

Rider 100

Motorcycle roller brake tester

USER MANUAL

Please read the user manual before starting the test procedure!

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However, should any errors be detected, Boston would greatly appreciate being informed of them. The above notwithstanding, Boston can not assume any responsibility for any errors in this manual or their consequences.

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1 Introduction

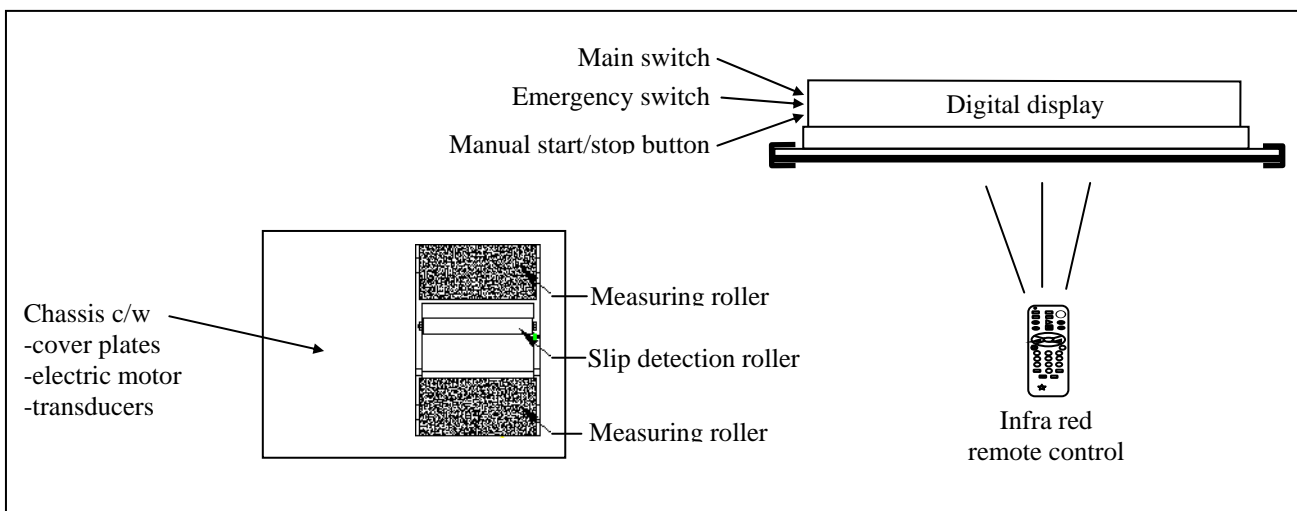
This manual describes how to safely use the *Rider 100* motorcycle roller brake tester (further to be called MBT) for statutory Vehicle Inspection test class I and II motorcycles (further to be called MOT class I&II). The manual is intended for users of this equipment. Another manual for installation, service and calibration is available. The MBT is designed for testing commercially available motorcycles for road use. The maximum wheel load during the test is 750 kg. The test speed is 2.9 km/h.

This manual gives the instructions in carrying out a brake test according to the UK department of transportation compulsory schemes. The manual provides the MOT braking measurement requirements and describes a complete test procedure.

The motor and control gear of the MBT 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 *Rider 100*

The MBT consists of a digital display and a mechanical unit. The mechanical unit contains an electrical motor, three measuring rollers, one brake force transducer, four weighing transducers and additional safety sensors. The digital display contains a computerised processing system, a manual start button, an emergency stop button, a main switch and an infra red remote control handset.



The motorcycle wheel is driven by the rollers. Applying the motorcycle brake exerts a reaction force on the electric motor. An electronic 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 also provides good friction values, both wet and dry. The third smaller roller, between the wheel supporting rollers, has two safety functions: The first is to detect if a wheel is present in the roller bed (a built in safety device prevents the motor to start without a wheel in place). The second function is to detect if the tyre slippage on the roller does not exceed the maximum value.

If the tester is not being used, it must be closed with the roller bed cover plate.

