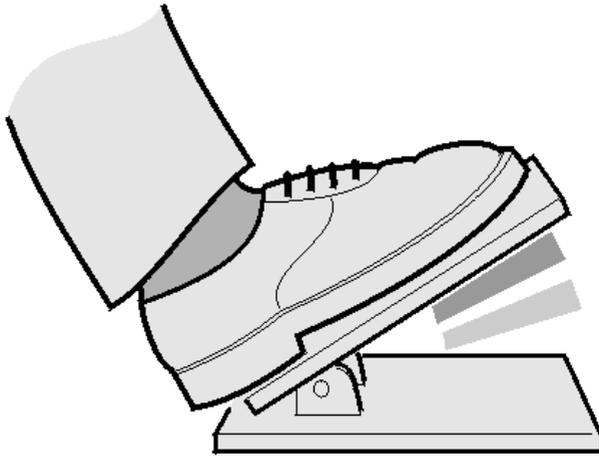


Operating Instructions

Electronic Brake System

For multiplex electrical system version 3

EBS



T0009004

VOLVO

Foreword

The following levels of observations, cautions and warnings are used in this Service Documentation:

Danger: Indicates an unsafe practice where serious personal injury or death could occur.

Warning: Indicates an unsafe practice where personal injury or severe damage to the product could occur.

Caution: Indicates an unsafe practice where damage to the product could occur.

Note: Indicates a procedure, practice, or condition that must be followed in order to have the vehicle or component function in the manner intended.

This operating instructions contains information concerning the operation and function of the Electronic Brake System (**EBS**) installed on Volvo coaches .with 3rd generation of the multiplex electrical system **BEA-3** (*Bus Electrical Architecture, version 3*).

This manual contains general information about instruments and controls, as well as driving instructions related to Electronic Brake System (**EBS**). In case a bus is not equipped with all functions described in this manual, it is due to the custom adaptation and different levels of equipment.

The information in this operating instructions it applying to buses.

Technical data, construction information, descriptions and illustrations in this operating instructions, that were current when the book was published, can have been changed. The Volvo Company reserves the right to make changes without prior notice.

Volvo Bus Corporation

Göteborg, Sweden

Order number: 89376909

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Foreword

The National Highway Traffic Safety Administration (NHTSA) and Prevost should be informed immediately if you believe that the vehicle has a defect that could cause a crash, injury or death. Contact NHTSA by calling the Auto Safety Hotline at 1 (888) 327-4236, by writing to NHTSA, U.S. Department of Transportation, Washington, DC 20590, by TTY at 1 (800) 424-9153, or visit their website at: www.nhtsa.dot.gov

Note: Illustrations in this operating instructions are used for reference only and may differ slightly from the actual vehicle. However, key components addressed in this document are represented as accurately as possible.

Please keep this operating instructions in the vehicle at all times.

Volvo Bus Corporation

Göteborg, Sweden

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Foreword

Privacy Notice for Vehicle Data

When you drive a truck, bus or coach sold or produced by companies belonging to the Volvo Group, the vehicle generates data that these companies may retrieve and process. Such data may include personal data relating to you as a driver.

The data are processed by the Volvo Group to develop and enhance our companies' products and services. The Volvo Group companies may process any personal data for the purposes as a data controller under the EU General Data Protection Regulation. The legal ground for processing is based on the Volvo Group companies' legitimate interests or, in some cases, the need to comply with legislation. We would like you to be fully informed about how the Volvo Group companies may process the data, as well as your rights. We recognize the individual's rights in relation to data processing activities, and take those rights seriously. We shall always be transparent about what data are collected, how they are utilized, with whom they are shared, and whom to contact in case of any concerns.

If you would like to know more about the kind of personal data the Volvo Group companies process, please visit the Volvo Group web site – www.volvogroup.com/privacy.

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Contents

Introduction	1
Driver's responsibility	1
About Electronic Brake System (EBS)	2
General	2
Manually engaged functions	3
Traction Control System (TCS)	3
Brake blending	5
Engage Differential Lock	5
Hill start assistance.....	7
Automatic functions	8
Antilock braking system (ABS)	8
Electronic Stability Program (ESP).....	8
Differential Lock Control (DLC).....	10
Engine torque control	11
Emergency braking assistance	11
Equalizing brake pad wear	11
Predicted brake pad wear	12
Warning of high brake temperature	12
Wheel brake monitoring	12
Fault codes	13
Resetting fault codes.....	13
Malfunction warnings	14
Index	15

Safety Information

IMPORTANT: Before driving this vehicle, be certain that you have read and that you fully understand each and every step of the driving and handling information in this operating instructions. Be certain that you fully understand and follow all safety warnings.

