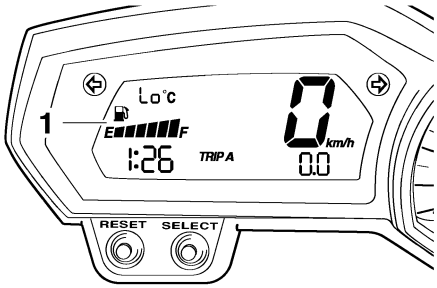
Push the “SELECT” button to switch the display between the odometer mode “ODO” and the tripmeter modes “TRIP A” and “TRIP B” in the following order:
“TRIP A” → “TRIP B” → “ODO” → “TRIP A”
When the fuel amount in the fuel tank decreases to 3.4 L (0.90 US gal) (0.75 Imp.gal), the left segment of the fuel meter will start flashing, and the odometer display will automatically change to the fuel reserve tripmeter mode “F TRIP” and start counting the distance traveled from that point. In that case, push the “SELECT” button to switch the display between the various tripmeter and odometer modes in the following order:
“F-TRIP” → “TRIP A” → “TRIP B” → “ODO” → “F-TRIP”
To reset a tripmeter, select it by pushing the “SELECT” button, and then push the “RESET” button for at least one second. If you do not reset the fuel reserve tripmeter manually, it will reset itself automatically and the display will return to the prior mode after refueling and traveling 5 km (3 mi).

Fuel meter

A



B

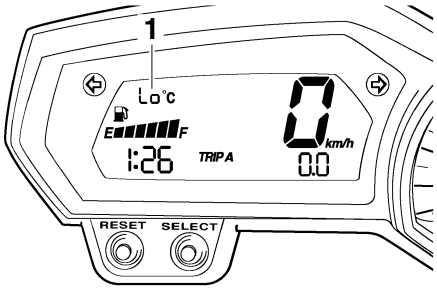


A. FZ6-N/FZ6-NA/FZ6-S/FZ6-SA
B. FZ6-NHG(W)/FZ6-NAHG/FZ6-SHG(W)/ FZ6-SAHG
1. Fuel meter

The fuel meter indicates the amount of fuel in the fuel tank. The display segments of the fuel meter disappear towards “E” (Empty) as the fuel level decreases. When only one segment is left near “E”, refuel as soon as possible.

NOTE:
This fuel meter is equipped with a self-diagnosis system. If the electrical circuit is defective, the following cycle will be repeated until the malfunction is corrected: “E” (Empty), “F” (Full) and symbol “⛽” will flash eight times, then go off for approximately 3 seconds. If this occurs, have a Yamaha dealer check the electrical circuit.

Coolant temperature mode (FZ6-NHG(W)/FZ6-NAHG/FZ6-SHG(W)/FZ6-SAHG)



1. Coolant temperature display

The coolant temperature display indicates the temperature of the coolant.
Push the “RESET” button to switch the coolant temperature display to the air intake temperature display.

NOTE:

When the coolant temperature display is selected, “C” is displayed for one second, and then the coolant temperature is displayed.

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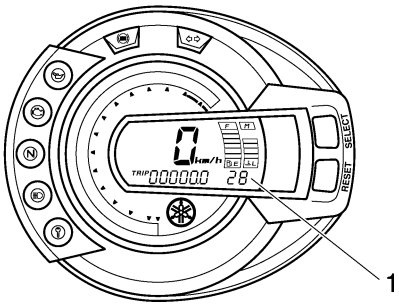
CAUTION:

Do not operate the engine if it is overheated.

Air intake temperature mode

A



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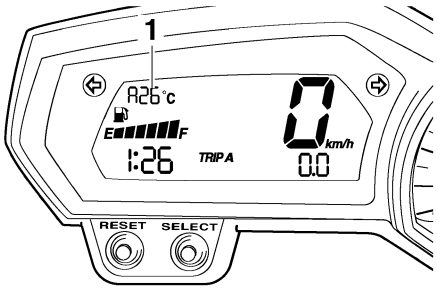


A. FZ6-N/FZ6-NA/FZ6-S/FZ6-SA
B. FZ6-NHG(W)/FZ6-NAHG/FZ6-SHG(W)/FZ6-SAHG
1. Air intake temperature display

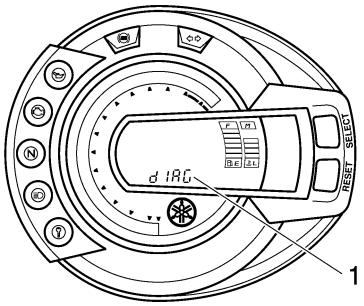
The air intake temperature display indicates the temperature of the air drawn into the air filter case. Push the “RESET” button to switch the coolant temperature display to the air intake temperature display.

NOTE:

- Even if the air intake temperature is set to be displayed, the coolant temperature warning light comes on when the engine overheats.
- When the key is turned to “ON”, the coolant temperature is automatically displayed, even if the air intake temperature was displayed prior to turning the key to “OFF”.
- When the air intake temperature display is selected, “A” is displayed for one second, and then the air intake temperature is displayed. (FZ6-NHG(W)/FZ6-NAHG/FZ6-SHG(W)/FZ6-SAHG)

Self-diagnosis device

A



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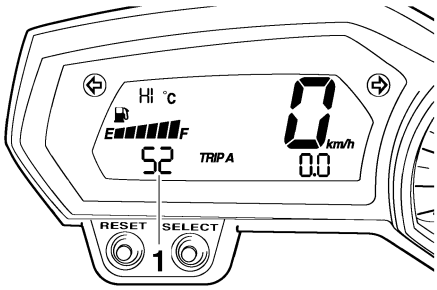


A. FZ6-N/FZ6-NA/FZ6-S/FZ6-SA
B. FZ6-NHG(W)/FZ6-NAHG/FZ6-SHG(W)/FZ6-SAHG
1. Error code display

This model is equipped with a self-diagnosis device for various electrical circuits.
If any of those circuits are defective, the engine trouble warning light will come on, and then the display will indicate a two-digit error code (e.g., 11, 12, 13).
This model is also equipped with a self-diagnosis device for the immobilizer system.

