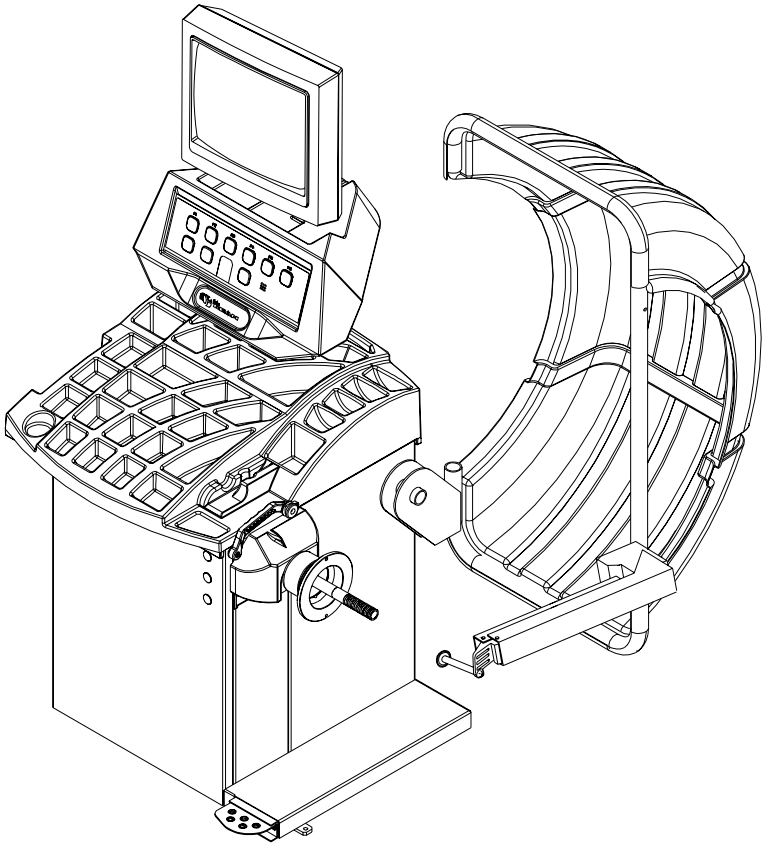
VPI SYSTEM IV
COMPUTER WHEEL BALANCER



OPERATION INSTRUCTIONS

Form ZEEWB516A
5872

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SAFETY PRECAUTIONS
SICHERHEITSVORSCHRIFTEN
PRÉCAUTIONS DE SÉCURITÉ
MISURE DI SICUREZZA
PRECAUCIÓNES DE SEGURIDAD
PRECAUÇÕES DE SEGURANÇA
Προφυλάξεις ασφαλείας
VEILIGHEIDSVOORSCHRIFTEN
SÄKERHETSFÖRESKRIFTEN
TURVATOIMENPITEET
FORSIKTIGHETSREGLER
SIKKERHEDS INSTRUKTIONER
VARÚÐAR RÁÐSTAFANIR

WHEEL BALANCERS AND WHEEL ALIGNERS

SUPPLEMENT TO OPERATOR'S MANUAL
ERGÄNZUNG ZUR BEDIENUNGSANLEITUNG
SUPPLÉMENT A LA NOTICE D'UTILISATION
SUPPLEMENTO DEL MANUALE D'ISTRUZIONE
SUPLEMENTO AL MANUAL DE USO
SUPLEMENTO DO MANUAL DO OPERADOR
ΣΥΜΠΛΗΡΩΜΑΤΙΚΟ ΤΟΥ ΒΙΒΛΙΟΥ ΟΔΗΓΙΩΝ ΧΡΗΣΗΣ
SUPPLEMENT VAN DE GEBRUIKERSHANDLEIDING
SUPPLEMENT TILL BRUKSANVISNING
LISÄYS KÄSIKIRJAAN
TILLEGG TIL BRUKERVEILEDNINGEN
SUPPLEMENT TIL BRUGER HÅNDBOG
VIÐAUKI VIÐ HANDBÓK

1-1

1 Safety.

All Safety Precautions relevant to the unit are described in the Safety Booklet, refer to Figure 1-1.

The Safety Precautions should be fully understood by every operator. We suggest to store (a copy) of the Safety Booklet near the unit, in sight of the operator.

The Operator's Manual will contain specific warnings and cautions when possible dangerous situations may be encountered during the described procedures.

1.1 Typography.

This manual contains text styles that asks you to pay extra attention:

Note: Suggestion or explaination.

CAUTION: STRESSES THAT THE FOLLOWING ACTION MAY CAUSE DAMAGE TO THE UNIT OR OBJECTS ATTACHED TO IT.

WARNING: STRESSES THAT THE FOLLOWING ACTION MAY CAUSE (SEVERE) INJURY TO THE OPERATOR OR OTHERS.

- Bulleted list:
- indicates that action must be taken by the operator before being able to enter the next step in the sequence.

2 Specifications.

Power:		
Power Supply	230 V~, 50/60 Hz, 1 ph	
Motor rating	0.12	kW
Power consumption	1.1	A
Mains fuses	2x IEC 127 T5A	
Protection class	IP54	
Measurements:		
Measuring time	>3	s
Measuring speed	<200	rpm
Offset	0-400	mm
Increments:		
inch (<10”)	0.5 (.25)	”
mm (PAX)	1	mm
Wheel dimensions:		
Max. width	530	mm
Max. diameter	950	mm
Max. weight	70	kg
Rim width	25-510 / 1-20	mm/”
Rim diameter:		
NORMAL, ALU, STATIC	205-610 / 8-24	mm/”
HWM1 / PAX	215-610 / 8.5-24	mm/”
HWM2	305-610 / 12-24	mm/”
Shaft and cones:		
Stub shaft diameter	40-28,5	mm
Cone, small	43-77	mm
Cone, medium	74-100	mm
Cone, large	96-116	mm
Dimensions:		
Weight	137	kg
Shipping weight	165	kg
Dimensions (hxdxw)	1770x1175x1213	mm
Shipping dimensions	1200x1020x1120	mm
Miscellaneous:		
Noise level	< 70	db(A)

2.1 Conditions.

During use or long term storage, the conditions should never exeed:

Temperature range	0-50	°C
Humidity range	10-90	%, non condensing

3 Introduction.

This wheel balancer combines advanced, high-performance technology, robustness and reliability with very simple, user-friendly operation.

The low rotation speed of the wheel ensures that this balancer is very safe.

It features an easy-to-use display and input panel, ensuring fast and intuitive operation.
Operator time and effort are reduced to a minimum, while maintaining accuracy and consistancy.

Always work in a clean area and with clean wheels, no dirt stuck in the tyre or on the rim. That way a proper mounting of the wheel and an optimal balancing result can be reached.

Application.
The off-the-vehicle wheel balancer is designed for dynamic and static balancing of passenger car and light-truck wheels, that fall within the limits stated in the technical specifications.
This is a high accuracy measuring device. Handle with care.

Manuals to the unit.
The setup of the information related to the unit is:
- Safety Booklet (standard supplement)
  Supplied with the unit.

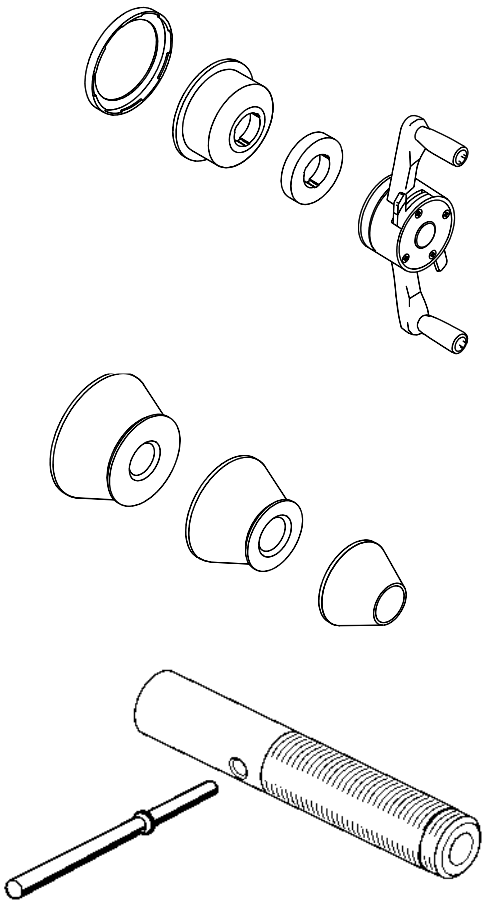
- Operator's Manual (Chapter 1 – 9)
  The operator must be familiar with it.

- Service Manual (Chapter 10 and up)
  Manual for use by service personnel only.

Installation instructions.
The Installation Instructions can be found in Chapter 9, Appendices.

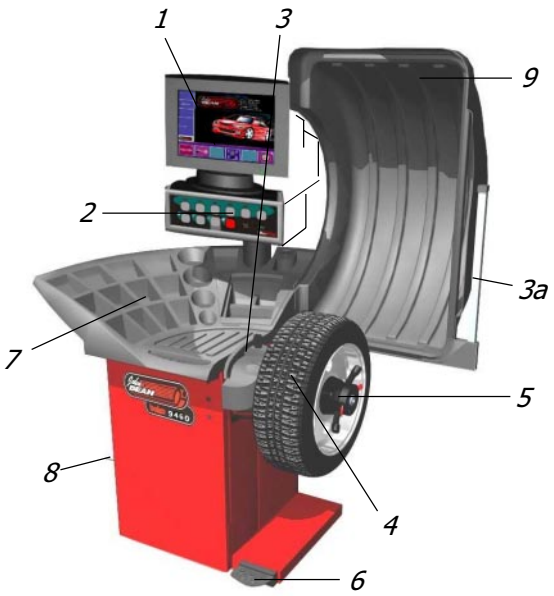
3.1 Accessories.

Refer to Figure 3.1-1.
The standard accessories are:

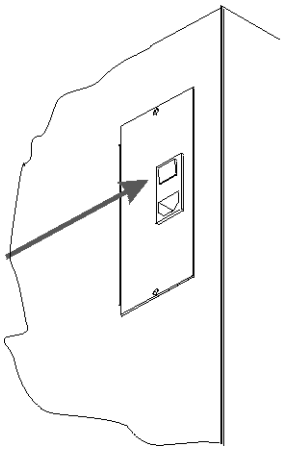


Quick-Release Hub Nut	4027007
Spacer ring	0026425
Universal drum	0026426
Universal drum cushion	0026427
Large cone	0025539
Medium cone	0025518
Small cone	0025517
Stub shaft	0025516
Key	4025821
User Calibration weight	0025415
Weight pliers	0006452
Callipers	4007580

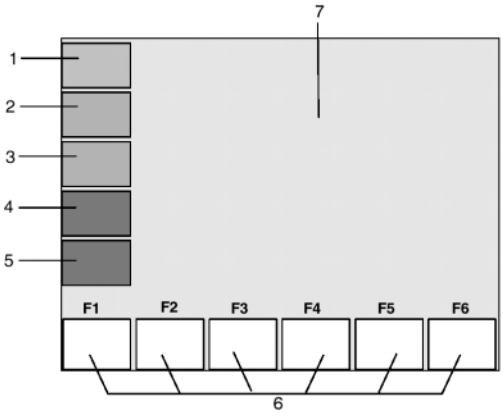
3.1-1



4-1



4-2



4.1-1

4 Layout.

Refer to Figure 4-1.
Functional description of the unit:

1. **The screen**
   Refer to Chapter 4.1.

2. **Input panel**
   Refer to Chapter 4.2.

3. **Gauge arm**
   The gauge arm is a multi-functional tool for measurement and to apply weights.

4. **Flange (hidden by wheel)**

5. **Stub shaft with quick release hub nut**

6. **Brake pedal**

7. **Weight compartments**

8. **Storage areas for cones or clamping devices**

9. **Tilting frame and hood**
   Hood may be optional.

Refer to Figure 4-2.
1. **Mains switch (ON/OFF)**

4.1 The screen

Fig. 4.1-1 Screen with display fields

1-5 Information fields
6 Menu fields of screen
7 Display field of screen
The screen reads out inputs, helpful information, all measured
data and error codes.

Description of display fields

The screen is subdivided into various display fields, each of
which is associated with a certain type of information.

Information fields

1 Number of the installed program version
Machine name
Date and time
2 Menu name
3 Selected wheel profile
4 Electrical compensation
5 Error codes

4.1-2

6 Menu fields

Pictographs illustrating special features are viewed in the six menu fields. Under every menu field is the associated menu key which is used to call the feature illustrated.

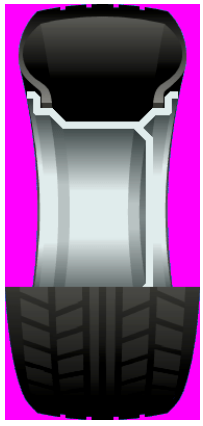
7 Display field

- Wheel type and rim dimensions
- Balancing modes
- Direction of orientation and correction position (location of unbalance)
- Amount of unbalance

Fig. 4.1-2 Initial screen/Main menu

4.1.1 Pictographs - Symbols

Pictographs are viewed on the screen in all fields: In Information fields, menu fields, and in the display field.



P1

P1 Wheel type standard

P2

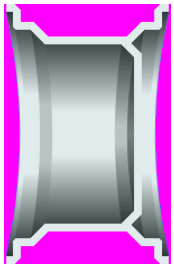
P2 Wheel type 1, -standard-, nominal size in inches

P3

P3 Wheel type 3, -special wheel-, actual correction dimensions, no nominal size. Motorcycles Program.

P4

P4 Wheel type 2, -standard-, nominal size in mm



P9

P9 Standard rim

P12

P13

Balancing modes

P12 nor. - Standard balancing mode

P13 Alu 1

P14

P15

P14 Alu 2, Alu 2P

P15 Alu 3, Alu 3P

P16

P17

P16 Alu 4

P17 Alu 5

P18

P19

P20

P21

P20 Gauge arm for distance and rim diameter

P21 Gauge arm for distance and rim diameter with adhesive weight

P21a

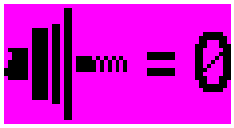
70g

0g

P22

P23

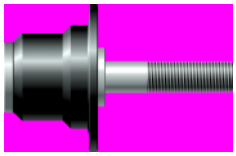
P24



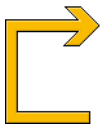
P25

P26

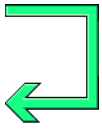
P27



P28



P29



P30

P21a Gauge arm for rim width.

P22 Display of unbalance measured and direction indicator (red arrows or arrow heads)

P23 Correction position reached (green arrows)

P24 Correction position for both correction planes reached

P25 Compensation run carried out

P26 Start measuring run by pressing the START key after closing the wheel guard.

P27 Calibration weight

P28 Main shaft

P29 Select memory location for wheel profile (red arrow)

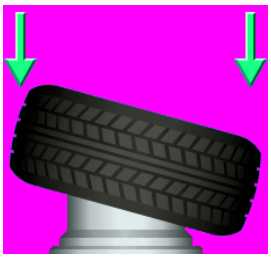
P30 Select a previously stored wheel profile (green arrow)

P31

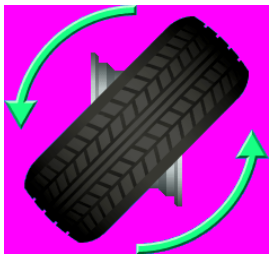
P32

P31 Provide mark on left tire side

P32 Provide mark on right tire side



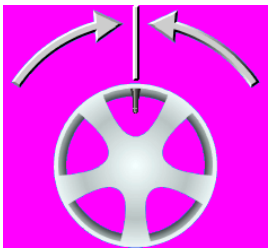
P33



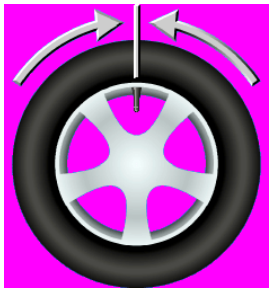
P34

P33 Fit tire on rim and inflate to the specified inflation pressure

P34 Turn tire over on rim



P35



P36

P35 Rotate rim until valve is exactly perpendicular to and above the main shaft

P36 Rotate wheel until valve is exactly perpendicular to and above the main shaft

P37

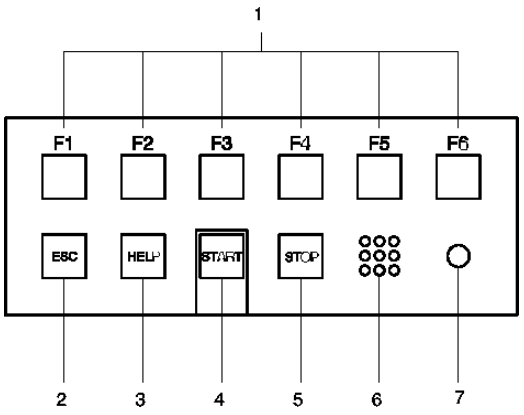
P38

P37 Readjust tire on rim until the mark coincides precisely with the valve

P38 Readjust tire on rim until the double mark coincides precisely with the valve

P39

P39 Tire changer



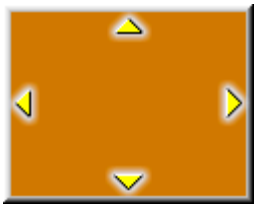
4.2-1

a

b

c

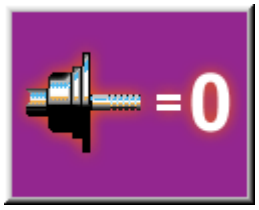
d



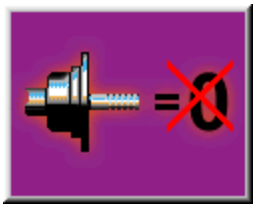
e

f

T1



T2



T3

T4

T5

4.1.2 Menu fields

Types of menu fields

The assignment of the menu keys F1 to F6 is shown in the menu fields above the relative keys on the screen. The menu keys have different functions and initiate different actions, depending on the program step.

- Keys without a symbol in the upper right-hand corner or at the edge initiate an action immediately, e.g. key T2 Carry out compensation run.
- Keys with one or more symbols in the upper right-hand corner of the menu field or at the edges initiate various actions:

a Press key to access a sub-menu, e.g. key T4 Balancing.
b Press and hold key down while rotating wheel at same time, e.g. key T11 Number of spokes.
c Press key to toggle between two options or states, e.g. key T9 Static / dynamic unbalance.
d Press key to toggle between several options or states, e.g. key T21 Weight position for left correction plane.
e Toggle switch (4 functions): Press edge of key to carry out the highlighted action, e.g. key T32 Character set: move the cursor in the character set to the left, to the right, up or down.
f Toggle switch (2 functions): Press key on top or bottom to select the highlighted function, e.g. key T8 Precision reading of unbalance.