IT IS IMPORTANT THAT THE FOLLOWING INFORMATION BE READ, UNDERSTOOD AND ALWAYS FOLLOWED.

The following types of advisories are used throughout this operating instructions:



DANGER

Danger Indicates an unsafe practice where serious personal injury or death could occur. A danger advisory banner is in **white** type on a **black** background with a **black** border.



WARNING

Warning Indicates an unsafe practice where personal injury or severe damage to the product could occur. A warning advisory banner is in **black** type on a **gray** background with a **black** border.



CAUTION

Caution Indicates an unsafe practice where damage to the product could occur. A caution advisory is in **black** type on a **white** background with a **black** border.

Note: Note Indicates a procedure, practice, or condition that must be followed in order to have the vehicle or component function in the manner intended.

This booklet is intended to help the driver about how to operate properly the Electronic Brake System, (EBS).

Driver's responsibility

- As the driver, you are responsible for the safety and comfort of the passengers during the journey. Therefore, do not drive the bus before you have read this operating instruction. You must be familiar with all Electronic Brake System (EBS) functions, indications and warnings to know what to do if something unexpected happens.
- The brakes on the bus are operated by compressed air. Never drive if the air pressure is too low or if you discover other problems with the brakes.
- As the driver of the vehicle, you should be aware of the vehicle weight and loading capacity. See instructions on warning stickers, the vehicle registration book and on the identification plate.
- As the driver of the vehicle, it is your responsibility to foresee any hazards that could threaten your passengers.
- It is also your responsibility to ensure that all the safety equipment of the bus is in place. Therefore check regularly the working order of seat belts, emergency door and window opening, door sensitive edges, fire extinguishers and first aid equipment.
- Re-tighten the wheel nuts after approximately **200 km (125 mi)** if the wheels have been removed.
- Tighten the wheel nuts every **6 months** regardless of whether the wheels have been removed.
- Follow the recommended service and maintenance programme to maintain the bus's condition and safety.
- The bus tyres and rims should be approved for the intended load and speed in accordance with current legal requirements.

2 About Electronic Brake System (EBS)

General

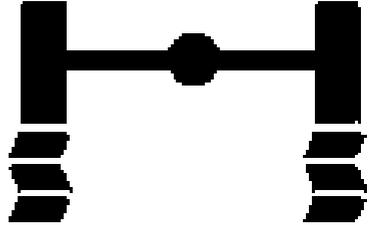
The bus is equipped with **EBS** (*Electronic Brake System*), which monitors and controls the bus's brakes.

EBS (*for multiplex electrical system, Version 3*) does not work in the same way as previous braking systems. In previous braking systems a particular pressure to the pedal gave a particular pressure to the braking system. With **EBS** a particular pressure to the pedal gives a particular reduction in speed, while the pressure applied to the brake cylinders on the axles varies depending on the load on the axles.

The initial braking after reloading can identify differences and allows the braking system has to adjust to the new axle loading.

Traction Control System (TCS)

With **TCS** (*Traction Control System*) the torque at the wheels is automatically decreased when wheel spin occurs. At speeds of under **40 km/h (25 mph)**, the **TCS** also functions as an automatic differential brake, and brakes the driving wheels on one side when required.



T3014400

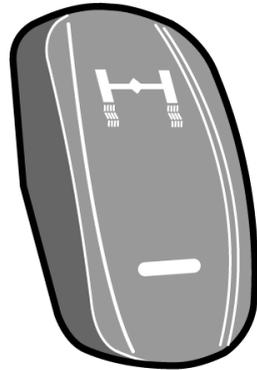
Display symbol when **TCS** is activated.

Off-road TCS

Engage the terrain **TCS** in difficult conditions, such as on sand, gravel or snow. **TCS** then allows the wheels to spin more. The level at which **ESP** engages to prevent skidding is raised somewhat **ESP** (*Electronic Stability Program*).

The function is activated by pressing the switch. Disengage the terrain **TCS** by pressing the switch again. When the “off-road” **TCS** is engaged an indicator on the switch lights up, at the same time as the level for engaging Electronic Stability Program (**ESP**) is raised slightly.

Note: Do not use the “off-road” **TCS** during normal driving.



