INTRODUCTION

The *9.7* is the CRT motor driven balancer from John Bean. Designed to make the positioning of stick-on weights as quick and simple as possible.
The *9.7* has the following new features:

- The operator is guided through the work steps by colour screens and icons displayed on a screen to VGA standard (640 x 480 pixels).
- The rim/machine distance and rim diameter can be entered automatically via guage arm.
- The distance (offset) diameter gauge can be applied inside the rim disc so that the distances and diameters of the correction planes for adhesive weights can be determined and entered in the weight placement modes Alu 2S (Alu Plus) and Alu 3S.
- With the *9.7* the main spindle can be locked by means of a pedal-operated mechanical spindle lock.
- If a 230 voltage supply is not available, the line voltage has to be brought into a range of 200 - 240 volts using an auto-transformer, which is available as an optional extra.
- Enhanced optimization procedure. If optimization produces no improvement, the system checks whether it is possible to reduce the balance weights (weight minimization) and informs the operator.
- Behind-the-spokes placement (HSP mode) for hidden adhesive weights is supported.
- The residual unbalance of the adaptor can be measured and compensated (subtracted).
- The number of measurement runs carried out can be read out in screen 3 «Selecting modes of operation».
- A key is provided for selection of unbalance readings in grams or ounces during balancing.
- The volume of audible signals can be adjusted and therefore adapted to the ambient noise level.
- Three of the four circuit boards of the electronic unit feature SMD technology. The power supply consists of a primary switch mode power supply module.
- The balancer features rugged silicon rubber keys with snap action and 2 mm key travel.

WHEEL MOUNTING ACCESSORIES

Standard Accessories

Quick-Release Hub Nut

Spacer Ring

Large Cone - 3.5 x 5.25

Medium Cone - 2.875 x 3.75

Medium Cone - 2.375 x 3.125

Small Cone - 1.75 x 2.5

Universal Drum

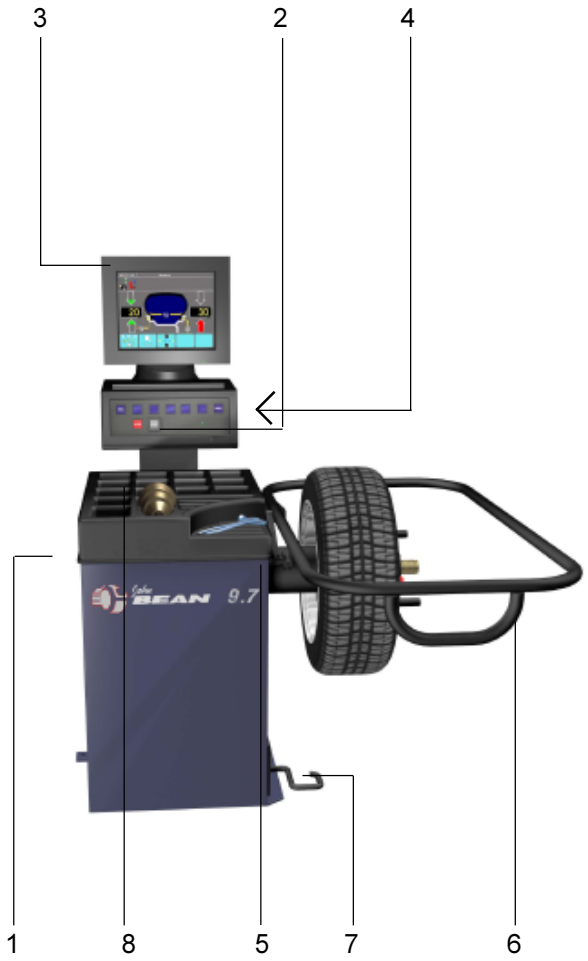
Universal Drum Cushion

Callipers

FUNCTIONAL DESCRIPTION

The opposite diagram shows a view from the front of the complete assembled Wheel Balancer.

1. Mains Switch
2. Operator's Control Unit with Key Pad
3. Monitor
4. Calibration Weight
   (Located behind Monitor Mount)
5. Rim Diameter Distance Gauge
6. Hinged Wheel Guard
7. Spindle Lock Pedal
8. Storage Tray



Gauge Arm

Fig. 11 Gauge for rim diameter and distance rim/ machine

1 Gauge arm with gauge head
2 Gauge head for detection of rim dimensions function of the different rim profiles and to fit adhesive weights in the weight holder.

The gauge head is used for precise attachment of adhesive weights in correction planes accessible from the left (fitting position identical with position previously identified).

The balance weight is placed in the holder is approached to the fitting position (finding the correct position). The weight is then moved upwards towards the rim and pressed against the rim using the applicator.

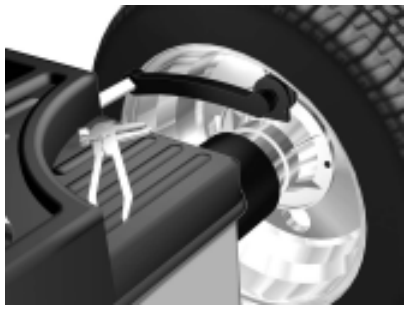
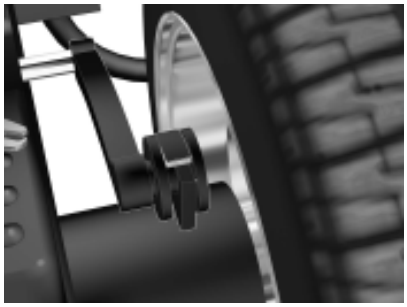


Fig. 11



Main Spindle Lock

Fig. 12 Pedal of main spindle lock

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

The main spindle 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.

Fig. 12

Keypad

1 ESC key
2 Menu keys (associated with a menu field)
3 HELP key
4 Loudspeaker outlet
5 Pilot light, operating voltage ON
6 START key
7 STOP key (emergency stop)

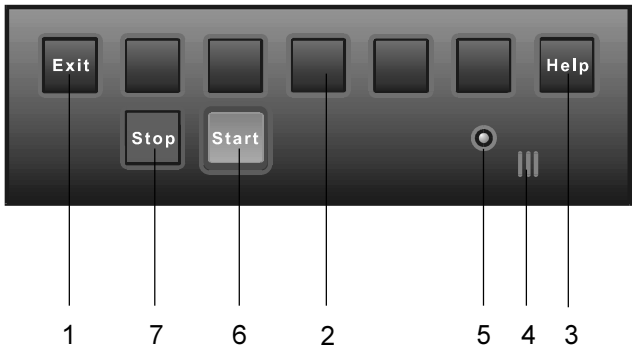


Fig 13

Description of keys

1 ESC key
- switch back to the previous screen (status)
- delete error codes and helpful information from the screen

2 Menu keys
- Carry out or continue certain functions or steps of operation.

The meaning of the menu keys is shown by associated icons (symbols) on the screen. The most important functions of operation are signalled by highlighted menu fields, thus requesting the operator to press the associated menu key.

3 HELP key

- Display useful information to explain a situation and in case of error codes - provide hints for remedy

4 Pilot light, operating voltage ON
- The LED lights up when the mains switch is turned on and the operating voltage is available.

5 START key

- Start the measuring run.
  By setting the relative mode of operation accordingly it is possible to start measurement by closing the wheel guard (see “Changing modes of operation”).

6 STOP key
- stop a measuring run that has just been initiated and brake the wheel

The STOP key also has an emergency stop function. **7**

Controls and displays

The screen

Fig. 14 Screen with display fields - example of display

1 Heading of screen
2 Information line of screen
3 Display field of screen
4 Menu fields 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.

Field 1 - Heading

Number of the installed program version

Screen number and title

Date and time

Field 2 - Information line

Request to act (prompting icons/hints)

Error codes (icons on red background)

Helpful information (HELP key)

Display when special features are entered

OK signal for correct balancing or optimization/ minimization

Field 3 - Display field

Wheel type and rim dimensions

Balancing modes

Direction of orientation and correction position (location of unbalance)

Amount of unbalance

Field 4 - Menu fields

Icons illustrating special features are viewed in the five menu fields. Under every menu field is the associated menu key which is used to call the feature illustrated. If operation of a menu key is specially recommended (depending on situation), the respective menu field will be highlighted.

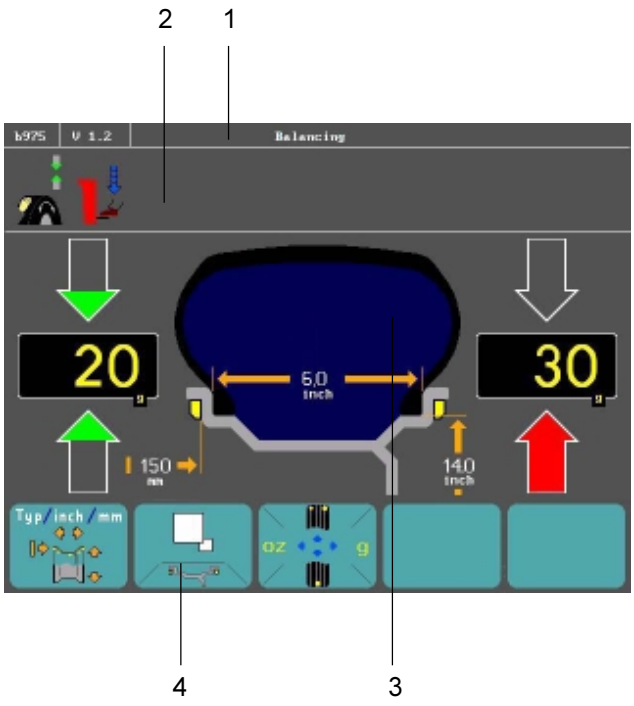


Fig. 14

Screen saver and energy saving mode

In order not to damage the display during a longer pause, a timer (screen saver) will be shown on the screen.

After a further 10 minutes the energy saving mode is activated. The screen goes dark and only the pilot light (Fig. 13, Item 5) is lit.

The screen saver and energy saving mode are switched off in the default setting. They can be activated by setting the corresponding mode of operation (see page 38).

The screen will return to the last image visible on the screen before the pause upon operation of any of the keys, pressing the pedal or moving the gauge arm.

Help information

To call help information:

Press the HELP key (Fig. 13, Item 3).
Help information explains a particular situation or - in the event of error codes - gives hints for remedy.

To delete help information again:

Press the ESC key (Fig. 13, Item 1).

A sliding bar **(Fig. 15, Item 2)** in the right–hand margin of the help field **(Fig. 15, Item 1)** indicates that the text is too long to fit into the help field.

The text can be shifted up or down using the HELP key **(Fig. 13, Item 3)** so that all lines of text are visible. The position of the sliding symbol on the sliding bar shows whether you are at the beginning or end of the text.

Fig. 15.A:
Sliding symbol at the top of the sliding bar indicates the beginning of the help information. Press the HELP key on the bottom to view the end of the text.

Fig. 15.B:
Sliding symbol at the bottom of the sliding bar indicates the end of the help information. Press the HELP key on the top to view the beginning of the text.

Icons

Icons are viewed on the screen in two display fields.

Menu key pad reference/prompt to press on a menu key, depending on the situation;

Recommendations to act are viewed in the menu field on a **light green** background.

Helpful hints - requests to execute a step;
viewed in the information line on a **blue–grey** background

Hints on operator errors and remedy; viewed in the information line on a **red** background.

Notes on operating conditions (e.g. compensation of adaptor unbalance); viewed in the information line on an **orange** background.

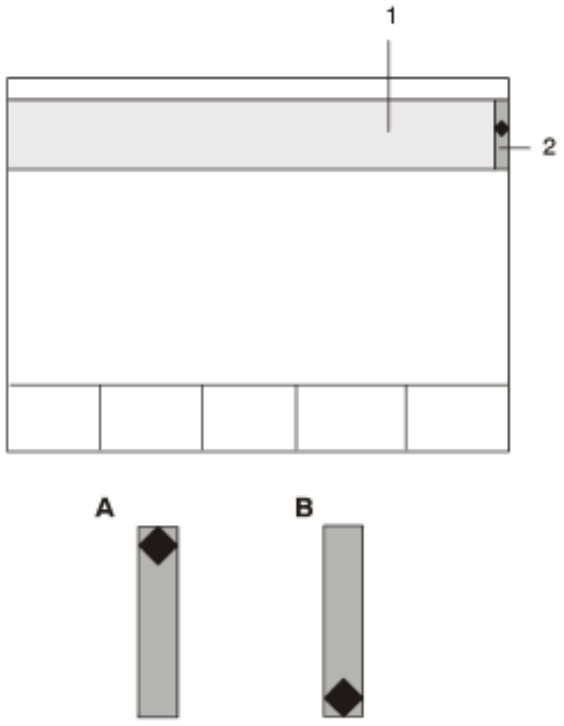


Fig. 15

Icons - Meaning and sector where they are shown

1 Change to the screen for selecting modes of operation (menu field)

2 Start balancing program (menu field)

3 Carry out compensation run
(menu field)

4 Delete the compensation values
(menu field)

5 Change to the screen –Wheel data–, and enter wheel type, balancing mode and rim dimensions (menu field)

6 Toggle switch, two functions
Press on top:
Precision reading of unbalance, no suppression of minor unbalance readings
Press on bottom:
Reading of amount and location of unbalance for conventional balancing run with clip weights - comes up only as long as the key is pressed (quick reading).
(menu field)

7 Toggle switch, four functions
Press on top: dynamic unbalance
Press on bottom: static unbalance
Press on left: balance weight reading in ounces
Press on right: balance weight reading in grammes
(menu field)