If any of the immobilizer system circuits are defective, the immobilizer system indicator light will flash, and then the display will indicate a two-digit error code (e.g., 51, 52, 53).

NOTE:

If the display indicates error code 52, this could be caused by transponder interference. If this error code appears, try the following.

1 Use the code re-registering key to start the engine.

NOTE:

Make sure there are no other immobilizer keys close to the main switch, and do not keep more than one immobilizer key on the same key ring! Immobilizer system keys may cause signal interference, which may prevent the engine from starting

2 If the engine starts, turn it off and try starting the engine with the standard keys.
3 If one or both of the standard keys do not start the engine, take the vehicle, the code re-registering key and both standard keys to a Yamaha dealer and have the standard keys re-registered.

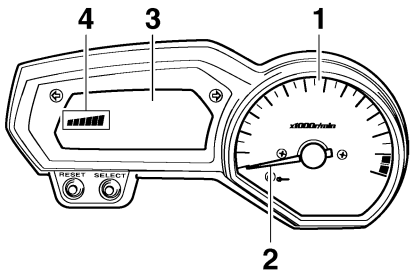
If the display indicates any error codes, note the code number, and then have a Yamaha dealer check the vehicle.

ECA4S81010

CAUTION:

If the display indicates an error code, the vehicle should be checked as soon as possible in order to avoid engine damage.

LCD and tachometer brightness control mode (FZ6-NHG(W)/FZ6-NAHG/FZ6-SHG(W)/FZ6-SAHG)



1. Tachometer panel
2. Tachometer needle
3. LCD
4. Brightness level

This function allows you to adjust the brightness of the LCD and the tachometer panel and needle to suit the outside lighting conditions.

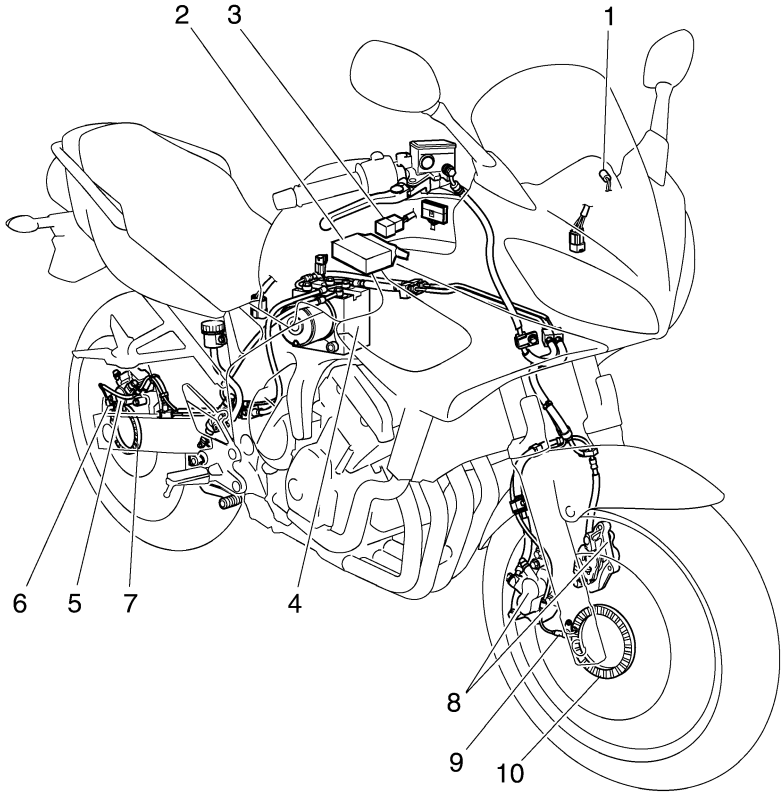
To set the brightness

1 Turn the key to “OFF”.
2 Push and hold the “SELECT” button.
3 Turn the key to “ON”, and then release the “SELECT” button after five seconds.
4 Push the “RESET” button to select the desired brightness level.
5 Push the “SELECT” button to confirm the selected brightness level. The display will return to the odometer or tripmeter mode.

EAS4S81007
OUTLINE OF THE ABS

1 The Yamaha ABS (anti-lock brake system) features a dual electronic control system, which acts on the front and rear brakes independently.
2 The ABS features a compact and lightweight design to help maintain the basic maneuverability of the vehicle.
3 The hydraulic unit, which is the main component of the ABS, is centrally located on the vehicle to increase mass centralization.

ABS layout



1. ABS warning light
2. ABS ECU (electronic control unit)
3. ABS motor relay
4. Hydraulic unit (HU)
5. Rear brake caliper
6. Rear wheel sensor
7. Rear wheel sensor rotor
8. Front brake caliper
9. Front wheel sensor
10. Front wheel sensor rotor

ABS

The operation of the Yamaha ABS brakes is the same as conventional brakes on other vehicles, with a brake lever for operating the front brake and a brake pedal for operating the rear brake.
When wheel lock is detected during emergency braking, hydraulic control is performed by the hydraulic system on the front and rear brakes independently.

