

D401

ATL Class 4 Roller Brake Tester



USER MANUAL

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1 Introduction

This manual describes how to safely use the *D401 roller brake tester* (further to be called the RBT) for statutory Vehicle Inspection testing for Class 3 and 4 vehicles (further to be called MOT class 3&4). The manual is intended for users of this equipment. Another manual for installation, service and calibration is available.

The RBT is designed for testing commercially available class 3 & 4 vehicles for road use (including 3-wheel vehicles and 4-wheel driven vehicles). It is important to note that the testing of 4-wheel drive vehicles is not permitted when using the ATL automated procedure. The maximum axle load during the test is 3000 kg. The test speed is 2.9 km/h. The RBT can be operated by one person.

This manual describes how to carry out a brake test according to the Department of Transport compulsory scheme. The manual provides the MOT braking measurement requirements and describes a complete test procedure.

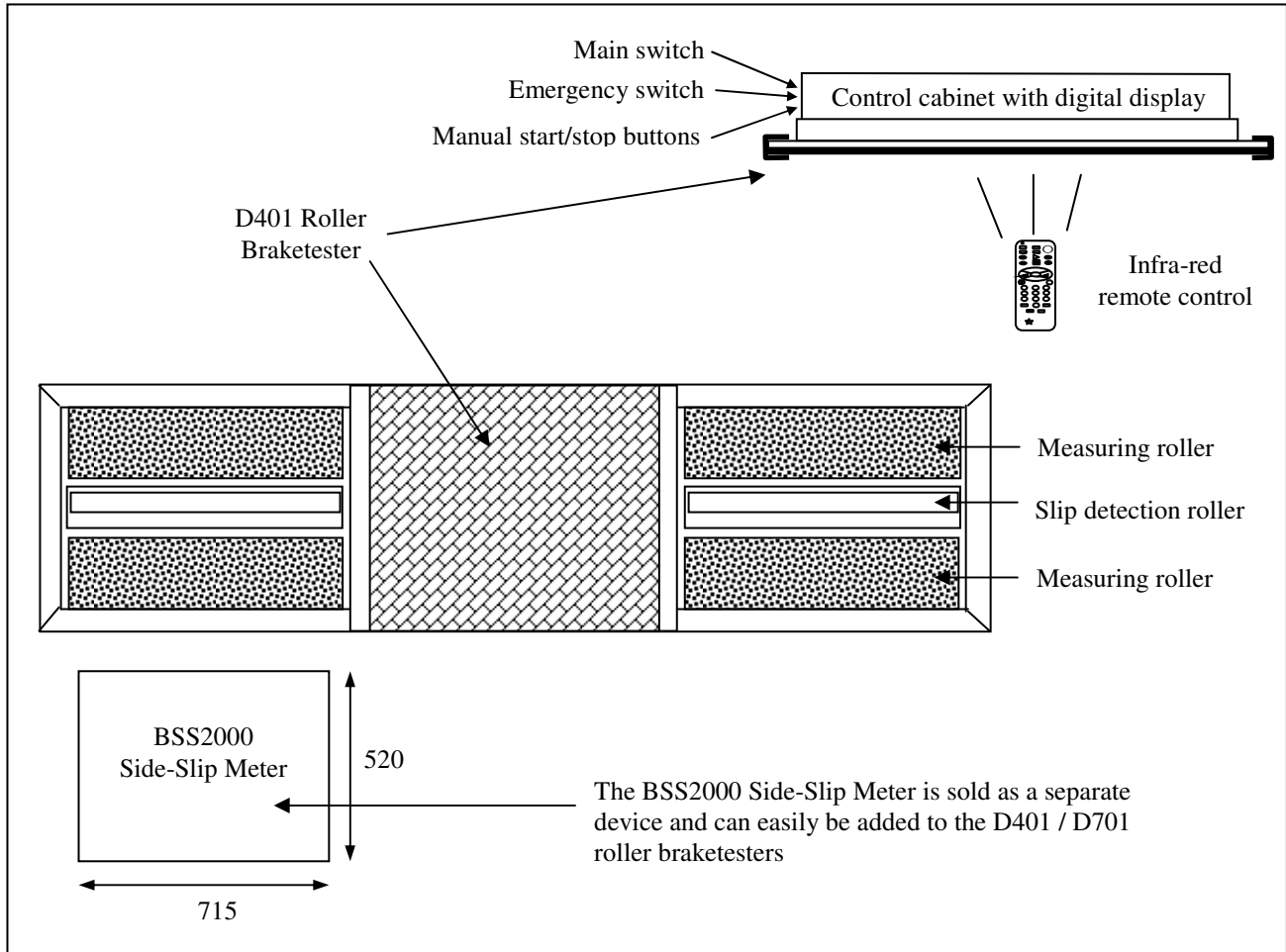
The motor and control gear of the RBT are not flameproof and it is the responsibility of the operator to make sure that the proposed site and the aspects of the installation comply with the Petroleum Regulations and that they satisfy the local Petroleum Officer's requirements.

2 General product description D401

The RBT is a well-known method to analyse and judge the efficiency of the braking system of a vehicle.

The *D401* consists of a mechanical floor unit with built in vehicle weighing system, a connection / control panel, an infra-red remote control and the Boston Global Control Platform (GCP) for automated control when being used for ATL one man testing.

The connection / control panel can be fitted with an optional display matrix for the display of information and data taken from the RBT. In this format it is possible to use the *D401* as a stand alone braketesting without the need for the computer platform, however in this format it is not possible to carry out the automated one man test.



The mechanical unit contains two electrical motors, two independent sets of three measuring rollers, two brake force transducer, additional safety sensors and a four point vehicle weighing system fitted to the base.

The brake forces induce reaction forces on the electric motor. An electric transducer with strain gauges measures these reaction forces. The roller diameter is sufficiently large to keep the tyre flexing to a minimum. The special coating of the rollers is very wear resistant and provides good friction values in both wet and dry conditions. The third smaller roller on each side between the wheel supporting rollers has two functions: The first is to detect if a vehicle is present in the roller bed (a built in safety device to prevent the motor to start up without a vehicle in place).

For safety purposes, the motors will **not start** if the left and right small rollers are not pushed down within **one second** after each other (except when 3-wheel mode is selected). The second function is to detect if tyre slippage on the rollers does not exceed the maximum value.

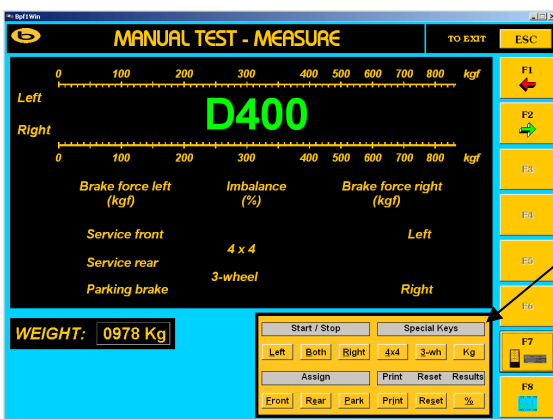
During the test, the computer measures the brake force values. The system will calculate the imbalance between the left wheel brake force and the right wheel brake force of an axle, as well as the brake efficiency of the service brake and the parking brake.