8 Start optimization program
(menu field)

9 Change to the screen –Wheel type– and choose the wheel type
(menu field)

10 Wheel type 1, –standard–, nominal size in inches
(menu field)

11 Wheel type 2, –standard–, nominal size in mm
(menu field)

12 Wheel type 3, –special wheel–, actual correction dimensions, no nominal size
(menu field)

13 Wheel type 4, –light–truck flat base rim–
(menu field)

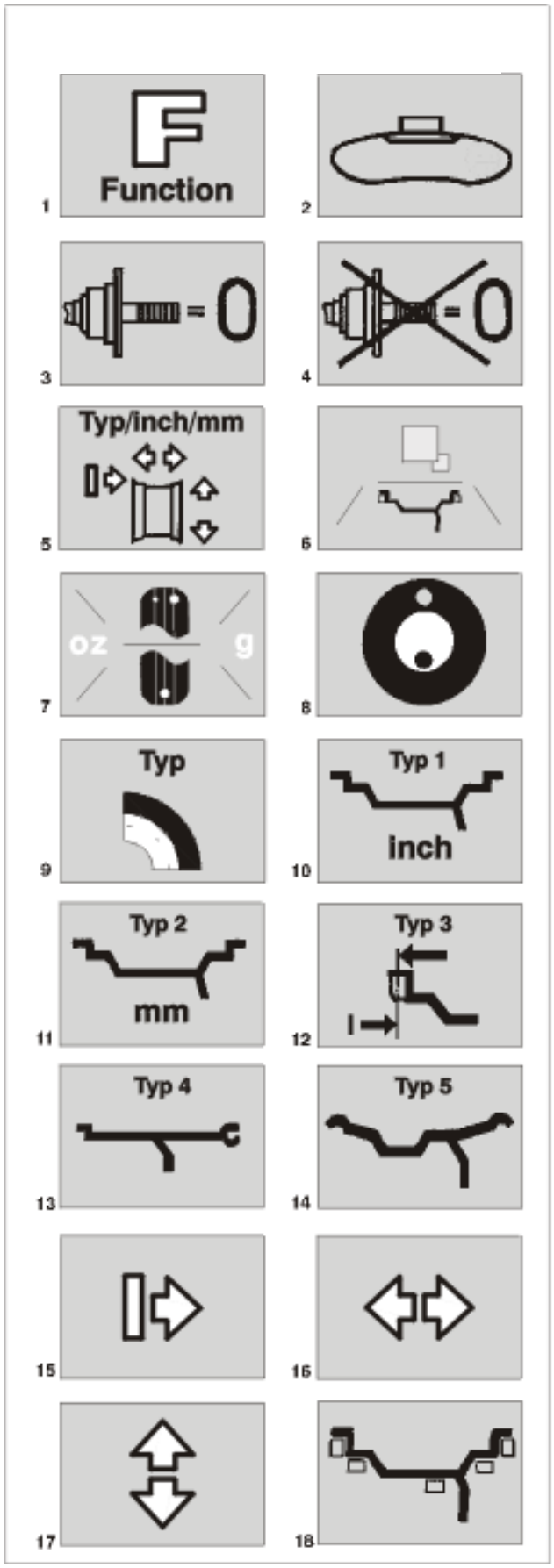
14 Wheel type 5, –15 deg. taper rim–
(menu field)

15 Distance left correction plane/machine
(menu field)

16 Rim width
(menu field)

17 Rim diameter
(menu field)

18 Change to the screen –Balancing mode– and choose the balancing mode
(menu field)



19 Switching on Alu S during selection of the balancing mode: switch from Alu 2 to Alu 2 S, switch from Alu 3 to Alu 3 S (menu field)

20 Switching to Alu during selection of the balancing mode: switch from Alu 2 S to Alu 2, switch from Alu 3 S to Alu 3 (menu field)

21 Rotate wheel to enter rim dimensions or other data (information line/menu field)

22 Press START key (information line)

23 Adjust valve perpendicular to and above main spindle (only rim clamped) - Store valve position (information line/menu field)

24 Adjust valve perpendicular to and above main spindle - Store valve position (information line/menu field)

25 Request to fit tyre (information line)

26 Index wheel to correction position, provide single mark on right tyre side (information line)

27 Index wheel to correction position, provide double mark on left tyre side (information line)

28 Make single mark coincide with valve (information line)

29 Make double mark coincide with valve (information line)

30 Turn–over of tyre on rim recommended (information line)

31 Turn–over of tyre not possible or not desired (menu field)

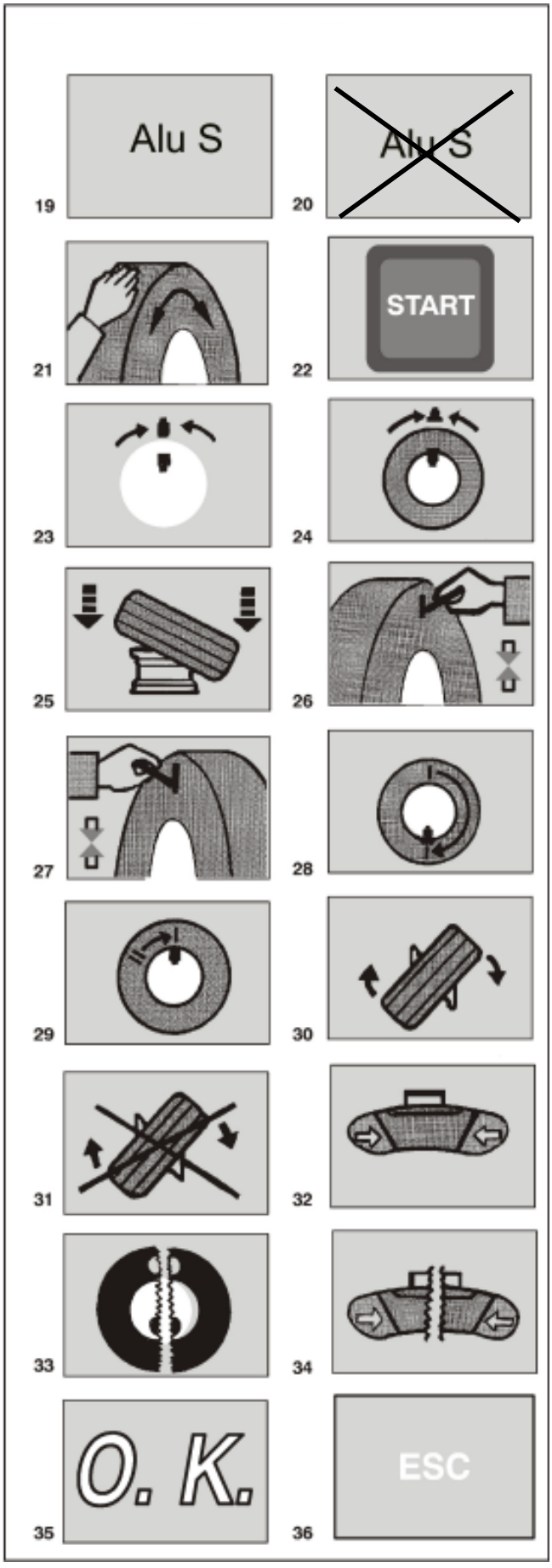
32 Start weight minimization program (optimization without compensation run for rim) (menu field)

33 Continue interrupted optimization. Will appear only after interruption of program. (menu field)

34 Continue interrupted weight minimization. Will appear only after interruption of program. (menu field)

35 Note confirming correct self–test of machine, or correct execution of current program (information line)

36 ESC key
Press the key to return to the previous screen or status. Error codes and help texts are deleted. (information line)



37 Wheel adaptor without calibration weight
(information line)

38 Fit calibration weight on wheel adaptor
(information line)

39 Scan wheel data on rim flange
(information line)

40 Scan wheel data on bead seat with clamped adhesive weight
(information line)

41 Move weight holder with adhesive weight right to the correction position
(information line)

42 Move weight holder with adhesive weight left to the correction position
(information line)

43 Do not touch the machine (self-test)
(information line)

44 Initial screen (only after self–test)
(information line)

45 Store the input
(information line)

46 Call John Bean service
(information line)

47 Initial screen (only after self–test)
(information line)

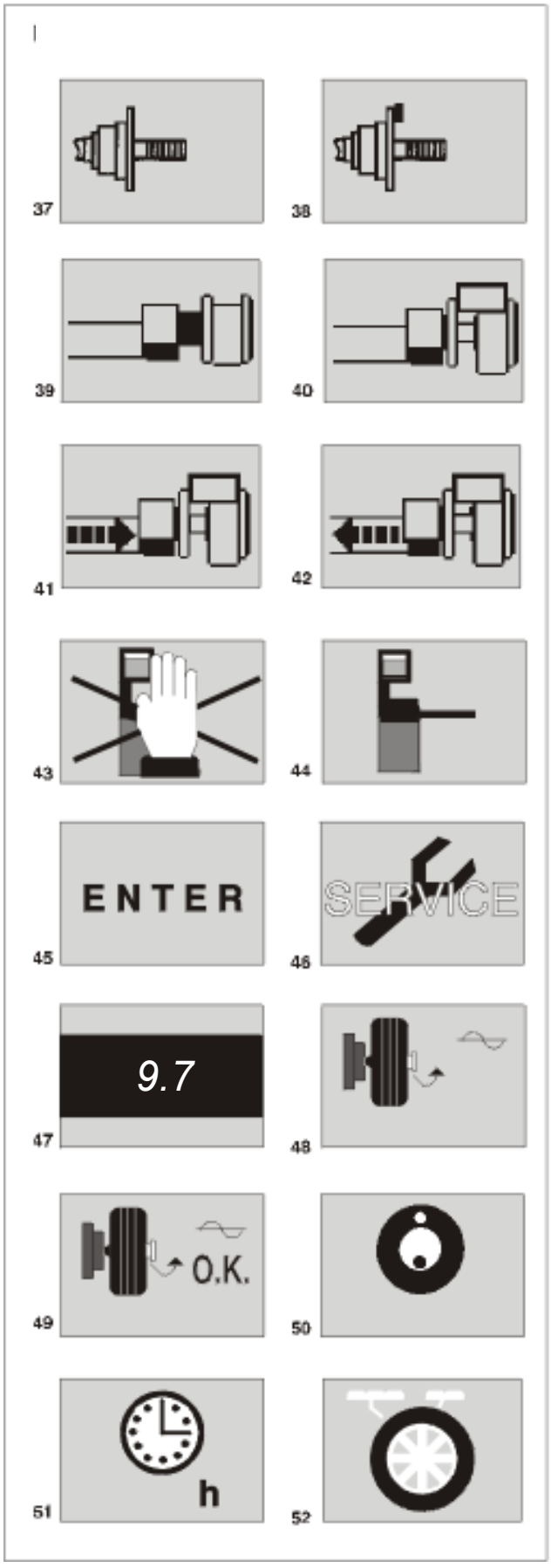
48 Number of measuring runs performed
(information line)

49 Number of measuring runs performed with OK reading
(information line)

50 Number of optimization runs performed
(information line)

51 Number of hours of operation of the electronic unit
(information line)

52 Select behind–the–spokes placement mode
(menu field)



53 Three–spoke wheel (menu field)

54 Four–spoke wheel (menu field)

55 Five–spoke wheel (menu field)

56 Six–spoke wheel (menu field)

57 Seven–spoke wheel (menu field)

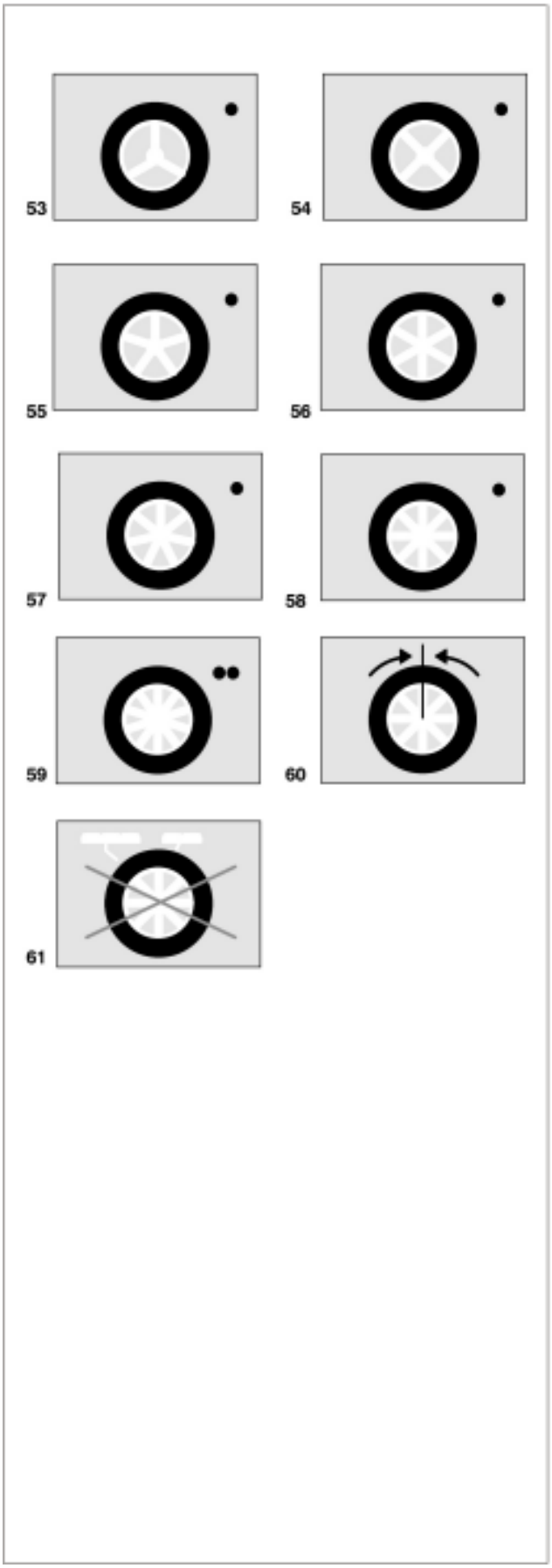
58 Eight–spoke wheel (menu field)

59 Ten–spoke wheel (menu field)

60 Store spoke position (menu field)

61 Return to store spoke position (menu field), or wheel without spokes (information line)

Icons with error code „E ...„ are illustrated and explained in detail in „Error codes„.



Switching on the machine

Please read through the operation manual and follow the instructions, especially when operating the wheel balancer for the first time.

- Switch on the machine by the mains switch **(Fig. 1, Item 1).**
  The electronic unit now performs a number of self–tests during which the screen views „SYSTEM START„ **(Fig. 16)**.

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, after approx. 20 seconds, a melodious signal is heard, the screen shows the „Main menu„ (Fig. 17) and the machine is ready for operation.

Fig. 16

Fig. 17 „Main menu„

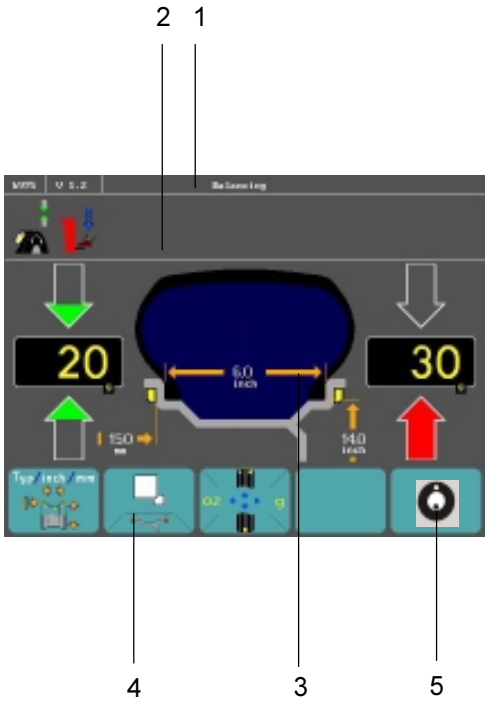


Fig. 17

The menu fields show:

1 Free
2 Start balancing program
3 Change to the screen for selecting modes of operation
4 Carry out compensation of wheel adaptor unbalance
5 Start optimization program

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

- wheel type 1 (standard wheel)
  - entry of rim data in inches
- display of amount of unbalance in 5–g increments
- measurement and display for two correction planes (dynamic unbalance)
- standard balancing mode (normal)
- suppression of minor unbalance readings (limit set to 3.5g)
- automatic braking of wheel when wheel guard is opened during measuring run (see note below)
- compensation of adaptor unbalance off
- start of measuring run by START key

These settings can be changed permanently or as long as the machine remains switched on (see “Changing modes of operation”).