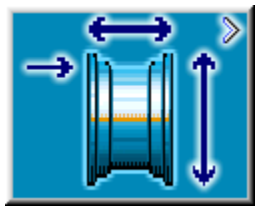
Main menu
T1 Change to the screen FUNCTION

T2 Carry out compensation run

T3 Compensation run carried out

T4 Change to the screen BALANCING

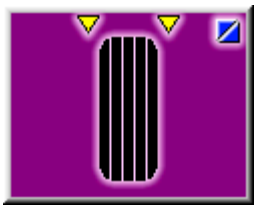
T5 Change to the screen OPTIMIZATION MENU



T7

T8

T9



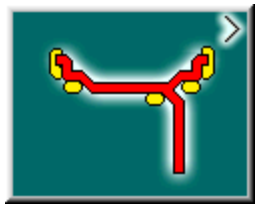
T10

T11

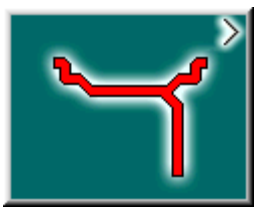
T12

T13

T14

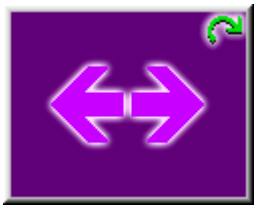


T15



T16

T17



T18

BALANCING

T7 Change to menu RIM DATA INPUT

T8 Toggle switch, two functions; reading only as long as the key is pressed (quick reading):

Pressed on top:

Precision reading of unbalance, no suppression of minor unbalance readings.

Pressed on bottom:

Reading of amount and location of unbalance for conventional balancing run with balance clips - comes up.

T9 Select static unbalance

T10 Select dynamic unbalance

T11 Select number of spokes

T12 Wheel with 6 spokes selected

T13 Select behind-the-spokes placement mode

T14 Behind-the-spokes placement mode selected

RIM DATA INPUT

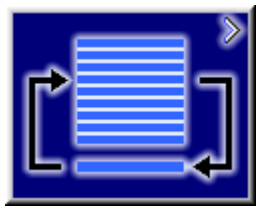
T15 Change to the screen WEIGHT PLACEMENT

T16 Change to the screen RIM TYPE

T17 Hold key down and enter the distance rim/machine by rotating the wheel

T18 Hold key down and enter the rim width by rotating the wheel

T19



T20

T19 Hold key down and enter rim diameter by rotating the wheel
T20 Change to the screen PROFILE

WEIGHT PLACEMENT

T21

T22

T21 Select weight position for left correction plane
T22 Select weight position for right correction plane

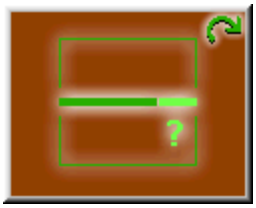
FUNCTION

T23

T24

T23 Change to the screen USER CALIBRATION

T24 Change to the screen TEXT EDITOR



T25

T26

T25 Hold key down and set the value for the mode of operation by rotating the wheel

T26 Hold key down and select the mode of operation by rotating the wheel.

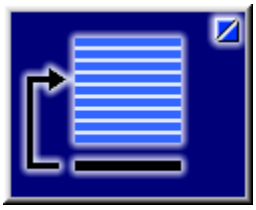
T27

T28

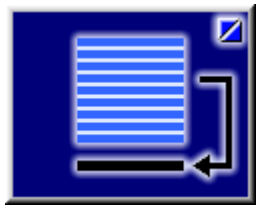
PROFILE

T27 Confirm wheel profile to be saved or selected

T28 Select stored wheel profile



T29

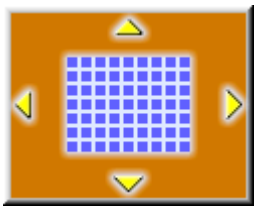


T30

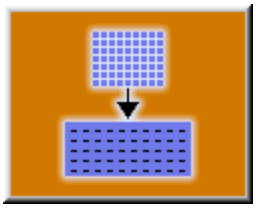
T29 Store wheel profile

T30 Load previously stored profile

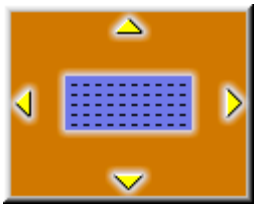
T31



T32

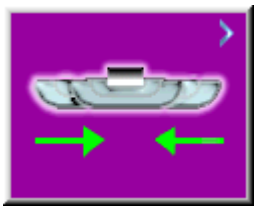


T33



T34

T35



T36

T37

T38

TEXT EDITOR

T31 Save text

T32 Toggle key, four functions: Move the cursor within the character set (right, left, up, down)

T33 Transfer characters from the character set to the text field

T34 Toggle key, four functions: Move the cursor within the text field (right, left, up, down)

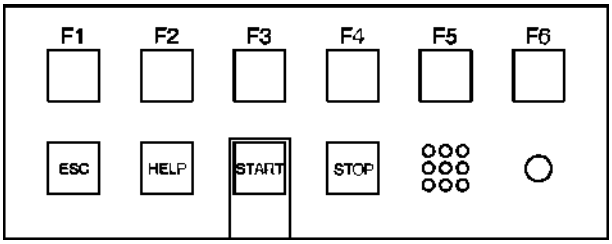
OPTIMIZATION / WEIGHT MINIMIZATION

T35 Continue interrupted optimization

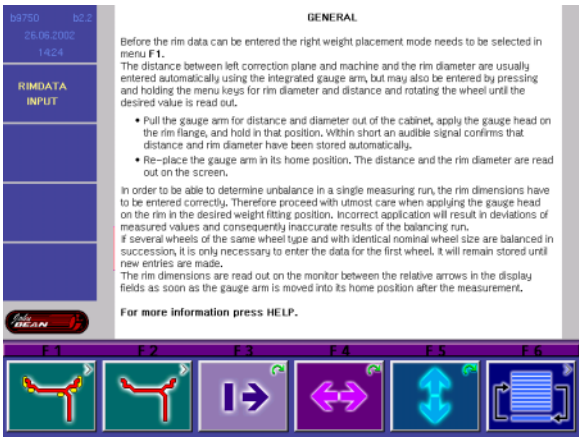
T36 Start MINIMIZATION.

T37 Confirm

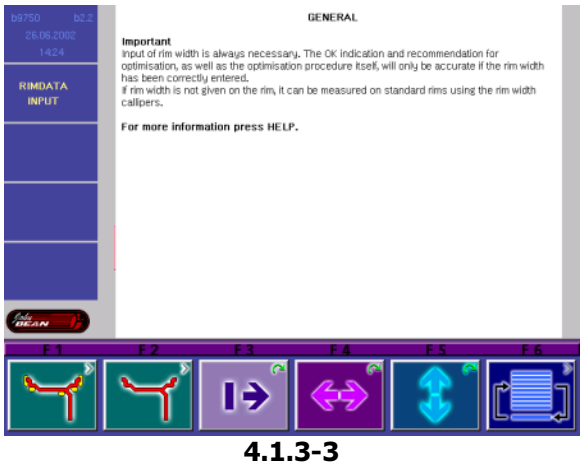
T38 Back



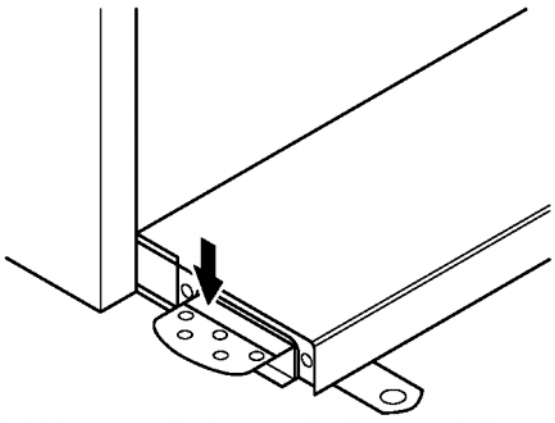
4.1.3-1



4.1.3-2



4.1.3-3



4.1.4-1

4.1.3 Help information

Help information explains the current action and, in the case of
an error code, provides hints for remedy.

Display help information

- Press the HELP key (**1 Fig. 4.1.3-1**)

The first screen with help information appears, e. g. to the
screen RIM DATA INPUT (**Fig. 4.1.3-2**).

- Press the HELP key once more to display the next screen with help information.

The second screen with help information to the screen RIM
DATA INPUT (**Fig. 4.1.3-3**) appears.

Note:
On pressing the HELP key in the last screen with help information the display jumps to the first screen again.

Quit help information

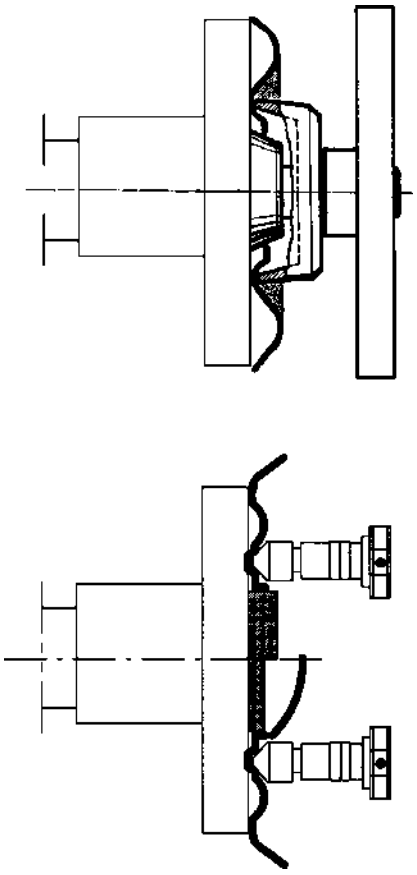
- Press the ESC key (**2 Fig. 4.1.3-1**).

4.1.4 Main shaft lock

Fig. 4.1.4-1 Pedal of main shaft lock

The main shaft is locked when the pedal is depressed. This facilitates tightening or untightening of the clamping nut and retains the wheel in the correction position for correct fitting of the balance weights.

This lock is designed only to facilitate orientation of the wheel and must not be used for braking the main shaft.



5.1-1

5 Operation.

This chapter describes how to operate the unit in order to balance a wheel.
The standard balancing runs will be described first. In chapter 5.4 and up special modes and functions will be described.

Be sure to be familiar with:
- possible dangers, refer to chapter 1
- the unit, refer to chapter 4.

5.1 Mounting the wheel.

- Clean the wheel thoroughly prior to mounting it to the unit.
- No dirt (sand, stones, glass, stickers, etc.) should be left on the rim or the tyre.
- Remove all weights from the rim.
- Always balance a “clean” wheel!
- Work safely. Wear safety glasses.

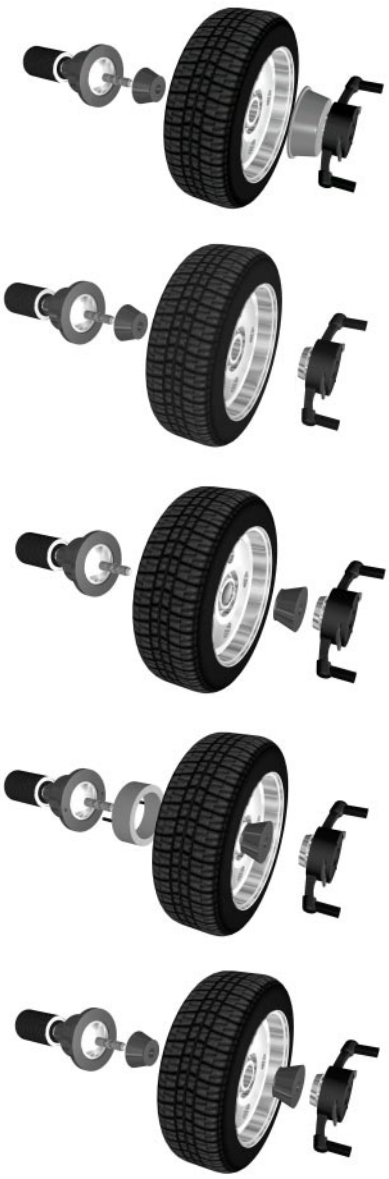
Use only clamping and centring devices that fit properly on the unit and are designed to be used with it. In order to keep pace with technical progress, the unit, clamping and centring devices may undergo design revisions. Always check for compatibility between the devices and the unit. Refer to the supplied technical information.

The method used to mount a wheel depends on the way the wheel is centered at the vehicle.
- When the rim has a true center hole, a hub centric wheel, use a cone. Refer to Figure 5.1-1, top. This is also the faster way to mount a wheel. If the correct cone is not available, or if a wheel is very hard to balance, using an adaptor plate may help.
- When the rim does not have a true hole and should be centered on the mounting studs, a lug centric wheel, use an adaptor plate. Refer to Figure 5.1-1, bottom.

Cone Mounting
Cone mounting is the most common way to mount automobile wheels. Choose the cone that fits best when placed through the wheel center hole. Place the cone and wheel on the shaft and ensure that the cone centres the wheel when you tighten the handle.

- Hold the handle in place and rotate the wheel when tightening.

WARNING: ENSURE THAT THE WHEEL IS FIRMLY AGAINST THE MOUNTING FLANGE AND THE HANDLE THREADS ENGAGE **AT LEAST** THREE TURNS ON THE SHAFT.



5.1-2

5.1-3

- Fit the supplied cushion to the pressure drum to prevent damage to painted or non-steel rims.

Refer to Figure 5.1-2. From top to bottom the following cone clamping systems are shown:

Back Cone Mounting with pressure drum.

The cone centers the wheel from inside. The pressure drum should contact the wheel on a flat surface. Never center the wheel with the pressure drum.

Back Cone Mounting without pressure drum.

Only if the pressure drum cannot contact the front face properly (e.g. very small wheels). Ensure that the quick release hub nut does not contact the cone. Else use the spacer ring.

Front Cone Mounting.

The cone centers the wheel from outside.

Front Cone Mounting with an extension adapter.

The extension adapter may be required for some light truck wheels and reverse-offset wheels that must be moved away from the balancer mounting flange.

Install the extension adapter on the mounting flange with the knurled thumbnuts provided. Then mount the wheel, using the normal front cone method.

Double Cone Mounting

The cones must not touch each other. If the cones touch, the wheel will not be centred and mounted securely.

Note: Double cone mounting can be used for some speciality wheels. The back cone centres on the formed part of the wheel, and the front cone centres on the hole.

Adaptor Mounting.

Refer to Figure 5.1-3. From top to bottom are shown:
Universal Wheel Adaptor
Metric Bolt Plate Adaptor

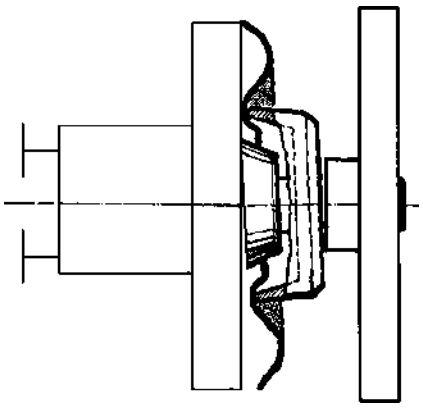
Mount the adaptor and wheel as described in the adaptor manual.

5.1.1 Wheel Mounting Errors.

Refer to Figure 5.1.1-1.
Regardless of the mounting method used, the wheel must be centred before balancing.

The wheel must be clean and free of large burrs or nicks, especially where it mates with the cone or adapter and the balancer flange.

Any dirt between the flange and the mating surface of the wheel will cause misalignment on the shaft.
A misalignment of the thickness of a matchbook cover will cause an unbalance of 15 grams (0.50 ounce) or more on automobile wheels and 30 grams (1 ounce) on light truck wheels.



5.1.1-1

The wheel must also be tightened securely to prevent it from slipping in relation to the flange. If the wheel slips on‘ the balancer, accurate weight measurement and location are impossible.

5.1.2 Wheel Rotational Errors.

A mounted wheel has a specific position, related to the balancer shaft reference point.
If the wheel is rotated 180 degrees from the initial position and re-tightened, a different imbalance reading may result.
This is caused by mechanical tolerance in the axial plane and if it happens, it is with hub centric wheels most of the times. A mechanical tolerance, between shaft and cone or cone and the wheel center hole, of 0.1 mm may result in an imbalance of 10 gram.

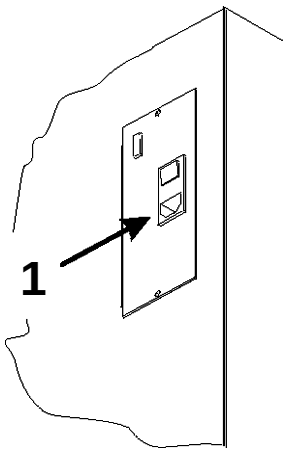
To calculate the rotational error:

- Select a NORMAL weight mode.
- Spin the wheel. Note down the imbalance.
- Rotate the wheel 180 degrees from the initial position.
- Spin the wheel. Note down the imbalance.
- Subtract the readouts per plane.
  The difference between the two readings could be as much as 15 grams (0.50 ounce) for cone-mounted automobile wheels and 60 grams (2 ounces) for light truck wheels.
- If the difference is higher, check the shaft, cones and the centre hole of the rim for wear or damage. Try different cones and/or rims to determine what causes the rotational error.
- If the rotational error can not removed, call service.

The actual imbalance error is one-half of the rotational error.

5.1.3 Removal of the wheel.

- Carefully untighten the quick release hub nut or the mounting studs.
- Do not slide the rim on the threads, but lift the wheel when removing it.
- Check the thread for damage and clean if necessary.



5.2.1-1

5.2 Preparation

- The operator should be familiar with the warnings and cautions.
- The operator should be qualified to work with the unit.
- Always make sure that the wheel guard (when fitted) is raised and the gauge arm is in the idle position (on the far left) when the unit is turned OFF.

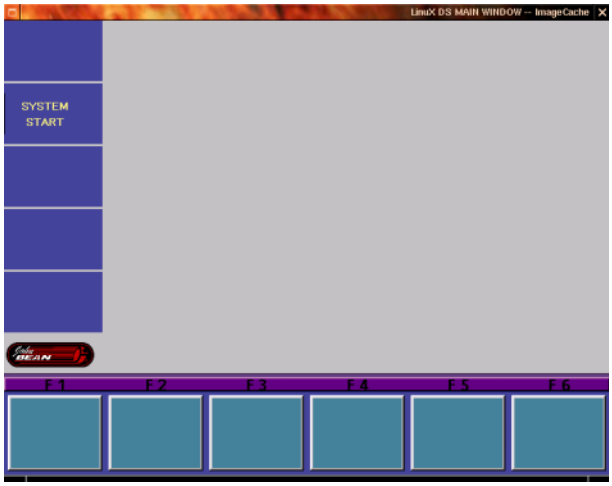
5.2.1 Power up

- Do not keep any key pressed!

See **Figure 5.2.1-1**.

- Plug the mains cable plug into the power outlet.

PLEASE READ THROUGH THE OPERATION MANUAL AND FOLLOW THE INSTRUCTIONS, ESPECIALLY WHEN OPERATING THE WHEEL BALANCER FOR THE FIRST TIME.