T0012059

TCS activation switch.

4 Manually engaged functions

Disengage TCS

Use the display control lever to deactivate **TCS**. The vehicle should be stationary. See the separate operating instructions “Display” for general information concerning how the display works.

- 1 Scroll to the “Settings” menu (**3 and 4**).
- 2 Press “Select” (**2**).
- 3 Scroll to the “Traction control” menu (**3 and 4**).
- 4 Press “Select” (**2**).
- 5 Scroll to “Off” (**3 and 4**).
- 6 Press “Select” (**2**).

The next time that the ignition key is turned to the drive position or the front axle rotates faster than **12 km/h (7 mph)** the **TCS** will engage again.

Note: Disengage **TCS** during rolling brake tests!

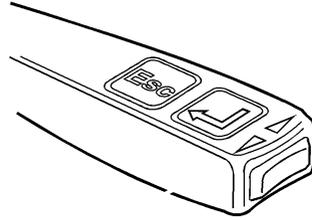
Switch OFF **TCS** before towing with a raised axle!

If TCS is activated after changing a wheel

If the driving axle wheels are replaced by smaller ones, this may activate **TCS**.

Drive a distance faster than **25 km/h (16 mph)**. The **EBS** system learns the difference in size between the wheels. How long for depends on how great the difference in size between the wheels is.

It may be difficult to drive because **TCS** limits the engine torque. In that case engage terrain **TCS** (“Off-road TCS”, page 3). Terrain **TCS** permits a greater difference in wheel speeds between the front and drive axles. When terrain **TCS** is engaged, it takes longer for the **EBS** system to recognize the difference in the wheel sizes.



T3008810

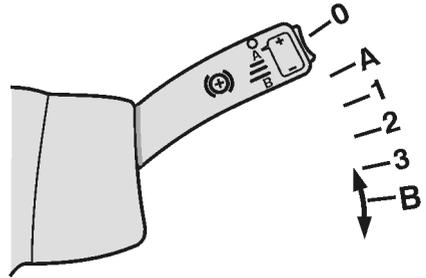
Display control.

Brake blending

When the retardation lever is in the “A” position, the supplementary brakes are applied together with the normal brakes when the brake pedal is pressed.

The **EBS** ensures that the different brakes are used in the most effective way. The supplementary brakes are used as much as possible and the normal brakes are applied as required.

Note: The “B” position for the lever is only available on vehicles with *l-Shift*. This position activates a braking program which allows a higher engine speed when engine braking is applied.



Brake blending. Put the lever in position “A”.

Engage Differential Lock

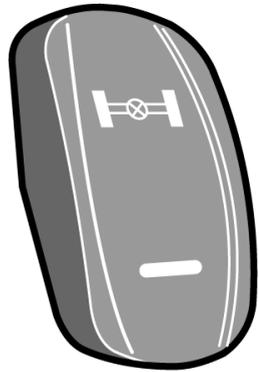
(This function is an option.)

On vehicles equipped with a differential lock (DLC, *Differential Lock Control*), the lock can be engaged without the clutch being pressed.

At speeds below **40 km/h (25 mph)**, after pressing in the switch, the **EBS** system will slow the wheels so they are rotating at the same speed before engaging the differential lock.

At speeds above **40 km/h (25 mph)**, the **EBS** system waits (*it does not brake the wheels*) until the wheels are rotating at the same speed before engaging the differential lock.

When the differential lock is activated, the control lamp “Differential lock activated” lights on the instrument panel.



T0012041

Differential lock engaged switch (optional).
The light on the instrument panel flashes.

6 Manually engaged functions



CAUTION

The manual mode must only be used on slippery surfaces. Other usage could damage the drive shaft.

To use the differential lock, proceed as follows:

- 1 Set the switch to the lower position.
- 2 Wait until the indicator light on the instrument panel flashes.
- 3 Accelerate **carefully** so as not to damage the drive axle and gear.
- 4 Drive away from the slippery area.
- 5 Release the accelerator.
- 6 Disengage the differential lock.

Note: The differential lock is not engaged until the warning lamp on the instrument panel flashes and remains engaged as long as the warning lamp is flashing, even if the switch is turned *OFF*.