Note - automatic braking of wheel.
It is possible to change the relative mode of operation so that the wheel slows down unbraked when the wheel guard is opened during a measuring run, to check the wheel for radial and lateral run–out.

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.

WHEEL MOUNTING METHODS

WARNING

Follow instructions for proper mounting of the wheel, *Before mounting* ensure there are no loose objects or debris attached to the wheel.
After mounting ensure the wheel is properly tightened and the wheel secure before lowering the tilting frame.

Back cone mounting

Back cone mounting is the most common way to mount automobile wheels. Choose the cone that fits best when placed through the wheel centre hole from the rear. Slide the cone spring and cone on the shaft. Place the wheel on the cone and be sure that the cone centres the wheel when you tighten the handle.

The pressure drum should contact the wheel on a flat surface. Do not centre the wheel with the pressure drum. Tighten the wheel firmly against the mounting flange. Hold the handle in place and rotate the wheel when tightening. Be sure that the wheel is firmly against the mounting flange and the handle threads engage at least three turns on the shaft.

Front cone mounting

Front cone mounting is required when using light truck wheels and is also an acceptable alternative for many automobile wheels. The wheel centre hole must be true on the outside of the wheel to use the front cone mounting method.

Choose the cone that fits best when placed through the wheel centre hole from the front. Slide the wheel on the balancer shaft without a back cone or spring on the shaft. Place a cone on the shaft, through the front of the wheel. Be sure the cone centres the wheel and that the wheel is squarely against the mounting flange when you tighten the handle.

Back cone mounting without pressure drum

Ensure the handle does not contact the cone, or the wheel will not be centred and mounted securely. Attach the spacer ring to the hub nut if this situation occurs.

On some extended-centre wheels with small hub diameters, the pressure drum cannot contact the front face of the wheel properly. Such wheels can be mounted using the standard back cone method without a pressure drum. Check that the handle contacts the wheel centre evenly and that the wheel is centred on the cone.

Double cone mounting

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

Double cone mounting can be used for some speciality wheels, such as those on a Porsche 928. The back cone centres on the formed part of the wheel, and the front cone centres on the hole.

Front cone mounting with an extension adaptor

The extension adaptor may be required for some light truck wheels and reverse-offset wheels that must be moved away from the balancer mounting flange. The extension adaptor is often used with the 5-$^{1}/_{2}$-inch diameter light truck cone.

Install the extension adaptor on the mounting flange with the knurled thumbnuts provided. Mount the wheel, using the normal front cone method.

Wheel mounting errors

Regardless of the mounting method used, the wheel must be centred before balancing. A wheel should be mounted on the appropriate cone or adaptor and tightened carefully to ensure proper centring and mating against the balancer flange.

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

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.

Clamping the wheels

Note

Only correctly clamped wheels can be balanced precisely.

In their technical documentation many motor–vehicle manufacturers specify the kind of wheel mounting on the vehicle (centre bore or stud location). The required clamping and centring means should be selected among the different versions available from Hofmann.

Note

Use only clamping and centring equipment that fit properly on the machine and are designed for use on it. In order to keep pace with technical progress, machines or clamping and centring equipment might undergo design revisions so that newer versions of clamping and centring equipment may not be compatible with existing machines, or older versions not compatible with new machines.

Application and handling of the proper clamping and centring equipment is described in the literature given separately for each device survey on clamping means, operation manuals for the different clamping means).
For proper storage of the clamping means a set of holders can be fitted on the left side of the machine.

Performing a compensation run

All clamping and centring equipment is balanced at our production facility to within a certain tolerance.

To compensate for any residual unbalance that might be left in the clamping equipment, it is recommended that an electrical compensation run be performed after switching on the machine or after changing the wheel adaptor, especially a motorcycle wheel adaptor (see “Changing modes of operation”). This mode cannot be transferred into the permanent memory.

- Starting from the screen „Main menu„ (Fig. 18) press the menu key for electrical compensation of unbalance in clamping equipment (Fig. 18, Item 1).
- Start the compensation run with the START key.

The compensation run takes longer than a regular measuring run.
After the compensation run the icon in the information line shows that compensation has been carried out.
This mode of operation is retained until deleted by pressing the menu key , by starting readjustment or an optimization run, or upon switching off the machine.

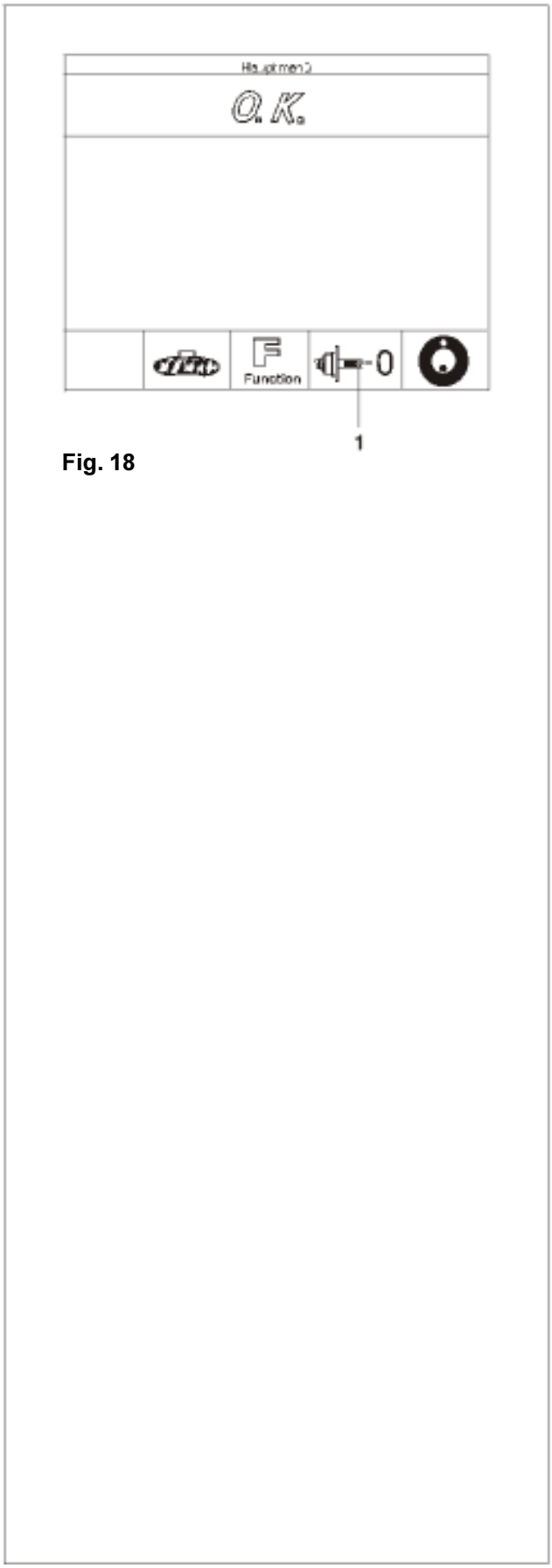


Fig. 18

Clamping car and light–truck wheels

Note
Read the rim width from the rim or tyre prior to clamping the wheel. If the rim dimensions are not to be determined using the gauge arm but entered manually, read the rim size from the rim or tyre prior to clamping the wheel.

- Before clamping the wheel make sure the contact surfaces on wheel adaptor and rim are free from dirt and grease.
- Clamp the wheel depending on the adaptor used, making sure that it is exactly centred and securely clamped.
  When using cone adaptors with wing nut, do not tighten these nuts by means of a hammer or similar object.

Entry of wheel type, balancing mode and wheel size

For determination of unbalance the following inputs have to be made:

- Wheel type
- Balancing mode (weight fitting position)
- Rim dimensions (nominal width and nominal diameter).
- Distance between machine and left correction plane.

Rim width is entered manually using the menu keys. The distance between left correction plane and machine and the rim diameter are normally entered by means of the gauge arm (Fig. 11).

When the machine is turned on, standard setting is wheel type 1 –standard– **(Fig. 24, Item 1)** with rim dimensions in inches or the wheel data of the wheel last tested is shown (if the mode of operation „Non–volatile wheel data“ is set to „on“).

If all or part of the wheel data is already correct it is only necessary to change the incorrect wheel data.

- To enter the data in the „Main menu„ **(Fig. 21)**, press the balancing key (Item 2).

A screen as illustrated in **Fig. 22** (after switching on the machine) or **Fig. 23** (if one measuring run has already been carried out) then comes up.

Fig. 22 „Wheel data„
Request to enter wheel type, balancing mode and rim dimensions

Assignment of menu fields:

1 Choice of wheel type
2 Distance between left correction plane and machine
(manual input)
3 Rim width (manual input)
4 Rim diameter (manual input)
5 Choice of balancing mode

Fig. 21

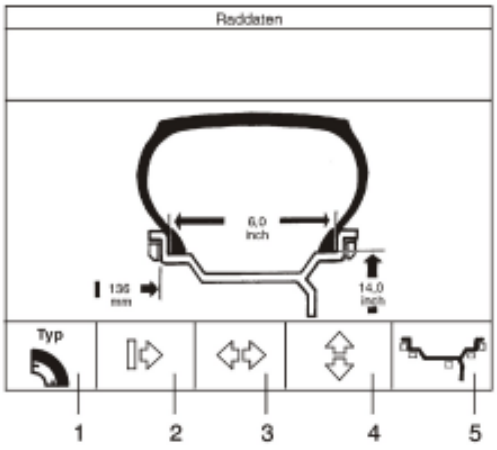


Fig. 22

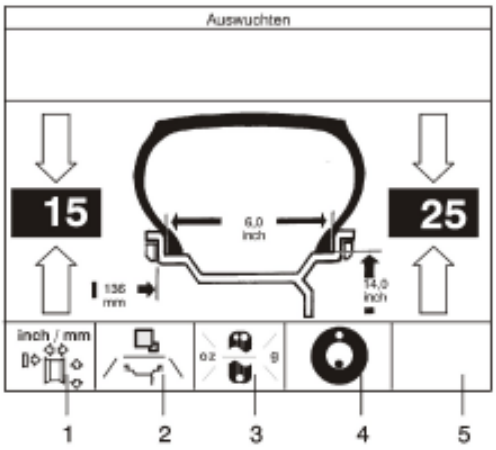


Fig. 23

Fig. 23 „Balancing„

Assignment of the menu fields

1 Input of wheel data **(see Fig. 22)**
2 Pressed on top:
Precision reading of unbalance,suppression of minor unbalance readings turned off
Pressed on bottom:
Reading of amount and location of unbalance for conventional balancing run with clip weights (quick reading); reading comes up only as long as the key is pressed.
3 Pressed on top: static unbalance
Pressed on bottom: dynamic unbalance
Pressed on left: balance weight reading in ounces
Pressed on right: balance weight reading in grammes
4 Optimization program
5 Free

- Starting from the screen as in Fig. 23 press menu key 1 (Fig. 23, Item 1) to go to the screen as in Fig. 22, and enter (if necessary) wheel type, the desired balancing mode and the rim dimensions.

Input of wheel type

Fig. 24 Wheel types - icons

1 Standard wheel (drop–centre rim) - nominal data in inches
2 Standard wheel (drop–centre rim) - nominal data in mm - TRX or TD wheels
3 Special wheel, no nominal size specified, no given balancing mode applicable. The rim dimensions must be measured in mm directly from the centre of gravity of the balance weights and entered manually.
4 Light–truck wheel with flat–base rim - nominal data in inches, rim diameter given in inch in integers (e.g. 14.0„/15.0„ etc.).
5 Light–truck wheel with 15° taper rim - nominal data in inches, rim diameter given in inch in .5 numbers (e.g. 16.5„/17.5„).

Input procedure for wheel type

- Starting from the screen as in Fig. 22 „Wheel data„, press menu key 1 for –wheel type–. The screen as in **Fig. 25** „Wheel type„ appears (wheel types are explained in Fig. 24).
- Choose the desired wheel type by pressing the relative menu key in the screen as in Fig. 25.
- Once the wheel type is chosen, return to the „Wheel data“ screen by pressing the ESC key.

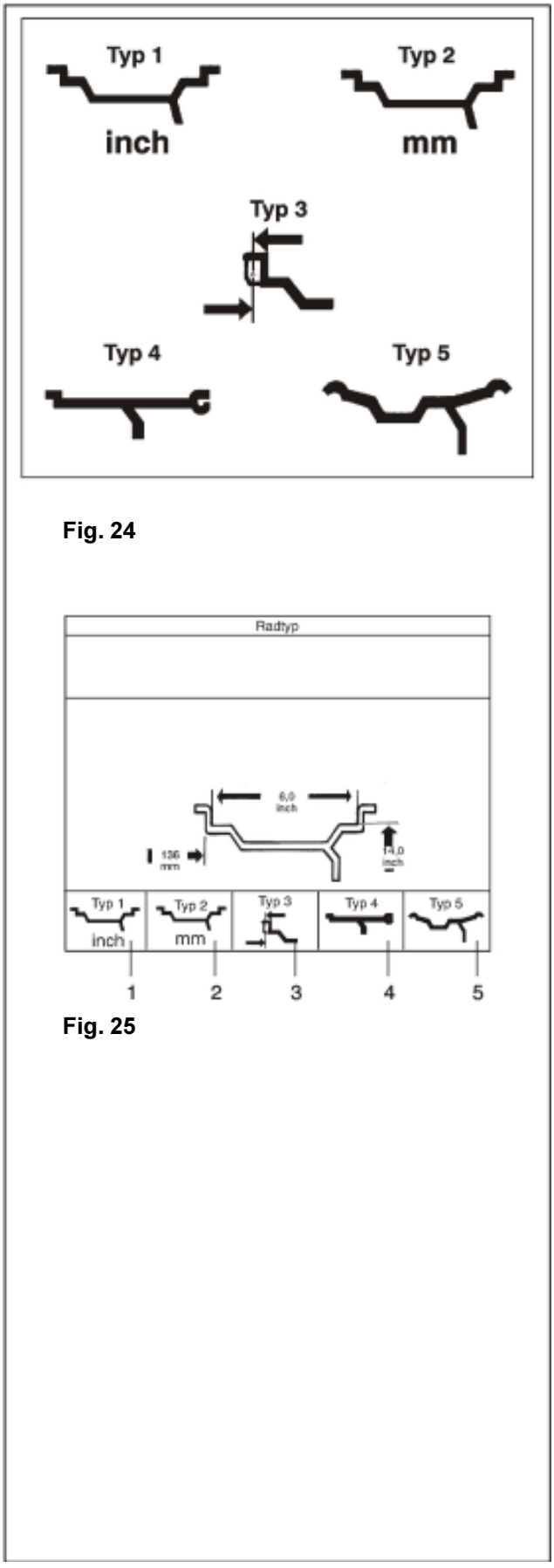


Fig. 24

Fig. 25

Input of balancing modes

On a standard (alloy) wheel different types of balance weights (balance clips, adhesive weights) can be used. 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 **(Fig. 26)**.