5.2.1-2

Switch on the machine by the mains switch (**1 Fig. 5.2.1-1**). The electronic unit now performs a number of self-tests during which the screen views SYSTEM START (**Fig. 5.2.1-2**).
As long as the machine is carrying out the self-tests, no inputs and no other operations whatsoever must be made. During this starting phase the machine must not be subjected to even the slightest vibrations.
Upon completion of the self-tests a melodious signal is heard, the screen shows the main menu (**Fig. 5.2.1-3**) and the machine is ready for operation.

Fig. 5.2.1-3 Main menu

The menu fields of the function keys F1 to F6 show:
F1 Change to the screen FUNCTION
F2 Carry out compensation run
F3 Not assigned
F4 Change to the screen BALANCING
F5 Not assigned
F6 Change to the screen OPTIMIZATION MENU

5.2.2-1

Error codes at power on
If an error code occurs it must be acknowledged by pressing the STOP key or the ESC key. No audible signal is given.
The following malfunction codes may occur at power-on:

Blue Screen
The communication between the micro controller and em-bedded PC is interrupted.

- Check connecting lead

E900
Unknown machine model.
E901
The machine is not calibrated.
E89

A key is jammed.

- Find and release jammed key.

If the error cannot be remedied, call service.

H82

The self-test was disturbed (e.g. by rotating the wheel). The message is displayed for 3 seconds, after which the measurement is repeated (max. 10 times), or aborted by pressing the STOP key or the ESC key.

E3

Gauge arm for distance and rim diameter is not in home position.

- Move gauge arm to its home position. Press the STOP key or the ESC key.

E92

During the second attempt the gauge arm for distance and rim diameter was still not in the home position. The gauge arm is rendered inoperative.

- Wait 3 seconds, or press the STOP key or the ESC key to continue.

E145

The contents of both permanent memories are different, but both contain valid data.

Fatal error codes

The self-test program has detected an error and displays a alphanumeric code consisting of six digits and/or letters.

C10 800

Line voltage under 170 V. Balancing is feasible if the motor can drive the main shaft to the measuring speed. Wheel data may be lost.

- Bring the line voltage to within a range of 200 - 230 –240 Volts with an input transformer (ref. 6705 902).

C10 801

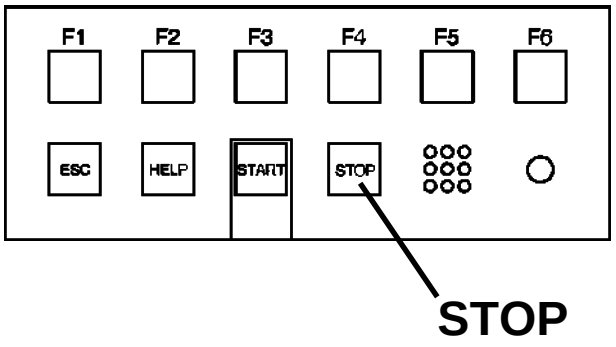
Line voltage over 265 V. Damage to the electronic unit of the machine is likely!

- Bring the line voltage to within a range of 200 - 230 –240 Volts with an input transformer (ref. 6705 902).

C10 804

Line voltage over 275 V. Damage to the electronic unit of the machine is likely! Turn off mains switch. Any damage resulting from repeated occurrence of this error code is not covered by the guarantee.

- Bring the line voltage to within a range of 200 - 230 –240 Volts with an input transformer (ref. 6705 902).



5.2.2-1

5.2.2 Emergency stop

See **Figure 5.2.2-1**.
To perform an emergency stop:

- Select the STOP key to apply the electronic brake.

When the emergency stop was made, due to an unexpected action of the unit, rethink the steps that were made:

Did the operator make an error or mistake?

Correct the input and proceed working. No special procedure is to be followed.

Did the unit do something unexpected?

- Read the relevant chapters again.
- Prepare the unit for a restart:
  switch off the unit
  wait a few seconds
  switch on the unit.
- Carefully repeat the commands with the manual at hand.
- Call service immediately if the unit malfunctions again and:

CAUTION: PREVENT ANY FURTHER USE OF THE UNIT.

5.2.3 Shutting down

When finishing a job, complete all operations correctly:

- Remove the wheel from the unit.
- Remove the cones and quick-release hub from the stub shaft. Check the surfaces (internal and external) of the cones for damage. The cone is extremely important for high quality balancing.
- Check the locking hub and end shaft threads.
- Clean all threads and surfaces with a dry, soft cloth.
- Return the cones and hub to their correct positions.
- Disconnect the electrical power supply plug from the network socket.
- Check the power cable for damages or wear.

- Tidy up the storage compartments.
- Clean the display and input panel with a dry cloth.
- Remove old wheel weights and other material from under the unit. The unit must rest on its three feet only.

5.2.4 Settings

Once the unit has been turned ON the type of default wheel is displayed.

Status at switching on

The electronic unit is factory-adjusted to the following modes of operation, which are available after switching on:

- wheel type 1 (car wheel with nominal dimensions in inches, width 6.5” and diameter 15.0”).
- entry of rim data in inches.
- display of amount of unbalance in 5-g increments.
- suppression of minor unbalance readings (limit set to 3.5 g).
- automatic braking of wheel when guard is opened during the measuring run.
- compensation of adapter unbalance switched off start of measuring run by START key only.

5.3-1

5.3-2

5.3-3

5.3.1-1

5.3 Balancing procedure

For determination of unbalance the following inputs have to be made:
- wheel type
- balancing mode (weight fitting position on rim)
- wheel size (nominal width and nominal diameter)
- distance between machine and left correction plane

The wheel dimensions to be entered are usually given on the rim (in inches or mm on standard wheels, in mm on TD or TRX wheels). Rim diameter is also given on the tire.
It is useful to find out rim size before the wheel is clamped on the machine.
The RIM DATA INPUT menu can be accessed in two ways:

- By pressing menu key F4 - Balancing - in the main menu (**Fig. 5.3-1**).

The BALANCING screen (**Fig. 5.3-2**) appears.

- Press menu key F1 Rim data input in the BALANCING menu.

The RIM DATA INPUT screen (**Fig. 5.3-3**) appears. or

- By picking up both gauge arms in the main menu (**Fig. 5.3-1**).

The system automatically switches to the RIM DATA INPUT screen (**Fig. 5.3-3**).

Fig. 5.3-3 RIM DATA INPUT
Assignment of menu fields:
F1 Change to the screen WEIGHT PLACEMENT
F2 Change to the screen RIM TYPE
F3 Enter distance between left correction plane and machine
F4 Enter rim width
F5 Enter rim diameter
F6 Change to the screen PROFILES

The rim data are usually entered using the integrated gauge arms, but may also be entered by pressing and holding the relative menu keys **F3, F4** and **F5 (1,2 and 3, Fig. 5.3-3)** and rotating the wheel until the desired values are read out. On releasing the function key the input is retained until another input is made.

5.3.1 Input of wheel type

- Starting from the screen as in **Fig. 5.3-3** RIM DATA INPUT, press menu key F2 for rim type.

The screen as in **Fig. 5.3.1-1** RIM TYPE appears.

5.3.1-1

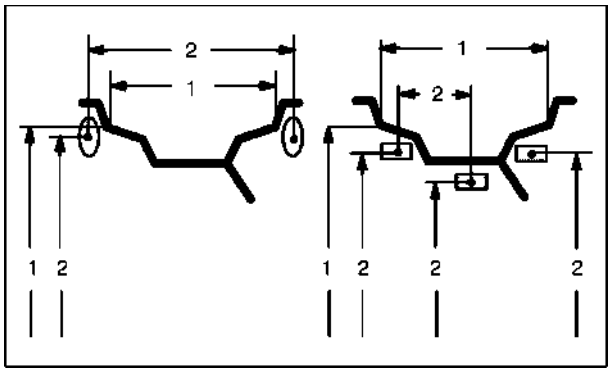
- Choose the desired rim type by pressing the relative menu key in the screen as in **Fig. 5.3.1-1**.
- Once the rim type is chosen, return to the screen RIM DATA INPUT by pressing the ESC key.

Fig. 5.3.1-2 Rim types
Assignment of menu fields:

1 Standard wheel (F1) - nominal data in inches. Unit of measure is inch. It is possible to choose either of the balancing modes nor., Alu 1 to Alu 5.

2 Standard wheel (F2) - nominal data in mm - TD or TRX wheel. Display: Rim symbol is viewed - unit of measure is mm. Its possible to choose either of the balancing modes nor., Alu 1 to Alu5.

3 Wheel type 3, -special wheel-, actual correction dimensions, no nominal size. Motorcycles Program. Special wheel (F3), actual center of gravity of the balance weights; it is not possible to choose a balancing mode. Different diameters can be entered for the left and right correction plane. Unit of measure is inch.



5.3.2-1

5.3.2 Input of balancing mode

The use of different types of balance weights (balance clips, adhesive weights) on a standard (alloy) wheel and the resulting different fitting positions of the weights on the rim produce differences between the nominal rim data which have been entered and the actual correction dimensions.
These differences are automatically taken into account when the respective balancing mode is selected. For this reason the wheel size (correction data) and the balancing mode are always to be seen in close context.

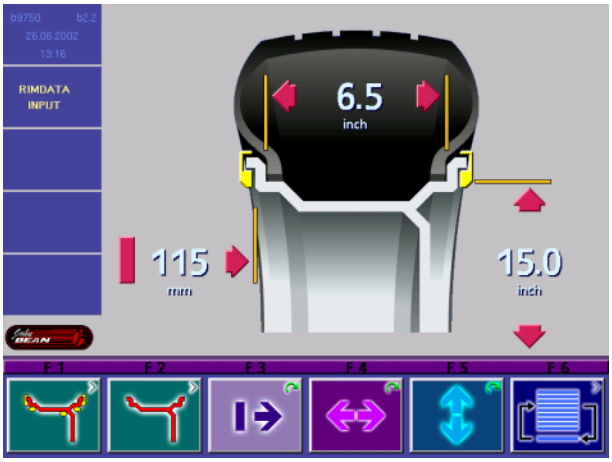
Fig. 5.3.2-1 Possible fitting positions of the balance weights –nominal rim data/actual correction data
1 Nominal rim dimensions to be entered
2 Actual correction data (center of gravity of weights) which the electronic unit uses for determination of unbalance

The input of different balancing modes is only possible with:
-Wheel type 1 -standard wheel/inch-
-Wheel type 2 -standard wheel/mm-
-Wheel type 3 –Motorcycle type wheel-

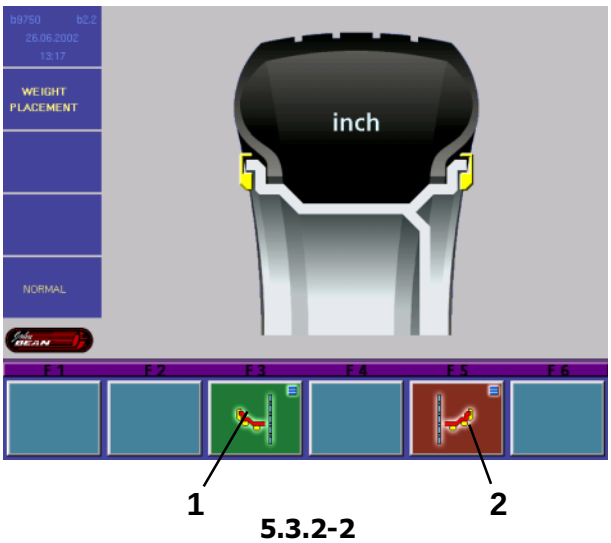
How to proceed

- Starting from the screen as in **Fig. 5.3-3** RIM DATA INPUT, press menu key F1 weight placement.

The screen as in **Fig. 5.3.2-2** WEIGHT PLACEMENT appears .
Choose the desired weight fitting position for the left correction plane:



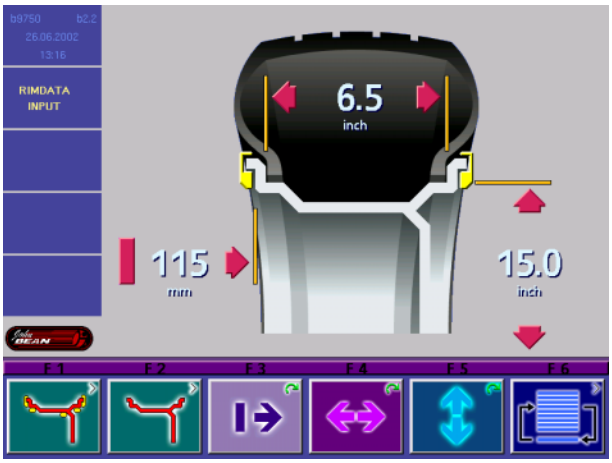
5.3-3



5.3.2-2

5.3.2-3

5.3.2-4



5.3.3-1

- Press the menu key F3 (**1, Fig. 5.3.2-2**) if necessary several times until the weight symbol lights up at the de-sired position on the rim.

Choose the desired weight fitting position for the right correction plane:

- Press the menu key F5 (**2, Fig. 5.3.2-2**) if necessary several times until the weight symbol lights up at the de-sired position on the rim.
- Once the balancing mode is chosen, return to the screen RIM DATA INPUT by pressing the ESC key.

The chosen balancing mode is retained until another mode is chosen, or until the machine is turned off.

With balancing modes Alu 2 and Alu 3 the correction planes de-termined by the machine are used for balancing. In balancing modes Alu 2S and Alu 3S the correction planes for the adhesive weights can be determined exactly by means of the gauge arm.

- To choose between Alu 2 and Alu 2S, or between Alu 3 and Alu 3S, press the menu key F4 (**Fig. 5.3.2-3**).

Fig. 5.3.2-4: Menu key F4 after either one of the Alu S modes was selected.

5.3.3 Input of rim dimensions for the standard balancing mode

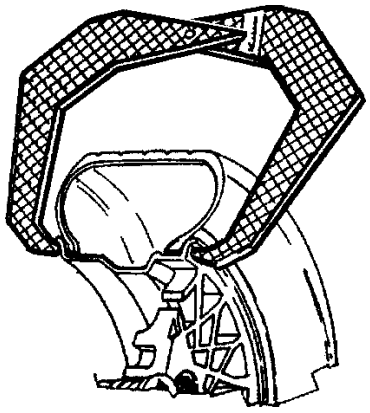
If several wheels of the same wheel type and with identical nominal wheel size are balanced in succession, it is only necessary to enter the data for the first wheel. It will remain stored until new entries are made.

Fig. 5.3.3-1 RIM DATA INPUT
Assignment of menu keys:
F3 Distance machine / left correction plane
F4 Rim width
F5 Rim diameter

The rim dimensions are read out on the monitor between the relative arrows in the display fields as soon as the gauge arms are moved into their home position after the measurement.

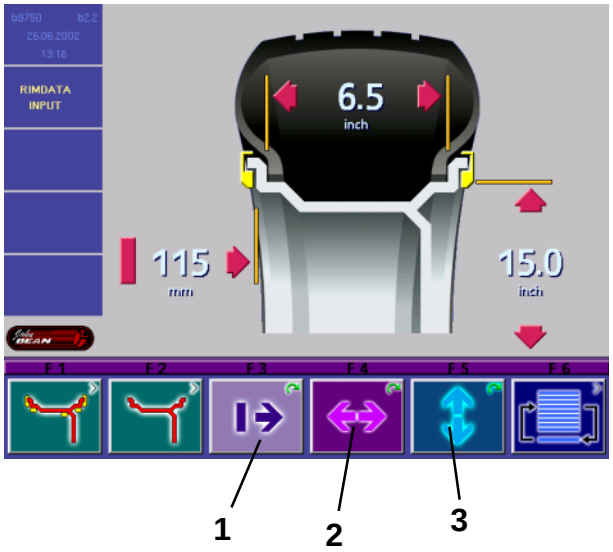
IMPORTANT

INPUT OF RIM WIDTH IS ALWAYS NECESSARY. THE OK INDICATION AND RECOMMENDATION FOR OPTIMIZATION, AS WELL AS THE OPTIMIZATION PROCEDURE ITSELF, WILL ONLY BE ACCURATE IF THE RIM WIDTH HAS BEEN CORRECTLY ENTERED.



5.3.3.1-1

5.3-2



5.3.3-1

5.3.3.1 Determination and input of rim width

Manual input of rim width

If rim width is not given on the rim, it can be measured on standard rims using the rim width calipers (**Fig. 5.3.3.1-1**).

- Starting from the balancing screen as in **Fig. 5.3-2**, press menu key F1.

The screen RIM DATA INPUT (**Fig. 5.3.3-1**) comes up.

- Press and hold the width menu key F4 (**2, Fig. 5.3.3-1**) and rotate the clamped wheel at the same time.

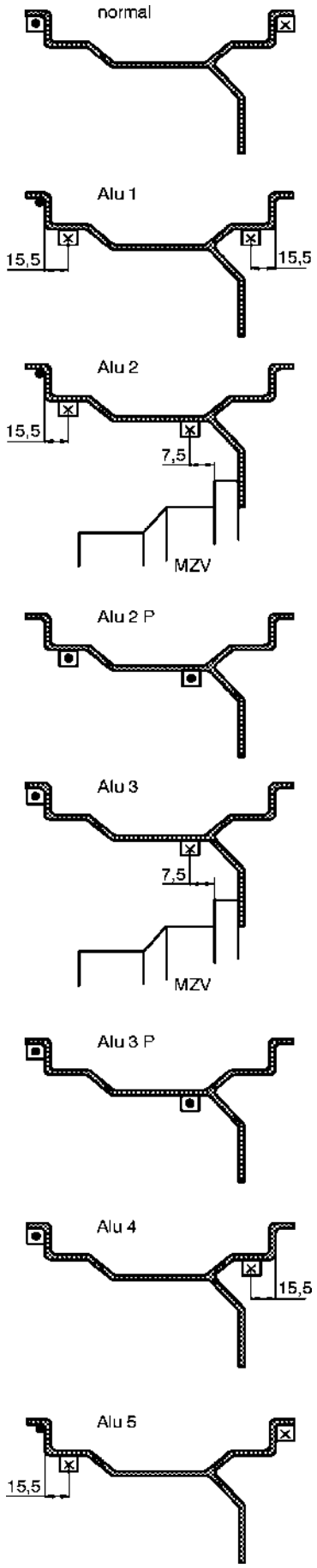
Depending on the direction of rotation of the wheel, the reading on the screen will decrease or increase.

- Release the menu key F4 as soon as the desired value is read out.

5.3.3.2 Gauge head application on various wheel types

In order to be able to determine unbalance in a single measuring run, the rim dimensions have to be entered correctly. There-fore proceed with utmost care and as is shown in the Figures when applying the gauge head on the rim in the desired weight fitting position. Incorrect application will result in deviations of measured values and consequently inaccurate results of the balancing run.

Fig. 5.3.3.2-1 shows correct application (with and without adhesive weight) of the gauge head on various rims and for various weight fitting positions. There are either one, or two positions where the gauge head has to be applied, function of wheel type and balancing mode.