The roller brake tester is equipped with an integrated weighing system.

During the test, the computer measures the weight and brake force values. When the motorcycle has been tested, the brake efficiency of the brake systems will be calculated by the computer if desired (the efficiency can also be calculated manually).

2.1 The infra red remote control and digital display

The equipment can be switched on by means of the main switch on the side of the display cabinet. Usually the unit is operated through the infra red remote control. The system however can also be operated manually (see chapter 5.4). The system can be switched off at any time by pressing the emergency stop button, located on the side of display cabinet. The functions of the remote control and the display cabinet are explained in the two following paragraphs 2.1.1 and 2.1.2. There is a separate user manual for an optional printer.

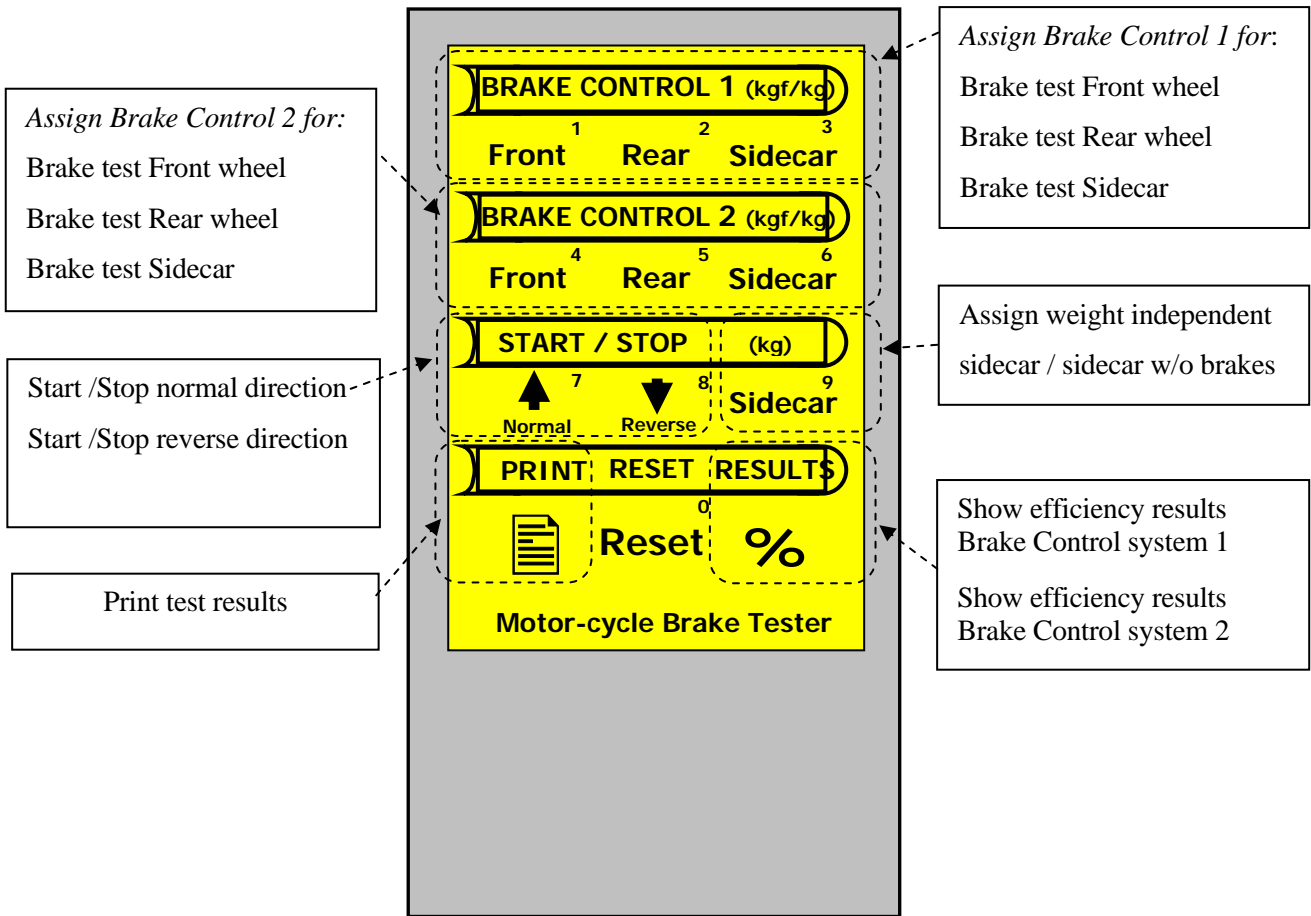
2.1.1 Infra red remote control

The system is controlled by means of an infra red remote control. The system is controlled by means of an infra red remote control. There are two types available that operate on different IR frequencies.

IR remote control Type 1

Key	Function	
0	Reset	
1	Assign test brake control 1 to front wheel	
2	Assign test brake control 1 to rear wheel	
3	Assign test brake control 1 to sidecar	
4	Assign test brake control 2 to front wheel	
5	Assign test brake control 2 to rear wheel	
6	Assign test brake control 2 to sidecar	
7	Start /stop normal (forward) direction	
8	Start /stop reverse direction	
9	Assign independent sidecar / sidecar w/o brakes	
	Show efficiency results brake control system 1	
	Show efficiency results brake control system 2	
	Print test results	