These differences are automatically taken into account by the electronic unit 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. 26 Possible fitting positions of the balance weights nominal rim data/actual correction data

1 Nominal rim dimensions to be entered
2 Actual correction data (centre of gravity of weights) which the electronic unit uses for determination of unbalance.

Input of different balancing modes

The input of different balancing modes is only possible with:

- Wheel type 1 –standard wheel/inch–
- Wheel type 2 –standard wheel/mm–
- Wheel type 5 –15° taper light–truck rim–

How to proceed

- Starting from the screen as in Fig. 22 „Wheel data„ press menu key 5. The screen as in **Fig. 28** „Balancing modes„ comes up.

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

- Press the menu key under the highlighted menu field on the left (Fig. 28, Item 2) if necessary several times until the weight symbol lights up at the desired position on the rim.

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

- Press the menu key under the highlighted menu field on the right (Fig. 28, Item 4) if necessary several times until the weight symbol lights up at the desired position on the rim.

With balancing modes Alu 2 and Alu 3 the correction planes determined by the machine are used for balancing. In balancing modes Alu2 S and Alu S the correction planes for the adhesive weights can be determined exactly by means of the gauge arm.

- To choose between Alu 2 and Alu 2 S, or between Alu 3 and Alu 3 S, press the menu key under the icon for Alu S (Fig 28, Item 3, with Alu S selected).
- Once the wheel type is chosen, return to the „Wheel data“ screen by pressing the ESC key.

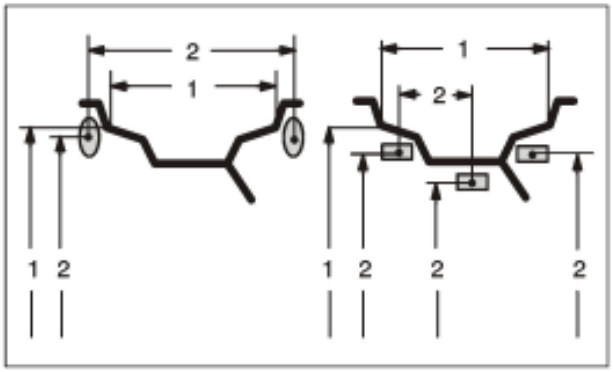


Fig. 26

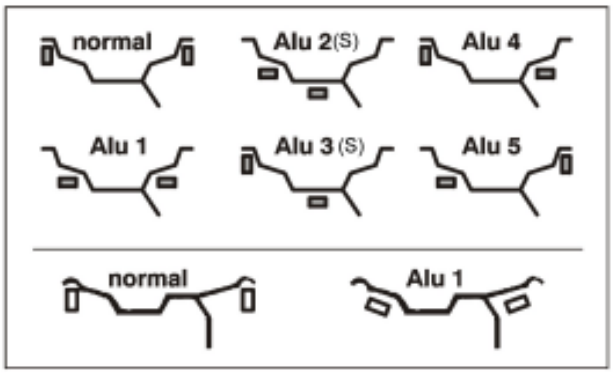


Fig. 27

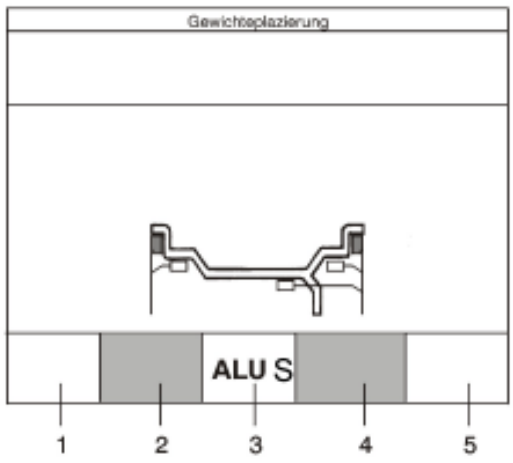


Fig. 28

Input of rim dimensions

The rim width is always entered by pressing and holding the rim width menu key and rotating the wheel until the requested value is read out.
The distance between left correction plane and machine and the rim diameter are usually entered automatically using the integrated gauge arm **(Fig. 29)**, but may also be entered by pressing and holding the menu keys for rim diameter and distance and rotating the wheel until the requested value is read out.

Determine the rim size before the wheel is clamped on the machine because it is usually not visible afterwards. The rim dimensions are usually given on the rim (in inches or mm on standard wheels, in mm on TRX or TD wheels). Rim diameter is also given on the tyres.
If rim width is not given on the rim, it can be measured on standard rims using the rim width callipers **(Fig. 30)**.

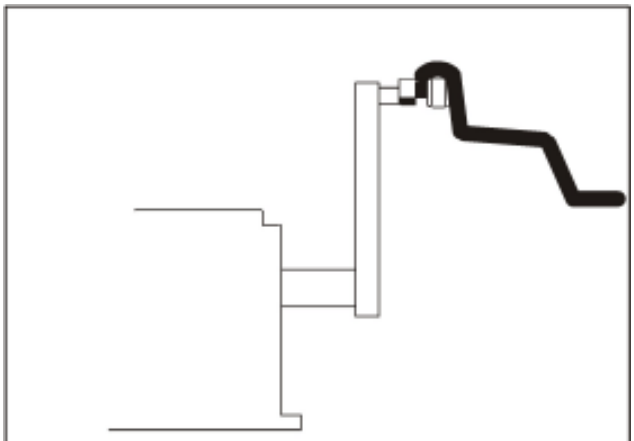


Fig. 29

Fig. 30

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.

Fig. 31 Wheel data

6 Rim width
7 Rim diameter
8 Distance between left correction plane and machine.

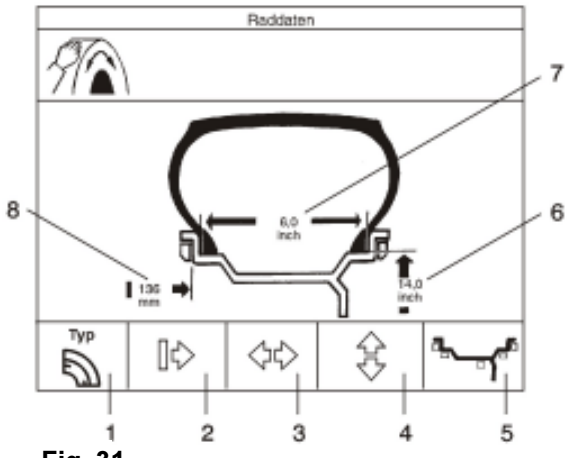


Fig. 31

Input of rim width

- Starting from the balancing screen as in Fig. 23, press menu key 1. A screen as in Fig. 31 comes up.
- Press and hold the width menu key (Fig. 31, Item 2) 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 as soon as the requested value is read out.

The entered rim dimensions are retained until another input is made or until the machine is turned off (if the mode of operation „Non–volatile wheel data“ is set to „off“).

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. Therefore 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.

Figures 32 to 37 show correct application (with and without adhesive weight) of the gauge head for distance and rim diameter on various rims and for various weight fitting positions.

Fig. 32. Standard wheel - steel rim

1 Gauge head
2 Rim

Fig. 33 Standard wheel - alloy rim

Fig. 34 Light–truck wheel, flat–base or drop–centre steel rim

Fig. 35 Light–truck wheel - 15° taper steel rim

Fig. 36 Light–truck wheel - 15° taper alloy rim

Fig. 37 Alloy wheel - adhesive weights

1 Left correction plane, first application position
2 Right correction plane, second application position

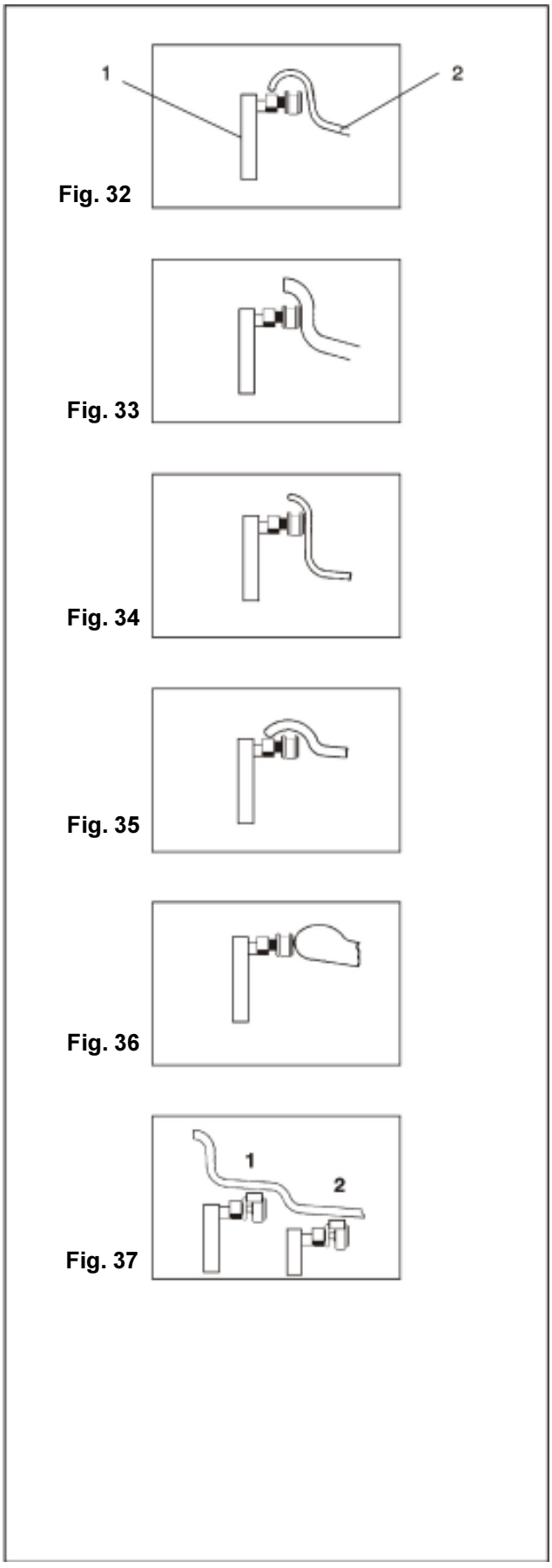


Fig. 38 illustrates the display of the gauge head application positions for the different balancing modes. There are either one, or two positions where the gauge heads have to be applied, function of wheel type and balancing mode.

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

Alu 1 Symmetric fitting of adhesive weights to the bead seats.

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

Alu 2 S Adhesive weights - adhesive weight on bead seat, concealed 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 concealed position in the rim disc; the correction plane for the adhesive weight is determined automatically by the machine.

Alu 3 S Balance clip fitted on left rim flange, adhesive weight attached in concealed 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

Input of distance and rim diameter using the integrated gauge arm

Correct application of the gauge head for the single wheel types is illustrated in **Fig. 32 to 37.**

The integrated gauge arm is used to enter the distance between the machine and left correction plane and the nominal rim diameter/correction diameter.

The integrated gauge arm allows exact determination of the correction planes and the actual correction diameters of adhesive weights on the bead seats and of „hidden„ weights.

If the integrated gauge arm is removed from its home position, the proper weight fitting position is shown on the screen according to the chosen wheel type **(Fig. 39)**. Once the gauge head has been applied in the first position and the value is entered, the next position will light up.

If an incorrect weight fitting position was entered and is to be determined once more:

- Press the STOP key to cancel the stored positions and to repeat the process at the first application position.

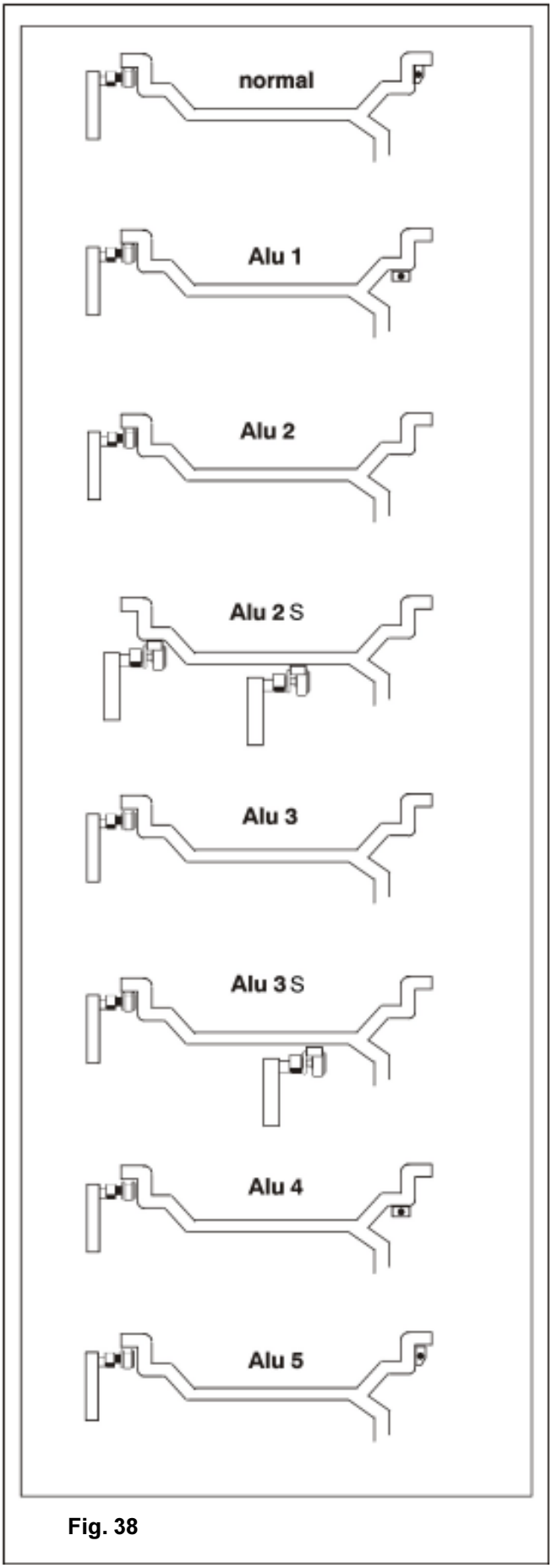


Fig. 38

Fig. 39 Input for balance clips

(Example: balancing mode –normal–)

- Starting from the balancing screen as in Fig. 23 press menu key 1 (Fig. 23, Item 1).