Useful terms

- Wheel speed:
  The rotation speed of the front and rear wheels.
- Chassis speed:
  The speed of the chassis.
  When the brakes are applied, wheel speed and chassis speed are reduced. However, the chassis travels forward by its inertia even though the wheel speed is reduced.

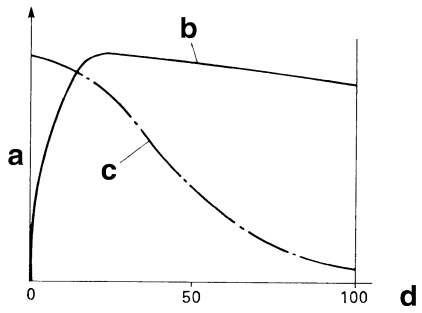
- Brake force:
  The force applied by braking to reduce the wheel speed.
- Wheel lock:
  A condition that occurs when the rotation of one or both of the wheels has stopped, but the vehicle continues to travel.
- Side force:
  The force on the tires which supports the vehicle when cornering.
- Slip ratio:
  When the brakes are applied, slipping occurs between the tires and the road surface. This causes a difference between the wheel speed and the chassis speed. Slip ratio is the value that shows the rate of wheel slippage and is defined by the following formula.

$$\text{Slip ratio} = \frac{\text{Chassis speed} - \text{Wheel speed}}{\text{Chassis speed}} \times 100\ (\%)$$

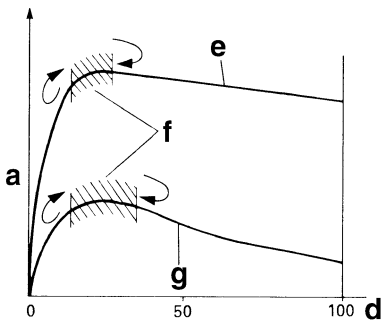
0%: There is no slipping between the wheel and the road surface. The chassis speed is equal to the wheel speed.
100%: The wheel speed is “0”, but the chassis is moving (i.e., wheel lock).

Brake force and vehicle stability
When the brake pressure is increased, wheel speed is reduced. Slipping occurs between the tire and the road surface and brake force is generated. The limit of this brake force is determined by the friction force between the tire and the road surface and is closely related to wheel slippage. Wheel slippage is represented by the slip ratio.
Side force is also closely related to wheel slippage. See figure “A”. If the brakes are applied while keeping the proper slip ratio, it is possible to obtain the maximum brake force without losing much side force. ABS allows full use of the tires’ capabilities even on slippery road surfaces or less slippery road surfaces. See figure “B”.

A



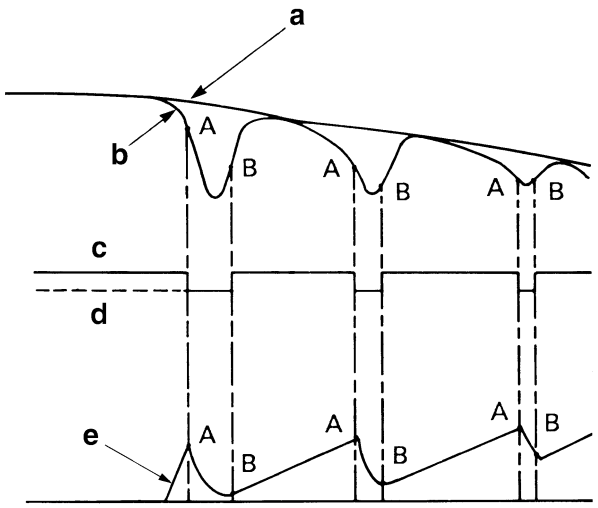
B



a. Friction force between the tire and road surface
b. Brake force
c. Side force
d. Slip ratio (%)
e. Less slippery road surface

f. Controlling zone
g. Slippery road surface

Wheel slip and hydraulic control
The ABS ECU calculates the wheel speed of each wheel according to the rotation signal received from the front and rear wheel sensors. In addition, the ABS ECU calculates the vehicle chassis speed and the rate of speed reduction based on the wheel speed values.
The difference between the chassis speed and the wheel speed calculated in the slip ratio formula is equal to the wheel slip. When the wheel speed is suddenly reduced, the wheel has a tendency to lock. When the wheel slip and the wheel speed reduction rate exceed the preset values, the ABS ECU determines that the wheel has a tendency to lock.
If the slip is large and the wheel has a tendency to lock (point A in the following figure), the ABS ECU reduces the brake fluid pressure in the brake caliper. The ABS ECU increases the pressure of the brake fluid in the brake caliper when the tendency to lock has diminished (point B in the following figure).



a. Vehicle speed
b. Wheel speed
c. Pressurized
d. Depressurized
e. Brake force

ABS operation and vehicle control
If the ABS starts operating, there is a tendency of the wheel to lock, and the vehicle is approaching the limit of control. To make the rider aware of this condition, the ABS has been designed to generate a reaction-force pulsating action in the brake lever and brake pedal independently.

NOTE:
When the ABS is activated, a pulsating action may be felt at the brake lever or brake pedal, but this does not indicate a malfunction.

The higher the side force on a tire, the less traction there is available for braking. This is true whether the vehicle is equipped with ABS or not. Therefore, sudden braking while cornering is not recommended. Excessive side force, which ABS cannot prevent, could cause the tire to slip sideways.

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⚠ WARNING

The braking of the vehicle, even in the worst case, is principally executed when the vehicle is advancing straight ahead. During a turn, sudden braking is liable to cause a loss of traction of the tires. Even in vehicles equipped with ABS, overturning of the vehicle cannot be prevented if it is braked suddenly.