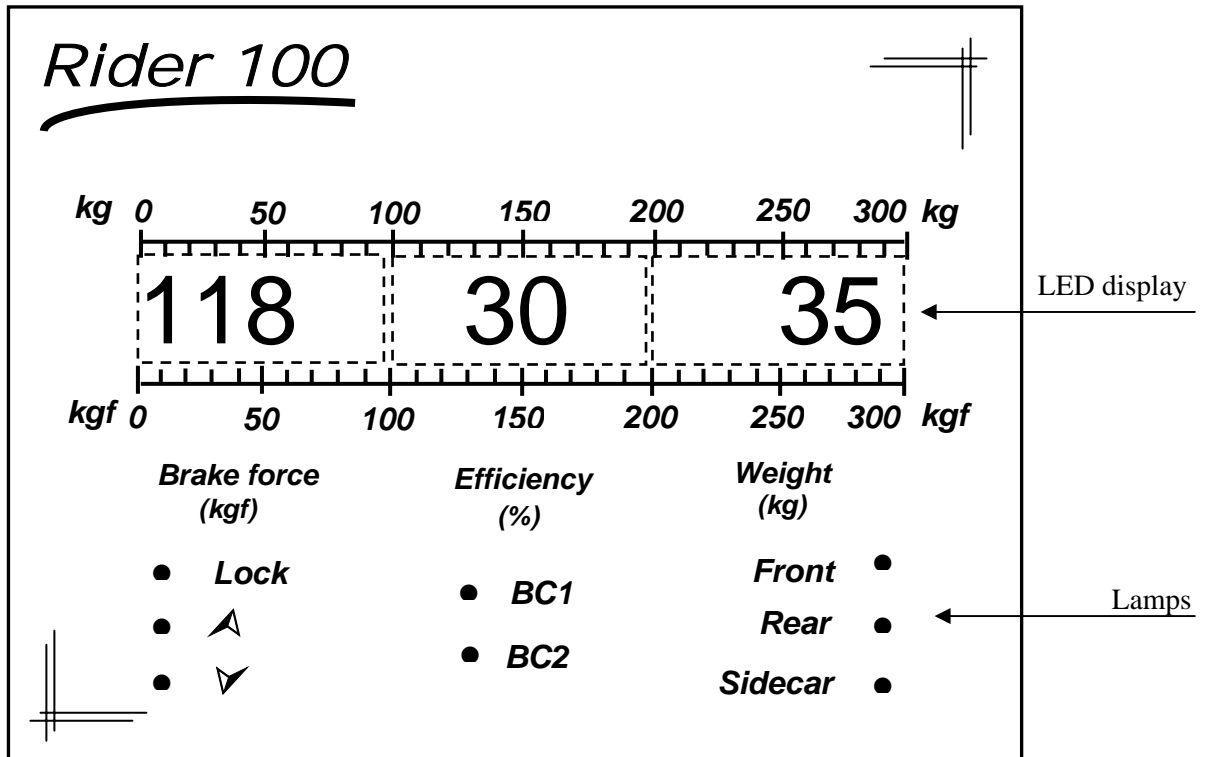
IR remote control Type 2



2.1.2 Digital display

The display cabinet contains a horizontal LED digital display (for showing measurements both in bar graph as well as in numerical values), eight indication lamps, a main switch, a manual start/stop button and an emergency stop switch.

Digital LED display	Displays the brake force in a bar diagram in <i>kgf</i> for: -The front wheel, the rear wheel and the sidecar. Displays the weight in a bar diagram in <i>kg</i> for: -The front wheel, the rear wheel and the sidecar.
Digital LED display Right	Display the weight in numerical values in <i>kg</i> for: -The front wheel, the rear wheel, the sidecar and the total motor cycle.
Digital LED display Left	Display the brake force in numerical values in <i>kgf</i> for: -The front wheel, the rear wheel, the sidecar, total per brake control system.
Digital LED display Centre	Display in numerical values: -The brake efficiency in % for brake control system 1 (BC1). -The brake efficiency in % for brake control system 2 (BC2).
Eight lamps	-2x to indicate the drive direction. -2x to indicate brake control system BC1 and BC2. -3x to indicate the assigned wheel: front, rear, sidecar. -1x to indicate wheel lock (slip).



Emergency switch	-To be used to stop the rollers in case of an emergency.
Manual start button	-For testing without the infra red remote control. Functions as KEY 7 : Start / Stop (in normal direction).

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:

- ◆ A competent person with a minimum of 18 years of age and have a minimum qualification of NVQ 3 (or an equivalent qualification) and / or experience within their own field of responsibility, E.g. installation engineering, automobile engineering etc.

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 motorcycle 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 have to be strictly adhered to, to avoid injuries to personnel and damage to machine and motorcycle.