A screen as in Fig. 39 „Wheel data„ comes up.

- Approach the gauge arm to the rim.

As the gauge arm is moved, the display views the gauge head in correct application position on the rim flange (Fig. 39, Item A).

- Apply the gauge head on the rim flange and hold in that position until the balance weight on the display turns green (Fig. 39, Item B), an audible signal is given.

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 to its home position after the measurement. The data is retained until a new input is made or until the machine is turned off (if the mode of operation „Non–volatile wheel data“ is set to „off“).

Fig. 40 Input for adhesive weights

(Example: Alu 2 S balancing mode)

- Starting from the balancing screen as in Fig. 23, press menu key 1 (Fig. 23, Item 1).

A screen as in **Fig.40** „Wheel data„ comes up.

- Clamp an adhesive weight in the weight holder of the gauge head with the cover film of the weight being in top position
- Approach the left gauge arm to the rim.

As the gauge arm is moved, the display views the gauge head in first application position on the bead seat (Fig. 40, Item A).

- Approach the gauge head to the desired position and hold in that position until the adhesive weight on the display turns green.
- Retract the gauge arm at least 25 mm until the gauge head is viewed in the second application position (Fig.40.B).
- Then approach the gauge head to the second position and hold until this balance weight symbol also turns green (Fig. 40.C), the gauge head disappears from the display, an audible signal is given and the dimensions are read out on the display.

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 to its home position after the measurement. The data is retained until a new input is made or until the machine is turned off (if the mode of operation „Non–volatile wheel data“ is set to „off“).

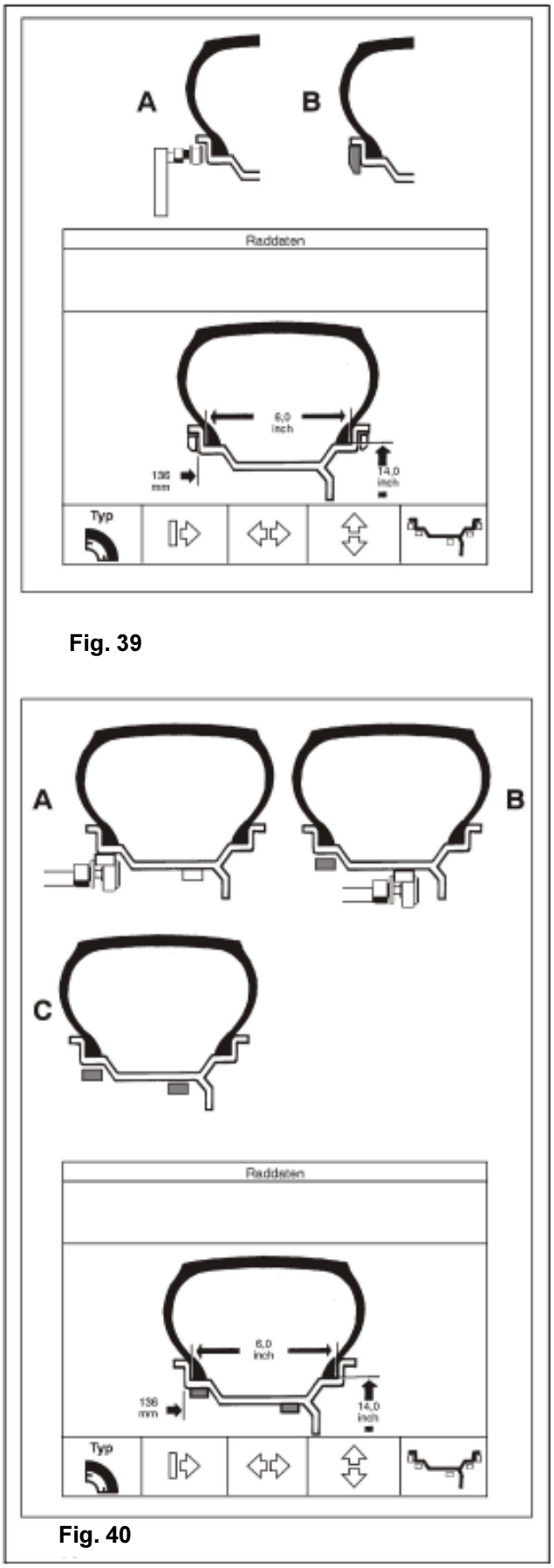


Fig. 39

Fig. 40

Input of rim dimensions via menu keys (except for wheel type 3)

If none of the given balancing modes can be used, or if the gauge arm is defective, enter distance and nominal rim dimensions by pressing the associated menu key and rotating the wheel.

Fig. 41 Determine distance by measurement

X Distance between gauge head and rim

A X (as measured) minus 5 mm = value A to be entered

1 Nominal rim width in inch or mm, depending on wheel type

2 Actual correction width
When using adhesive weights, the electronic unit uses the actual correction width for the unbalance measurement. If the rim dimensions are entered via the gauge arm, the electronic unit calculates the actual correction width by considering an internal corrective term.

Fig. 42 „Wheel data„ screen

2 Menu key for distance between left correction plane and machine (manual input)

3 Menu key for rim width (manual input)

4 Menu key for rim diameter (manual input)

6 Rim diameter reading

7 Rim width reading

8 Reading of distance between left correction plane and machine

- Starting from the balancing screen as in Fig. 23, press menu key 1 (Fig. 23, Item 1).

A screen as in **Fig. 42** „Wheel data„ comes up.

- Measure the distance X (Fig. 41) between gauge head and rim.
- The measured distance X minus 5 mm is the required input A.
- Press and hold the distance menu key (Fig. 42, Item 2) 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 as soon as the requested value (distance A) is read out.
- Enter rim width and diameter in exactly the same way:
  Rim width:
  press the rim width menu key (Fig. 42, Item 3) and rotate the wheel.
  Rim diameter:
  press the rim diameter menu key (Fig. 42, Item 4) and rotate the wheel.

The rim dimensions are now entered completely. The input is retained until a new input is made or until the machine is turned off (if the mode of operation „non volatile wheel data“ is set to „off“).

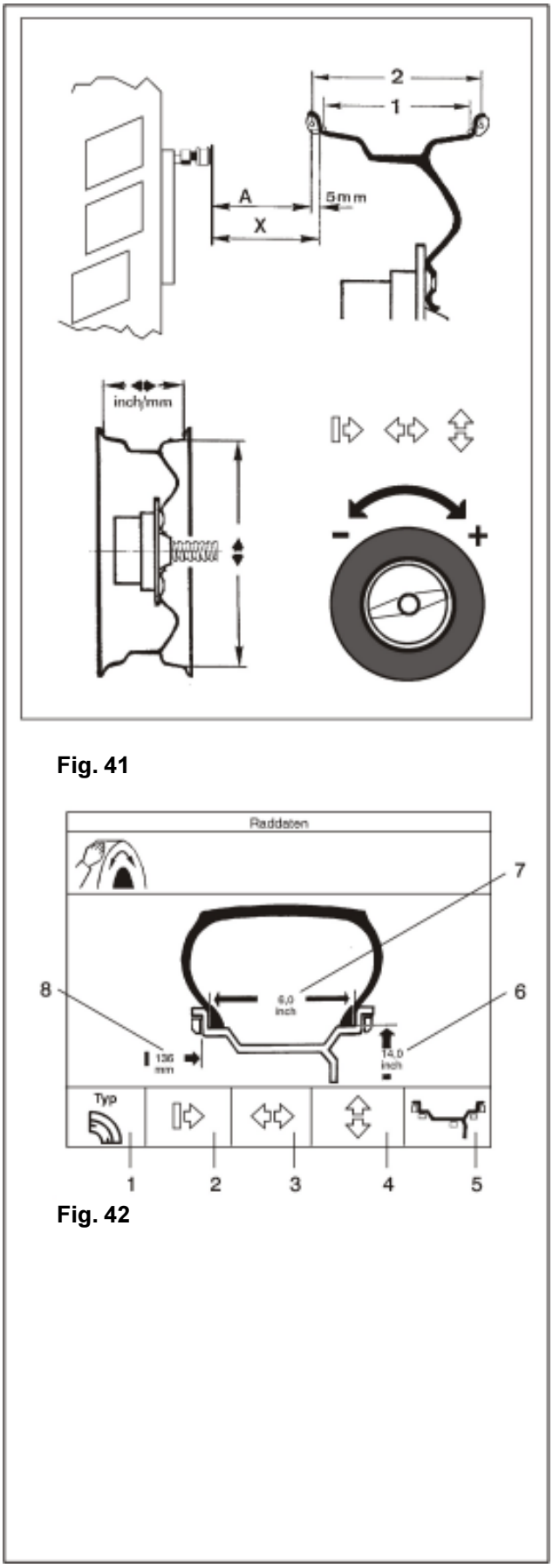


Fig. 41

Fig. 42

Inputs for special balancing operations (wheel type 3)

If none of the programmed balancing modes can be used, enter distance and nominal rim dimensions by means of the associated menu key and rotation of the wheel.

- Starting from the balancing screen as in Fig. 23, press menu key 1 (Fig. 23, Item 1).

A screen as in Fig. 24 „Wheel data„ comes up.

- Starting from a screen as in Fig. 24, choose wheel type 3 using menu key 3.
  Press the ESC key to go back to the „Wheel data„ screen as in **Fig. 44**.

The „Wheel data„ screen as in Fig. 44 comes up.

- Measure the distance and the actual correction dimensions (centre of gravity of balance weight to be fitted) directly on the wheel using a measuring tape **(Fig. 43)**.
- Press and hold the distance menu key (Fig. 44, Item 2) and at the same time rotate the clamped wheel.

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

- Release the menu key as soon as the requested value is read out.
- Enter rim width and diameter in exactly the same way:
  Rim width:
  press the rim width menu key (Fig. 44, Item 3) and rotate the wheel.
  Rim diameter:
  press the rim diameter menu key (Fig. 44, Item 4) and rotate the wheel.

The rim dimensions are now entered completely. The input is retained until a new input is made or until the machine is turned off (if the mode of operation "non-volatile wheel data" is set to "off")

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 machine 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 requested value is read out.

For correction diameters and possibilities of static unbalance correction, please refer to **Fig. 55**.

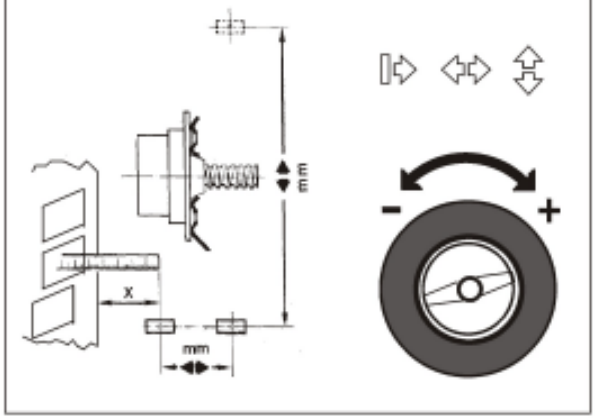


Fig. 43

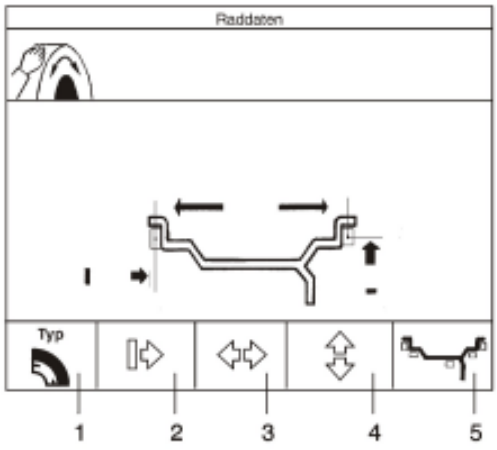


Fig. 44

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.

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 tyre 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).

WARNING

Follow instructions for proper mounting of the wheel, *Before mounting* ensure there are no loose objects or debris attached to the wheel.
After mounting ensure the wheel is properly tightened and the wheel secure before lowering the tilting frame.

Having set the mode to „no„:

- 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.

Balancing the wheels

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.

If the wheels to be balanced are rather small (e.g. motorcycle wheels), only static unbalance is measured and corrected.

Measurement

- Start a measuring run - by pressing the START key or by closing the wheel guard, depending on mode of operation.

As the measuring run is started, a screen as in **Fig. 45** (here: wheel type 1, standard balancing mode) comes up.

After measurement the machine stops automatically and the wheel is braked down to standstill.

Next, a screen as in **Fig. 46** (here: wheel type 1, standard balancing mode) comes up.
This screen shows the unbalance measured for each correction plane and the direction towards correction:

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

The measured unbalance can be read out in grammes or ounces.

For unbalance readings in grammes (5 g increments):

- Press menu key 3 (toggle switch, Fig. 46, Item 3) on the right.

For unbalance readings in ounces (0.25 oz increments):

- Press menu key 3 (toggle switch, Fig. 46, Item 3) on the left.

In the balancing modes –Alu 2– or –Alu 3– larger balance weights than for the standard balancing mode –normal– are often required. To briefly view the balance weights for the standard mode:

- Press the Fine key (toggle switch, Fig. 46, Item 2) on the bottom.

After measurement the balance weights can be fitted, or a weight minimization or optimization run can be carried out.

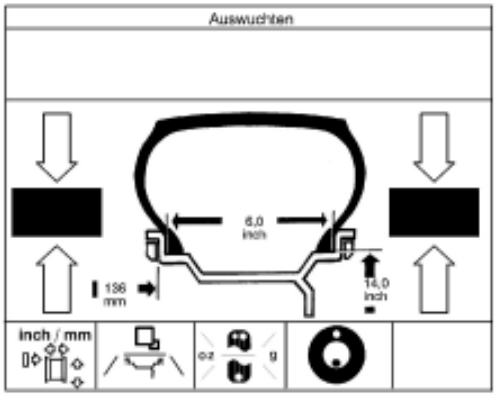


Fig. 45

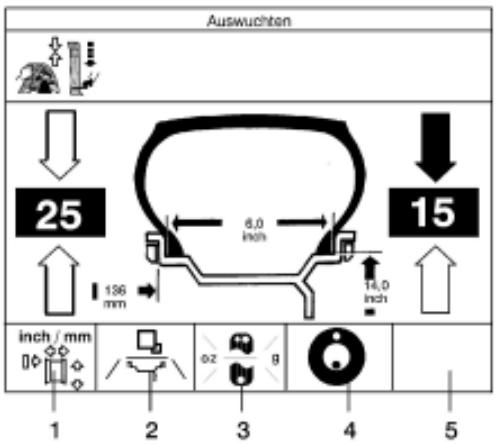


Fig. 46

How to fit the balance weights

How to fit balance clips

Left–hand correction plane:

- If necessary, index the wheel precisely into the correction position for the left plane. When the correction position is reached, only the two arrow heads **(Fig. 47)** light up green.
- Press the pedal of the main spindle lock to hold the wheel in this position.
- Attach the balance clip in the correction position at the rim flange exactly perpendicular to the main spindle **(Fig. 48 and 49)**.