5.3.3.2-1

normal Standard balancing mode where balance clips are attached to the rim flanges - always set when the ma-chine is turned on

Alu 1 Symmetric fitting of adhesive weights to the bead seats

Alu 2 Adhesive weights - adhesive weight on bead seat, hidden adhesive weight attached in the rim disc: the correction planes for the adhesive weights are determined automatically by the machine

Alu 2S Adhesive weights - adhesive weight on bead seat, hidden adhesive weight attached in the rim disc; the correction planes for the adhesive weights can be determined exactly

Alu 3 Balance clip fitted on left rim flange, adhesive weight attached in hidden position in the rim disc; the correction plane for the adhesive weight is determined automatically by the machine

Alu 3S Balance clip fitted on left rim flange, adhesive weight attached in hidden position in the rim disc the correction plane for the adhesive weight can be determined exactly

Alu 4 Balance clip fitted on left rim flange, adhesive weight attached to right bead seat

Alu 5 Balance clip fitted on right rim flange, adhesive weight attached to left bead seat.

Point of application of gauge arm
Given weight position
Point of application of gauge arm = weight position

5.3.3.3 Determination of distance and diameter

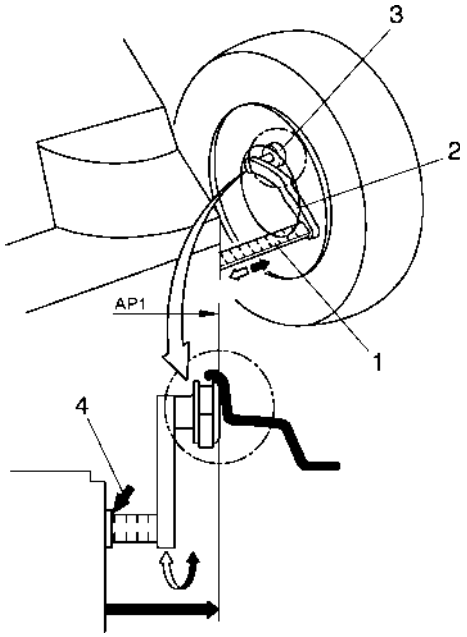
For the balancing modes nor., Alu 1, Alu 2, Alu 3, Alu 4, and Alu 5 the correction dimensions are derived from the nominal dimensions by subtraction or addition of mean correction values.

Fig. 5.3.3.3-1 Gauge for distance and rim diameter
1 Scale for distance, mm only; scale with 2 mm graduations
2 Gauge arm with gauge head
3 Gauge head
4 Reference edge for distance reading

The distance between left correction plane and machine and the rim diameter are usually entered automatically using the integrated gauge arm, but may also be entered by pressing and holding the menu keys for rim diameter and distance and rotating the wheel until the desired value is read out.

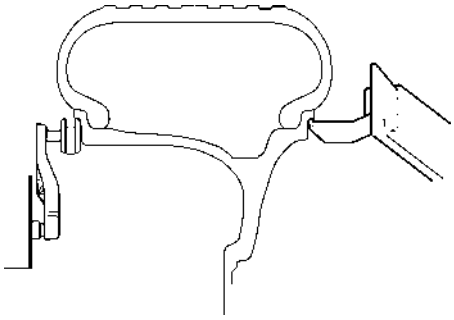
Automatic determination of distance and diameter

- Pull the gauge arm for distance and diameter (**2, Fig. 5.3.3.3-1**) out of the cabinet, apply the gauge head (**3, Fig. 5.3.3.3-1**) on the rim flange as shown

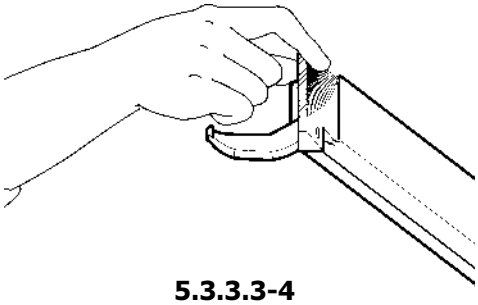


5.3.3.3-1

5.3.3.3-2



5.3.3.3-3



5.3.3.3-4

in **Fig. 5.3.3.3-1**, and hold in that position.
Within short an audible signal confirms that distance and rim diameter have been stored automatically.

- Re-place the gauge arm in its home position.

The distance and the rim diameter are read out on the screen RIM DATA INPUT (**Fig. 5.3.3.3-2**).

Automatic determination of the width.

- Make sure that both gauge arms are in the idle position.
- Position the gauge arms correctly on the rim so that the reference point of the arm touches the reference point on the rim (**Fig. 5.3.3.3-3**). The arms can either both be moved at the same time or first one and then the other. There is no priority for either left or right.

  Note: The external gauge arm is provided with an appropriate handle. A correct measure is made only when using this handle (**Fig. 5.3.3.3-4**) places the arm.
- Hold the gauge arm in position for at least a second. A short beep signals that the measurement has been taken and that the data has been recorded amongst the parameters in the program.
- Re-place the gauge arm in its home position.

The rim data are read out on the screen RIM DATA INPUT (**Fig. 5.3.3.3-2**).

Manual input of distance rim/machine

If automatic determination of the distance rim/machine is not possible (error code E 92), the distance can be determined manually in balancing modes normal, Alu 1, Alu 2, Alu 3, Alu 4 and Alu 5.

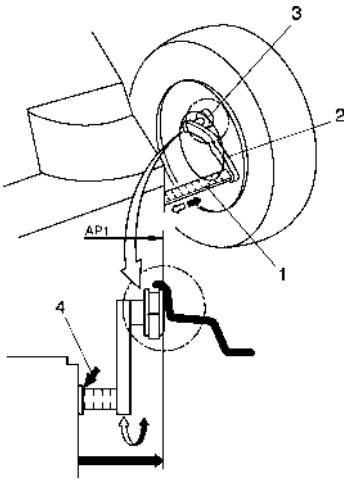
Attention: In balancing modes Alu 2Sand Alu 3S manual input of the distance rim/machine will produce an incorrect measurement result.

- Pull the gauge arm (**2, Fig. 5.3.3.3-1**) out of the cabinet, apply the gauge head (**3, Fig. 5.3.3.3-1**) on the rim flange as shown in Fig. 37 and hold in that position.
- Read and note down the distance shown on the scale (**4, Fig. 5.3.3.3-1**).
- Return the gauge arm to its home position.
- Press and hold the menu key F3 for distance (**1, Fig. 5.3.3.3-1**).
- Holding the key F3 pressed, rotate the wheel to enter the distance previously indicated on the scale.
- Release the menu key F3 after making the input.

5.3.3.4 Determination and input of wheel diameter

Manual input of diameter

- Read and note the wheel diameter on the rim or tire.
- To enter the wheel diameter, press and hold the menu key F5 (**2, Fig. 5.3.3.3-1**).
- Rotate the wheel while the key is pressed in order to enter the previously noted diameter.
- Having made the input release the menu key F5.

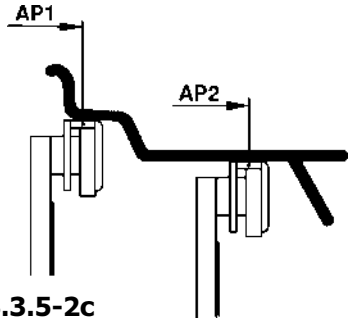


5.3.3.3-1

5.3.3.5-1

5.3.3.5-2a

5.3.3.5-2b



5.3.3.5-2c

5.3.3.5-2

5.3.3.5 Determining the position of the hidden weights (Alu 2S)

Note

Enter nominal rim width before determining the position of the weights.

- After having selected Alu 2 on the screen WEIGHT PLACEMENT press menu key F4 to choose balancing mode Alu 2S.

Alu 2S appears on the screen (**Fig. 5.3.3.5-1**).

- Return to the screen RIM DATA INPUT by pressing the ESC key.

Recommendation

Clamp an adhesive weight in the weight holder of the gauge head with the cover film of the weight being in top position prior to scanning the correction dimensions.

Fig. 5.3.3.5-2 Scanning of the exact correction dimensions

a Positioning of the gauge arm for application position AP1

b Positioning of the gauge arm for application position AP2

c Exact application position AP1 and AP2

- To determine the gauge application position AP1, pull the gauge arm for distance and rim diameter out of the cabinet, apply the gauge head on the rim in the center of the intended weight fitting position as shown in **Fig. 5.3.3.5-2a** and **5.3.3.5-2c** and hold in that position.

An audible signal is given when application position AP1 has been stored.

- Approach the gauge head to application position AP2 (**Fig. 5.3.3.5-2b** and **5.3.3.5-2c**) and hold in that position.

An audible signal is given when application position AP2 has been stored.

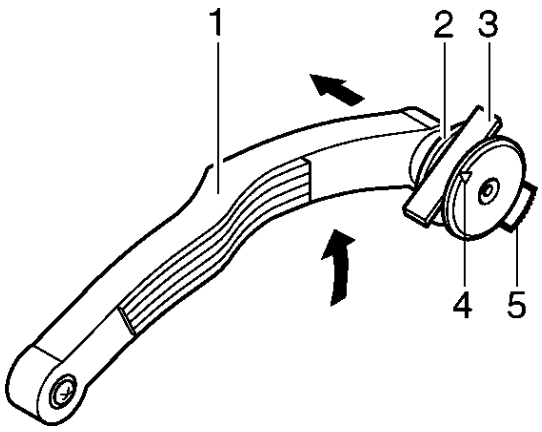
- Return the gauge arm for distance and rim diameter to its home position.

The rim dimensions are read out on the monitor between the relative arrows in the display fields as soon as the gauge arm is moved into its home position after the measurement.

- Start the measuring run.

Fitting of balance weights

- Select an adhesive weight for AP1 of the indicated size and adjust it to the wheel radius by bending.
- If necessary, index the wheel precisely into the correction position for the left plane. When the correction position is reached, the two arrows on the screen light up green.
- Press the pedal of the main shaft lock to hold the wheel in this position.



5.3.3.5-3

- Clean the fitting position before attaching the adhesive weights.
- Raise the gauge arm (**1, Fig. 5.3.3.5-3**) and pull the holding ring of the gauge head (**2, Fig. 5.3.3.5-3**) inwards.
- Insert the adhesive weight (**3, Fig. 5.3.3.5-3**) into the head with the protective foil facing upwards symmetrically relative to the arrow (**4, Fig. 5.3.3.5-3**).
- Press the adhesive weight firmly against the head and remove the protective foil from the weight.
- Pull the gauge arm towards application position AP1.
- The display shows the position of the gauge arm for distance and diameter. If the application position AP1has been reached, a little red arrow becomes green and an audible signal is given.
- Swing the gauge arm out towards the rim and press the weight firmly against the rim using the ejector (**5, Fig. 5.3.3.5-3**).
- Swing the gauge arm in and return it to its home position.
- Firmly press the adhesive weight on the rim by hand.

Fit the second adhesive weight for AP2 in the same manner.

5.3.3.6 Determining the position of the hidden weight (Alu 3S)

Note

Enter nominal rim width before determining the position of the weights.

- After having selected Alu 3 on the screen WEIGHT PLACEMENT, press menu key F4 to choose balancing mode Alu 3S.

Alu 3S appears on the screen (**Fig. 5.3.3.6-1**).

- Return to the screen RIM DATA INPUT by pressing the ESC key.

Recommendation

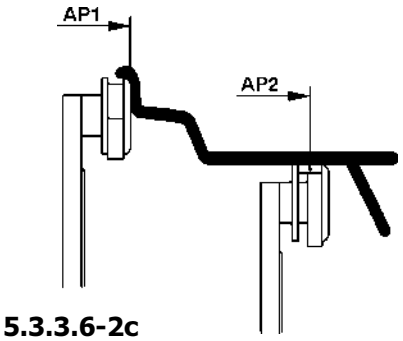
Clamp an adhesive weight in the weight holder of the gauge
head with the cover film of the weight being in top position prior
to scanning the correction dimensions.

5.3.3.6-1

Fig. 5.3.3.6-2 Scanning of the exact correction dimensions
a Positioning of the gauge arm for application position AP1
b Positioning of the gauge arm for application position AP2
c Exact application position AP1 and AP2

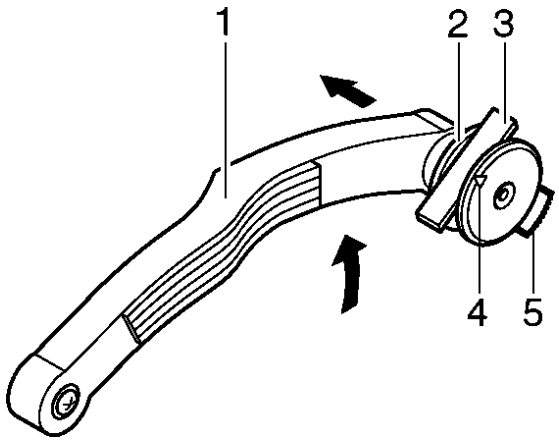
5.3.3.6-2a

5.3.3.6-2b



5.3.3.6-2c

5.3.3.6-2



5.3.3.6-3

- To determine the gauge application position AP1, pull the gauge arm for distance and rim diameter out of the cabinet, apply the gauge head on the rim in the center of the intended weight fitting position as shown in **Fig. 5.3.3.6-2a** and **5.3.3.6-2c** and hold in that position.

An audible signal is given when the application position AP1 has been stored.

- Approach the gauge head to application position AP2 and hold in that position (**Fig. 5.3.3.6-2b** and **5.3.3.6-2c**).

An audible signal is given when the application position AP2 has been stored.

- Return the gauge arm for distance and rim diameter to its home position.

The rim dimensions are read out on the monitor between the relative arrows in the display fields as soon as the gauge arm is moved into its home position after the measurement.

- Start the measuring run.

Fitting of balance weights

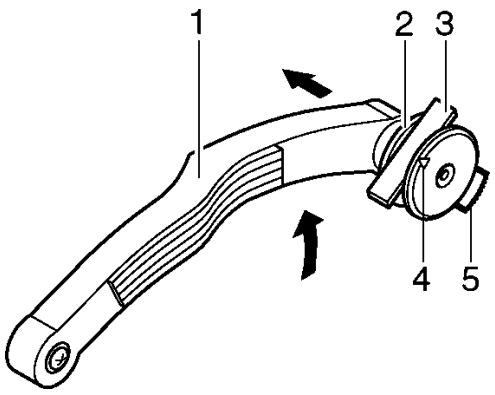
The weight for AP1 is a balance clip and is attached perpendicular to the main shaft after indexing the wheel, as in balancing mode nor. The gauge arm stays in its home position.

The adhesive weight for AP2 is fitted as described below:

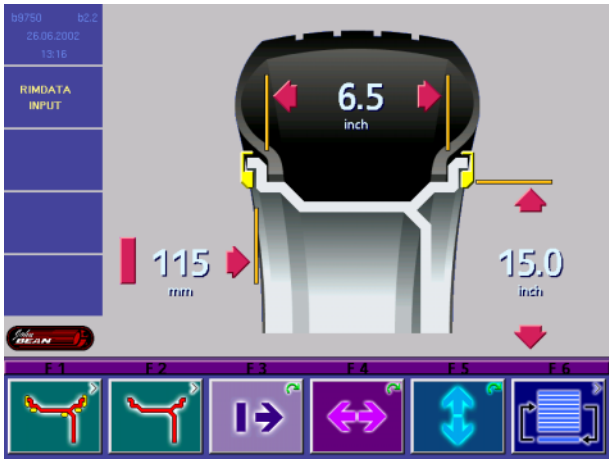
- Select an adhesive weight of the indicated size and ad-just it to the wheel radius by bending.
- If necessary, index the wheel precisely into the correction position for the left plane. When the correction position is reached, the two arrows on the screen light up green.
- Press the pedal of the main shaft lock to hold the wheel in this position.
- Clean the fitting position before attaching the adhesive weights.
- Raise the gauge arm (**1, Fig. 5.3.3.6-3**) and pull the holding ring of the gauge head (**2, Fig. 5.3.3.6-3**) inwards.
- Insert the adhesive weight (**3, Fig. 5.3.3.6-3**) into the head with the protective foil facing upwards symmetrically relative to the arrow (**4, Fig. 5.3.3.6-3**).
- Press the adhesive weight firmly against the head and remove the protective foil from the weight.
- Pull the gauge arm towards application position AP2.

The display shows the position of the gauge arm for distance and diameter. If the application position AP2has been reached, a little red arrow becomes green and an audible signal is given.

- Press the pedal of the main shaft lock to hold the wheel in this position.

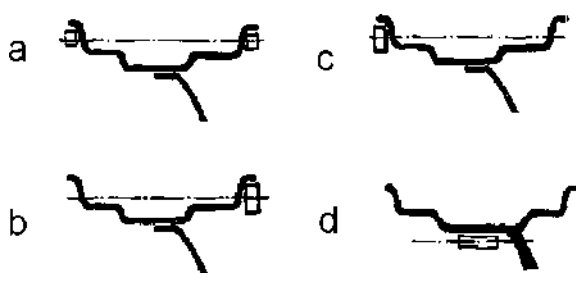


5.3.3.6-3



5.3.3.8-1

5.3.3.8-2



5.4.4-2

- Swing the gauge arm out towards the rim and press the weight firmly against the rim using the ejector (**5, Fig. 5.3.3.6-3**).
- Swing the gauge arm in and return it to its home position.
- Firmly press the adhesive weight on the rim by hand.

5.3.3.7 Input of rim dimensions for display of static unbalance (e. g. with small wheels)

For wheels which can only be balanced statically and having dimensions which cannot be entered using the gauge arm, only the correction diameter has to be entered. To enable the ma-chine to start, an arbitrary width between 1" and 13.8" has to be entered as well. Input is made as for standard wheels.

- Press and hold the relative menu key (diameter/ width) and rotate the wheel to set the respective values.
- Release the menu key as soon as the desired value is read out.

For correction diameters and possibilities of static unbalance correction, please refer to **Fig. 5.4.4-2**.

5.3.3.8 Store wheel profiles

Wheel profiles permit the storage of values for wheels that for example are balanced frequently so that the wheel data need not be entered again and again. This function is particularly useful for workshops that carry out series fitting of tire/rim assemblies or frequently handle the same wheel types (e.g. work-shops that offer rims for retrofitting). The once-only storage of the rim data in the profiles guarantees that the same correction planes are always used, in particular for alloy wheels, thus pro-viding consistent balance quality.

It is possible to store up to 9 wheel profiles.

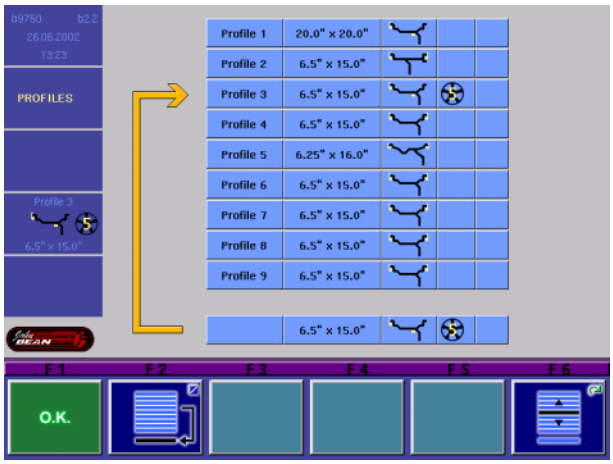
- Starting from the screen RIM DATA INPUT, press menu key F6 (**1, Fig. 5.3.3.8-1**).