2.1 General control

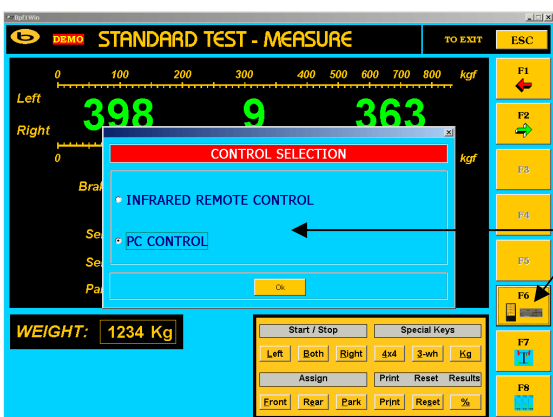
The equipment can be switched on by means of the mains switch on the side of the control cabinet. The unit can be operated through the infra-red remote control or by the keyboard on the GCP. The system however can also be operated manually using the manual buttons located on the side of the control cabinet (see chapter 5.8). The system can be switched off at any time by pressing the emergency stop button, also located on the side of control cabinet. The functions of the remote control and the control cabinet are explained in the two following paragraphs 2.1.1 and 2.1.2.

2.1.1 Infra-red remote control / PC control

The system can be manually controlled by means of an infra-red remote control or the keyboard on the GCP. For safety purposes, it is not possible for both methods of control to be active at the same time. As the user only requires the remote control for manual testing, the option to select which control to use can be found from within the manual test procedure on the GCP. Selecting the type of control can be done in the following way.



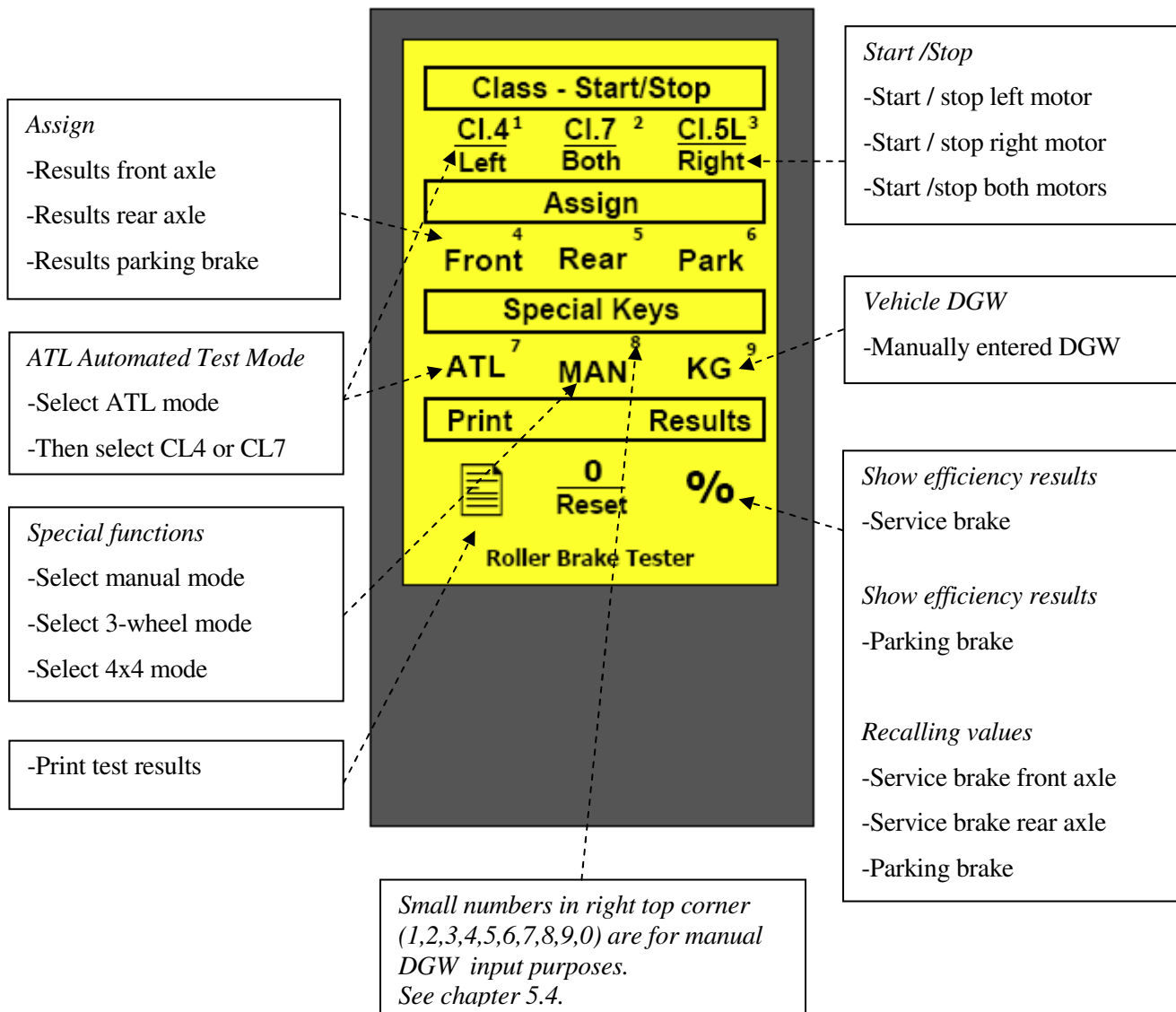
If the control panel shown here is displayed on the screen then keyboard control only is selected and the infra-red remote control is de-activated.



To change the type of control press 'F6'.

Select the desired type of control and click ok. If Infra-red is selected, the PC control buttons will not be shown.

Note: The activation buttons shown on the screen perform exactly the same functions as the buttons on the remote control.



2.1.2 Optional digital display

The optional display contains a horizontal LED digital matrix display (for showing measurements both in bar graph as well as in numerical values), seven indication lamps, a main switch, three manual start/stop buttons and an emergency stop switch. The display is shown in exactly the same format on the GCP screen when using manual mode. For ATL one man testing the screen will only show the approved automated test procedure.

Digital LED display

Displays the brake force in a bar diagram in *kgf* for:

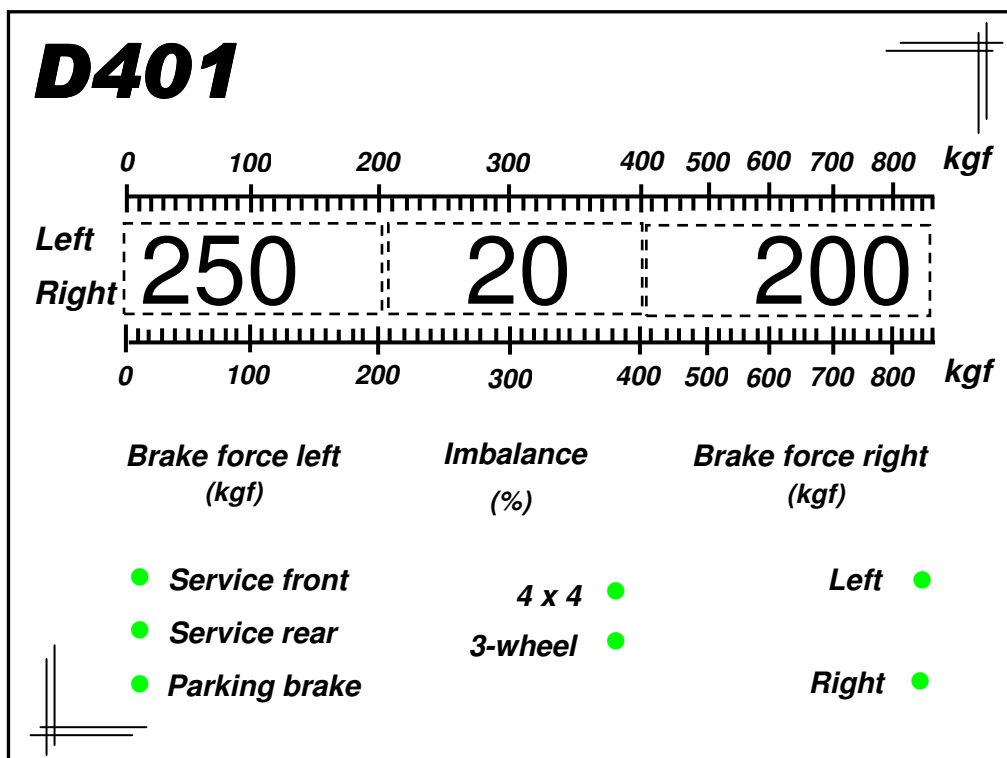
- The left wheel of an axle.
- The right wheel of an axle.
- The manual weight input.
- The brake efficiency in % for the service brake.
- The brake efficiency in % for the parking brake.