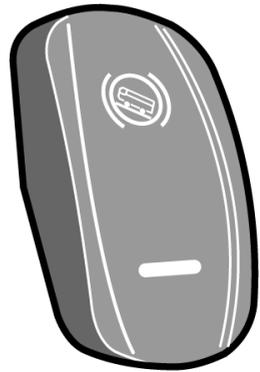
For automatic engagement of the differential lock, see “Differential Lock Control (DLC)”, page 10.

Hill start assistance

(This function is an option.)

The function is activated by pressing the switch. The lamp on the switch then lights up to indicate the activation.

Note: The function works differently depending on whether the vehicle is equipped with a manual or automatic gearbox.



T0012045

Switch for hill start help.

Hill start help on buses with an automatic gearbox

- 1 Keep the bus still with the brake pedal.
- 2 Release the foot brake.
The brake pressure is automatically retained for a few moments.
The symbol in the display is shown as long as the brakes are applied.
- 3 Start accelerating.

The brakes are automatically released two seconds after the brake pedal is released, or when the engine torque is sufficient.

Deactivate the function by pressing the switch again. The function is always disengaged when the engine is started.

8 Automatic functions

Antilock braking system (ABS)

Antilock Brake System (*ABS*,) is part of **EBS** and is completely automatic.

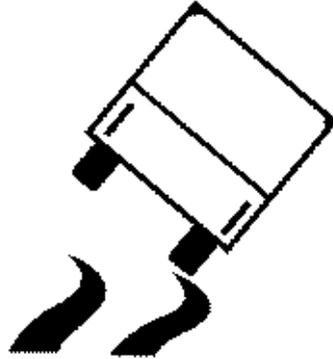
Electronic Stability Program (ESP)

(This function is an option.)

The Electronic Stability Program (**ESP**) is a stabilization system that reduces the risk of overturning and skidding.

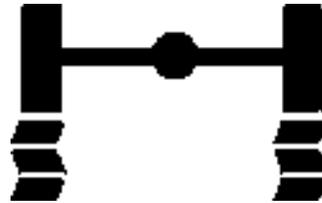
If the system senses that the bus is going to tip over. It first cuts back the engine. If this is not sufficient, it then applies the wheel brakes to reduce the speed of the vehicle.

If the system senses a risk of skidding, it cuts back the engine and applies the wheel brakes as necessary to hold the vehicle on its course. If necessary, the supplementary brakes are also disengaged.



T0012128

The displays shows the symbol for **ESP** engaged because of the risk of tipping.



T3014400

Display symbol when the **ESP** is activated because of the risk of skidding.



CAUTION

Even with **ESP** equipped vehicles, the driver remains responsible for ensuring vehicle stability during operation.



WARNING

Drive the vehicle in the same way as vehicles without **ESP**. **ESP** reduces the risk of tipping and skidding, but a bus can still tip over if the centre of gravity is very high and the wheels hit a kerb at high speed, or through careless driving. A bus can skid on slippery surfaces even if it has **ESP**.



DANGER

Do not drive buses equipped with **ESP** through steeply banked curves (*for example on a test track*). Driving on steeply banked curves can cause the **ESP** system to engage unnecessarily and dangerously.



DANGER

ESP may reduce the vehicle speed automatically.
ESP can make the vehicle decelerate automatically.
ESP can slow the vehicle with or without the operator applying the brake, and even when the throttle is being applied.

10 Automatic functions

Differential Lock Control (DLC)

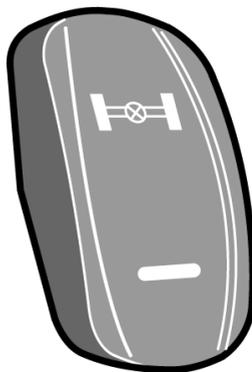
(This function is an option.)

Set the switch for the differential lock to the centre position. **DLC** is then activated.

The differential lock engages automatically when the drive wheels turn at different speeds and vehicle speed is below **15 km/h (9 mph)**.

The differential lock disengages if the vehicle speed exceeds **15 km/h (9 mph)** or at the next gear shift.

Note: For manual engagement of the differential lock, see “Engage Differential Lock”, page 5.



T0012041

Switch for the differential lock (*optional*).

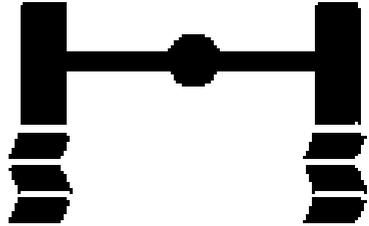
Overview of the switch functions

Switch position	Function
0 (<i>upper position</i>).	No differential lock engaged.
1 (<i>centre position</i>).	DLC engaged.
2 (<i>lower position</i>).	Differential lock manually engaged.