- ◆ The equipment may be operated only within its rated capacity. The equipment is designed for motorcycles and scooters stated as MOT class I and II.
- ◆ During the test nobody is to stand close to the mechanical units.
- ◆ The danger zone 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, if necessary.
- ◆ 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 MBT switched on and unattended.
- ◆ Keep the operating environment clean and free of oil; don't leave loose objects around the MBT.
- ◆ When the MBT is not working correctly, switch off the MBT immediately and refer to the user manual or contact Boston.
- ◆ Isolate the MBT from the power supply before starting a reparation or 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 MBT.
- ◆ Follow the maintenance specifications accurately.
- ◆ Avoid the entangling from clothes (e.g. ties) and/or limbs between the rollers or chains.
- ◆ Avoid any direct- or indirect electrical contact.
- ◆ Avoid any electrostatic influences.
- ◆ Do not test a motorcycle when there is insufficient light.
- ◆ Take precautions to extract exhaust in the workplace properly while testing.

3.2 Safety devices

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

- ◆ The MBT is provided with an emergency stop button, by which the machine can be stopped immediately in case of an emergency.
- ◆ The MBT can only be switched on if the centre rotating measuring roller is pressed down, i.e. when there is a motorcycle wheel in the roller brake tester.
- ◆ By applying the brake force and locking the wheel 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 MBT is ground wired to earth.
- ◆ A roller cover plate is provided to close the mechanical unit when the brake tester is not in use.
- ◆ The controlling software has been tested extensively.
- ◆ A list of safety rules is included in this user manual (see chapter 3.1).