Right–hand correction plane:

- Index the wheel precisely into the correction position for the right plane. When the correction position is reached, only the two arrow–heads light up green.
- Press the pedal of the main spindle lock to hold the wheel in this position.
- Attach the balance clip in the correction position at the rim flange exactly perpendicular to the main spindle **(Fig. 48 and 49).**
- After correction carry out a check run.

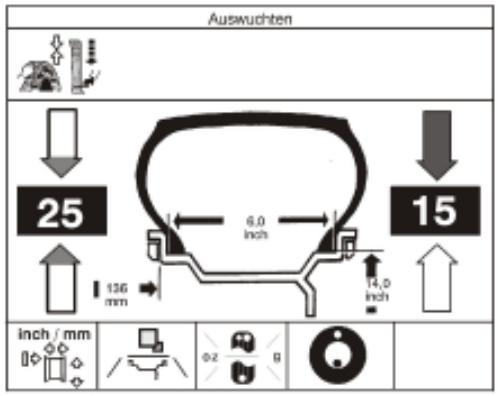


Fig. 47

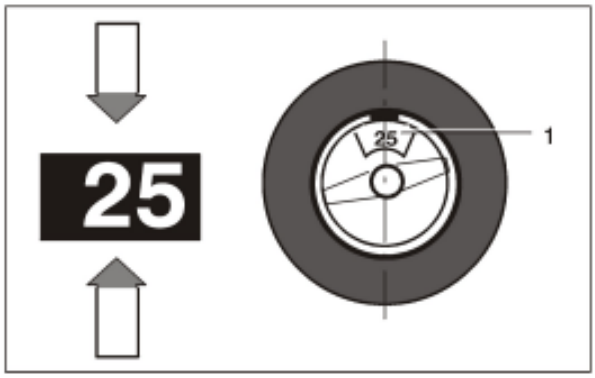


Fig. 48

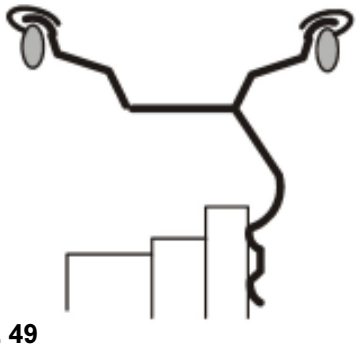


Fig. 49

How to fit adhesive weights using the gauge head

Be sure to fit the adhesive weights exactly because even slight deviations in attachment will produce a deviation of results. In this case it may be necessary to reposition the balance weight after the check run.

With balancing modes Alu 2 and Alu 3 the correction planes determined by the machine are used for balancing.

Left–hand correction plane (Inner):

- If necessary, index the wheel precisely into the correction position for the left plane. When the correction position is reached, only the two arrow heads **(Fig. 50)** light up green.
- Press the pedal of the main spindle lock to hold the wheel in this position.
- Clean the fitting position before attaching the adhesive weights.
- Alu 2 or Alu 3:
  Fit the adhesive weight at the bead seat (Alu 2) or rim flange (Alu 3). Firmly press the adhesive weight onto the rim by hand.

or

Alu 2 S or Alu 3 S:
Adhesive weights must be fitted with the weight holder, since the correction position is not perpendicular to and above the main spindle.

- Bend the adhesive weight by hand so that the centre of the weight will first touch the rim.
- Remove the cover film.
- Clamp the adhesive weight in the weight holder in centred position.
- Press the adhesive weight onto the rim using the ejector.
- Firmly press the adhesive weight onto the rim by hand.

Right–hand correction plane (Outer):

- Index the wheel precisely into the correction position for the right plane. When the correction position is reached, only the two arrow–heads light up green.
- Press the pedal of the main spindle lock to hold the wheel in this position.
- Clean the fitting position before attaching the adhesive weights.
- Alu 2 or Alu 3:
  Determine the correction plane for the concealed adhesive weight with the help of the imaginary line, as shown in Fig. 51. Fit the adhesive weight exactly perpendicular to and above the main spindle.

or

Alu 2 S or Alu 3 S:
Adhesive weights must be fitted with the weight holder, since the correction position is not perpendicular to and above the main spindle.

- Bend the adhesive weight by hand so that the centre of the weight will first touch the rim.
- Remove the cover film.
- Clamp the adhesive weight in the weight holder in centred position.
- Press the adhesive weight onto the rim using the ejector.
- Firmly press the adhesive weight onto the rim by hand.

- After correction carry out a check run.

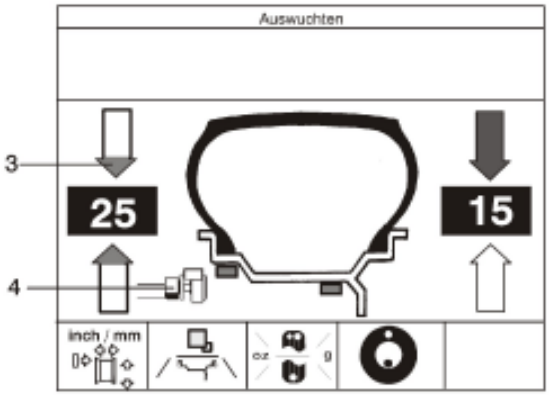


Fig. 50

Fig. 51 Correction plane for concealed adhesive weight in Alu 2 or Alu 3 model

1 Imaginary line (extension of cone adaptor to rim)
2 Cone Adaptor

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 entered using the function keys and rotating the wheel:

- Fit the adhesive weights to the rim as shown in **Fig. 52**.

Be sure to observe the given positions exactly because even slight deviations in attachment will produce a deviation of results. In this case it may be necessary to reposition the balance weight after the check run.

Check Spin

- 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 zero if the wheel is perfectly balanced, and the OK icon comes up in the information line **(Fig. 53)**.

Note

If both amount readings are zero, but there is no OK reading, dynamic unbalances below the threshold (tolerance limit) add to a static unbalance above the threshold. These residual unbalances, which are usually suppressed, will be read out by pressing the Fine key (toggle switch, Fig. 53, Item 2) on the top, and should then be balanced. The threshold for suppression of minor unbalance readings is factory–adjusted to 3.5 g for the standard balancing mode „normal„. It might be higher for other balancing modes.

Static unbalance

In general the wheels should be balanced dynamically, i.e. in two correction planes.

If this is not possible, e.g. with very small wheels (motorcycle wheels), only static unbalance is measured and corrected.

- To display static unbalance press menu key 3 (Fig. 53, Item 3) at the bottom.

A screen as in **Fig. 54** comes up. The amount of unbalance is read out in a display field in the middle of the screen and the direction to be indexed is indicated by both direction indicators simultaneously.

For correction diameter and possibilities of correction of static unbalance see **Fig. 55**.

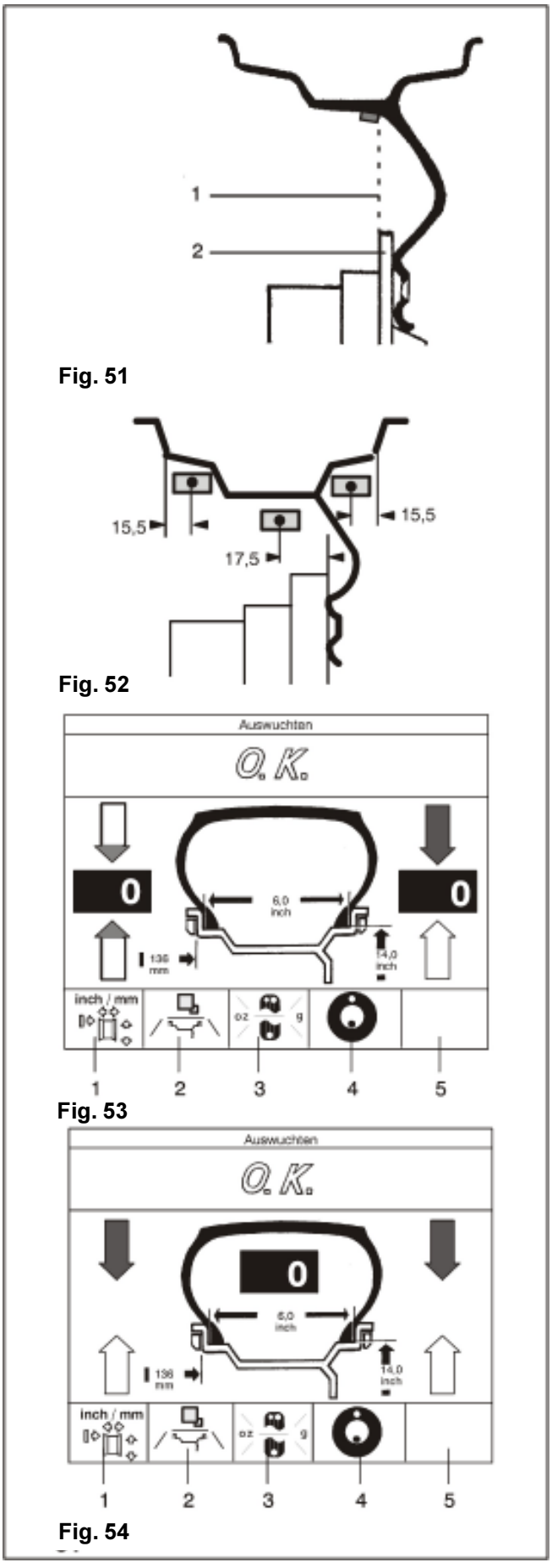


Fig. 51

Fig. 52

Fig. 53

Fig. 54

Recommendations for fitting balance weights for static unbalance correction

The correction diameter for static unbalance correction is programmed as follows:

normal same as for correction of dynamic unbalance

Alu 1 same as for correction of dynamic unbalance

Alu 2 in the rim disc (drop–centre)

Alu 3 in the rim disc (drop–centre)

Alu 4 at rim flange

Alu 5 at rim flange

As it is not always possible to correct static unbalance in the ideal rim position, the following recommendations for correction (Fig. 55) should be observed.

Balance clips (normal, Alu 4 and Alu 5)

- With large static unbalance (e.g. 30 g) divide the unbalance into two fairly equal parts and correct it on both sides of the wheel, according to the chosen balancing mode (weight fitting positions - **Fig. 55.1**).
- With small static unbalance fit the balance weight either in the outer or inner correction plane **(Fig. 55.2 and 55.3)**.
  The dynamic unbalance created thereby is negligible.

Adhesive weights (Alu 2 and Alu 3)

Figures 55.1 - 55.3 illustrate how balance clips can be fitted. When adhesive weights are used, or both types are mixed, proceed analogously according to the chosen balancing mode.

- For balancing modes Alu 2 and Alu 3 fit a balance weight in hidden position inside the rim disc; in this case the correction diameter for static unbalance correction lies inside the rim **(Fig. 55.4)**.

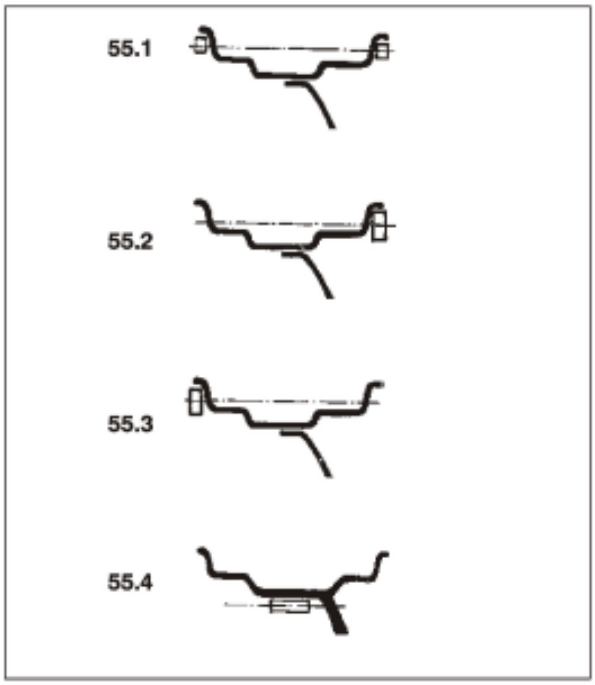


Fig. 55

Behind–the–spokes placement

When spoked wheels (SOFTLINE rims) are balanced, the behind–the–spokes placement 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. 56)**.

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 icons guiding the operator through this mode are explained in icons.

The operating steps for the behind–the–spokes placement mode are described and illustrated below.

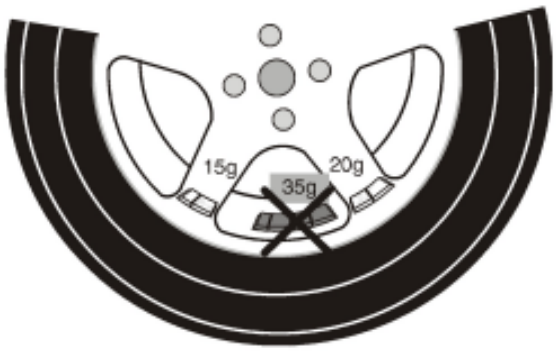


Fig. 56

How to proceed

Behind–the–spokes placement is activated automatically in Alu 2 S and Alu 3 S 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 input of wheel data.

The behind–the–spokes placement mode is chosen either starting from the main menu (switched–on status: standard wheel type with balance clips), or starting from the balancing screen when other wheels have been balanced before:

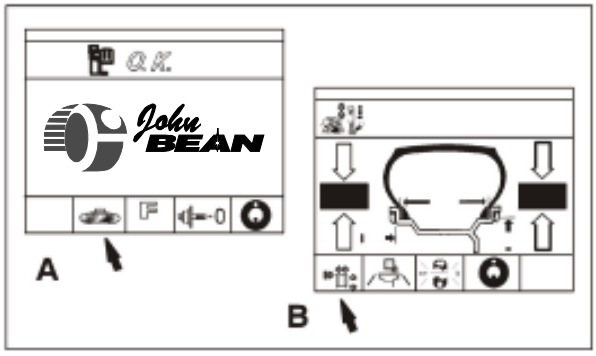


Fig. 57

- Starting from the main menu screen **(Fig. 57, Item A)** press the key (arrow).
  The screen as in **Fig. 58** „Wheel data„ comes up.

or

- Starting from the balancing screen **(Fig. 57, Item B)** press the key (arrow).
  The screen as in **Fig. 58** „Wheel data„ comes up.