The PROFILES screen as in **Fig. 5.3.3.8-2** comes up.

Fig. 5.3.3.8-2 PROFILE
Assignment of menu fields:
F1 Confirm wheel profile to be stored or selected
F2 Change between selecting (**Fig. 5.3.3.8-2**) and storing (**Fig. 5.3.3.8-3**) a wheel profile
F3 Not assigned
F4 Not assigned
F5 Not assigned
F6 Select previously stored wheel profile

The following values are stored:
- Nominal wheel dimensions
- Values measured with the gauge arm
- Weight positions
- Wheel type
- Positions for relocation

5.3.3.8-2



5.3.3.8-3

5.3.4 Correction of inputs after measurement

If incorrect data and/or incorrect wheel type or balancing mode were entered for a measuring run:

- Enter the correct dimensions, wheel type or balancing mode, and press the ESC key.

Upon operation of the ESC key the electronic unit accepts the new input, processes it and then reads out the corrected measured data in the BALANCING screen without repetition of the measuring run.

5.3.5 Observation of radial and lateral run-out of the wheels

Prior to the measuring run check the wheel for radial and lateral run-out. If considerable run-out is observed the tire may be incorrectly fitted on the rim. In this case, the wheel should not be balanced.

When supplied from our works the machine is programmed such that the wheel is braked automatically when the wheel guard is raised (mode of operation “automatic braking when wheel guard is raised” set to “yes”).
Observation of the wheel is only possible when this mode of operation is set to “no” (no braking of wheel by raising of wheel guard. Changing modes of operation).

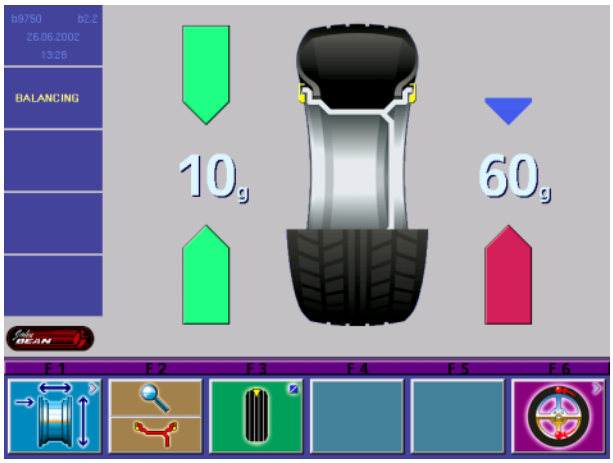
If the mode is set to “no”:

THE WHEEL ROTATES WHEN THE WHEEL GUARD IS OPEN. MAKE SURE THAT TOOLS OR THE LIKE DOES NOT BLOCK THE WHEEL. WEAR SAFETY GOGGLES AND TIGHTLY FITTING WORKING CLOTHES.

- If the wheel clamped on the balancer is to be checked for visible radial and/or lateral run-out, start a run - by pressing the START key or by closing the wheel guard, depending on mode of operation - prior to the actual measuring run.
- Then raise the wheel guard and observe the wheel for radial and lateral run-out while it slows down.
- Finally brake the wheel by operation of the STOP key.

5.4-1

5.3-1



5.4.1-1

5.4 Spinning the wheel

Preparations:
- Compensation run carried out, if necessary.
- Wheel correctly clamped.
- Wheel type chosen.
- Balancing mode chosen.
- Distance and wheel dimensions entered.

If several wheels of the same wheel type (identical nominal wheel size) are balanced in succession, it is only necessary to enter the data for the first wheel. The inputs will remain stored until new data is entered.

Fig. 5.4-1 BALANCING
Assignment of menu keys:
F1 Change to the screen RIM DATA INPUT
F2 Toggle switch, two functions; reading only as long as the key is pressed (quick reading):
Pressed on top:
Precision reading of unbalance, no suppression of minor unbalance readings
Pressed on bottom:
Reading of amount and location of unbalance for conventional balancing run with balance clips - comes up
F3 Change between static and dynamic unbalance
F4 Unassigned
F5 Unassigned
F6 Change to the screen OPTIMIZATION MENU

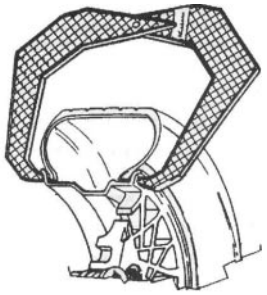
5.4.1 Measurement

The BALANCING screen can be accessed in two ways:
- Press menu key F4 Balancing in the main menu (**Fig. 5.3-1**).

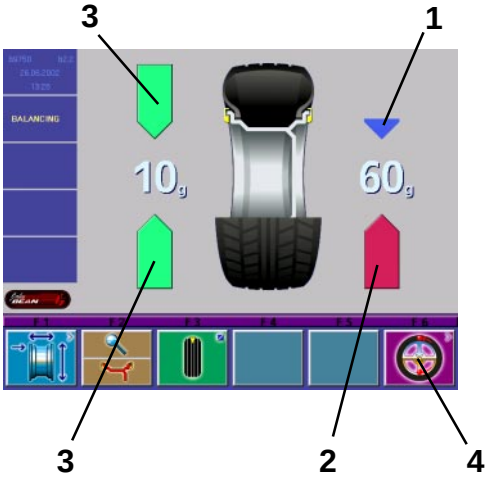
The BALANCING screen (**Fig. 5.4-1**) appears.
- Start a measuring run - by pressing the START key or by closing the wheel guard, depending on mode of operation.

or
- While in the RIM DATA INPUT screen start a measuring run - by pressing the START key or by closing the wheel guard, depending on mode of operation.

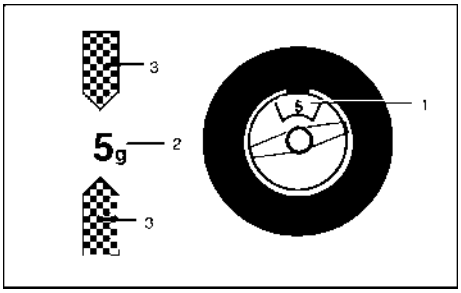
The BALANCING screen appears.
After measurement the balance weights can be fitted, or a weight minimization or optimization run can be carried out.
After measurement the machine stops automatically and the wheel is braked such that the weight for the left correction plane can be fitted exactly perpendicular to and above the main shaft. The screen shows the unbalance measured for each correction plane and the direction towards correction, e.g. **Fig. 5.4.1-1** (here: wheel type 1, balancing mode nor.):



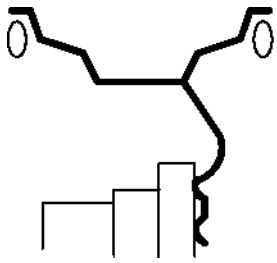
5.3.1-1



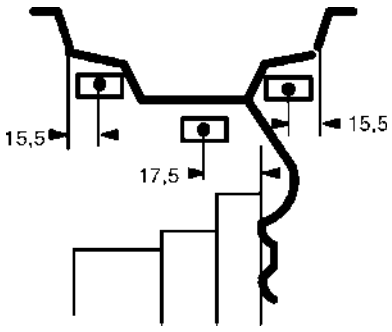
5.4.1-1



5.4.1-2



5.4.1-3



5.4.2.3-1

- left display - green arrows , showing the wheel is in correction position for the left plane
- right display - red arrow below, showing the direction to index the wheel to correction position

Arrow colors:

1 blue arrows: before indexing the wheel
2 red arrows: direction to index the wheel to correction position
3 green arrows: the wheel is in correction position

The menu key F6 (**4, Fig. 5.4.1-1**) lights up in yellow, if a
optimization/ weight minimization is recommended

For correct fitting of the balance weights see Fig. 5.4.1-2, 5.4.1-3 and 5.4.2.3-1.

Fig. 5.4.1-2 Example of display and correction of the left hand correction plane
1 Position of balance weight on rim
2 Display of amount of unbalance
3 Display of correction position - the two arrows light up

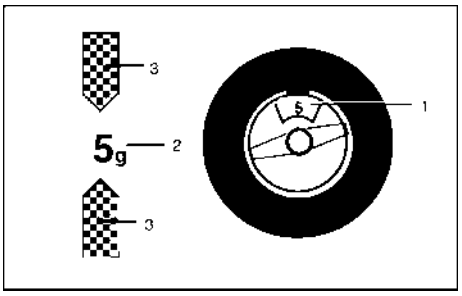
5.4.2 How to fit the balance weights

Fitting of balancing weights for the balancing modes nor., Alu 1, Alu 2, Alu 3, Alu 4, and Alu 5 is specified and illustrated in this paragraph.
Fitting of balance weights for the balancing modes Alu 2S and Alu 3S is specified and illustrated in paragraphs 5.3.3.5 and 5.3.3.6.

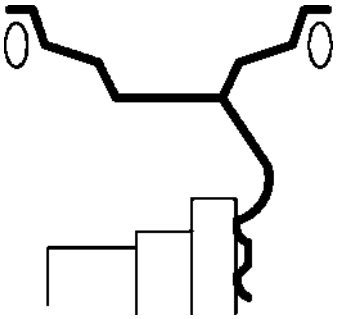
5.4.2.1 How to fit balance clips

Left-hand correction plane:
After the measuring run the wheel is braked such that the weight for the left correction plane can be fitted exactly perpendicular to and above the main shaft.

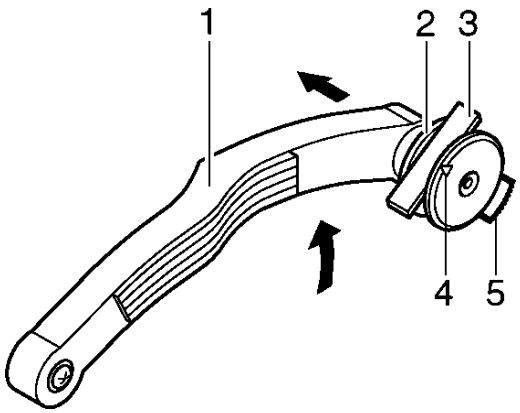
- If necessary, index the wheel precisely into the correction position for the left plane. When the correction position is reached, the two arrows (**Fig. 5.4.1-2**) light up green.
- Press the pedal of the main shaft lock to hold the wheel in this position.
- Attach the balance clip in the correction position at the rim flange exactly perpendicular to and above the main shaft (**Fig. 5.4.1-2** and **5.4.1-3**).



5.4.1-2



5.4.1-3



5.4.2.2-1

Right-hand correction plane:

- Index the wheel precisely into the correction position for the right plane. When the correction position is reached, the two arrows light up green.
- Press the pedal of the main shaft lock to hold the wheel in this position.
- Attach the balance clip in the correction position at the rim flange exactly perpendicular to and above the main shaft (**Fig. 5.4.1-2** and **5.4.1-3**).
- After correction carry out a check run (see § 5.4.3).

5.4.2.2 How to fit adhesive weights using the gauge head

Note

If an error code H20 is read out when the gauge arm is approached to the rim, there are no data for re-locating the correction plane. This means that either an error was made in applying the gauge arm, or the adhesive weight cannot be fitted on the rim using the gauge head. In this case refer to § 5.4.2.3.

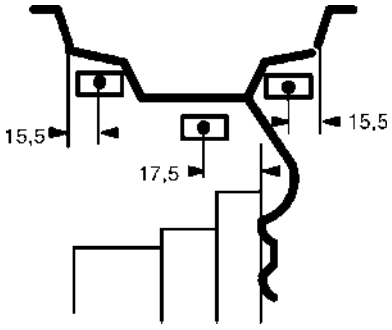
- If necessary, index the wheel to the exact correction position in the left correction plane. On reaching the correction position the two arrows light up green (**2, Fig. 5.4.1-2**).
- Press the pedal of the main shaft lock to hold the wheel in this position.
- Clean the fitting position before attaching the adhesive weights.
- Select an adhesive weight of the indicated size and ad-just it to the wheel radius by bending.
- Raise the gauge arm (**1, Fig. 5.4.2.2-1**) and pull the holding ring of the gauge head (**2, Fig. 5.4.2.2-1**) inwards.
- Insert the adhesive weight (**3, Fig. 5.4.2.2-1**) into the head with the protective foil facing upwards symmetrically relative to the arrow (**4, Fig. 5.4.2.2-1**).
- Press the adhesive weight firmly against the head and remove the protective foil from the weight.
- Pull the gauge arm towards application position.

The display shows the position of the gauge arm for distance and rim diameter. If the correction plane has been reached, the little red arrow becomes green and an audible signal is given.

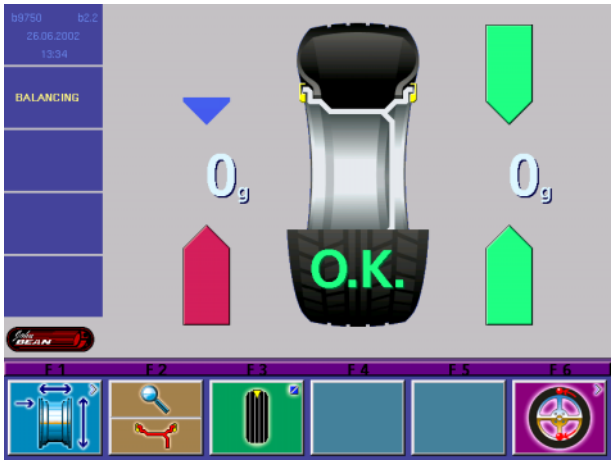
- Swing the gauge arm out towards the rim and press the weight firmly against the rim using the ejector (**5, Fig. 5.4.2.2-1**).
- Swing the gauge arm in and return it to its home position.
- Firmly press the adhesive weight on the rim by hand.
- After correction carry out a check run (see § 5.4.3).

5.4.2.3 How to fit adhesive weights based on given dimensions

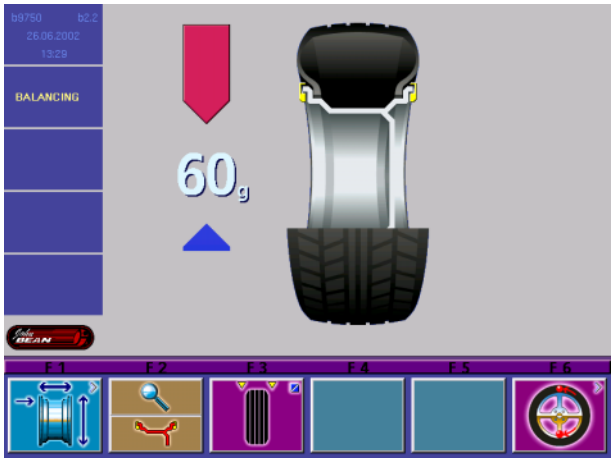
If the correction positions are not accessible with the gauge arm and the wheel dimensions have been



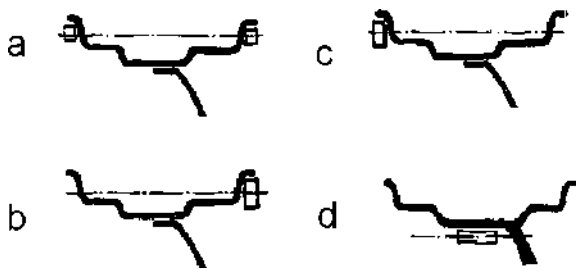
5.4.2.3-1



5.4.3-1



5.4.4-1



5.4.4-2

entered using the function keys and rotating the wheel:

- Fit adhesive weights in the given positions according to the balancing mode. Make sure to observe the given positioning dimensions (**Fig. 5.4.2.3-1**).

Dimensional tolerances result in slight deviations of the measured values so that the weight may need to be repositioned after the check run. In this case an OK indication is not displayed after the check run.

5.4.3 Check run

- When the balance weights are fitted, start a check run either by pressing the START key or by closing the wheel guard, depending on which mode is preset.

After the check run both readings will be “0” if the wheel is perfectly
balanced, and the OK pictograph comes up (**Fig. 5.4.3-1**).

Note
If there is no OK reading, dynamic unbalances below the tolerance limit (suppression preset to 3.5 g) add to a static unbalance above the tolerance limit. These residual unbalances are read out upon operation of the menu key F2 and should then be balanced.

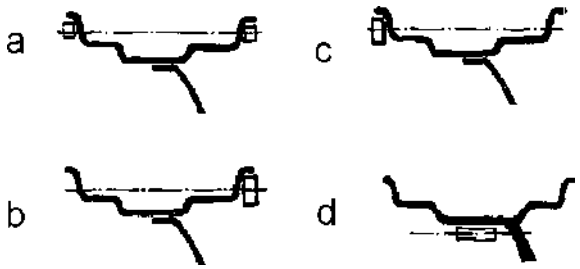
5.4.4 Static unbalance

In general the wheels should be balanced dynamically, i.e. in two correction planes.
If the wheels to be balanced are rather small (e. g. motorcycle wheels), only static unbalance should be measured and corrected.

- To display static unbalance press menu key F3 (**Fig. 5.4.3-1**) at the bottom.

A screen as in **Fig. 5.4.4-1** comes up.
For correction diameter and possibilities of correction of static unbalance see **Fig. 5.4.4-2**.

Recommendations for fitting balance weights for static unbalance correction
The correction diameter of static unbalance is usually the same as the one of dynamic unbalance. With various balancing modes where the weights are not fitted on identical correction diameters (Alu 2, Alu 3, Alu 4 and Alu 5), the correction diameter for static unbalance is programmed in the machine.
As it is not always possible to correct static unbalance in the ideal rim position, the following recommendations for correction (**Fig. 5.4.4-2**) should be observed.



5.4.4-2

- With large static unbalance (e.g. 30 g) divide the unbalance into two fairly equal parts and correct it at both sides of the wheel, considering the chosen balancing mode (**Fig. 5.4.4-2a**).
- With small static unbalance fit the balance weight either in the outer or inner correction plane (**Fig. 5.4.4-2b** and **5.4.4-2c**). The dynamic unbalance created thereby is negligible.

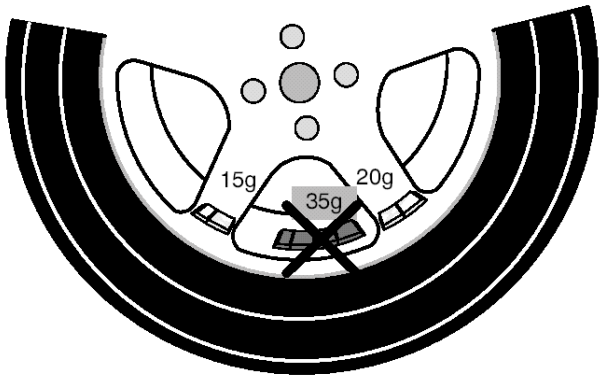
Note

Figures 5.4.4-2a - 5.4.4-2c illustrate how balance clips can be fitted.