Digital LED display left

Displays the brake force in numerical values in *kgf* for:

- The left wheel of an axle.

Digital LED display right	Displays the brake force in numerical values in <i>kgf</i> for: -The right wheel of an axle.
Digital LED display centre	Displays in numerical values: -The imbalance left/right of an axle.
Seven lamps	-3x to indicate the assigned axle: front, rear, parking brake. -2x to indicate wheel lock (slip) left and right wheel. -1x to indicate when the <i>3-wheel</i> mode is selected. -1x to indicate when the <i>4 x 4</i> mode is selected.
Emergency switch	-To be used to stop the rollers in case of an emergency.
Manual start buttons	-For testing without the infra red remote control.



2.1.3 Global Control Platform (GCP)

The GCP is the main control unit for the automated brake test. It consists of a computer system with Boston ATL software, and is also able to operate other products in the Boston range such as emissions testers, engine diagnostic testers and more. For further details on other functions please contact Boston or your local distributor.



The GCP contains a high specification PC with a laser printer and large display monitor. The ATL one man test bracketester operating software is pre-installed and activated during installation. Connection to the main control cabinet is via hard-wired serial link or wireless Bluetooth depending on customer requirements. The GCP should be positioned within clear viewing distance of the RBT so that the operator inside the vehicle can easily follow the automated commands on the display. A second wall mounted PC display can also be connected to the GCP to enable better viewing as well as a LED matrix display fitted to the control cabinet.

3 Safety

In order to comply with your responsibilities under the Health and Safety at Work Act 1974, it is essential that this brake tester and any optional accessories are sited, installed, operated, and maintained by Boston Garage Equipment or your authorised / approved local distributor.

3.1 Important safety rules

- ◆ All persons installing, operating or maintaining this brake tester and any optional accessories must be familiar with the layout of the equipment, the safety precautions, the emergency shutdown procedures and vehicle braking systems.
 - ◆ Appropriate training is required, prior to installing, using or maintaining this roller brake tester.
 - ◆ In case of an emergency, all electric power can be disconnected by pushing the emergency button on the side of the display, or turn the main power switch off.
 - ◆ The instructions in this manual must be strictly adhered to, to avoid injuries to personnel and damage to machine and vehicle.
 - ◆ The equipment may be operated only within its rated capacity. The equipment is designed for MOT class 3 & 4 vehicles.
 - ◆ During the test no person should stand close to the mechanical units.
 - ◆ The testing area should be clear of personnel, tools and equipment before starting each stage of the test.
 - ◆ Do not stand on, or walk over the rollers at any time.
 - ◆ The unit should be placed inside a rigid, flat and clean surface, protected against water, humidity and weather influences.
 - ◆ Only a qualified technician should carry out any work on the electrical system.
 - ◆ He should follow procedures pre-described by national standards and the regulations of the local Power Company.
 - ◆ It is not allowed to make the safety features inoperative or to remove them.
 - ◆ Do not park a vehicle on any part of the tester.
 - ◆ It should only be used where the operator has a good view of the whole machine.
 - ◆ Don't leave the RBT switched on and unattended.
 - ◆ Keep the operating environment clean and free of oil. Never leave loose objects around the RBT.
 - ◆ When the RBT is not working correctly, switch off the RBT immediately and refer to the user manual or contact Boston Garage Equipment.
 - ◆ Isolate the RBT from the power supply before maintenance, by switching off the main power and to secure it with a lock.
 - ◆ Make sure the remote control is stored safely when not in use.
 - ◆ Always use the original tools to adjust the RBT.
 - ◆ Follow the maintenance specifications accurately.
 - ◆ Avoid any direct- or indirect electrical contact.
 - ◆ Avoid any electrostatic influences.
 - ◆ Do not test a vehicle when there is insufficient light.
 - ◆ Take precautions to extract exhaust in the workplace properly while testing.
- ◆ **Special attention is required for testing 3-wheel and 4WD-vehicles!**

3.2 Safety devices

With the design of the RBT the following safety devices have been installed, to reduce risks as much as possible.

- ◆ The RBT is provided with an emergency stop button on the side of the control cabinet by which the machine can be stopped immediately in case of an emergency. To release the emergency stop button after operation, rotate the button.
The RBT can only be switched on if the centre rotating measuring rollers are pressed down, i.e. when there is a vehicle axle in the roller brake tester (except when 3-wheel mode is selected).
- ◆ By applying the brake force and locking any wheels under test, the rollers will stop immediately.
- ◆ Closed covers for the chain and electrical components.
- ◆ The electrical circuits are built in the display cabinet, to reduce any direct danger.
- ◆ The RBT is ground wired to earth.
- ◆ Optional roller cover plates can be provided to close the mechanical unit when the brake tester is not in use.

3.3 Misuse

The RBT is designed for use as a brake tester for statutory testing of MOT class 3 & 4 vehicles and for brake diagnostic purposes only.

It must **NOT** be used for any other purpose e.g.

- ◆ 'Running in' of brake linings.
- ◆ Brake adjustments.
- ◆ Diagnosis of vehicle faults e.g., tyre examination etc.
- ◆ Any purpose requiring the operator to be in the danger zone, other than to conduct a brake test and/or maintenance and calibration purposes (authorised personnel only).

4 MOT regulations

4.1 Brake efficiency

- ◆ The brake efficiency of each system is calculated from the total brake force and expressed as a percentage of the vehicle weight.
- ◆ Total up the braking effort from all wheels of the vehicle when the service brake is applied.
- ◆ Total up the braking effort recorded from the appropriate wheels when the parking brake is applied.
- ◆ The weight of the vehicle can be determined from the *Brake Data Chart*.
- ◆ This total weight on the *Brake Data Chart* includes 140 kg for the weight of the driver.
- ◆ On the *D401* display, the vehicle weight can also be entered manually by means of the infra red remote control (see chapter 5.4).
- ◆ It is required to test the service brake individually, wheel by wheel.

- ◆ *Efficiency calculation*

$$\text{Efficiency \%} = \frac{\text{Total brake effort all wheels}}{\text{Vehicle weight}} \times 100$$

- ◆ The Department of Transport allows the use of an electronic calculator to perform the calculation of brake efficiency.
- ◆ If the separate brake measurements are assigned properly with the remote control, the display is able to show the efficiency for both the service brake as well as the parking brake.
- ◆ If an optional printer is connected, the brake efficiencies will be shown on the print out (only if the separate brake measurements are assigned properly).

The MOT brake efficiency requirements are specified in the MOT inspection manual and are also shown on the following page.