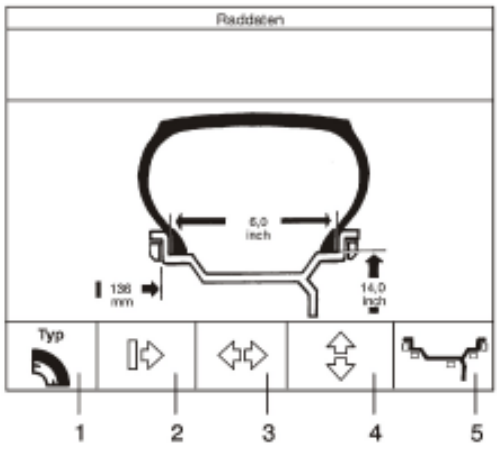


Fig. 58

- Press key 5 (Item 5) in the „Wheel data„ screen as in Fig. 58.

The „Balancing mode„ screen as in **Fig. 59** comes up, showing balance clips on the rim.

- In the screen as in Fig. 59 press keys 2 and 4 respectively to choose the desired balancing mode (hidden weight - arrow).

OnceAlu S is chosen, the icon for behind–the–spokes placement (Fig. 59, Item 5) is displayed.

- Press key spoked wheel (Item 5) and **hold the key pressed**.

As the key is pressed, a spoked wheel with crossed lines (=no spokes) appears in the information line. Now while holding the key pressed rotate the wheel to choose the number of spokes of the wheel (between 3 and 10; in the example a five–spoke wheel is chosen). Behind–the–spokes placement is also possible for a 12–spoke wheel; in this case choose the six–spoke wheel on the screen (half the number of spokes).

- Rotate the wheel clamped on the balancer until thespoked wheel in the information line has the desired number of spokes.
- Release the key.

Next, the icon with the chosen number of spokes appears in the information line (Fig. 59, Item 6).

- Choose the desired weight fitting position with the gauge arm.

As the input is completed, the „Wheel data„ screen as in Fig. 58, but with the chosen balancing mode (weight fitting position) comes back.

- Enter rim width.

Correction of measured unbalance

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

As the measuring run is started, the „Balancing„ screen as in Fig. 60 appears, but without measured data. The screen as in Fig. 60 is identical with the screen in the conventional balancing mode, but with two pairs of arrows for the direction of orientation of the right–hand plane.
After the measuring run a screen as in Fig. 60 appears including the measured data.

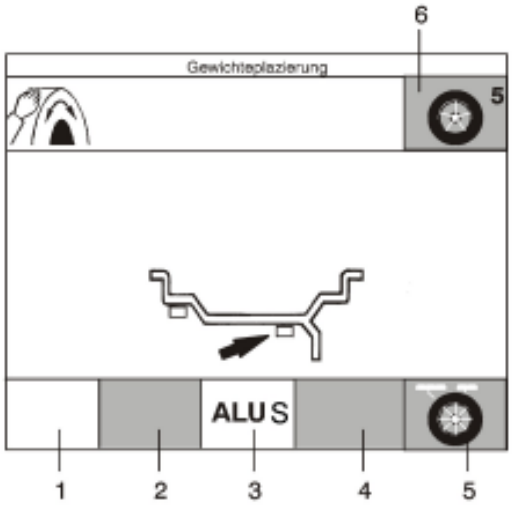


Fig. 59

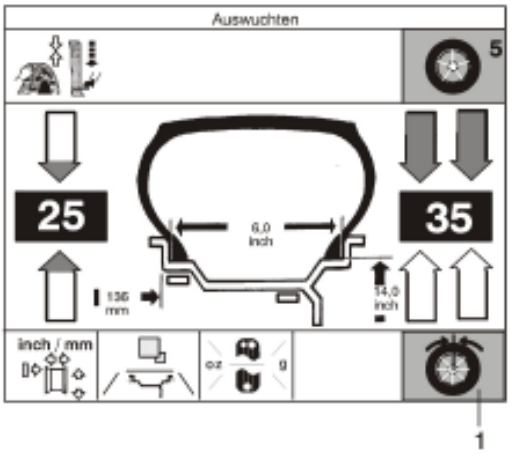


Fig. 60

Fig. 60 The balancing screen in the behind–the–spokes placement mode after the measuring run

- left display - both arrow–heads are green, showing that the left plane is indexed to the correction position
- right display - the two pairs of arrows are identical in their response. The top pair of arrows is red, showing the direction to index the wheel to correction position

1 Key to store the spoke position directly vertical above the main spindle.

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

Fit adhesive weights as described on page 30.

How to fit a hidden adhesive weight

As a result the measured data and the indexing arrows for two correction positions (hidden behind the spokes) of the right wheel side are displayed **(Fig. 61)**.

- Index the wheel precisely into the correction position for the right plane. When the correction position is reached, only the two arrow–heads light up green.

If the weight fitting position is not behind a spoke:

- Rotate the wheel so that a spoke is centred relative to and above the main spindle (Fig. 61, arrow).
- In this position press the spoke position key (Fig.61, Item 2).

As the spoke position is stored the menu field shows the icon „wheel without spokes„.

- If necessary, index the wheel to correction position as shown by the left pair of arrows of the right display (behind–the–spokes locations) (Fig. 61) and retain with the main spindle lock.
- Clean the fitting positions before attaching the adhesive weights.
- In this position fit a suitable balance weight (in the example 20 g, **Fig. 62, Item A**) 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 spindle lock.
- Fit the second balance weight behind the spoke (right pair of arrows of right display) in the same way (in the example 15 g, **Fig. 62, Item B**).

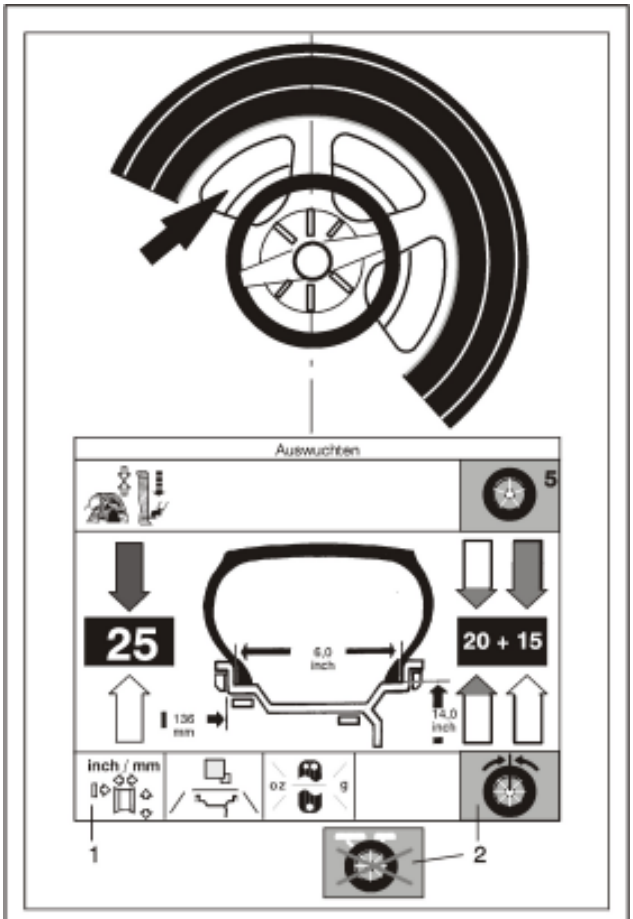


Fig. 61

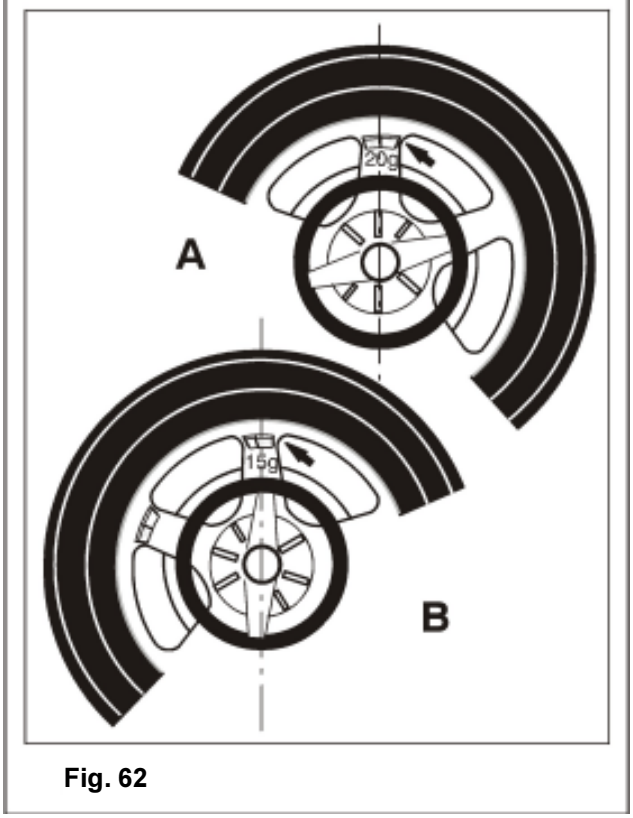


Fig. 62

Quit behind–the–spokes placement

- To leave the behind–the–spokes placement mode, press menu key 1 (Item 1) in the screen as in Fig.61.

The „Wheel data„ screen comes up.

- Press key 5 (Item 5) in the „Wheel data„ screen (Fig.58).

A screen as in **Fig. 63** comes up.

- In the screen as in **Fig. 63** press key 5 (Item 5) and **hold the key pressed**.
  Now while holding the key pressed rotate the wheel until the icon „no spokes„ is displayed in the information line (Fig. 63, Item 6).
- Release the key.

- Press the ESC key twice in succession.

As a result the behind–the–spokes placement mode is quit and the electronic returns to conventional balancing mode **(Fig. 64** - the readings here refer to the latest measuring run.)

Note

*The unbalance reading of the behind–the–spokes placement mode, which is not yet subdivided for two fitting positions (**Fig. 65**, example 35 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. 61). 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.

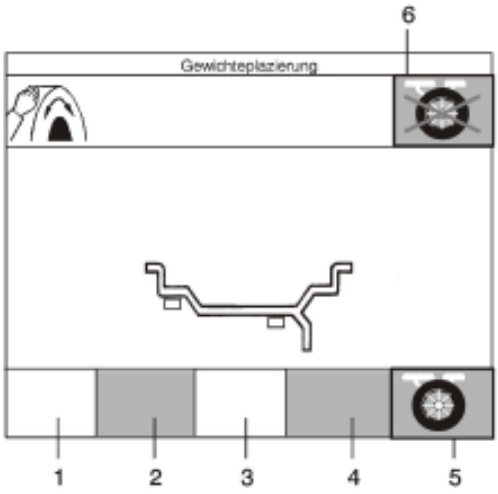


Fig. 63

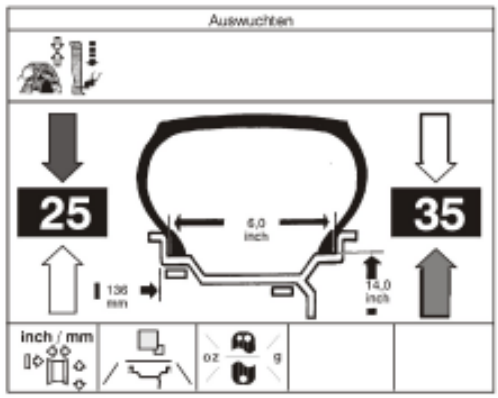


Fig. 64

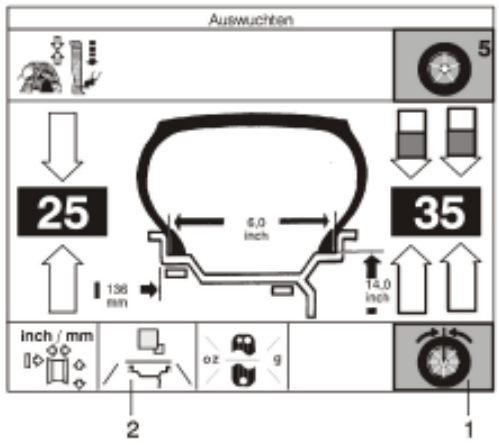


Fig. 65

Changing modes of operation

In order to adjust the machine to special user requirements some modes of operation can be changed.

When the machine is supplied, the modes of operation as proposed by John Bean will apply.

Modes changed and stored in the permanent memory are retained after the machine is switched off until they are altered again, or until the John Bean modes are chosen again.

A list of operating modes and the values proposed by John Bean is given below, followed by an example of how modes of operation can be changed.

List of operating modes

Fig. 66 List of operating modes

Setting recommended modes of operation	**0**
Saving modes of operation to the permanent memory	**0**
Language selection	**English**
Unit of measure of unbalance readings	**grammes**
Resolution of unbalance readings	**5g**
Suppression of minor unbalance readings	**on**
Input: threshold for suppression in grammes	**3.50**
Input: threshold for suppression in ounces	**0.25**
Braking on raising the wheel guard	**on**
Starting a measurement run by closing the wheel guard	**off**
Volume of audible signal	**5**
Counter readings	
Non–volatile wheel data	**off**
Screen saver and energy saving mode	**off**
Number of revolutions for unbalance measurement	**11**

How to proceed

- Starting from the screen as in **Fig. 67** (available after switching on) press menu key F (Item 3).

A screen as in Fig. 68 „Selecting modes of operation„ appears with the modes of operation which can be changed, either by setting their status to 0 or 1, or by pressing the relative menu key and rotating the wheel (to change their value).

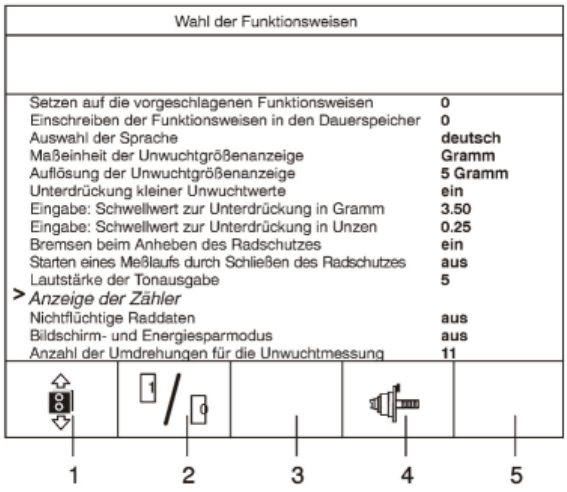


Fig. 66

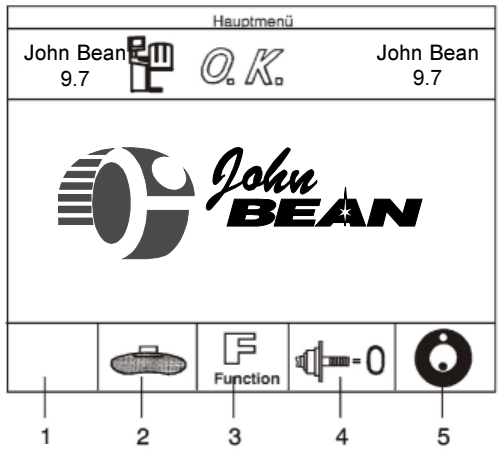


Fig. 67

The menu keys:

1 Cursor (>) up or down (toggle function).

2 If the cursor is in a position where the mode is set to status 0 or 1 (e.g. unit of measure), the menu field shows the icon for status change; in this case switch over using menu key 2.
If the cursor is in a position where a value is changed (e.g. suppression threshold), menu field 2 shows the icon for wheel rotation. In this case change the setting by holding menu key 2 pressed and rotating the main spindle or wheel.