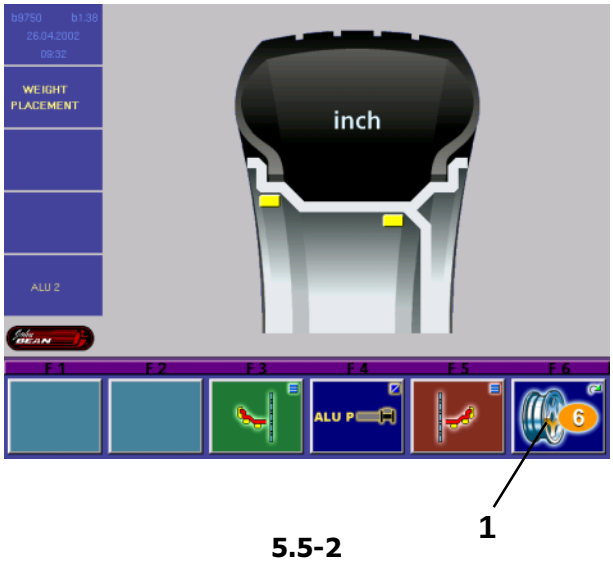
When adhesive weights are used, or both types are mixed, proceed

analogously depending on balancing mode.

- For balancing modes Alu 2 and Alu 3 fit a balance weight in hidden position inside the rim; in this case the correction diameter for static unbalance correction lies inside the rim (**Fig. 5.4.4-2d**).



5.5-1



5.5-2

5.5-3

5.5. Special Functions

5.5.1 Behind-the-spokes placement

When spoked wheels (SOFT LINE rims) are balanced, the behind- the-spokes placement mode (also called split weight mode) allows balance weights which would have to be fitted between two spokes according to the measured unbalance (hence would be visible from outside) to be placed in hidden position behind two spokes adjacent to the unbalance location (see example, **Fig. 5.5-1**).
After a measuring run the electronic unit calculates the behind-the-spokes placement automatically and reads the relative balance weight locations on the screen.
The pictographs guiding the operator through this mode are explained in § 4.1.2.
The operating steps for the behind-the-spokes placement mode are described and illustrated below.

How to proceed
Behind-the-spokes placement is activated automatically in Alu 2, Alu 2S and Alu 3, Alu 3S balancing modes (hidden weight) and can be selected there whenever required.

Choice of balancing mode (weight fitting position)
Choice of behind-the-spokes placement mode and rim data input
The behind-the-spokes placement mode is activated with the menu key F1 in the screen RIM DATA INPUT, the number of spokes of the wheel is chosen either with the menu key F6 in the screen WEIGHT PLACEMENT, or with the menu key F5 in the screen BALANCING.

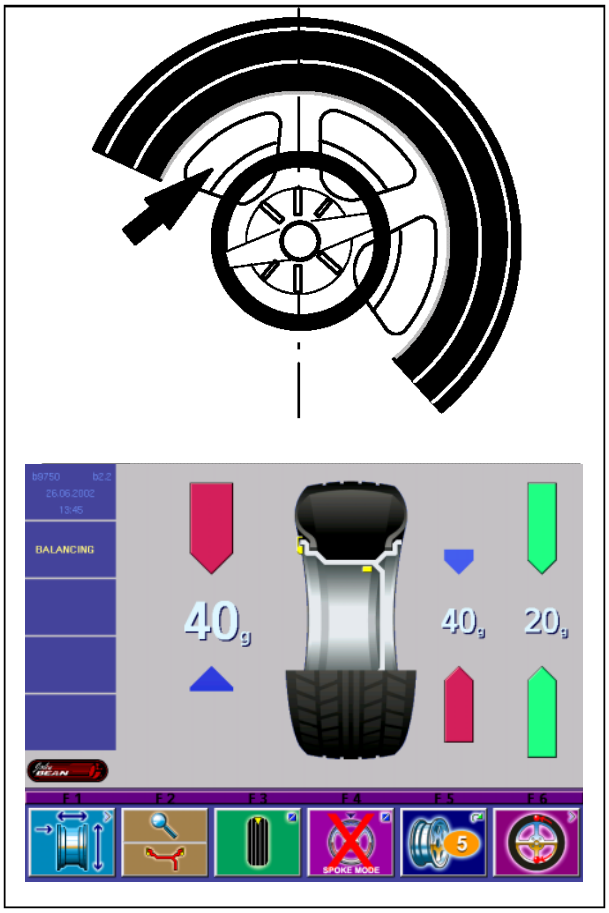
In the screen WEIGHT PLACEMENT:
- In the screen WEIGHT PLACEMENT press the menu keys F3 and F5 to choose the balancing modes Alu 2, Alu 2S, Alu 3 or Alu 3S (see § 5.3.2).

Next comes **Fig. 5.5-3** with the menu key F6 and the selected number of spokes.
The number of spokes can be chosen between 3 and 12.
- Press and hold the menu key F6. Rotate the wheel to set the number of spokes of the wheel (**1, Fig. 5.5-2**).

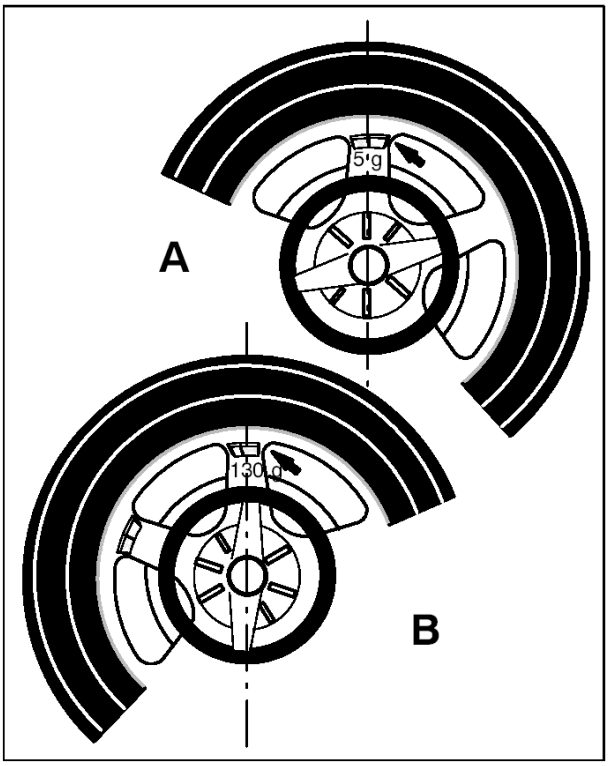
The pictograph with the chosen number of spokes appears in the menu field F6 (**2, Fig. 5.5-3**).

In the screen BALANCING (when other wheels have been balanced before):
- Press and hold the menu key F5. Rotate the wheel to set the number of spokes of the wheel.

The pictograph with the chosen number of spokes appears in the menu field F5 (**2, Fig. 5.5-3**), the menu field “Behind-the-spokes placement“ appears in F6 (**1, Fig. 5.5-3**).



5.5-4



5.5-5

5.5.2 Correction of measured unbalance

- Close the wheel guard and carry out the measuring run.

As the measuring run is started, the screen BALANCING appears, but without measured data. After the measuring run the screen BALANCING appears including the measured data (**Fig. 5.5-3**).

How to fit adhesive weights on the left side of the rim disc

- Clean the fitting position before attaching the adhesive weights.
- Fit adhesive weights on the left side of the rim disc as de-scribed in § 5.4.2.2.

How to fit a hidden adhesive weight

- Rotate the wheel so that a spoke is centered relative to and above the main shaft (**Fig. 5.5-4**, arrow).
- In this position press the menu key F4 for behind-the-spokes placement (**1, Fig. 5.5-3**).

The measured data and the indexing arrows for two correction positions (hidden behind the spokes) of the right wheel side are displayed (**Fig. 5.5-4**). The menu field F4 shows the pictograph “Behind-the-spokes placement mode selected”.

- If necessary, index the wheel to correction position as shown by the left pair of arrows of the right display (be-hind-the-spokes locations) (**Fig. 5.5-4**) and retain with the main shaft lock.
- Clean the fitting positions before attaching the adhesive weights.
- In this position fit a suitable balance weight (in the example 5 g, **A, Fig. 5.5-5**) in the correct position.
- Index the wheel to correction position as shown by the right pair of arrows of the right display (behind-the-spokes locations) and retain with the main shaft lock.
- Fit the second balance weight behind the spoke (right pair of arrows of right display) in the same way (in the example 130 g, **B, Fig. 5.5-5**).

To return to the undivided reading of unbalance for left and right correction plane (**Fig. 5.5-3**):

- Briefly press the menu key F4 for balancing mode (**1, Fig. 5.5-3**). The unbalances for left and right correction plane are read out. The behind-the-spokes placement mode is still active as long as Alu 2, Alu 2S, Alu 3 or Alu 3S are set.

To leave the behind-the-spokes placement mode and reset the electronic unit to the conventional balancing mode:

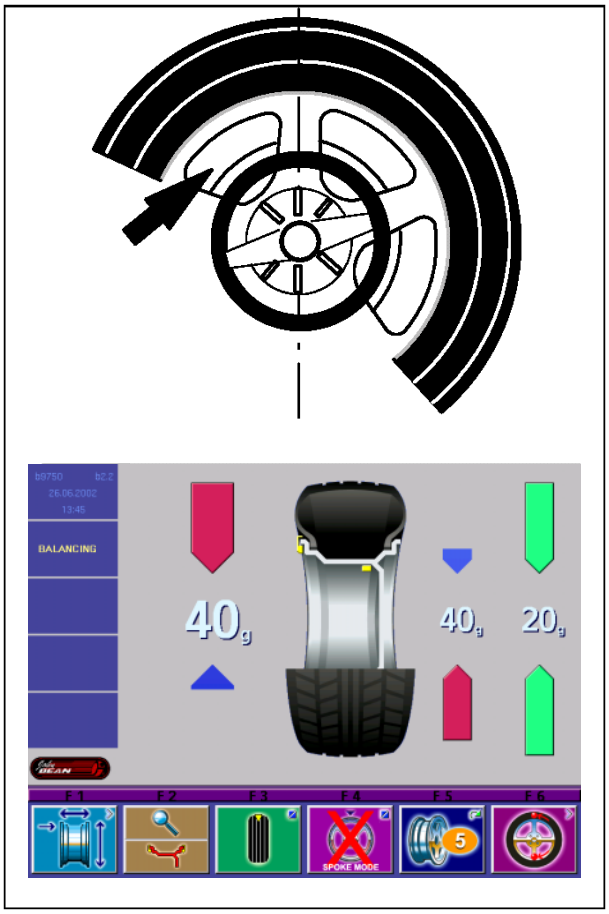
In the reading BALANCING:

- Press and hold the menu key F5 for balancing mode. Rotate the wheel to set number of spokes to “?”.

In the reading WEIGHT PLACEMENT:

- Set a balancing mode other than Alu 2, Alu 2S or Alu 3, Alu 3S or to set the number of spokes to “?”.

5.5-3



5.5-4

Notes

The unbalance reading of the behind-the-spokes placement mode, which is not yet subdivided for two fitting positions (**Fig. 5.5-3**, example 130 g) is identical with the unbalance reading of the conventional balancing mode.

The unbalance reading is only subdivided on two fitting positions when the spoke position is stored (**Fig. 5.5-4**).

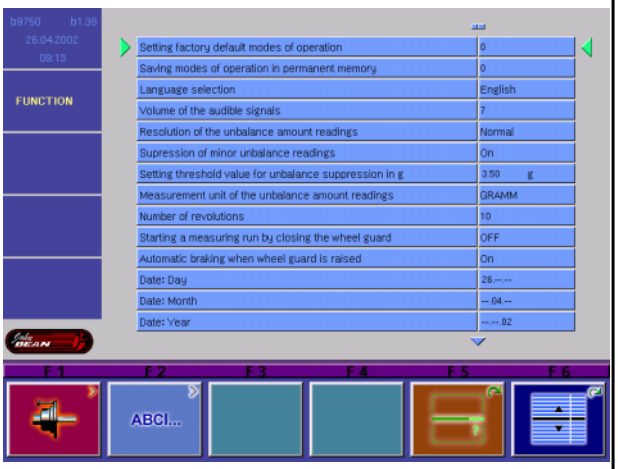
This feature allows wheels without spokes to be balanced in the behind-the-spokes placement mode without returning to the conventional balancing mode.

The same situation occurs in the optimization mode.

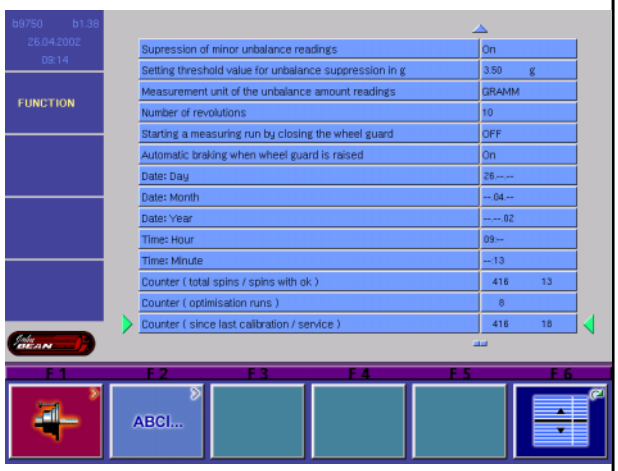
If optimization is desired in conjunction with the behind-the-spokes placement mode, it is recommended that optimization be carried out first.

The residual unbalance read out after optimization is subdivided automatically to two fitting positions when the behind-the-spokes placement mode is chosen after the optimization run so that there is no need to carry out another measuring run.

5.5.3-1

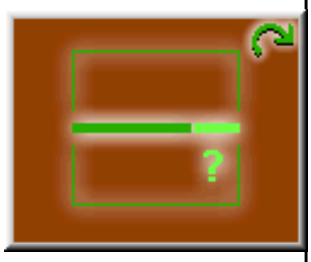


5.5.3-2a



5.5.3-2b

5.5.3-3



5.5.3-4

5.5.3 Changing modes of operation

Normal operation usually does not require any modification of the factory-adjusted modes of operation or their factory-adjusted state. In special cases, or if the need arises, different modes of operation or states may be changed by entry of a code.
Besides modes of operation this menu also contains various counters for measurement runs.

Select the Functions menu

- Press menu key **F1** in the main menu (**Fig. 5.5.3-1**).

A screen as shown in **Fig. 5.5.3-2a** FUNCTIONS appears. The modes of operation and their values shown in this screen can be changed via menu keys **F6** and **F5** and by rotating the wheel.
Fig. 5.5.3-2 FUNCTIONS
F1 Change to the USER CALIBRATION screen (see § 5.5.5.).
F2 Change to the TEXT EDITOR screen (see § 5.5.3.3).
F3 Unassigned.
F4 Unassigned.
F5 Change value of mode of operation
This menu key is only assigned if a value can be changed.
In the case of counters the key is unassigned.
F6 Select mode of operation.

- To return to the main menu (**Fig. 5.5.3-1**) press the ESC key.

Select mode of operation

- In the screen as shown in **Fig. 5.5.3-2a** press and hold down menu key **F6** (**Fig. 5.5.3-3**) and position the right and left arrows on the desired mode of operation (**Fig. 5.5.3-2a or 5.5.3-2b**) by rotating the wheel.
- Release menu key **F6**.

If the correct value is already displayed:

- Press the ESC key to return to the main menu (**Fig. 5.5.3-1**).

Change value

Once the correct mode of operation has been selected:

- Press and hold down menu key **F5** (**Fig. 5.5.3-4**) in the FUNCTIONS menu (**Fig. 5.5.3-2**), and set the desired value by rotating the wheel.
- Release menu key **F5**.

Note
For counters it is not possible to set values, e.g. counter for total spins/spins with O.K. In this case key **F5** has no function assigned and is empty.

Saving changed modes

The changed modes can also be stored permanently with mode “Saving modes of operation in permanent memory”, so that they are not cancelled when the machine is switched off but are retained in a permanent memory for future use until a new input is made and stored.

Settings changed, but not saved in the permanent memory will be reset to the previous value when the machine is turned off.
The possible changes of modes and the necessary inputs are described in the following.

5.5.3.1 List of modes of operation

Setting modes of operation as recommended
See § 5.2.1 Switching on the machine.
0* = No action
1 = Factory-adjusted modes of operations are set (state 1 is only shown briefly)
The selected mode of operation can be transferred to the permanent memory.

Saving modes of operation in permanent memory
0* = No storage
1 = Data are stored in the permanent memory
Store in the permanent memory – a three-tone signal is given to acknowledge acceptance.
If the mode stored in the permanent memory is to be changed, enter the desired state (e. g. on or off) for the mode in question and transfer it into the permanent memory.

Language selection
Selection of menu language. Several languages are available, e.g. Danish, English, German.

Volume of the audible signals
Scale of volume 0 to 100 (low - high).
Factory-adjusted to 50.*
The volume is not changed before the ESC key is pressed for quitting the mode.
The selected mode of operation can be transferred to the permanent memory.

Resolution of the unbalance amount readings
Selecting the resolution of unbalance readings in 1or 5g, or 0.05 or 0.25 oz increments.
Normal* = 5 g (0.25 oz) increments
Fine = 1 g (0.05 oz) increments
The selected mode of operation can be transferred to the permanent memory.

Suppression of minor unbalance amount readings
Off = Suppression off
On * = Suppression on
The selected mode of operation can be transferred to the permanent memory.

Setting threshold value for unbalance suppression in g
Selecting the limit (threshold) value for suppression of minor unbalance readings in Grammies, or ounces. The unit (g. or oz) depends on the settings made under “Measurement limit of the unbalance amount readings”.

Grammies:
Range 3.50 to 20.0 g
Factory-adjusted to 3.5 g
Ounces:
Range 0.25 to 2.00 oz
Factory-adjusted to 0.25 oz
The selected mode of operation can be transferred to the permanent memory.

Measurement limit of the unbalance amount readings
Selecting unbalance readings in Grammies or ounces, active when the machine is switched on.
Gram * = Readings in Grammies
Ounce = Readings in ounces
The selected mode of operation can be transferred to the permanent memory.

Number of turns
5 to 25 revolutions possible.
Factory-adjusted to 10.*
The selected mode of operation can be transferred to the permanent memory.

Note
Reducing the number of measurement revolutions will reduce the accuracy of measurement.