3.3 Misuse

The MBT is designed for use as a brake tester for statutory testing of MOT class I & II 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 motorcycle 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

- ◆ The efficiency of each system operated by a single brake control is the ratio of the retarding force generated by that system divided by the weight of the machine and the rider.
- ◆ Most machines have two controls, one operating the front wheel brake and the other operating the rear wheel brake.
- ◆ Where a linked or dual system is operated by one control, the retarding force used in the efficiency calculation is the total from both wheels when operated by that control only. In this case the other control will probably operate on one wheel.
- ◆ Efficiency calculation:

$$\text{Efficiency \%} = \frac{\text{Total retarding force for one system}}{\text{Weight of machine plus rider}} \times 100$$

The MOT brake efficiency requirements are specified as:

- ◆ Minimum brake efficiency of not less than 30% when one of the brake controls is operated.
- ◆ Minimum brake efficiency of not less than 25% when the other brake control is operated.
- ◆ Minimum brake efficiency of not less than 30% when only one means of operating the brakes is required for motorcycles registered before 1 January 1927.

Source: the "MOT inspection manual Motor Cycle Testing, 1992 edition"

- ◆ The department of transport allows the use of an electronic calculator to perform the calculation of brake efficiency.
- ◆ The brake force is indicated in *kgf*.
- ◆ The weight is indicated in *kg*.
- ◆ The brake efficiency is indicated in *%*.
- ◆ The first brake control system is called *BC1* (usually the **hand brake** control system).
- ◆ The second brake control system is called *BC2* (usually the **foot brake** control system).

5 Manual MOT testing procedure

5.1 Preparations before starting a brake test

- A. Check if the tyres are in good condition, correctly inflated and free from mud and stones.
 - B. Remove the roller cover and switch the power on.
 - C. Determine if the brake control system is single brake controlled or linked/dual brake controlled.
- **The motor can always be stopped by pressing any KEY on the remote control 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. This will stop the rollers *or*
 - (2). Press the manual start/stop button on the side of the cabinet *or*
 - (3). Push the **red emergency stop switch**, to isolate the electrical supply to the roller bed
 - When using the roller brake tester the wheel not on the rollers must be braked and chocked against the reaction force.

**The described testing procedure assumes a normal (forward) driving direction.
The described KEYS correspond with the keys on the infra red remote control.**

5.2 Testing motorcycles with single brake control systems

TESTING THE FRONT WHEEL

Press KEY 0 to reset the system and clear the memory from any previous results.

- ◆ Drive the front wheel in the rollers. Make sure that the motorcycle is positioned on the rollers in a straight line and that it is not in gear. The driver should sit on the motorcycle as in a normal situation.

STEP 1: Measure brake force and weight

- ◆ Press **KEY 7** to start the measurement. The drive direction lamp lights. This is also the indicator and warning that the rollers are running.
- ◆ The weight of the front wheel is measured and displayed on the LED display in a horizontal bar diagram.
- ◆ The weight value will remain displayed until the brake force measurement is finished.

- ◆ A moment after the weight measurement is taken, the rollers of the MBT will start.
- ◆ The real time brake force is displayed on the LED display in a horizontal bar diagram.
- ◆ Slowly increase the brake force on the first brake control system (BC1= hand brake) 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 immediately (to avoid unnecessary wear of the tire) and the lock lamp will light to indicate this wheel lock.
- ◆ If slip does not occur while the maximum brake force is achieved, the rollers can be stopped by pressing **KEY 7**.

For an accurate measurement, the brake force has to be built up slowly over 10 seconds!

- ◆ After the rollers have stopped, on the LED display, the bar diagrams for brake force and weight will be switched into the maximum brake force value, the weight and the efficiency for that wheel in numerical values.
- ◆ The above mentioned numerical values and a possible wheel lock indication on the display, will remain displayed until either the tester is manually reset or the rollers are re-started for the next measurement.

- ◆ The operator has to observe and note the weight and brake force measurement for manual brake efficiency calculation.
- ◆ For automatic brake efficiency calculation press **KEY 1** to assign the front wheel test results into the memory. Lamp “**BC 1**” and “**FRONT**” light to confirm this action.
- ◆ The brake test can be repeated if necessary. By pressing **KEY 1** again, the result is stored and overwrites the previous test result.