Efficiency limits

CLASS OF VEHICLE	MINIMUM BRAKE EFFICIENCIES REQUIRED		
	SERVICE BRAKE	PARKING BRAKE	
		Vehicle with a single line braking system	Vehicle with a split (dual) braking system
Vehicles with 4 or more wheels having a service brake (foot-brake) operating on at least 4 wheels and a parking (handbrake) operating on at least 2 wheels.	50%	25%	16%
Vehicles with 3 wheels with a service brake operating on ALL wheels and a parking brake operating on at least one wheel which were first used:			
i) before 1 January 1968	40%	25%	16%
ii) on or after 1 January 1968	50%	25%	16%
Vehicles first used before 1 January 1968 which do NOT have one means of control operating on at least 4 wheels (or 3 for three wheeled vehicle) and which have one brake system with two means of control or two brake systems with separate means of control.	30% from first means of control	25% from second means of control	
Vehicles first used before 1 January 1915.	One efficient braking system require		

NOTE: 16% parking brake efficiency equates to a vehicle holding on a gradient of 6.25

4.2 Brake imbalance

- ◆ The imbalance of brake force between the left and right wheels of an axle, expressed as a percentage of the higher brake force.
- ◆ The imbalance of the braking effort on an axle is obtained by comparing the brake efforts at each wheel when they are tested simultaneously.
- ◆ Imbalance calculation:

$$\text{Imbalance \%} = \frac{\text{Higher brake effort} - \text{Lower brake effort}}{\text{Higher brake effort}} \times 100$$

- ◆ The MOT minimum brake balance requirement as specified in the MOT inspection manual is 25%.

5 Manual MOT testing procedure

Chapter 5 describes the testing procedure on the *D401* roller brake tester according to the MOT method of inspection. See *latest MOT Inspection Manual* to check for any recent changes.

- ◆ Brake forces are indicated in *kgf*.
- ◆ Weight input is indicated in *kg*.
- ◆ Imbalance is indicated in %.
- ◆ Brake efficiency is indicated in %.

5.1 Preparations before starting a brake test

- A. Examine the tyres to ensure they are not under-inflated, if the tyre pattern is in good condition and if the tyres are free from mud and stones.
- B. Determine whether the vehicle has a single brake control system or a split (dual) brake control system. This is important for the operator to check a PASS or FAIL on the brake efficiency.
- C. Remove the (optional) covers of the roller tester and switch the power on.

NO VEHICLE SHOULD BE IN THE BRAKE TESTER WHEN THE POWER IS SWITCHED ON AS THE WEIGHING SYSTEM WILL PERFORM AN AUTOZERO RESULTING IN WRONG CALCULATION OF VEHICLE WEIGHTS DURING TESTING.

The machine will go through its self-test and through its warm-up stage. When the horizontal bar diagram is going back slowly from right to left, by pressing MENU, the tester will be in its test mode. *D401* will appear in the display. The *D401* is now ready for testing.

- D. Drive the front axle in the roller beds and select neutral gear.
Start both rollers by pressing **Key “BOTH”** on the remote control to position the wheels and align the vehicle. Make sure the tyres do not touch the sides of the chassis.
- E. Press **Key “BOTH”** to stop the roller set. The machine is now ready to test the front wheels.

- ◆ **Pressing any KEY on the remote control can always stop the motors and abort a test.**
- ◆ **In the event of an emergency, these procedures must be followed:**
 - (1) Press any **KEY** on the remote control. This will stop the rollers *or*
 - (2) Press the manual start/stop buttons on the side of the cabinet *or*
 - (3) Push the **red emergency stop switch**, to isolate the electrical supply to the roller bed and stop the rollers.

**The described KEYS correspond with the KEYS on the both the infra-red remote control and the GCP.
To ensure accurate storage of test results, always start with the LEFT wheel of an axle.**

Press “RESET” to reset the system and clear the memory from any previous results!

5.2 Testing the front wheels

1. Press **Key “LEFT”** to start the left roller, there will be a short delay and the axle weight will be shown before the roller starts. The “**Left**” lamp flashes as an indication that the left rollers are running. Slowly increase the brake force on the brake pedal until maximum effort is achieved, or until the wheel locks and slips on the rollers. The real time brake force is displayed on the LED display in a horizontal bar diagram. At the slip limit the motor will be cut out immediately (to avoid unnecessary wear of the tyre) and the “**Left**” lamp will light to indicate this wheel lock. If slip does not occur while the maximum brake force is achieved, the left rollers can be stopped by pressing **Key “LEFT”**. The “**Left**” lamp will not light or flash.

For an accurate measurement, the brake force has to be built up slowly!

After the rollers have stopped, on the LED display, the bar diagram for the brake force will switch into a numerical brake force value and will remain displayed.

The operator should note the achieved brake force for the left wheel.

Press **Key “FRONT”** to assign the service brake left wheel for the front axle and the computer will automatically hold the test result in its memory (only relevant for automatic brake efficiency calculation by the computer and recalling of results per axle). The “**Service front**” lamp will light to confirm this assignment.

- 1a. During the test, the pedal force can be held at a constant value to visually check any fluctuations on that wheel. The operator should note and interpret the irregularities in the brake force behaviour.
1. For the right wheel press **Key “RIGHT”** to start the right rollers. Repeat the test procedure as described for the left wheel in **STEP 1** and note the highest brake force.
The maximum brake force value will remain displayed until the next measurement is started.

When starting the right rollers, the left wheel brake force value (and possible lock indication) will return on the display (when correctly stored under key FRONT in step 1). After the right wheel test, both brake force values for left and right are displayed at the same time.

The operator should note the achieved brake force for the right wheel.

Press **Key “FRONT”** to assign the service brake right wheel for the front axle.

The “**Service front**” lamp will light to confirm this assignment.

The computer has already stored the brake force measurement of the left wheel in its memory.

3. Press **Key “BOTH”** to start both sides and note whether a significant brake effort is recorded from any wheel without applying the brake pedal (rolling resistance test).
4. Slowly increase the pressure on the brake pedal and aim to stop just short of the value on which maximum brake force is achieved during the individual left and right wheel brake force measurement (the brake forces are already noted by the operator in **STEP 1 & 2**).
5. Gradually release the service brake and observe how the braking effort at each wheel reduces.
6. During **STEP 4**, the lower reading of the two brake forces should not be less than 75% of the higher reading.

Remark: Disregard any service brake imbalance when the brake effort from each front wheel is less than 40 kgf.

7. Press **Key “BOTH”** to stop both rollers. After the rollers have stopped, on the LED display, the bar diagrams for brake forces left and right will switch into numerical brake force values.
The maximum imbalance in brake forces for the left and right wheel is also displayed numerically.

The operator should note the imbalance and determine a PASS or FAIL according to the MOT regulations (see chapter 4.2 Brake imbalance). The operator can also store the results in the computer’s memory.

Press **Key “FRONT”** to assign the service brake imbalance result for the front axle.

The **“Service front”** lamp will light to confirm this assignment (*the assignments of the independent left and right wheel brake force measurements will also be displayed numerically*).

8. If the vehicle has a parking brake on the front wheels, press **Key “LEFT”** to start the left roller and apply the parking brake. Follow the procedure as described in **STEP 1**.
Keep the hold on button or trigger in the disengaged position at all time.

Press **Key “PARK”** to assign the parking brake measurement for the left wheel.

The **“Parking Brake”** lamp will light to confirm this assignment.

Repeat the test of the parking brake for the right wheel as described in **STEP 2**.

Press **Key “PARK”** to assign the parking brake measurement for the right wheel.

The **“Parking Brake”** lamp will light to confirm this assignment.

Repeat the imbalance test for the parking brake as described in **STEP 3-7**.

Press **Key “PARK”** to assign the parking brake imbalance result.

The **“Parking Brake”** lamp will light to confirm this assignment. (*the assignments of the independent left and right wheel brake force measurements will also be displayed numerically*).

Remove the vehicle from the roller bed.

It can be helpful to start both roller sides of the brake tester when driving out of the rollers.

5.3 Testing the rear wheels

9. Release the brakes and drive the rear wheel into the rollers. Follow instructions A, D, E as described in paragraph 5.1 to prepare the vehicle for testing the rear wheels.
10. Repeat **STEPS 1-7** for testing the rear wheels of the service brake individually and for the imbalance as described for the front wheels.

The operator should note the maximum brake forces as well as the imbalance.

The only difference is the storage of the measurements:

Press **Key “REAR”** to assign the service brake left wheel for the rear axle.