The ABS functions to prevent the tendency of the wheel to lock by controlling the brake fluid pressure. However, if there is a tendency of the wheel to lock on a slippery road surface, due to engine braking, the ABS may not be able to prevent the wheel from locking.

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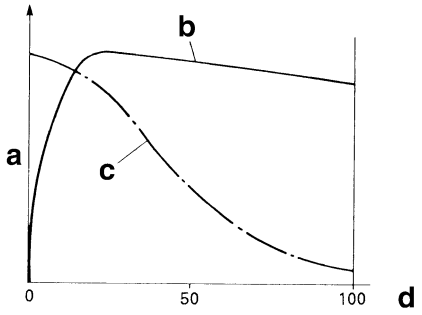
⚠ WARNING

The ABS controls only the tendency of the wheel to lock caused by applying the brakes. The ABS cannot prevent wheel lock on slippery surfaces, such as ice, when it is caused by engine braking, even if the ABS is operating.

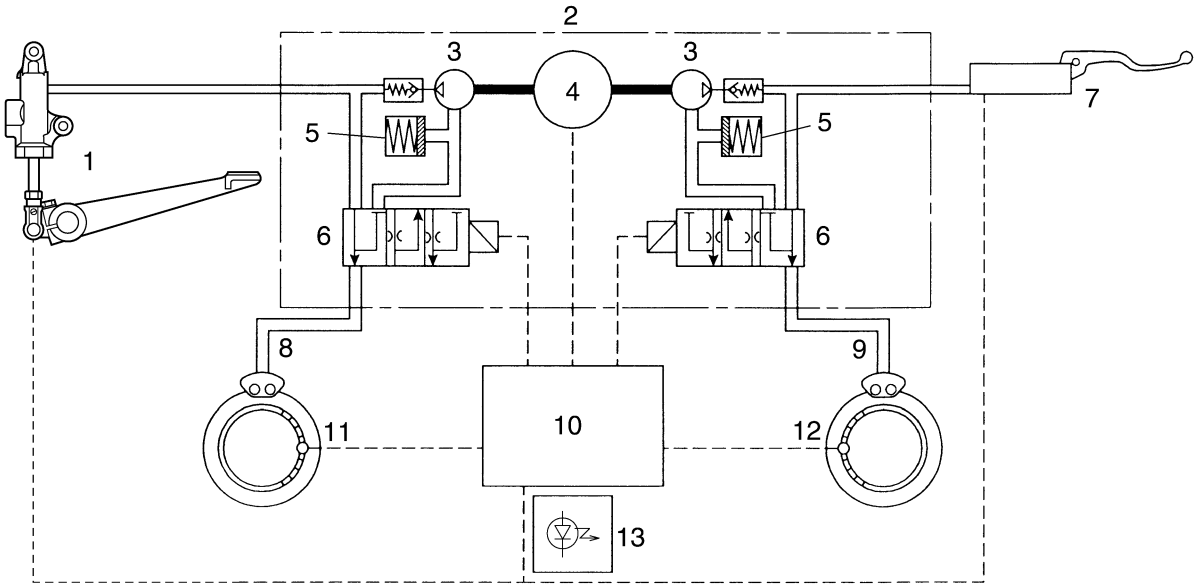


a. Friction force between the tire and road surface
b. Brake force
c. Side force
d. Slip ratio (%)

Electronic ABS features

The Yamaha ABS (anti-lock brake system) has been developed with the most advanced electronic technology.
The ABS control is processed with good response under various vehicle travel conditions.
The ABS also includes a highly developed self-diagnosis function. The ABS detects any problem condition and allows normal braking even if the ABS is not operating properly.
When this occurs, the ABS warning light on the meter assembly comes on.
The ABS stores the malfunction codes in the memory of the ABS ECU for easy problem identification and troubleshooting.

ABS block diagram



1. Rear brake master cylinder
2. Hydraulic unit
3. Hydraulic pump
4. ABS motor
5. Buffer chamber
6. Hydraulic control valve
7. Front brake master cylinder
8. Rear brake caliper
9. Front brake caliper
10. ABS ECU
11. Rear wheel sensor
12. Front wheel sensor
13. ABS warning light

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ABS COMPONENT FUNCTIONS

Wheel sensors and wheel sensor rotors

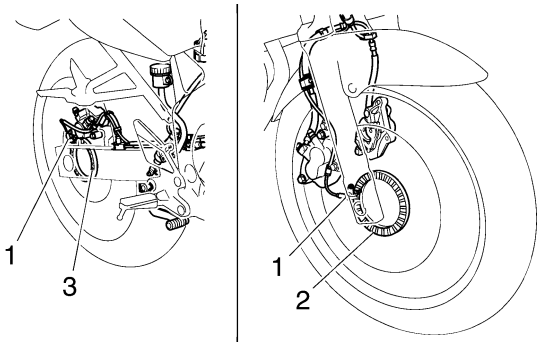
Wheel sensors “1” detect the wheel rotation speed and transmit the wheel rotation signal to the ABS ECU.

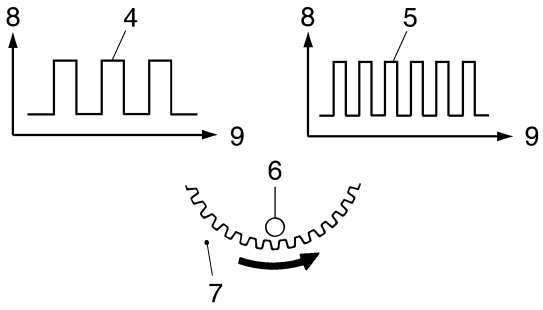
Each wheel sensor is composed of a permanent magnet and a hall IC. The wheel sensors are installed in the sensor housing for each wheel.