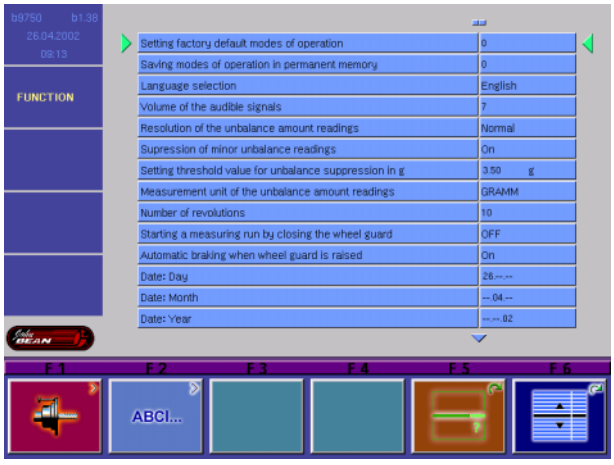
Starting the measuring run by closing the wheel guard
Off* = Start via START key
On = Start via wheel guard
The selected mode of operation can be transferred to the permanent memory.

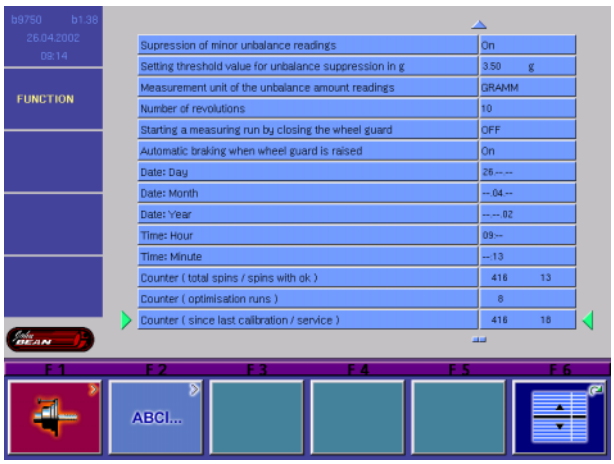
Automatic braking when the wheel guard is raised
Off = No braking

THE WHEEL ROTATES WHEN THE WHEEL GUARD IS OPEN. MAKE SURE THAT THE WHEEL IS NOT BLOCKED BY A TOOL OR SIMILAR ITEM. WEAR SAFETY GOGGLES AND TIGHTLY FITTING WORKING CLOTHES.

On* = Braking
The selected mode of operation can be transferred to the permanent memory.

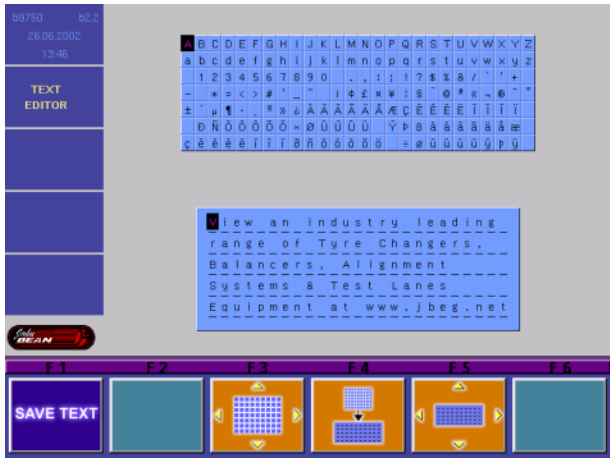
Date: Day
Actual date: selection of the day.
Date: Month
Actual date: selection of the month.
Date: Year
Actual date: selection of the year.
Time: Hour
Actual time: selection of the hour.
Time: Minute
Actual time: selection of the minute.
Note





5.5.3-2a/2b

5.5.3.3-1



5.5.3.3-2

Changes to the date and time are immediately active and
are retained when the machine is next started without needing to be saved to the permanent memory.

* = Factory adjusted mode

5.5.3.2 Counters

Every measuring run actually completed is stored. Maximum count is 999,999 runs. Once this number is reached, the counter is reset to zero. The information is primarily useful for statistical purposes, e. g. to obtain evidence of load intervals of parts when defective, or of monthly (yearly) use of the machine, etc. The measuring runs performed while the machine is on are transferred into the permanent memory and added when it is switched off. The counter cannot be reset or changed.

Counter (total spins / spins with o.k.)
Total spins = Total number of measuring runs
Spins with o.k. = Number of measuring runs where balance quality was considered OK

Counter (optimization runs)
Optimization runs = Number of optimizations or minimizations.

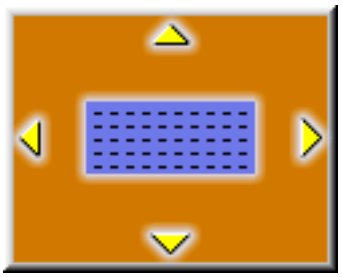
Counter (since last calibration / service)
Since last calibration = Number of measuring runs since the last calibration
Service = Number of measuring runs in service mode

5.5.3.3 Input of promotional text

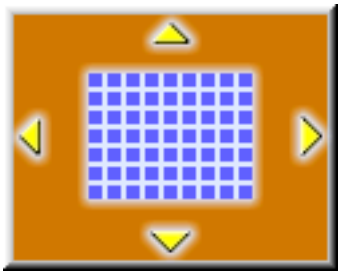
- Press menu key **F2** (**Fig. 5.5.3.3-1**) in FUNCTION screen.

The TEXT EDITOR screen (**Fig. 5.5.3.3-2**) with character set and text field appears. The cursor in each of these fields can be moved by means of its own toggle switch (**F3 and F5**).
Fig. 71 TEXT EDITOR
Assignment of menu fields
F1 Save text
F2 Not assigned
F3 Toggle key, four functions: move the cursor within the character set
F4 Transfer characters from the character set to the text field
F5 Toggle key, four functions: move the cursor within the text field
F6 Not assigned

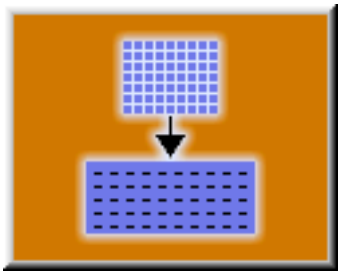
Text field
The text field comprises five lines of 25 character



5.5.3.3-3



5.5.3.3-4



5.5.3.3-5

5.5.3.3-6

positions each. The space between words must be filled with blanks and cannot be obtained simply by pressing the space bar as done with normal word processing systems.

Input of text (for example: JOHN)
It is recommended that the text to be entered be written down so as to facilitate input of the text and achieve a nice arrangement of the words on the screen.

- Press the menu key **F5** (**Fig. 5.5.3.3-3**) to move the cursor in the text field to the desired position (beginning of the first line in this example).
- Press the menu key **F3** (**Fig. 5.5.3.3-4**) to move the cursor in the character set to "**J**".
- Press the transfer key **F4** (**Fig. 5.5.3.3-5**).

The character "**J**" appears in the text field and the cursor advances automatically to the next character position, or to the beginning of the next line when the end of a line is reached.
Letters/characters transferred from the character set overwrite letters/characters at the current position of the cursor in the text field.

- Press the menu key **F3** (**Fig. 5.5.3.3-4**) to move the cursor in the character set to "**O**".
- Press the transfer key **F4** (**Fig. 5.5.3.3-5**).

The character "**O**" appears in the text field.

- Proceed analogously to transfer all the desired characters from the character set to the text field.

Saving or deleting text inputs
To store the input or changes in the permanent memory:

- Press the menu key F1 (**Fig. 5.5.3.3-6**).

or
To deselect the input or changes and retain the text since the last storage operation:

- Press the ESC key.

If the input is not confirmed with the menu key F1, the former text will be retained.

5.5.4 Optimization/ Weight minimization

5.5.4.1 General

Optimization is a finer form of matching.
During the Optimization/Minimization procedures the rim and tire are adjusted relative to each other on the basis of different unbalance measurements. This generally means that, where present, lateral and radial run-out and radial and lateral force variations are reduced and thus wheel running conditions optimized.
In addition, the mass (balance weight) necessary for balancing can be reduced.
If optimization is not desired, it is possible to achieve weight minimization (so-called matching).
This is e. g. possible if the rim does not exhibit geometric deformations, in other words when unsmooth wheel running conditions are a result of a non-uniform tire. In this case the unbalance of the rim can be readjusted relative to the unbalance of the tire such that the unbalances compensate each other and the smallest possible weight for unbalance correction is deter-mined.

5.5.4.2 Instructions for the optimization/ weight minimization programs

During tire changing operations, as required for optimization/ minimization, the wheel balancer can be used as a conventional wheel balancer by another operator.
For this purpose, interrupt the optimization/minimization program by pressing the ESC key or STOP key. The electronic unit will then store the current program step, the rim dimensions and all data so far measured. The menu field “Optimization interrupted” (**Fig. 5.5.4.2-2**) appears.
By pressing the menu key associated with this menu field you can proceed with the program exactly where it has been interrupted.
The screen will view how to proceed.
After interruption by operation of the ESC key or STOP key or the balancing key, the readings refer to the unbalance of the latest measuring run.
If another optimization/minimization run is to be started after an interruption, it is sufficient to depress the menu key for optimization/ minimization (**Fig. 5.5.4.2-1**).
If a measuring run has to be interrupted by operation of the STOP key (e. g. because wheel is incorrectly clamped or in the case of an emergency), the machine will switch back to the previous program step. Optimization/minimization is then continued simply by entering the valve position of the wheel once again.
During optimization/minimization a measuring run always has to be started with the START key. Starting by closing of the wheel guard is not operative in this case.
Compensation of unbalance of the clamping device is can-celled by starting an optimization or minimization run.

5.5.4.2-2

5.5.4.2-1

5.5.4.3-1

5.5.4.3-2

5.5.4.3-3

5.5.4.3-4

5.5.4.3-5

5.5.4.3 Start optimization/weight minimization

- Make sure the tire is correctly mounted on rim and inflated to specified inflation pressure (mounting guide rib of the tire must be correctly seated).
- Clamp the wheel.
- Enter correct rim dimensions, or check existing inputs for correctness.
- Starting from the main menu or the BALANCING screen press the menu key F6 Optimization menu.

The OPTIMIZATION MENU screen (**Fig. 5.5.4.3-1**) is displayed.
If an optimization/weight minimization result has already been saved, the screen OPTIMIZATION MENU (**Fig. 5.5.4.3-2**) will be displayed.

Start weight minimization

- Press the menu key F5.

The MINIMIZATION 1 screen (**Fig. 5.5.4.3-3**) is displayed.

Start weight optimization

- Press the menu key F6.

The OPTIMIZATION 1 screen (**Fig. 5.5.4.3-5**) is displayed.

Continue optimization or weight minimization

- Press the menu key F4.

The screen in which optimization/weight minimization was
previously interrupted is displayed.

Fig. 5.5.4.3-3 MINIMIZATION 1
(First measuring run of tire/rim assembly)

- Readjust the wheel such that the valve is exactly perpendicular to and above the main shaft.
- Enter the valve position by pressing menu key F6.

The MINIMIZATION 2 screen (**Fig. 5.5.4.3-4**) is displayed.

Fig. 5.5.4.3-4 MINIMIZATION 2
START? is signaled on the screen.

- If necessary, go back by pressing menu key F5.
- Press the START key.

A measuring run is performed.

- Next proceed as for optimization, starting at the screen as shown in § 5.5.4.5.

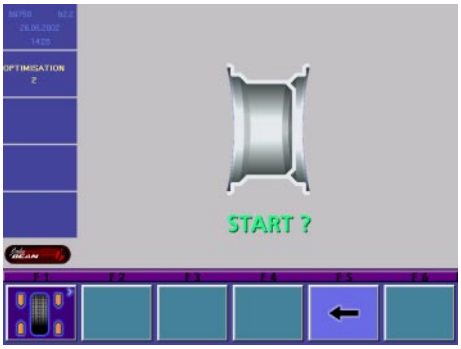
5.5.4.4 Start optimization

- Clamp the rim only on the balancer.
- Enter correct rim dimensions, or check existing inputs for correctness.
- Starting from the main menu or the BALANCING screen press the menu key F6 Optimization menu.

The OPTIMIZATION MENU screen (**Fig. 5.5.4.3-5**) is displayed.

Fig. 5.5.4.3-5 OPTIMIZATION 1
(Compensation run of rim only)

- Readjust the wheel such that the valve is exactly perpendicular to and above the main shaft.

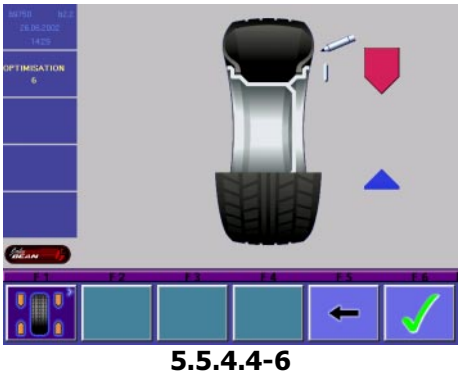


5.5.4.4-2

5.5.4.4-3

5.5.4.4-4

5.5.4.4-5



5.5.4.4-6

- Enter the valve position by pressing menu key F6.

The OPTIMIZATION 1 screen (**Fig. 5.5.4.4-2**) is displayed.

Fig. 5.5.4.4-2 OPTIMIZATION 2
START? is signaled on the screen.

- If necessary, go back by pressing menu key F5.
- Press the START key.

A compensation run is performed.
The screen as shown in **Fig. 5.5.4.4-3** is displayed.

Fig. 5.5.4.4-3 OPTIMIZATION 3

- Mount the tire correctly on the rim and inflate to specified inflation pressure (make sure the mounting guide rim of the tire is correctly seated).
- Confirm by pressing menu key F6.

The OPTIMIZATION 4 screen (**Fig. 5.5.4.4-4**) is displayed.

Fig. 5.5.4.4-4 OPTIMIZATION 4
(first measuring run of tire/rim assembly)

- Clamp the wheel on the balancer.
- Readjust the wheel such that the valve is exactly perpendicular to and above the main shaft.
- Enter the valve position by pressing menu key F6.

The OPTIMIZATION 5 screen (**Fig. 5.5.4.4-5**) is displayed.

Fig. 5.5.4.4-5 OPTIMIZATION 5
START? is signaled on the screen.

- If necessary, go back by pressing menu key F5.
- Press the START key.

A measuring run is performed.
The OPTIMIZATION 6 screen (**Fig. 5.5.4.4-6**) is displayed.

5.5.4.5 Continue minimization and optimization

Fig. 5.5.4.4-6 OPTIMIZATION 6
(second measuring run of tire/rim assembly)
From this screen weight minimization is carried out in the same way as optimization.

- Rotate the wheel into marking position following the arrows.
- Provide a single mark on the tire outer side exactly perpendicular to and above the main shaft.
- If necessary, go back by pressing menu key F5.
- Confirm by pressing menu key F6

The OPTIMIZATION 7 screen (**Fig. 5.5.4.5-1**) is displayed.

Fig. 5.5.4.5-1 OPTIMIZATION 7

- Readjust the tire on the rim such that the single mark coincides with the valve (use tire changer).
- Confirm by pressing menu key F6.

The OPTIMIZATION 8 screen (**Fig. 5.5.4.5-2**) is displayed.

Fig. 5.5.4.5-2 OPTIMIZATION 8
(3rd measuring run of tire/rim assembly)

5.5.4.5-1

5.5.4.5-2

5.5.4.5-3

5.5.4.5-4

5.5.4.5-5

- Clamp the wheel on the balancer.
- Rotate the wheel such that the valve is exactly perpendicular to and above the main shaft.
- Enter the valve position by pressing menu key F6.

The OPTIMIZATION 9 screen (**Fig. 5.5.4.5-3**) is displayed.

Fig. 5.5.4.5-3 OPTIMIZATION 9

START? is signaled on the screen.

- If necessary, go back by pressing menu key F5.
- Press the START key.

A measuring run is performed.

The screen OPTIMIZATION 10, outside (**Fig. 5.5.4.5-4**) or the screen OPTIMIZATION 10, inside (**Fig. 5.5.4.5-5**) is displayed.

Fig. 5.5.4.5-4 OPTIMIZATION 10, outside

- Rotate the wheel into marking position following the arrows.
- In this position provide a double mark on the tire outer side exactly perpendicular to and above the main shaft.
- If necessary, go back by pressing menu key F5.
- Confirm by pressing menu key F6.

The OPTIMIZATION 11 screen (**Fig. 5.5.4.5-6**) is displayed.

Fig. 5.5.4.5-5 OPTIMIZATION 10, inside

- Rotate the wheel into marking position following the arrows.
- In this position provide a double mark on the inside of the tire, exactly perpendicular to and above the main shaft.
- If necessary, go back by pressing menu key F5.
- Confirm by pressing menu key F6.

The OPTIMIZATION 11, turn screen (**Fig. 5.5.4.5-7**) is displayed.

Fig. 5.5.4.5-6 OPTIMIZATION 11

- Readjust the tire on the rim such that the double mark coincides with the valve (use tire changer).
- Confirm by pressing menu key F6.

The OPTIMIZATION 12 screen (**Fig. 5.5.4.5-8**) is displayed.

Fig. 5.5.4.5-7 OPTIMIZATION 11, turn

- Turn the tire over on the rim.
- Make the double mark coincide with the valve (use a tire changer).
- Confirm by pressing menu key F6.

The OPTIMIZATION 12 screen (**Fig. 5.5.4.5-8**) is displayed.

Fig. 5.5.4.5-8 OPTIMIZATION 12

(4th measuring run of tire/rim assembly)

- Clamp the wheel on the balancer.
- Rotate the wheel such that the valve is exactly perpendicular to and above the main shaft.
- Confirm the valve position by pressing menu key F6.

5.5.4.5-6

5.5.4.5-7

5.5.4.5-8

5.5.4.5-9

5.5.4.5-10

The OPTIMIZATION 13 screen (**Fig. 5.5.4.5-9**) is displayed.

Fig. 5.5.4.5-9 OPTIMIZATION 13

START? is displayed on the screen.

- If necessary, go back by pressing menu key F5.
- Press the START key.

A measuring run is performed.

The OPTIMIZATION 14 screen (**Fig. 5.5.4.5-10**) is displayed.

Finish weight minimization / optimization

Fig. 5.5.4.5-10 OPTIMIZATION 14

If the wheel running conditions are optimal, the following codes can be displayed:

H0 Wheel running conditions cannot be improved by optimization.

H1 Further optimization not recommended but feasible.

H2 Weight minimization is recommended, optimization can achieve no further improvement.

If optimization has been performed:

The pictograph OK shows that optimization was carried out correctly and has been completed successfully.

If minimization has been performed:

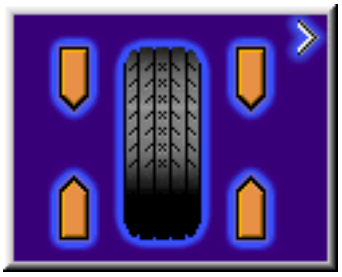
The pictograph OK shows that minimization was carried out correctly and has been completed successfully.

To return to the BALANCING screen:

- Press menu key F1 (**Fig. 5.5.4.5-10**) or F6 (**Fig. 5.5.4.5-12**).

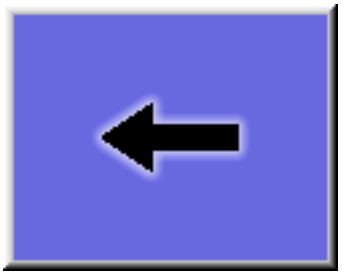
To perform minimization:

- Press menu key F5 (**Fig. 5.5.4.5-13**).