Press **Key “REAR”** to assign the service brake right wheel for the rear axle.

Press **Key “REAR”** to assign the service brake imbalance result for the rear axle. (*the assignments of the Independent left and right wheel brake force measurements will also be displayed numerically*).

The **“Service rear”** lamp will light to confirm all three assignments.

11. If the parking brake is operated by the rear wheels, follow the procedure described in **STEP 8**.
12. Remove the vehicle from the roller bed.
It can be helpful to start both roller sides of the brake tester when driving out of the rollers.

5.4 Vehicle weight

- 12a. Vehicle weight measurement is automatic on the D401 and therefore the system is able to automatically calculate the brake efficiency. However, the vehicle weight can also be entered manually using the remote control or GCP keyboard.

The *DGW* of the vehicle can be obtained from the *Department of Transport Plate* (commonly called “*Ministry*” Plate) fitted to the vehicle. If a Ministry plate is not fitted to the vehicle then obtain the *DGW* from the manufacturer’s plate fitted to the vehicle.

Weight input procedure:

Press **Key “KG”**. The digital display will mention “**KG:** ”. The operator should always enter 4 digits (if the vehicle weighs under 1,000 kg, the first digit should be a 0 (zero)). Each key on the remote control mentions a number, which can be used for vehicle weight input. The display will present each digit (*example: KG: 0985*). The computer will use the last entered weight until a new weight is entered or “**RESET**” is pressed. After entering the 4 digits, the total weight is displayed for a few seconds.

5.5 Calculation of brake efficiency

13. Manually calculate the brake efficiency for both the service brake and parking brake as described in chapter 4.1 by means of a calculator. Determine if the vehicle **PASSES** or **FAILS** on brake efficiency and imbalance. All brake force values are noted by the operator in the pre-described tests.

The *D401* is capable of displaying the efficiency for the service brake and the parking brake when all separate tests are assigned properly and the vehicle weight has been manually entered.

When pressing key **%** once, the service brake efficiency is displayed.

The display will show “**EFF. SB%**” (SB = Service brake).

When pressing key **%** again, the parking brake efficiency is displayed.

The display will show “**EFF. PB%**” (PB = Parking brake).

5.6 Recalling values

14. When required by the operator, the test results of the service brake and the parking brake can be recalled on the display by means of the remote control. The results can all be recalled by pressing Key **%**.


Press once : Shows the last results of the *service brake front axle* and imbalance result left/right wheel, as well as possible wheel locks.

Press again : Shows the last results of the *service brake rear axle* and imbalance result left/right wheel as well as possible wheel locks.

Press again : Shows the last results of the *parking brake* and imbalance result left/right wheel, as well as possible wheel locks.

REMARK: Key **%** is for the use of the brake efficiency and the recalling of values. All 5 requested values are displayed by pressing key **%** 5 times. It is a continuous cycle.

5.7 Printing test results

When using the D401 for statutory MoT testing, the printing of results is automatic. At the end of the test, the printer will produce two copies, one marked GARAGE COPY and the other CUSTOMERCOPY. When using the manual mode, the operator can obtain a single print of results by pressing **KEY**. 

5.8 Testing procedure without remote control

It is possible to perform a test without remote control or GCP keyboard input. This test procedure requires two persons. One person to perform a test, while the other person pushes the start/stop buttons on the display. The brake force will be displayed, however, these values can not be stored in the computer memory and therefore automatic calculation of the brake efficiency is not possible.

On the control cabinet there are three push buttons mounted on the side casing. If you want to start the left, right or both rollers, press the related button. Press the button again, to stop the rollers. The test starts up and the procedure is the same as described in paragraph 5.2 and 5.3. The manual buttons function as **Keys** “LEFT”, “RIGHT”, “BOTH” on the remote control.

6 Testing 3-wheel vehicles

The *D401* is capable of testing 3-wheel vehicles, as classified under MOT class 3 and 4 vehicles. This mode allows the operator to start the left side of the roller bed, if the smaller middle roller of this one side only is pressed down.

NOTE: The testing of 3-wheel vehicles is not permitted when using the ATL automated procedure and the MANUAL procedure should be applied in this instance.

When the 3-wheel mode is selected, as a safety precaution, the right rollers will not start when the middle roller of the right side is pressed down as well.

- ◆ **The motor can always be stopped by pressing any KEY and the test will be aborted.**
- ◆ **In the event of an emergency, these procedures must be followed:**
 - (1) Press any **KEY** on the remote control or GCP keyboard. This will stop the rollers *or*
 - (2) Press the manual start/stop buttons on the side of the cabinet *or*
 - (3) Push the **red emergency stop switch**, to isolate the electrical supply to the roller bed and stop the rollers.

Preparations

- A. Examine the tyres to ensure they are not under-inflated, if the tyre pattern is in good condition and if the tyres are free from mud and stones.
- B. Remove only the left optional cover of the roller tester and switch the power of the tester on.
- C. Drive the front axle (front wheel) in the roller bed and select neutral gear.
- D. Start the left roller by pressing **Keys “3-WH” and “LEFT”** to position the wheel and align the vehicle. Make sure the tyre does not touch the side of the chassis.
The “**3-wheel**” lamp on the display will constantly light as a warning and to confirm this function and will stay on during the test of the single wheel axle.
- E. Press **Key “LEFT”** to stop the roller set. The “3-wheel” lamp is still on.
- F. The machine is now ready to test the front wheel.

Test procedure

1. While the 3-wheel mode is already selected, press “LEFT” to start the left roller. This is for 3-wheel mode only and therefore not the same as Key “LEFT” as described in chapter 5.2. The “3-wheel” lamp on the display will constantly light as a warning. The “Left” lamp flashes as an indication that the left rollers are running.
2. Slowly increase the brake force on the brake pedal until maximum effort is achieved, or until the wheel locks and slips on the rollers. At the slip limit the motor will be cut out directly and the left lamp will light to indicate this wheel lock. If slip does not occur while the maximum brake force is achieved, the left roller can be stopped by pressing Key “LEFT”. The wheel lock lamp will not light or flash.

For an accurate measurement, the brake force has to be built up slowly!

After the rollers have stopped, the maximum brake force is displayed in a numerical value and will remain displayed until the next measurement is started.

The operator should note the achieved brake force.

Press Key “FRONT” to assign the service brake of the single wheel for a single wheel-front axle.

The “Service front” lamp will light to confirm this assignment

Press Key REAR to assign the service brake of the single wheel for a single wheel-rear axle.

The “Service rear” lamp will light to confirm this assignment

3. During the test, the pedal force can be held at a constant value to visually check any fluctuations on that wheel. The operator should note the irregularities in the brake force behaviour.
4. Follow the procedure described in chapter 5 for testing the service brake and parking brake on the dual wheel axle (can be front or rear axle) for brake force as well as imbalance. Assigning results of the measurements is according to the same principle.

To exit the 3-wheel mode, press key “3-WH”. The 3-wheel lamp will go out as a confirmation that the 3-wheel mode is de-activated.

7 Testing 4x4 vehicles

The D401 is capable of testing 4 wheel drive vehicles, however this function can only be used in the MANUAL test mode. The brakes of each wheel of an axle are tested separately one after the other. **On one side the rollers turn in the normal direction, while on the other side the rollers turn in the reverse direction.**

NOTE: The testing of 4 wheel drive vehicles is not permitted when using the brake tester for statutory MoT testing.

Always refer to the car manufacturer’s specification before testing these types of vehicles.
Always ensure that the correct buttons on the remote control are used.

Press Key “4x4” to select the 4-wheel drive mode and Key “LEFT” to start the left roller. The right rollers will turn in the reverse direction. This key is for the 4x4-mode only and is therefore not the same as Key “LEFT” as described in chapter 5.2. The “Left” and “Right” lamp will flash and the “4x4” lamp will light to indicate that the tester is in the 4x4 mode.