STEP 2: Observe brake force fluctuations

- ◆ After the brake force measurement, the operator can test the front wheel for brake force fluctuations.
- ◆ Press **KEY 7** to start the measurement.
- ◆ The weight of the front wheel is measured as described in **STEP 1**.
Remark: The weight value is irrelevant for the ovality measurement.
- ◆ A moment after the weight measurement is taken, the rollers of the MBT will start.
- ◆ Slowly increase the brake force and hold it steady at a constant value of approximately half the maximum value measured in **STEP 1**. Visually check the brake force fluctuations on that wheel.
- ◆ The operator should note and interpret the irregularities in the brake force behaviour.
- ◆ Release the brake quickly and observe the way in which the braking effort reduces.
- ◆ Press **KEY 7** to stop the rollers.
Do not press any keys for assigning results, as this will erase previous brake tests.

TESTING THE REAR WHEEL

- ◆ Drive the rear wheel in the rollers. Make sure that the motorcycle is positioned on the rollers in a straight line and that it is not in gear. The driver should sit on the motorcycle as in a normal situation.

STEP 3: Measure brake force and weight

- ◆ Press **KEY 7** to start the measurement. The drive direction lamp lights.
- ◆ The weight of the rear wheel is measured as described in **STEP 1**.
- ◆ A moment after the weight measurement is taken, the rollers of the MBT will start.
- ◆ The real time brake force is displayed on the LED display in a horizontal bar diagram.
- ◆ Slowly increase the brake force on the second brake control system (BC2= foot brake) 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 immediately (to avoid unnecessary wear of the tire) and the lock lamp will light to indicate this wheel lock.
- ◆ If slip does not occur while the maximum brake force is achieved, the rollers can be stopped by pressing **KEY 7**.
- ◆ After the rollers have stopped, on the LED display, the bar diagrams for brake force and weight will be switched into the maximum brake force value, the weight and the efficiency for that wheel in numerical values.
- ◆ The above mentioned numerical values and a possible wheel lock indication on the display, will remain displayed until either the tester is manually reset or the rollers are re-started for the next measurement.
- ◆ The operator has to observe and note the weight and brake force measurement for manual brake efficiency calculation.
- ◆ For automatic brake efficiency calculation press **KEY 5** to assign the rear wheel test results into the memory. Lamp “**BC 2**” and “**REAR**” light to confirm this action.

- ◆ The brake test can be repeated if necessary. By pressing **KEY 5** again, the result is stored and overwrites the previous test result.

STEP 4: Observe brake force fluctuations

- ◆ After the brake force measurement, the operator can test the rear wheel for brake force fluctuations. Follow the procedure as described in **STEP 2**.
Remember: Do not press any keys for assigning results, because this will erase previous brake tests.

5.2.1 Test results

After the complete test, or after testing one of the brake control systems, it is possible to display the calculated brake efficiency by means of the infra red remote control.

For motorcycles with two controls, one operating the front wheel brake and the other the rear wheel brake, the calculation of the brake efficiency is as follows.

KEY  **Test results first braking control system (BC1)**

$$\text{Efficiency \%} = \frac{\text{kgf front}}{\text{SUM kg front, rear, rider}} \times 100$$

KEY  **Test results second braking control system (BC2)**

$$\text{Efficiency \%} = \frac{\text{kgf rear}}{\text{SUM kg front, rear, rider}} \times 100$$

When the efficiency for *BC1* is displayed, the following appears:

- Numerical brake force value in the left part of the LED display.
- Numerical efficiency percentage for BC1 in the centre part of the LED display.
- Numerical total weight value of the motorcycle in the right part of the LED display.
- BC1 lamp lights.
- Front lamp lights.

When the efficiency for *BC2* is displayed, the following appears:

- Numerical brake force value in the left part of the LED display.
- Numerical efficiency percentage for BC2 in the centre part of the LED display.
- Numerical total weight value of the motorcycle in the right part of the LED display.
- BC2 lamp lights.
- Rear lamp lights.