Sensor rotor “2” is pressed in the inner side of the front wheel hub and rotate with the wheel.

Sensor rotor “3” is install on the rear hub and rotate with the wheel. The sensor rotors have 42/front, 44/rear serrations inside and are installed close to the wheel sensors. As the sensor rotor rotates, the hall element in the hall IC installed in the wheel sensor generates the voltage which is proportional to the magnetic flux density, and the generated voltage is processed for waveform shaping in the hall IC to output.

The ABS ECU calculates the wheel rotation speed by detecting the frequency of this voltage.





4. At low speed
5. At high speed
6. Wheel sensor
7. Wheel sensor rotor
8. Voltage
9. Time

ABS warning light

The ABS warning light "1" comes on to warn the rider if a malfunction in the ABS occurs.
When the main switch is turned to "ON", the ABS warning light comes on for 2 seconds, then goes off, so that the rider can check if the ABS warning light is disconnected and check if the ABS is operating properly.

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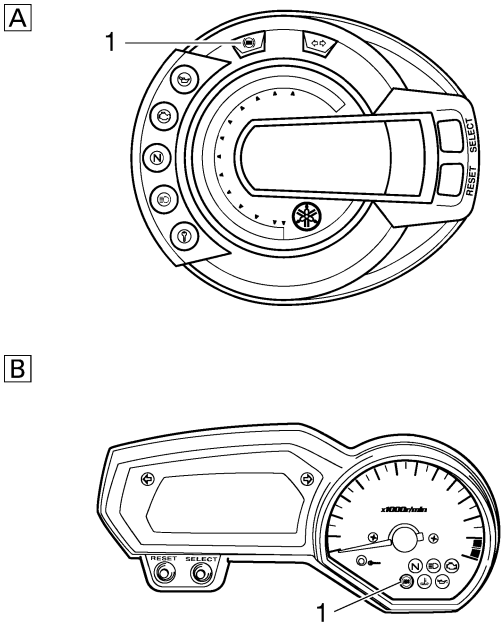
CAUTION:

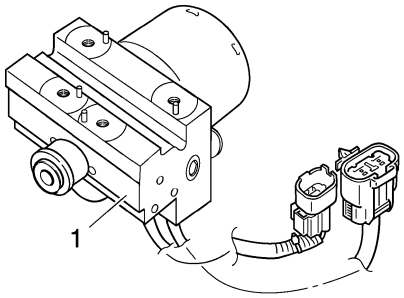
If the rear wheel is raced with the vehicle on the suitable stand, the ABS warning light may flash or come on. If this occurs, turn the main switch to "OFF", then back to "ON". The ABS operation is normal if the ABS warning light comes on for 2 seconds, then goes off.

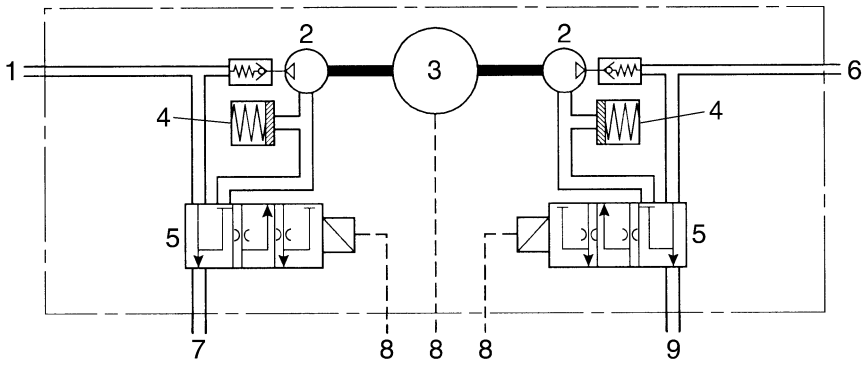


A. FZ6-NA/FZ6-SA
B. FZ6-NAHG/FZ6-SAHG

Hydraulic unit

The hydraulic unit “1” is composed of three hydraulic control valves (each with a solenoid valve and flow control valve), two buffer chambers, two hydraulic pumps, and an ABS motor. The hydraulic unit adjusts the front and rear wheel brake fluid pressure to control the wheel speed according to signals transmitted from the ABS ECU.





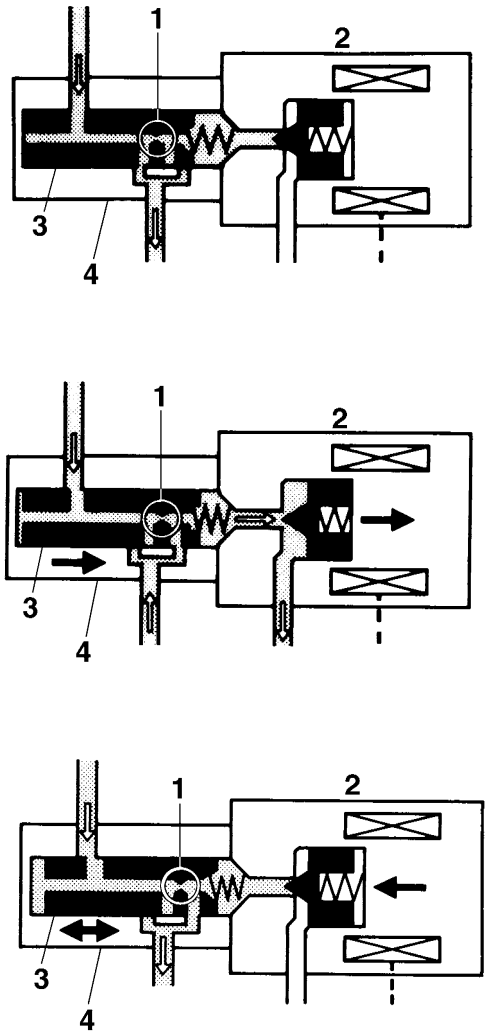
1. To the rear brake master cylinder
2. Hydraulic pump
3. ABS motor
4. Buffer chamber
5. Hydraulic control valve
6. To the front brake master cylinder
7. To the rear brake caliper
8. To the ABS ECU
9. To the front brake caliper