Engine torque control

(This function is an option.)

When the accelerator is released on a slippery road, the supplementary brake or the engine brake can lock the driving wheels. When this happens the supplementary brake is disengaged and the engine drives the driving wheels until they rotate at the same speed as the front wheels. This does not happen if the gearbox is in neutral position, **ABS** is activated or the vehicle speed is less than **10 km/h (6 mph)**.



T3014400

Display symbol for regulation of engine torque.

Emergency braking assistance

(This function is an option.)

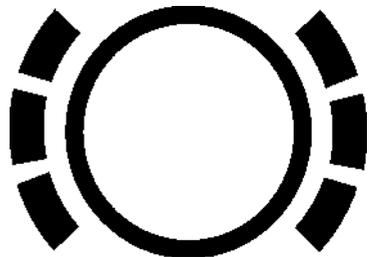
When the brake pedal is pressed quickly and forcefully the braking pressure is higher and the braking effect stronger. This function is there to enable the rapid application of full braking force in emergency situations.

Equalizing brake pad wear

If the brake pads wear more on one axle than another, greater braking force is distributed to the other wheels to even out the wear.

Note: This function works during gentle braking. During harder braking the braking force is divided so that braking occurs as effectively as possible.

A warning in the form of a symbol is shown on the display panel when a brake shoe becomes more than **80%** worn.



T5013668

Display symbol when a brake shoe is more than **80%** worn.

12 Automatic functions

Predicted brake pad wear

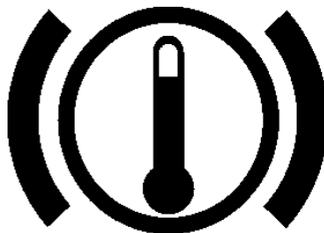
(This function is an option.)

The “ Vehicle data” menu in the information display, shows the period remaining until the brake linings need replacing. This information can also be read *off* at a Volvo-workshop.

Warning of high brake temperature

If the brakes become too hot the “CHECK” lamp lights and a symbol is shown on the display.

Note: If the temperature is allowed to rise still further, the feeling of the brakes changes so that the pedal has to be pressed harder to obtain the same braking effect as before.



T5013670

Warning symbol for high brake temperature.

Wheel brake monitoring

(This function is an option.)

If the braking effect on a wheel is weaker than on the other wheels, the “CHECK ” lamp lights and a symbol is shown on the display. This does not necessarily mean that braking feels different as the other wheels brake harder. However a fault code is stored in the system and authorized Volvo service centre should examine the braking system.



T3014494

Warning symbol for poor braking effect.

Resetting fault codes

Faults concerning low pressure at the brakes or if the brake pedal is pressed when the pressure in the braking system is too low, can cause several fault codes to be set that call for a reset test. These codes can be removed in the following way:

- 1 Ensure that the vehicle is stationary.
- 2 On the instrument panel display, ensure that the air pressure lies within the green range.
- 3 Check the display to see that the air pressure is at least **9 bar** (130 psi). If it is not, start the engine to allow the pneumatic system to pressurize.
- 4 Switch *OFF* the ignition so that the control unit is reset.
- 5 Start the engine without touching the foot brake.
- 6 Wait at least five seconds.
- 7 Slowly depress the foot brake until it is fully depressed (*it should take at least one second to be fully applied from when it is released*).
- 8 Hold the foot brake fully depressed for at least seven seconds.
- 9 Release the foot brake slowly (*it should take at least one second from fully applied to when it is released*).
- 10 If a reset test is required, the message “Perform Brake Test” is shown in the display. Confirm with “enter”. Follow the instructions on the display.
- 11 Switch *OFF* the ignition.
- 12 Wait at least five seconds.
- 13 Switch the ignition *ON*.
- 14 Check the fault codes.

After resetting, the remedied fault codes should be inactive. Otherwise the fault remains.

If it takes longer than **25 seconds** to carry out steps 12, 13 and 14 or the fault codes will not be deactivated.

Note: If the above measure does not help, contact an authorized Volvo service centre for further examination of the system.