1. Slowly increase the brake force on the brake pedal until maximum effort is achieved, or until the wheel locks and slips on the rollers. At the slip limit the motor will be cut out directly and the “Left” lamp will light to indicate this wheel lock. If slip does not occur the left roller can be manually stopped by pressing Key “LEFT”. The lock lamp will not light or flash.
The tester is still in the 4x4 mode.

For an accurate measurement, the brake force has to be built up slowly!

2. After the rollers have stopped, on the LED display, the bar diagram for brake force will switch into a numerical brake force value and will remain displayed until the tester is manually reset.

The operator should note the achieved brake force for the left wheel or assign the results according to the same **KEYS** as described in chapter 5.2.

- 2a During the test, the pedal force can be held at a constant value to visually check any fluctuations on that wheel. The operator should note and interpret the irregularities in the brake force behaviour.
- 3 Press **Key “RIGHT”** on the remote control to start the **right** roller.

REMEMBER: The tester is still in the 4x4 mode. The 4x4 lamp still lights.

WARNING: Do NOT press the LEFT key when the 4x4 mode is NOT selected.

The left rollers will turn in the reverse direction. Follow the procedure as described for the left wheel.

- 4 During **STEP 1 and 2** of a 4x4-vehicle, the lower reading of the two brake forces should not be less than 75% of the higher reading.

Both wheels cannot run in the same direction at the same time. A measurement as described in **STEP 3** in chapter 5.2 is therefore not possible. The brake force for the left wheel and the brake force for the right wheel have to be compared by the operator and the imbalance should be calculated manually.

- 5 Repeat **STEP 1-4** in chapter 5 for the service brake of the rear axle.
- 6 Test the parking brake as described in chapter 5.2 and 5.3.

8 ATL automated procedure

The automated ATL procedure operates in a different way to that in the manual procedure. The system is controlled by auto-prompts shown on the GCP display which the operator must follow.

There are some vehicles which cannot be tested using the automated test procedure; these are 4 wheel drive vehicles, vehicles with 3 wheels only and vehicles with 3 axles. In these circumstances, the manual test procedure should be applied.

The automated test is carried out in the following order and the screen shots below indicate the most common route through the software. The software will operate differently depending on the data entered at the beginning of the test.

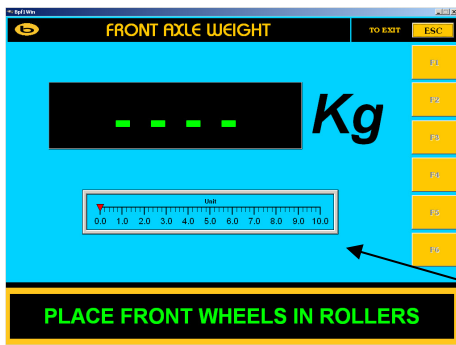
1. Front axle brake test.
2. Front axle brake imbalance test.
3. Parking brake test
4. Rear axle brake test
5. Rear axle brake imbalance test.

Firstly the operator must enter the vehicle data into the system such as vehicle make, model, type of braking system etc. The vehicle weight does not need to be entered here as the axles are weighed automatically. After this has been done, the operator is instructed by prompts on the display to place the front wheels of the vehicle in the rollers. The software determines when the vehicle is in place and the axle weight is then taken before automatic startup of the rollers.

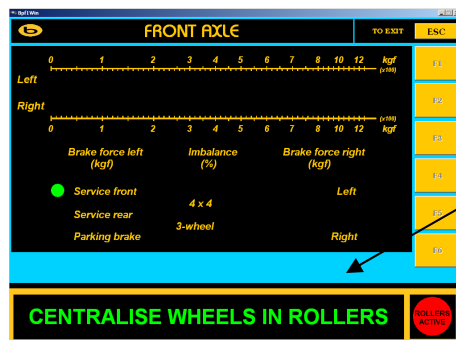
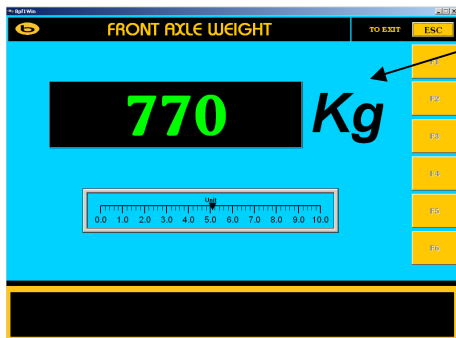
After the data has been entered, the operator must press 'F2' to continue.

From this point on, the procedure is completely automatic and the operator must follow the on-screen prompts to carry out the test.

8.1 Front axle brake test

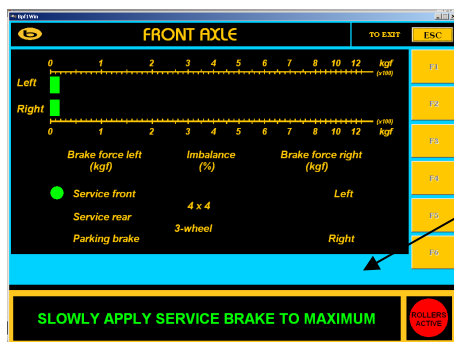


The operator must now place the first axle in the roller bed. The axle weight will then be taken automatically.

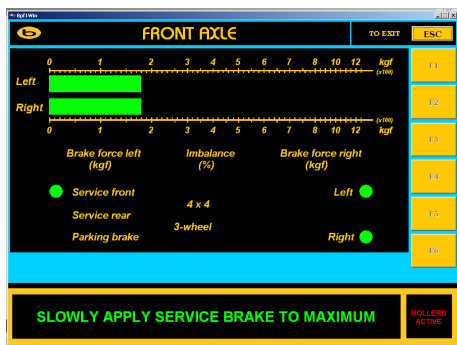


The rollers will start automatically and the operator is prompted to centralise the wheels in the rollers. This message is shown for 2 seconds.

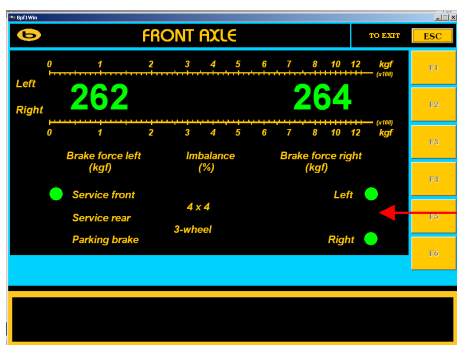
For safety reasons, whenever the rollers are running, the large red warning lamp will flash in the bottom right corner of the display.



After the 2 second delay, the operator is prompted to slowly apply the service brake to maximum.

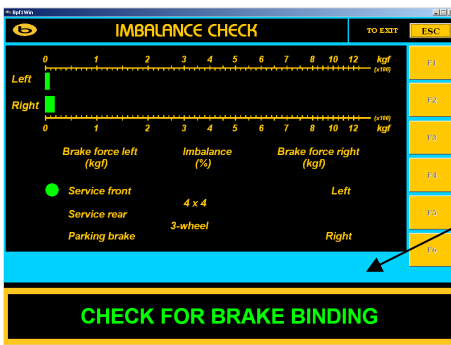


As brake force is slowly applied, the individual brake force values are shown for each wheel. The rollers will automatically stop when slip occurs or readings are stable for 3 seconds. When the rollers stop, the display will change to digital format and display the test results.