• Hydraulic control valve

The hydraulic control valve is composed of a flow control valve and solenoid valve.

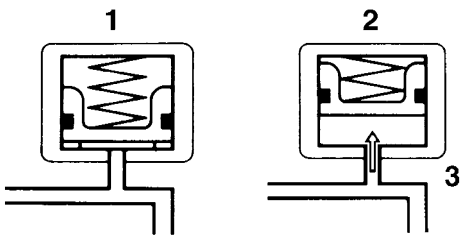
When the ABS is activated, the flow control valve regulates the flow of brake fluid to the brake and the solenoid valve decreases and increases the brake fluid pressure.

1. When the brakes are operated normally, the solenoid valve “2” is closed, the spool “3” of the flow control valve does not move, and the hydraulic line between the brake master cylinder and brake caliper is open.
2. When the ABS is activated, the solenoid valve “2” is opened by the power supplied from the ABS ECU signals to decrease the brake fluid pressure and the spool “3” of the flow control valve is moved toward the solenoid valve.
3. When the ABS ECU stops transmitting signals to decrease the brake fluid pressure, the solenoid valve “2” closes and the brake fluid is pressurized again. Pressurizing the brake fluid again, while the ABS is activated, limits the flow of the brake fluid with the movement of the flow control valve spool “3” and provides a gradual pressure increase.



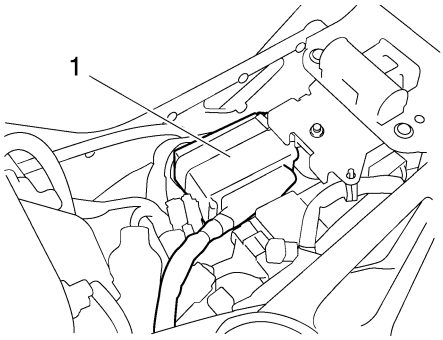
1. Orifice
2. Solenoid valve
3. Spool
4. Flow control valve

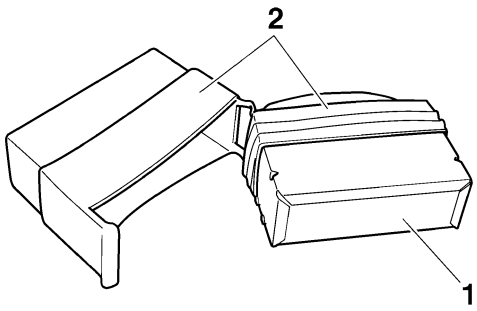
• Buffer chamber
The buffer chamber accumulates the brake fluid that is depressurized while the ABS is operating.



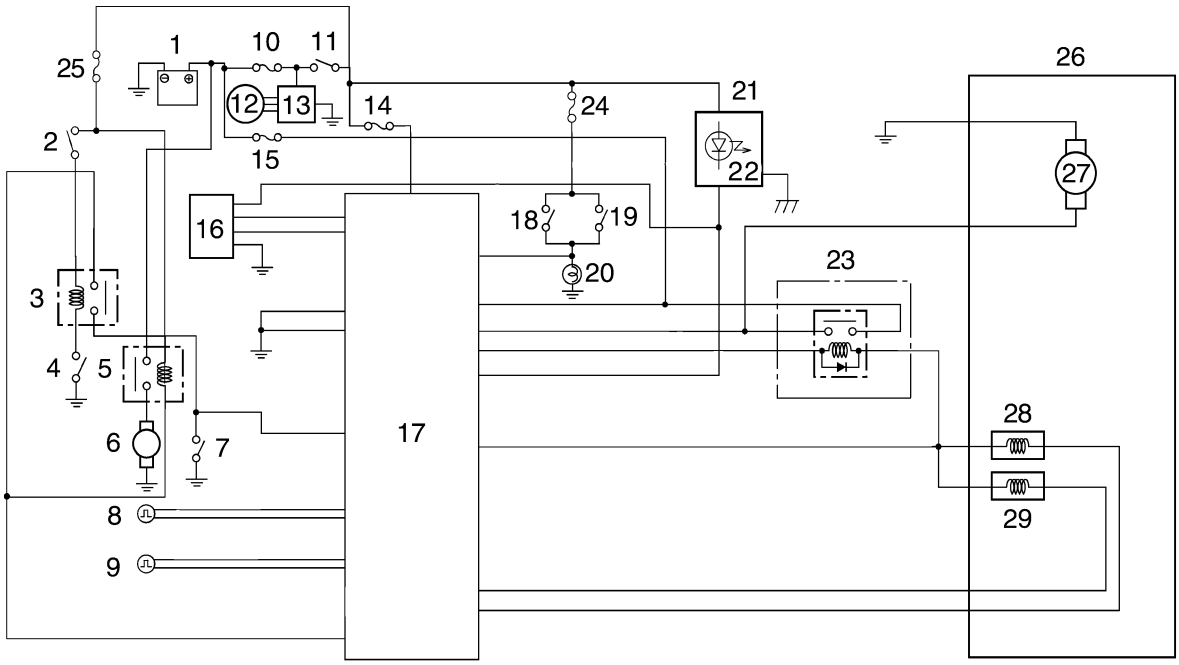
1. Buffer chamber (pressurized)
2. Buffer chamber (depressurized)
3. Raised piston

ABS ECU (electronic control unit)
The ABS ECU “1” controls the ABS and is installed under the fuel tank. To protect the ABS ECU from water damage, it is protected by a cover “2”.