5.3 Testing motorcycles with linked (dual) brake systems and/or sidecars

5.3.1 Testing linked (dual) brake systems

If the first brake control system (BC1=hand brake) also operates the rear wheel, **STEP 3** needs to be repeated for BC1 when the rear wheel is still in the rollers.

The only difference in procedure is:

- ◆ Press **KEY 2** to assign and store the rear wheel test results for BC1.
Lamps “**BC 1**” and “**REAR**” light to confirm this action.
This is only relevant for the automatic brake efficiency calculation (see chapter 5.3.3).
- ◆ The brake test can be repeated if necessary.
By pressing **KEY 2** again, the result is stored and overwrites the previous test result.

If the second brake control system (BC2=foot brake) also operates the front wheel, **STEP 1** needs to be repeated for BC2 when the front wheel is still in the rollers.

The only difference in procedure is:

- ◆ Press **KEY 4** to assign and store the front wheel test results for BC2.
Lamps “**BC 2**” and “**FRONT**” light to confirm this action.
This is only relevant for the automatic brake efficiency calculation (see chapter 5.3.3).
- ◆ The brake test can be repeated if necessary.
By pressing **KEY 4** again, the result is stored and overwrites the previous test result.

5.3.2 Testing sidecars

If the motorcycle is equipped with a sidecar, both the weight, and any brake force produced by one of the two brake control systems needs to be measured.

Drive the sidecar into the rollers. Make sure that the sidecar wheel is positioned on the rollers in a straight line and that the motorcycle it is not in gear.

Press **KEY 7** to start the measurement.

The weight of the sidecar is measured as described in **STEP 1**.

A moment after the weight measurement is taken, the rollers of the MBT will start.

There are 4 possibilities to operate the brake of a sidecar.

- A. It is controlled by BC1 (hand brake).
 - B. It is controlled by BC2 (foot brake).
 - C. It is controlled independently.
 - D. There is no brake control at all.
- A.** If the sidecar is controlled by BC1 (hand brake), slowly increase the brake force until maximum effort is achieved, or until the wheel locks and slips on the rollers as described in **STEP 1**.
The operator has two options:
- ◆ Observe and note the results for manual efficiency calculation.
 - ◆ Press **KEY 3** to assign and store the sidecar test results into the memory.
Lamps “**BC 1**” and “**SIDECAR**” light to confirm this action. This is only relevant for the automatic brake efficiency calculation (see chapter 5.3.3).

- B** If the sidecar is controlled by BC2 (foot brake), slowly increase the brake force until maximum effort is achieved, or until the wheel locks and slips on the rollers as described in **STEP 1**.
The operator has two options:
- ◆ Observe and note the results for manual efficiency calculation.
 - ◆ Press **KEY 6** to assign and store the sidecar test results in the memory.
 Lamps “**BC 2**” and “**SIDECAR**” light to confirm this action. This is only relevant for the automatic brake efficiency calculation (see chapter 5.3.3).

- C/D** If the sidecar is not controlled by one of the two brake control systems or is operated with an independent brake control system, only the weight of the sidecar is relevant. Its brake force is not relevant for the brake efficiency calculation.
The operator has two options:
- ◆ Observe and note the weight result for manual efficiency calculation.
 - ◆ Press **KEY 9** to assign and store the sidecar weight into the memory.
 The lamp “**SIDECAR**” lights to confirm this action. This is only relevant for the automatic brake efficiency calculation (see chapter 5.3.3).

After the brake force measurement, the operator can test the sidecar wheel for brake force fluctuations. Follow the procedure as described in **STEP 2**.
Remember: Do not press any keys for assigning results. This will overwrite previous brake tests.

5.3.3 Test results

After the complete test, or after testing one of the brake control systems, it is possible to display the calculated brake efficiency by means of the infra red remote control.
 For more complex motorcycles as described in chapter 5.3.1 and 5.3.2, the calculation of the brake efficiency can be as follows.