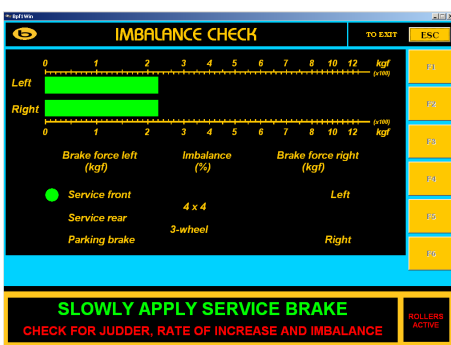


The LEFT and RIGHT lamps on the right of the display indicate wheel lock.

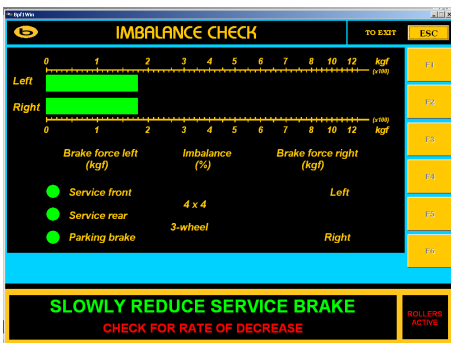
8.2 Front axle brake imbalance check



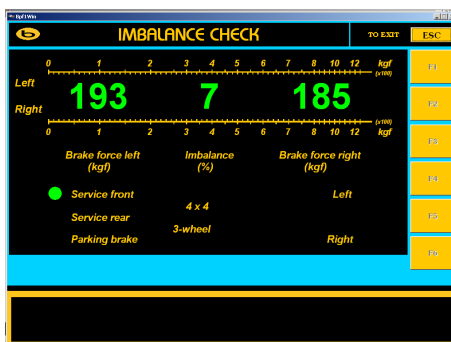
The next test is to check for brake binding and imbalance. The rollers will start and the operator must check for binding for two seconds.



After two seconds, the operator slowly increases the brake effort to reach 75% of the lowest reading taken in the front axle brake test. After the brake effort reaches the 75% threshold, the RBT will sound an audible 'BLEEP' and visually show all three lamps on the left of the console. The operator must now slowly reduce the brake effort as prompted on the display.

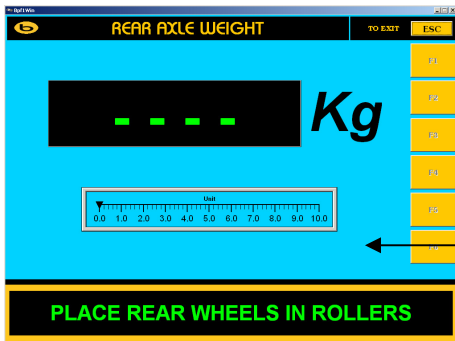


NOTE: If the operator locks either of the vehicle wheels during this test, then the imbalance test must be repeated. The message 'REPEAT IMBALANCE' will be shown and the rollers will re-start.

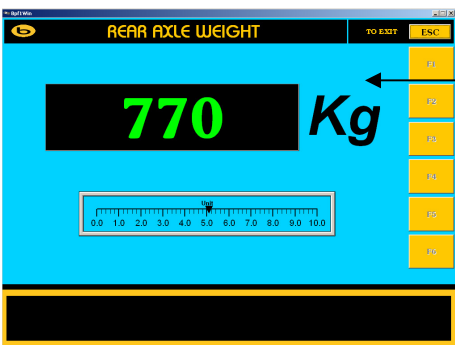


When the software detects the reduced brake effort, the rollers will automatically stop and the display will change to show the test results.

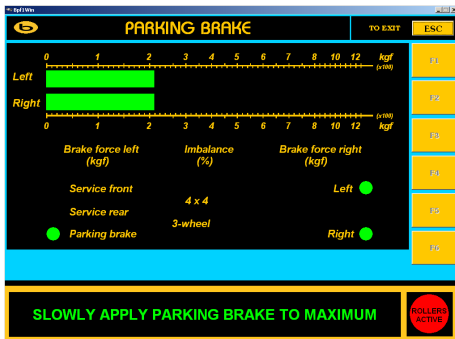
8.3 Parking brake test



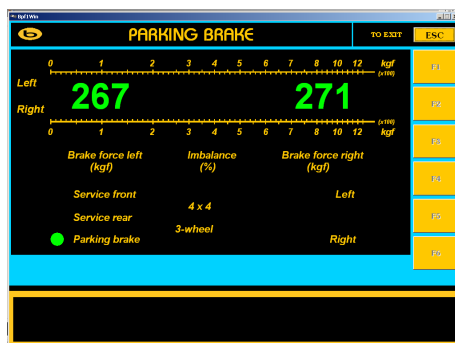
After the front axle binding test is complete, the operator must carry out the parking brake test. If the parking brake is located on the front axle then the test will continue, otherwise a prompt will be shown to instruct the operator to move the vehicle forward and place the rear axle in the rollers.



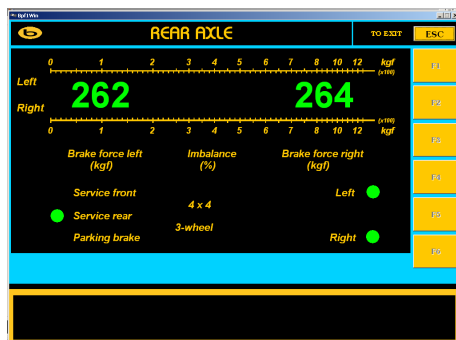
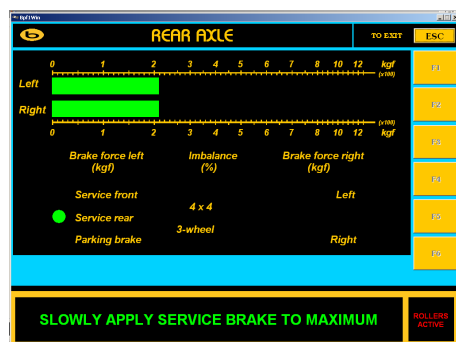
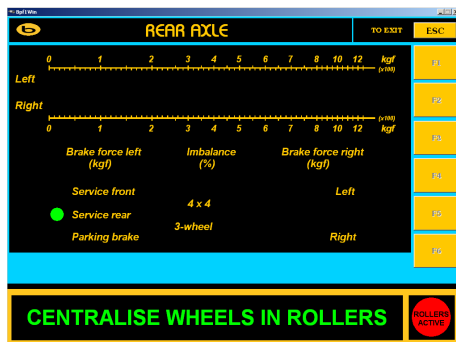
Once the software has determined the vehicle is in the rollers, the axle weight will be taken.



After the weight is taken, the rollers will automatically start. The operator is prompted to slowly apply the parking brake to maximum. When the maximum effort is reached and either wheel locks, the rollers will stop and the test results are shown on the display.

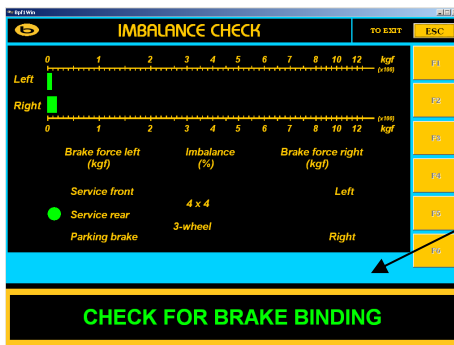


8.4 Rear axle brake test

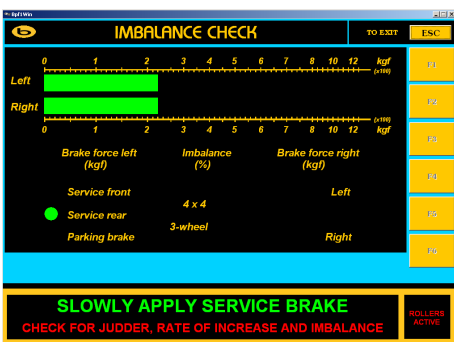


The rear axle brake test is conducted in the same way as the front axle brake test.