As shown in the block following diagram, the ABS ECU receives wheel sensor signals from the front and rear wheels and also receives signals from other monitor circuits.



1. Battery
2. Engine stop switch
3. Starting circuit cut-off relay
4. Sidestand switch
5. Starter relay
6. Starter motor
7. Start switch
8. Front wheel sensor
9. Rear wheel sensor
10. Main fuse
11. Main switch
12. Generator

13. Rectifier/regulator
14. ABS fuse
15. ABS motor fuse
16. ABS test coupler
17. ABS ECU
18. Rear brake light switch
19. Front brake light switch
20. Tail/brake light
21. Meter assembly
22. ABS warning light
23. ABS motor relay
24. Signal fuse
25. Ignition fuse
26. Hydraulic unit
27. ABS motor
28. Front brake solenoid
29. Rear brake solenoid

The necessary actions are confirmed using the monitor circuit and control signals are transmitted to the hydraulic unit and ABS motor relay.

ABS control operation

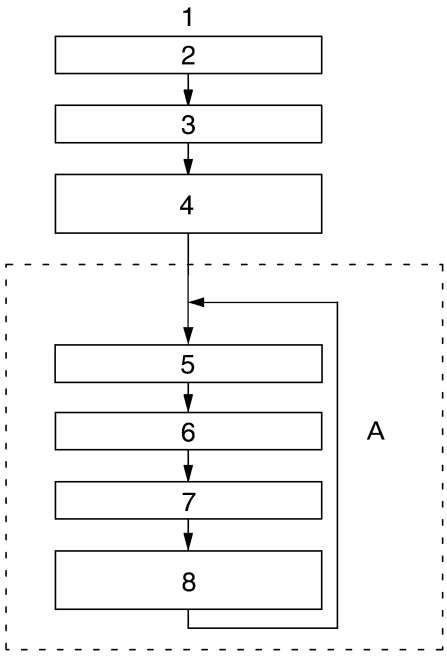
The ABS control operation performed in the ABS ECU is divided into the following two parts.

- Hydraulic control
- Self-diagnosis

These operations are performed once every 8/1000th of a second. When a failure is detected in the ABS, a malfunction code is stored in the memory of the ABS ECU for easy problem identification and troubleshooting.

NOTE:

Some types of failures are not recorded in the memory of the ABS ECU (e.g., a drop in battery voltage).

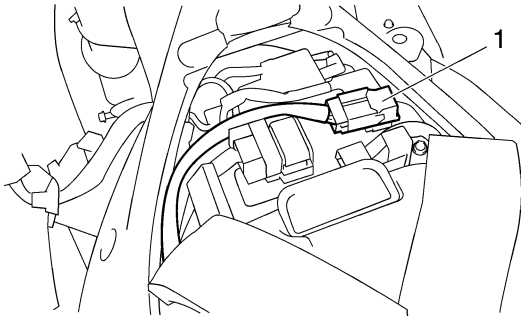


1. Software operation flow
2. Main switch “ON”
3. Initialize
4. Self-diagnosis (when static)
5. Self-diagnosis (when riding)
6. Receive signals
7. Control operation
8. Depressurize/pressurize

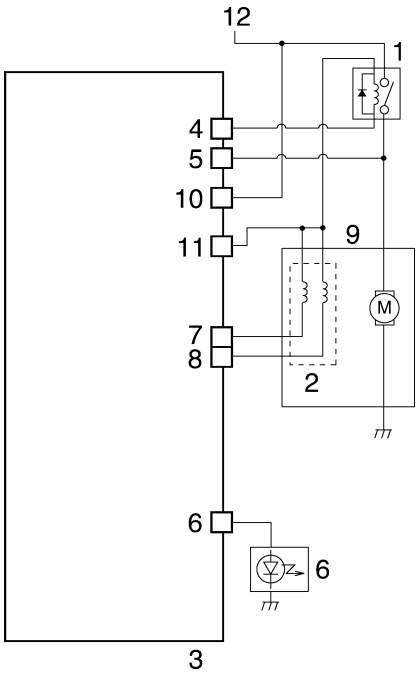
A. 8/1000th of a second

ABS motor relay

The ABS motor relay “1” controls the power supply of the hydraulic unit and is located on the battery.



Composition and operation
The ABS motor relay is activated by signals transmitted from the ABS ECU and operates simultaneously when the ABS starts to reduce the hydraulic pressure of the brake fluid. If the solenoid relay is turned off, the ABS motor relay is also deactivated and the motor stops operating if there is a malfunction.