5.5.4.5-11

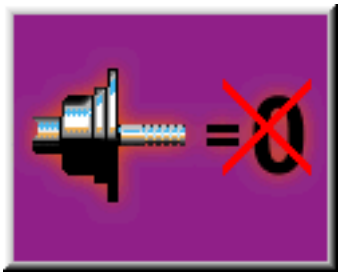
5.5.4.5-12



5.5.4.5-13

1

5.5.5-1



5.5.5-2

5.5.5 Performing a compensation run

All clamping and centering means are balanced in our works to within a certain tolerance.
To compensate for any residual unbalance that might be left in the clamping means, it is recommended that an electrical compensation run be performed after switching on the machine or after changing the wheel adapter, especially a motorcycle wheel adapter. This mode cannot be transferred into the permanent memory.

- Starting from the screen main menu (**Fig. 5.5.5-1**) press the menu key F2 for electrical compensation of unbalance in clamping means (**1, Fig. 5.5.5-1**).
- Start the compensation run with the START key.

The compensation run takes longer than a regular measuring run. After the compensation run the pictograph = **0** showing that compensation has been carried out appears above menu key F1.
This mode of operation is retained until deleted by pressing menu key F2 (**Fig. 5.5.5-2**) again, by starting readjustment or an optimization run, or by switching off the machine.

6 Maintenance.

This unit is designed to bring you a long service. During the startup mode the operator should check if all indicators and displays light up.

If the operator correctly shuts down (Chapter 5.2.3) at the end of his shift, no additional maintenance is required.

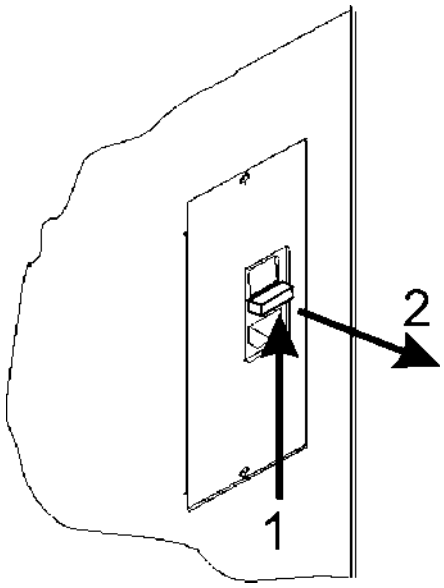
This unit is not to be opened by the operator, apart from the instructions hereafter.

6.1 Storage.

When the unit will be stored for a several weeks or longer, prepare the unit correctly:

- Shut down the unit properly, refer to Chapter 5.2.3.
- Remove the stub shaft from the flange.
- Apply a light, non-corrosive oil onto all threads and cones.
- Wrap oiled items in paper to keep the parts dustfree.

When the unit will be put into use again, clean all oiled parts.



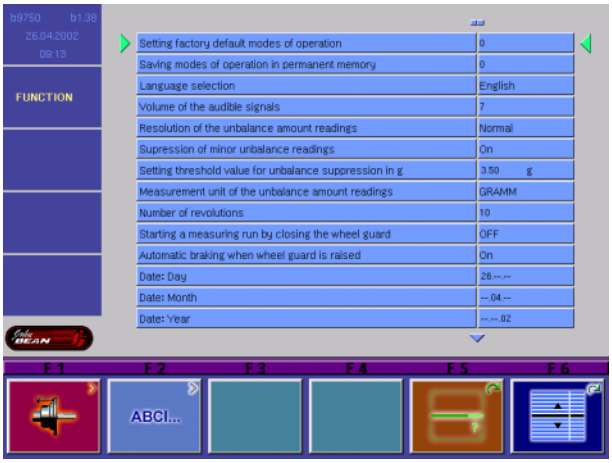
6.2-1

6.2 Changing the mains fuse.

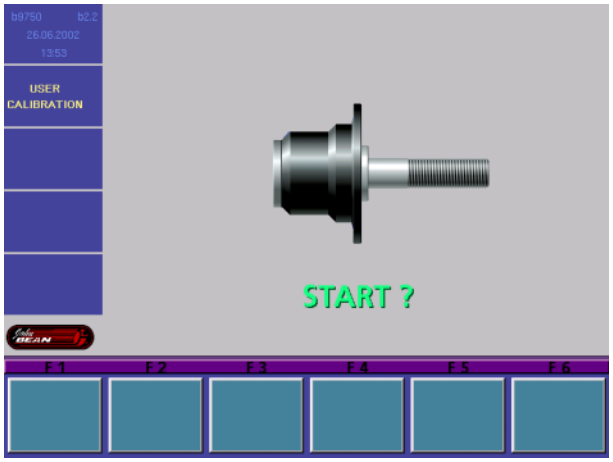
Refer to Figure 6.2-1.

- Switch off the unit.
- Unplug the power cord from the power outlet.
- Remove the power cord from the mains cable inlet.
- Press the lip, centered in the fuse holder, upwards.
- Pull out the fuse holder.
- Replace the fuse by an identical rated one.
- Bring unit back to its original state.

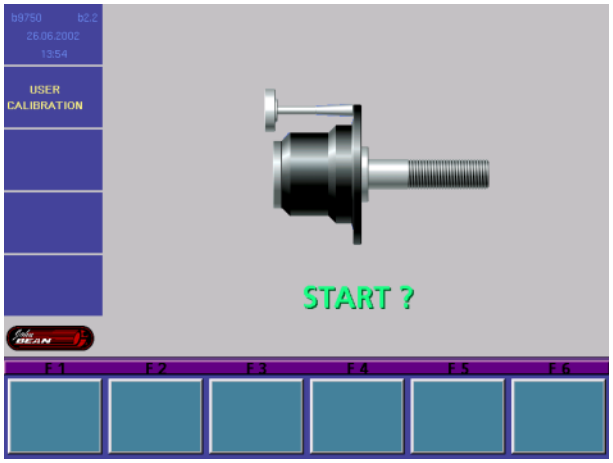
6.3.1-1



6.3.1-2



6.3.1-3



6.3.1-3

6.3 Calibration procedure.

This chapter contains the calibration procedures that are accessible to the user.

If several measuring runs are necessary to balance a wheel because balance weight size and position have to be readjusted repeatedly, this is often due to insufficient measurement accuracy.
In such case the operator has the possibility of readjusting the machine.
For readjustment by the operator a calibration weight is sup-plied with the machine (kept on the right at the back of the weight box).
A calibration run takes longer than a regular measuring run.
Electrical compensation of adapter unbalance, if carried out, will be cancelled by readjustment.

IMPORTANT:READJUSTMENT MUST BE CARRIED OUT USING THE CLAMPING ADAPTER SUPPLIED WITH THE MACHINE FROM OUR WORKS.

Readjustment

- Make sure no wheel or other clamping means is clamped on the machine.
- Press menu key F1 in the main menu (**Fig. 6.3.1-1**) - if necessary return to the main menu by pressing the ESC key.

The FUNCTION screen (**Fig. 6.3.1-2**) appears.

- Press menu key F1 in the FUNCTION menu (**Fig. 6.3.1-2**).

The screen USER CALIBRATION (**Fig. 6.3.1-3**) appears.

- Close the wheel guard, and press the START key to carry out a first readjustment run (long measuring run - to detect residual unbalances, if any).

During the calibration run three points are displayed in place of the start symbol. On completion of the first readjustment run a screen as in **Fig. 6.3.1-4** appears.

- Screw the calibration weight into the threaded bore pro-vided for this purpose in the basic body of the wheel adapter (**Fig. 6.3.1-4**).
- Press the START key to carry out a second readjustment run with the calibration weight fitted on the adapter (to detect the correction values).

On completion of the second run the electronic unit processes the data determined in the calibration runs and enters them into the permanent memory. On completion of the processing operation a three-tone signal is given and readjustment is completed.

- Once readjustment is completed, be sure to remove the calibration weight from the wheel adapter and put it back in its designated place.
- Press the ESC key to return to the main menu.

7 Trouble shooting.

If a problem with the wheel balancer appears, proceed in the following order to solve the problem:

1. Rethink the last steps taken.
   Did you work according to the manual?
   Did the unit work as described and expected?

2. Check the unit according to the list in this chapter.

3. Call your local sales agent for technical service.

The set up of this chapter is:
Problem
1. Possible cause #1
- Possible solution(s)
2. Possible cause #2
- Possible solution(s)

When switched on, nothing lights up.
1. Power switch in OFF position (not applicable for handspin balancers).
- Set power switch in ON position.
2. No power cable connected.
- Connect power cable to power outlet.
3. No mains power
- Check power supply, power system fuses
4. Fuse(s) of the unit blown.
- Replace fuse(s) of the unit.
  If the fuse(s) has (have) recently been replaced, call service to check the unit.

When switched on, a beep is heard for 1 second.
Configuration error.
- Call Service

When switched on, the unit beeps with a certain sequence.
- Note down the sequence.
- Call Service

Display appears to freeze or lock up.
1. The unit may be in a program, waiting for a specific action.
- Finish the program currently in use.
- Switch off the unit.
  Wait for 20 seconds, switch on the unit.
  Proceed.
2. Power to the balancer may have been interrupted.
- Switch off the unit.
  Wait for 20 seconds, switch on the unit.
  Proceed.
- If this happens frequently, have your power system checked. If that is okay, call service.

Wheel does not spin automatically (not for handspin unit).

1. Tilting frame switch malfunctions.
- Check if the tilting frame switch is mechanically being activated by the tilting frame.
2. Gauge arm not in home position
- Restore gauge arm to home position.
- Call service if not possible.
3. Electrical malfunction.
- Call service.

Gauge arm input differs from rim dimension stated on rim or tyre.

1. Did you position the gauge arm correctly?
- Refer to Chapter 5.3.1.
2. Check the offset input of the gauge arm by doing input by hand.
- Refer to the scale on the gauge.
- If not identical, proceed with step 4.
3. Check the diameter of the spot on the rim where the diameter has been measured.
- If not identical, proceed with step 4.
4. A calibration is required.
- Have the gauge arm calibrated.

Balancing results are inconsistent.

1. The balancer may not be installed properly.
- Make sure the unit rests on its 3 feet only.
- Make sure the floor is not relaying shocks from e.g. passing trucks to the unit.
2. The wheel may be mounted incorrectly.
- Check the stub shaft, cones and adaptors for play.
- Use an adaptor plate to eliminate play.
- Perform a Vibratory System calibration.
3. The electronics are faulty.
- Call service.

A mode, display segment or indicator is continuously shown on the display.

1. A “brown out” (power dip) may have occurred.
- Switch off the unit.
  Wait for 20 seconds, switch on the unit.
- Call service.

7.1 System messages.

The wheel balancer can show messages to the operator. These may be error related (E-codes) or service related (C-codes). The codes will be described in the following chapters.
Whenever a code appears:
- note it down
- look up the code in the list. If the code is not described, call service.
- perform the steps described.

The setup of this chapter is:
Code
Description
- Step(s) to be performed.

7.1.1. Error codes

Errors in operation	**- Error code E**
Warnings	**- Error code H**
Fatal error code	**- 300 or C10**

E1
Rim dimensions were entered incorrectly, or incompletely.
- When the error code is read out, enter data once again.

E2
Wheel guard is not closed.

E3
Gauge arm for distance and rim diameter is not in home position.

E5
Range of electrical compensation exceeded (wheel adapter has unacceptable unbalance).
- Press STOP key.
- Check wheel adapter, repeat compensation run.

E6
The calibration weight was not fitted for readjustment.
- Press STOP key.
- Repeat readjustment.

E7
With this wheel type it is not possible to choose a balancing mode.
- If necessary, choose another wheel type.

E8
Valve position was not entered in electronic unit (error code only in optimization or minimization programs).

- Position valve exactly perpendicular to and above main shaft and press the OP key.

E9
Optimization/minimization was carried out incorrectly.
1. Wheel was not exactly centered on clamping means during
every run.
2. Tire was eccentric relative to rim for at least one time.
3. Valve position was incorrectly indexed for at least onetime,
and entered incorrectly.
4. Wrong mark (single or double mark) was used for reference
when readjusting the tire.
5. Wheel got out of place on the clamping means during the
measuring run (sudden start or stop, or the like).
6. Wrong wheel dimensions were entered.

- Repeat the optimization procedure.

E15
Corrective term of readjustment is out of range.
During readjustment values were determined which exceed, or fall short of, the given adjustment value. The error code is a warning only, press the C key to transfer the corrective terms into the permanent memory.

- Use clamping means supplied with the machine, or have basic calibration carried out (service).

E16
During the first readjustment run by the operator the calibration
weight was fitted by mistake.

- Unscrew the calibration weight and start the measuring run again.

E17
Wheel slips on clamping means.
The clamping nut is not well tightened, the main shaft accelerates too quickly. The machine will stop.

- Firmly tighten the clamping nut, or in special cases press
the START key a little bit longer.

E83
During a measuring run the measured data have been made useless under the effect of outside pulses (e. g. vibrations) and measurement was interrupted.

- Repeat the measuring run.

E88
The rotating speed of the main shaft exceeds the safety limit.

E89
A key is jammed.
- Find and release the jammed key, call service if necessary.

E92
Gauge arm for distance and rim diameter is defective.
- Call service.
- As long as the gauge arms defective, enter distance and nominal rim dimensions by pressing the function keys and rotating the wheel (§ 5.3.3.3).

H0
Wheel running conditions cannot be improved by optimization.

H1
Further optimization not recommended but feasible.

H2
Weight minimization is recommended, optimization can achieve no further improvement.

H3
Optimization not recommended.

H20
Correction plane cannot be re-located with the gauge arm for distance and rim diameter.
- Measure the correction plane and switch to dynamic unbalance reading.

H21
The indexed position is not the one for the correction plane in which the adhesive weight is to be fitted with the gauge arm.
- Index the correct position for this correction plane prior to fitting the adhesive weight.

H80
Readjustment feature not foreseen during basic calibration.
Consequently readjustment by the operator is not possible.
- _ Press on STOP key, error code is deleted.
- _ Call service for calibration of the machine.

H82
The self-test was disturbed (e.g. by rotating the wheel).
- The message is displayed for 3 seconds, after which the measurement is repeated (max. 10 times), or aborted by pressing the STOP key.

H90

The wheel was accelerated too slowly or decelerated too slowly after a measuring run.
If the main shaft does not reach the required speed, check whether the wheel shaft lock is actuated or whether the weight of the wheel is excessive. In this case:

- Release main shaft lock.
- Make sure that the shaft with clamped wheel can rotate freely.
- Turn the wheel by hand and then press on START key.
- If the error cannot be remedied: call service.

H91
Speed variations during measuring run. The main shaft lock may be operated.

- Release main shaft lock.
- Make sure that the shaft with clamped wheel can rotate freely.
- Repeat the measuring run.

Fatal error codes
The display shows an alphanumeric code consisting of six digits and/or letters. When messages are read out starting 300XXX the error occurred during the internal operational check, if it is C10XXX it occurred during the self-test after the machine was switched on.

- If necessary, call service.

300 800 or C10 800
Line voltage under 170 V. Balancing is feasible if the motor can drive the main shaft to the measuring speed. Wheel data may be lost.

- Bring the line voltage to within a range of 200 - 230 -240 Volts with an input transformer.

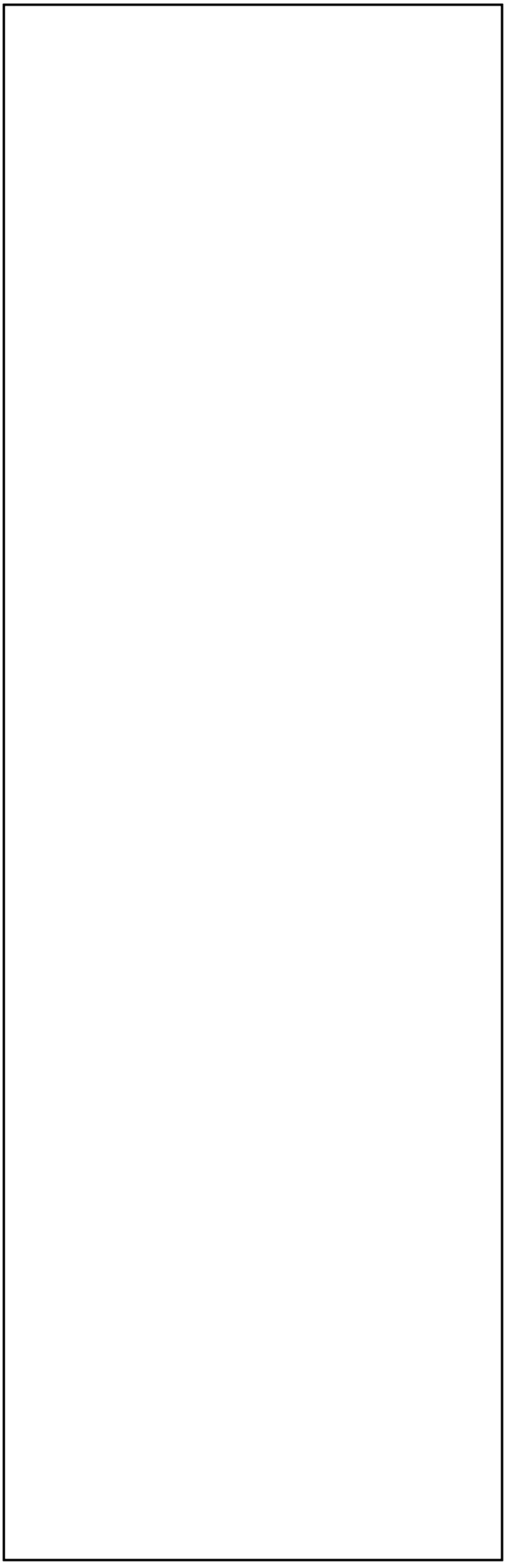
300 801 or C10 801
Line voltage over 265 V. Damage to the electronic unit of the machine is likely!

- Bring the line voltage to within a range of 200 - 230 -240 Volts with an input transformer.

300 804 or C10 804
Line voltage over 275 V. Damage to the electronic unit of the machine is likely! Turn off mains switch. Any damage resulting from repeated occurrence of this error code is not covered by the guarantee.
_ Bring the line voltage to within a range of 200 - 230 - 240 Volts with an input transforme.

Error messages by means of acoustic signals
Error messages can also be indicated by means of acoustic signals.
The service technician can locate and eliminate the corresponding error by means of the number of tones, their frequency
and duration (long/short) and the length of the pauses.

- Switch off the machine.
- Call service.



7.1.2 C-codes.

The operator does not have access to C-codes.

8 Disposal.

When it is decided to dispose of the unit, contact your reseller for a priceoffer or for the regulations on disposal that are applicable for the unit.

9 Appendices.

This chapter contains additional information to the unit. If a relation is made to the exact configuration of the unit, please note that the exact configuration can be different in your country. Refer to the order confirmation for details.

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