14 Fault codes

Malfunction warnings

Electronic Brake System (EBS), malfunction warnings

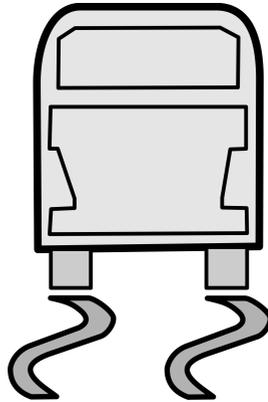
If the **EBS** system auto-diagnostic function, detect a malfunction operation, shall be shown a “Pop-up” icon on the Driver’s Information Display (*DID*) together with **ESP** (*Electronic Stability Program*) telltale check lamp lit on the instrument cluster, whose purpose is notify to the driver; when there is a malfunction on **EBS** (*Electronic Brake System*).

The “Pop-up” icon, appears with **ESP** telltale check lamp active.



W0142193

Pop-up displayed on Driver’s Information Display (*DID*).



W0142192

Telltale lit on instrument cluster.

A

About Electronic Brake System (EBS) 2
 ABS 8
 Accelerate 6
 Accelerating 7
 Accelerator 6, 11
 Activated 10
 Aid 1
 Air 1
 Antilock 8
 Assistance 7, 11
 Automatic functions 8
 Automatic 7
 Axle 4, 6, 11
 Axles 2

B

Blending 5
 Brake 2–5, 7–8, 11–14
 Brakes 1, 5, 8, 13
 Braking 5, 11–12

C

Capacity 1
 Check 13–14
 Clutch 5
 Code 12
 Codes 13
 Compressed 1
 Conditions 3
 Control 3, 5, 10–11
 Cylinders 2

D

Damage 6
 Dangerously 9
 Data 4
 Deactivate 4, 7
 Deactivated 13
 Decelerate 9
 Depress 13
 Diagnostic 14
 Differential 3, 5–6, 10

Disengage 3–4, 6
 Disengaged 7–8, 11
 Disengages 10
 Display 4, 7, 11–13
 DLC 5
 DLC 10
 Driver's 1
 Driving 3

E

EBS 2, 5, 8, 14
 Effect 11–12
 Electronic 2–3, 8, 14
 Emergency 1, 11
 Enable 11
 Engage 5
 Engage 3–4
 Engaged 5, 10
 Engages 10
 Engine 8, 11, 13
 Equalizing 11
 ESP 3, 8, 14
 Extinguishers 1

F

Fault codes 13
 Fault 12–13
 Flashes 6
 Forcefully 11
 Foresee 1
 Function 3, 10–11
 Functions 1

G

Gear 6
 Gearbox 7, 11
 General 2

H

Hazards 1
 Help 7
 High 12
 Hill 7

16 Index

Hold. 13

I

I-Shift..... 5
Identification..... 1
Instrument..... 6
Introduction 1

L

Lamp..... 14
Legal..... 1
Legislation..... 4
Linings..... 12
Load..... 2
Loading..... 1
Lock..... 5–6, 10

M

Maintenance..... 1
Malfunction..... 14
Manually engaged
 functions..... 3
Monitoring..... 12

N

Notice..... 4
Notify..... 14

O

Off-road..... 3
Operation..... 8
Overturning..... 8

P

Pad..... 11–12
Panel..... 6
Pedal..... 2, 5, 7, 12
Plate..... 1
Pneumatic..... 13

Pop-up..... 14
Position..... 10
Predicted..... 12
Pressure..... 2, 7, 11, 13
Pressurize..... 13
Privacy..... 4
Program..... 3, 5, 8, 14

R

Raised..... 4
Re-tighten..... 1
Regulation..... 4
Release..... 6
Released..... 13
Replaced..... 4
Resetting..... 13
Responsibility..... 1
Retardation..... 5
Rims..... 1
Rolling..... 4

S

Safety information..... 7
Senses..... 8
Shaft..... 6
Skidding..... 3, 8
Slightly..... 3
Slippery..... 6, 8, 11
Speed..... 9
Spin..... 3
Stability..... 3, 8, 14
Stabilization..... 8
Start..... 7
Stationary..... 4, 13
Switch..... 3, 5–7, 13
System..... 2–3, 8, 14

T

TCS..... 3–4
Telltale..... 14
Temperature..... 12
Test..... 13
Tests..... 4
Throttle..... 9

Tighten..... 1
Torque..... 11
Towing..... 4
Traction..... 3
Tyres..... 1

V

Vehicle..... 4

W

Warning..... 12
Warnings..... 14
Wear..... 11–12
Wheel..... 3, 12
Wheels..... 1, 3–4, 10–11

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