1. ABS motor relay
2. Solenoid valves
3. ABS ECU
4. Pump motor relay coil
5. Pump motor monitor
6. ABS warning light
7. Front brake solenoid
8. Rear brake solenoid
9. Hydraulic unit
10. Power supply
11. Power of solenoid
12. Power

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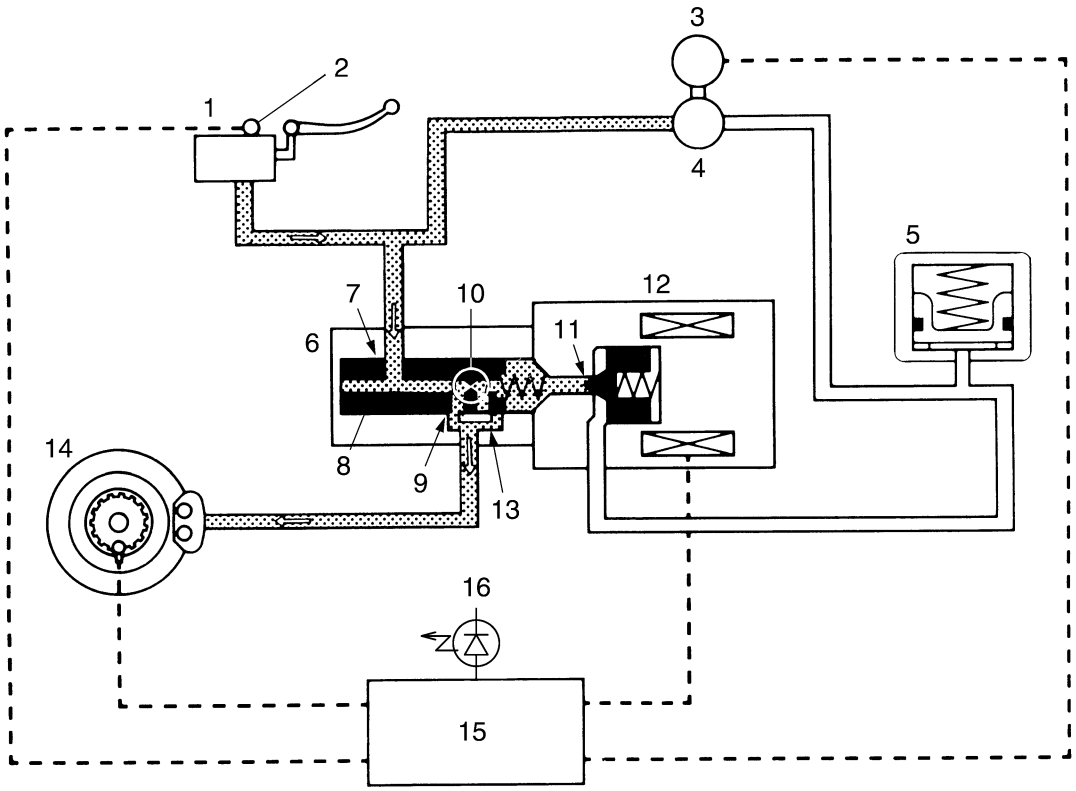
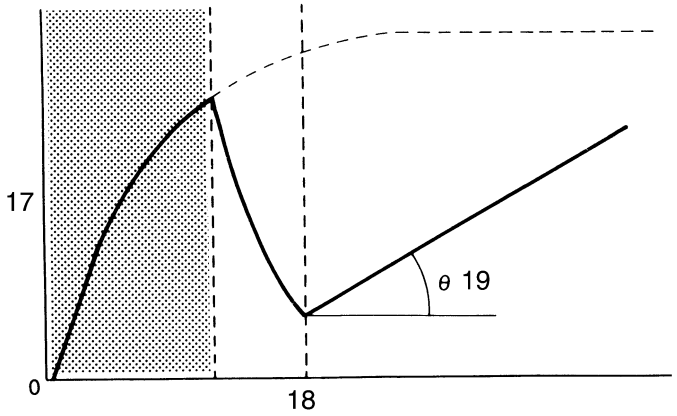
ABS OPERATION
The ABS hydraulic circuit consists of two systems: the front wheel, and rear wheel. The following describes the front system only.

Normal braking (ABS not activated)
When the ABS is not activated, port D “11” of the solenoid valve is closed because a control signal has not been transmitted from the ABS ECU and port A “7” and port B “9” of the flow control valve are open.

Therefore, when the brake lever is squeezed, the hydraulic pressure in the brake master cylinder increases and the brake fluid is sent to the brake caliper via port A “7” and port B “9”.
At this time, the inlet and outlet check valves of the pump close the lines and brake fluid is not sent. As a result, the brake master cylinder directly pressurizes the brake caliper during normal braking.
When the brake lever is released, the brake fluid in the brake caliper returns to the brake master cylinder via port A “7” and port B “9”.





1. Brake master cylinder
2. Brake light switch
3. ABS motor
4. Hydraulic pump
5. Buffer chamber
6. Flow control valve
7. Port A
8. Spool
9. Port B
10. Orifice
11. Port D
12. Solenoid valve
13. Port C
14. Brake caliper
15. ABS ECU
16. ABS warning light

17.Brake fluid pressure
18.Time
19.Repressurizing

Emergency braking (ABS activated)

1.Depressurized state

When the front wheel is about to lockup, port D “11” of the solenoid valve is opened by the “depressurization” signal transmitted from the ABS ECU. When this occurs, the spool of the flow control valve compresses the return spring and closes port B “9”. Brake fluid that has entered through port A “7” is restricted by the orifice “10” and the brake fluid is sent to the brake caliper via port C “13” and port D “11”, and the buffer chamber. As a result, the hydraulic pressure in the brake caliper is reduced.

The brake fluid stored in the buffer chamber is pumped back to the brake master cylinder by the fluid pressure pump linked to the pump motor.