KEY  **Test results first braking control system (BC1)**

$$\text{Efficiency \%} = \frac{\text{SUM } kgf \text{ front, rear, sidecar for BC 1}}{\text{SUM } kg \text{ front, rear, sidecar, rider}} \times 100$$

KEY  **Test results second braking control system (BC2)**

$$\text{Efficiency \%} = \frac{\text{SUM } kgf \text{ front, rear, sidecar for BC 2}}{\text{SUM } kg \text{ front, rear, sidecar, rider}} \times 100$$


5.4 Testing procedure without remote control

It is possible to do a test without the remote control, however, you have to consider that this test has its limitations. This test procedure requires two persons to operate the MBT. One person to do the test, while the other person pushes the start/stop button on the display.

Weight and brake force will be displayed on the cabinet, however, these values can not be assigned and stored into the computer memory and therefore automatic calculation of the brake efficiency is not possible.

On the display cabinet a push button is installed. If you want to start the rollers, press the button for 1 second. The rollers will start in the *normal* (forward) direction. Press the button again to stop the rollers. The test starts and the procedure is the same as described in paragraph 5.2 and 5.3. The manual button functions as **KEY 7** on the remote control.

5.5 Printing test results (optional)

If a printer is connected, after a test, the operator can print a summary of the measurements by pressing **KEY**  on the remote control.

6 Trouble shooting & maintenance

If the MBT 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 front plate for better signal receiving of the remote control.

If for example the motor is not starting when a motorcycle is placed in the rollers or the MBT makes uncommon noises, please contact Boston for service and do not open the MBT for inspection yourself.

The MBT 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 MBT is very maintenance friendly, 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 twice a year (recommended to be done by Boston).
- ◆ Lubricate the chain every 3 months when used intensively (recommended to be done by Boston).

For periodic maintenance, calibration and service contact Boston.

Warning: Do not use high pressure or steam cleaners on the MBT.

7 Warranty

Warranty conditions are available on request.

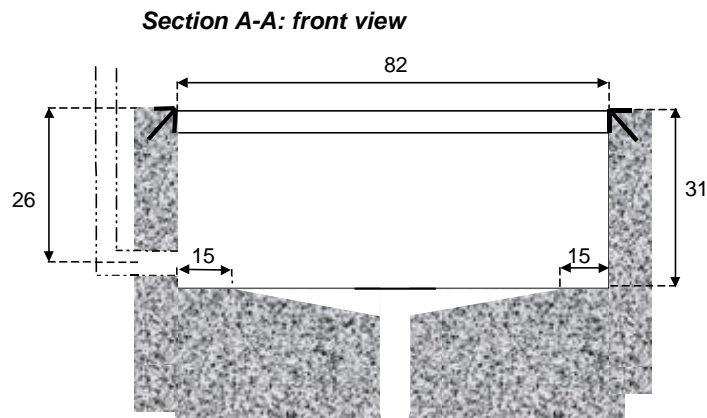
Appendix A: Product specifications

Power	3 phase 400 V / 50 Hz / 16 A
Motor	1.5 kW
Electronics	Microprocessor controlled
Testing speed	2.9 km/h
Max. brake force (per wheel)	300 kgf
Max. wheel load	750 kg
Weight roller tester	80 kg
Roller chassis dimensions	80 cm x 62 cm x 31 cm
Diameter of the rollers	206 mm
Roller width	300 mm
Roller centres dimension	400 mm
Friction roller surface	0.9 μ dry, > 0.6 wet
Dimensions digital display	67 x 50 x 12 cm (L x W x H)

Appendix B: Main spare parts

For a detailed list of the spare parts for the *Rider 100*, we refer to the installation manual
Please contact Boston for further information.

Appendix C: Floor foundation plan



Foundation plan motorcycle brake tester	
Dimensions in	cm
Overall net pit dimensions	82 x 64 x 31 cm
Overall net equipment dimensions	80 x 62 x 31 cm