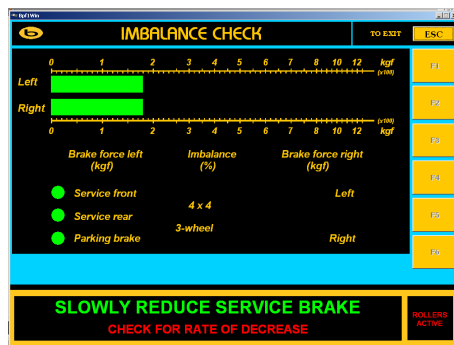
8.5 Rear axle brake imbalance check



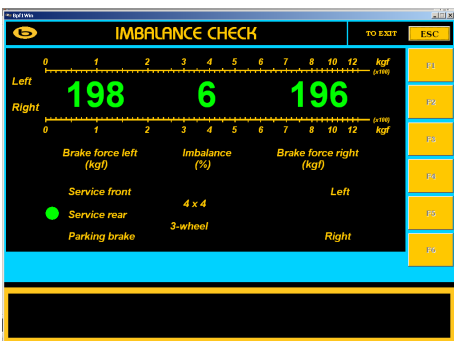
The next test is to check for brake binding and imbalance. The rollers will start and the operator must check for binding for two seconds.



After two seconds, the operator slowly increases the brake effort to reach 75% of the lowest reading taken in the front axle brake test. After the brake effort reaches the 75% threshold, the RBT will sound an audible 'BLEEP' and visually show all three lamps on the left of the console. The operator must now slowly reduce the brake effort as prompted on the display.

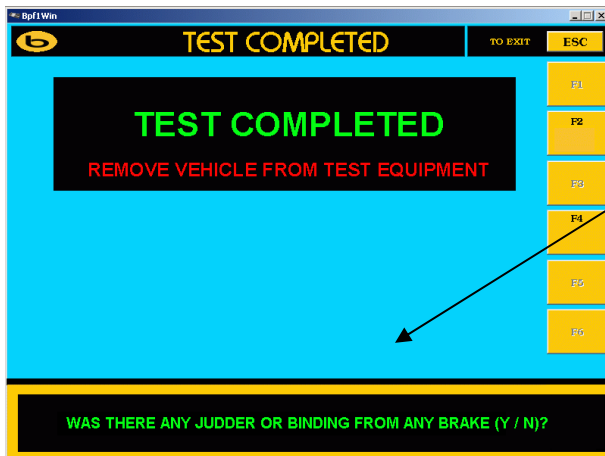


NOTE: If the operator locks either of the vehicle wheels during this test, then the imbalance test must be repeated. The message 'REPEAT IMBALANCE' will be shown and the rollers will re-start.



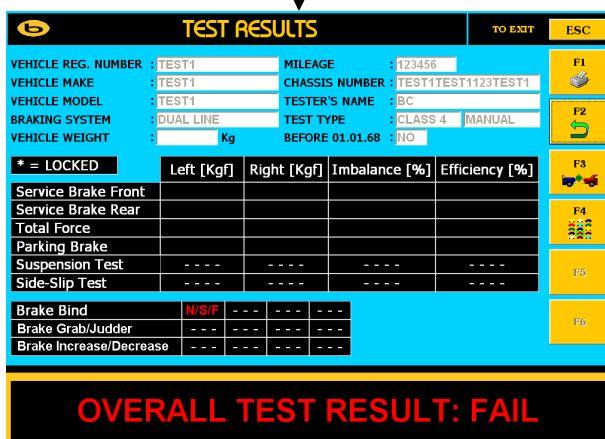
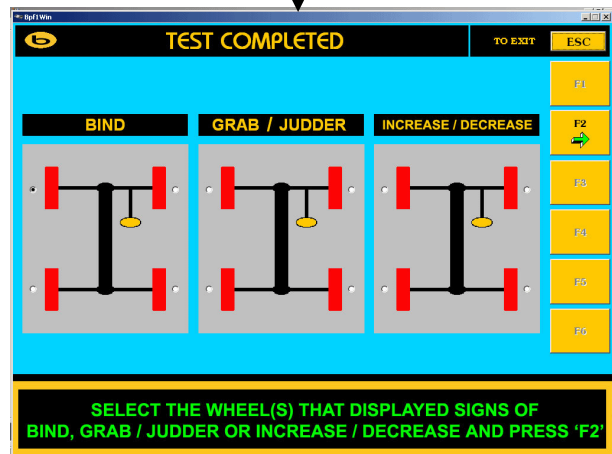
When the software detects the reduced brake effort, the rollers will automatically stop and the display will change to show the test results.

8.6 Test complete



The operator must select if there was any brake judder, bind or grab during the binding tests. To select which type was present, the operator must click on the relevant check box on the following screen.

If no bind, grab/judder or increase/decrease was detected during the test, the operator can press 'N' to answer NO and the software proceeds directly to the test results page.



Once the test is complete, the results page will automatically be shown. The printer will also print two copies of the results automatically. One copy for the customer and the other to be retained by the testing station.

8.7 Saving test results

Once the print instruction has been sent to the printer, the software will automatically save the vehicle and test data on the PC. The operator can also press 'F4' to save the customer details. The database is unlimited and only restricted by the fixed size of the storage hard drive on the computer.

To recall data from previous saved tests, the operator must enter into the initial data entry page within the ATL test procedure and select 'F4'

It is possible to find previous tests by entering the vehicle registration number, customer name or postcode etc.. into the value box from within the LOOKUP section. After the data has been entered, select FIND and the search results will be shown as a list at the bottom of the page.

Double click the search result to open the test data and re-print if necessary.

8.8 Vehicles first used before 01.01.1968

If the operator selected that the vehicle was first used before 01.01.1968, then the software procedure operates in the following way

Ver. 40.05 Ver. DEMO

Ver. 40.05 Ver. DEMO

Ver. 40.05 Ver. DEMO

If the operator selects YES, then the test Limits are as follows.-

SERVICE BRAKE =
30% from FIRST means of control

PARK BRAKE =
25% from SECOND means of control

The software then commences testing on the front axle as normal.

9 Troubleshooting & maintenance

If the RBT does not function, as it should, the operator should only take action when the failure appears to be very simple to solve. For example changing the battery on the remote control or cleaning the IR receiver for better signal receiving of the remote control.

The RBT is designed and constructed so maintenance can be reduced to a minimum. Only the service technicians are allowed to perform adjustments. They are trained and have suitable calibration instruments at their disposal.

Although the RBT involves very little maintenance, it is important that the following instructions are carried out properly:

- ◆ Check the roller coating twice a year (visually by the operator).
- ◆ Check the tension of the chains every four months.
- ◆ Lubricate the chain every 3 months when used intensively.

For periodic maintenance, calibration and service contact the Boston service department or your local distributor.

Warning: Do not use high pressure or steam cleaners on the RBT. The brake tester should be kept clean and dust-free. Clean the sheet metal with a lukewarm soap solution. Do not use any aggressive or abrasive detergents. Do not spray the units with water.

10 Warranty

Warranty conditions are available on request.

11 Product specifications

Voltage	3 phase 400 V / 50 Hz / 32 A
Motor	2 x 3 kW
Electronics	Microprocessor controlled
Testing speed	2.9 km/h
Max. brake force (per wheel)	800 kgf
Max. axle load	3,000 kg
Weight roller tester	325 kg
Chassis dimensions	234 cm x 66 cm x 30 cm (L x W x H)
Diameter of the rollers	206 mm
Roller width	700 mm
Roller centres dimension	420 mm
Friction roller surface	0.9 μ dry, > 0.6 wet
Dimensions optional digital display	67 x 50 x 12 cm (L x W x H)
Dimensions control cabinet	67 x 50 x 12 cm (L x W x H)



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