3 Free

4 Readjustment by the operator

5 Free

- Press menu key 1 to move the cursor to the desired mode.
- Press menu key 2 to choose the desired status
  or
  change a value by pressing and holding menu key 2 and simultaneously rotating the main spindle or wheel.

If changed modes of operation are to be retained after turning off the machine:

- Store the change in the permanent memory using the mode of operation „Input in permanent memory„.

Changed modes of operation which are not stored in the permanent memory are reset to their previous status/ value when the machine is turned off.

- After completing the change of mode(s) of operation, return to the main menu by pressing the ESC key.

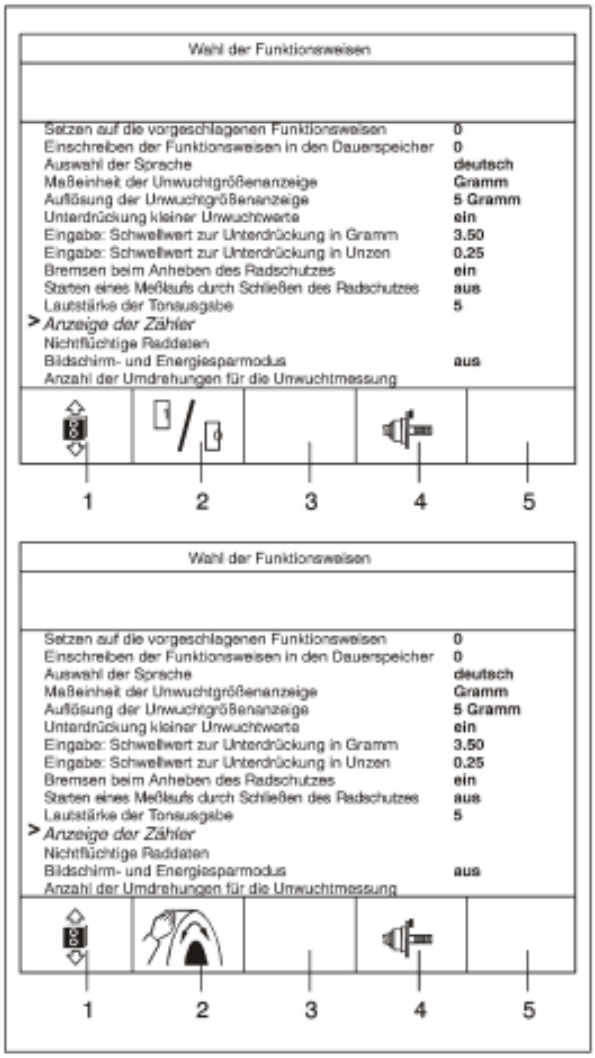


Fig. 68

Mode „counter readings„

- Starting from a screen as in **Fig. 68** choose the mode of operation „Counter readings„.

A screen as in **Fig. 69** appears.

The information line of the screen shows:

- symbols and counter readings for measuring runs performed
- measuring runs performed with OK
- optimization and minimization runs
- hours of operation of the built–in electronic unit

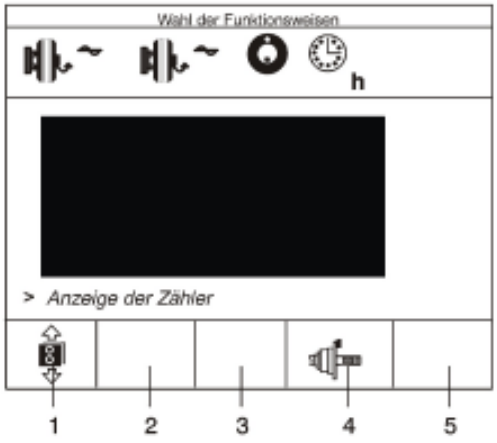


Fig. 69

Readjustment by the operator

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 supplied with the machine.

A calibration run takes longer than a regular measuring run.

Electrical compensation of adaptor unbalance, if carried out, will be cancelled by readjustment.

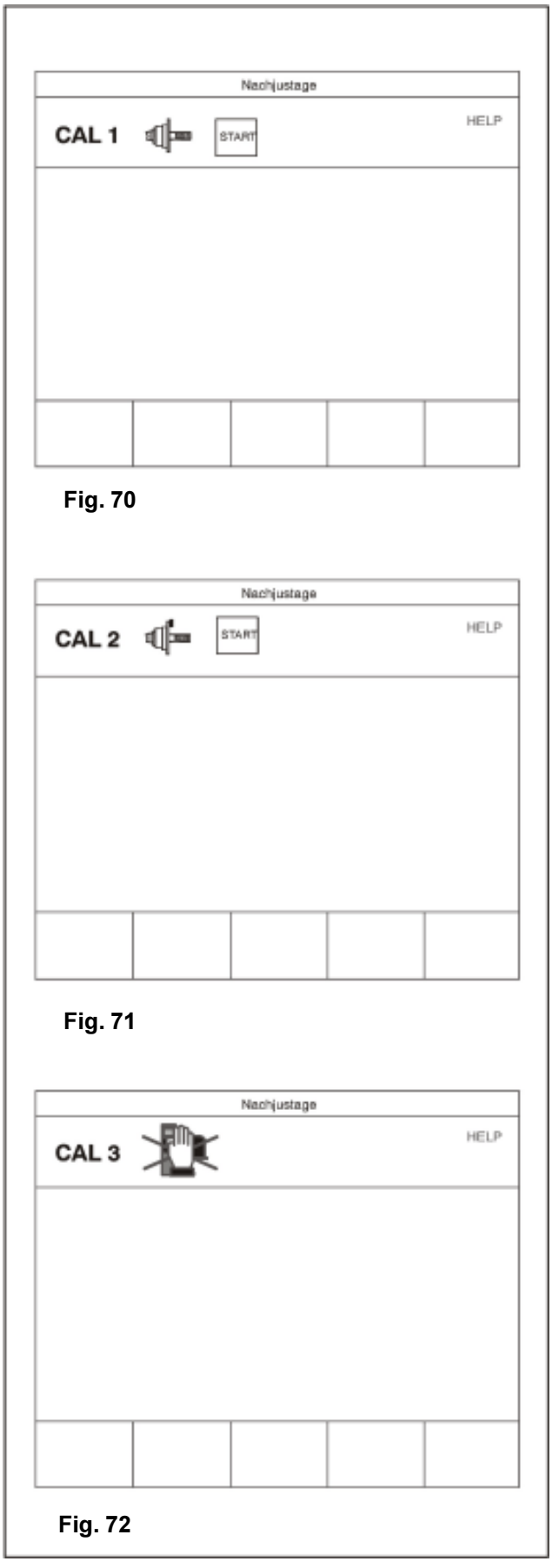


Fig. 70

Fig. 71

Fig. 72

Readjustment

- Make sure only the basic body of the wheel adaptor is fitted on the main spindle (no wheel or other clamping equipment).
- Starting from a screen as in Fig. 68 press menu key 4.

A screen as in **Fig. 70** appears.

- Press the START key.

On completion of the first readjustment run a screen as in **Fig. 71** appears.

- Screw the calibration weight into the threaded bore provided for this purpose at the right side of the basic body of the wheel adaptor.
- Press the START key.

On completion of the second readjustment run a screen as in **Fig. 72** comes up.
The machine must not be touched for about 7 seconds.
During this time the readjustment data are stored in the permanent memory; finally an audible signal is given.

- Remove the calibration weight from the wheel adaptor and return it to its proper place.
- Press the ESC key to return to the initial screen.

Optimization/Weight minimization

General

Optimization is a finer form of matching.

During the opto–ride procedures the rim and tyre 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, for example, possible if the rim does not exhibit geometric deformations, in other words when unsmooth wheel running conditions are a result of a non–uniform tyre. In this case the unbalance of the rim can be readjusted relative to the unbalance of the tyre such that the unbalances compensate each other and the smallest possible weight for unbalance correction is determined.

Instructions for the optimization/weight minimization programs

During tyre changing operations, as required for optimization/minimization, the 9.7 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 the balancing key (Fig. 74, Item 2). The electronic unit will then store the current program step, the rim dimensions and all data so far measured and signal in the middle menu field (via icon no. 31) that the program has been interrupted.

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 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. 73)**.

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 balancing adaptor is cancelled by starting an optimization or minimization run.

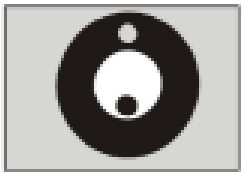


Fig. 73

Start weight minimization

- Make sure the tyre is correctly mounted on rim and inflated to specified inflation pressure (mounting guide rib of the tyre 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 program press the menu key for optimization minimization (Fig. 73) to choose the optimization program.

The screen as shown in **Fig. 74** „Optimization menu„ is displayed.

- Press menu key 4 (Fig. 74, Item 4) to go directly to the minimization program (no compensation of rim unbalance).

The screen as shown in Fig. 75 „Minimization - Step 1„ is displayed.

Fig. 75 „Minimization - Step 1„
(First measuring run of tyre/rim assembly)

- As indicated by the icon in the information line, readjust the wheel such that the valve is exactly perpendicular to and above the main spindle.
- Enter the valve position by pressing menu key 5.

START is signalled on the screen.

- Press the START key.

A measuring run is performed, after which the screen as shown in Fig. 78 or Fig. 84 is displayed.

- Next proceed as for optimization, starting at the screen as shown in Fig. 78.

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 program press the menu key for optimization minimization (Fig. 73) to choose the optimization program.

The screen as shown in Fig. 74 „Optimization menu„ is displayed.

- Press menu key 5 (Fig. 74, Item 5) to go to optimization.

The screen as shown in Fig. 76 „Optimization - Step 1„ is displayed.

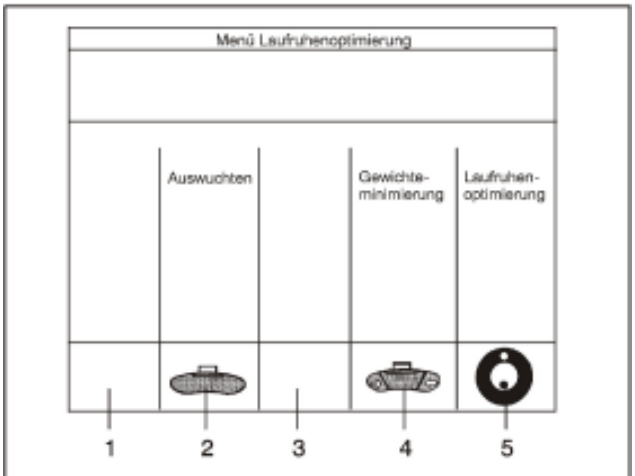


Fig. 74

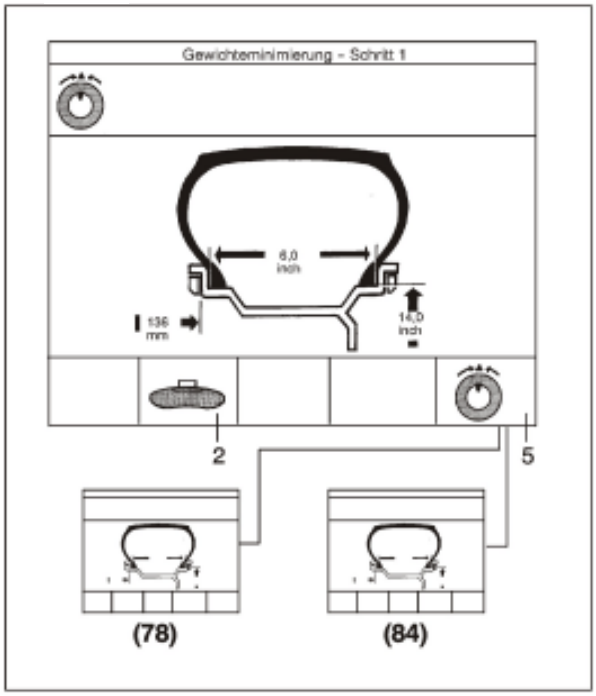


Fig. 75

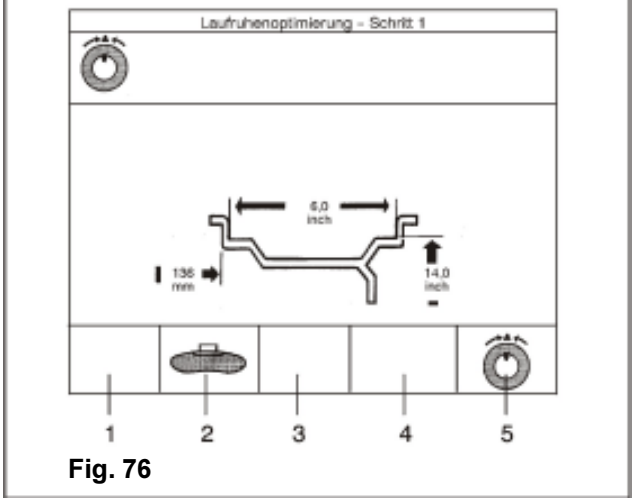


Fig. 76

Fig. 76 „Optimization - Step 1„
(Compensation run of rim only)

- As indicated by the icon in the information line, readjust the wheel such that the valve is exactly perpendicular to and above the main spindle. Enter the valve position by pressing menu key 5.

START is signalled on the screen.

- Press the START key.

A compensation run is performed, and the screen as shown in Fig. 77 is displayed.

Fig. 77 „Optimization - Step 2„
(first measuring run of tyre/rim assembly)

- As indicated by the 1st icon in the information line, mount the tyre correctly on the rim and inflate to specified inflation pressure (make sure the mounting guide rim of the tyre is correctly seated).
- As indicated by the 2nd icon in the information line, readjust the tyre on the rim such that the single mark coincides with the valve (use tyre changer).
- Clamp the wheel on the balancer.
- As indicated by the 3rd icon in the information line, readjust the wheel such that the valve is exactly perpendicular to and above the main spindle.
- Enter the valve position by pressing menu key 5.

START is signalled on the screen.

- Press the START key.

A measuring run is performed, after which the screen as shown in Fig. 78 or Fig. 84 is displayed.

Continue minimization and optimization

Fig. 78 „Optimization - Step 3„
(second measuring run of tyre/rim assembly)

From this screen weight minimization is carried out in the same way as optimization.

- As indicated by the 1st icon in the information line, rotate the wheel into marking position following the arrows and provide a **single mark** on the tyre outer side exactly perpendicular to and above the main spindle.
- As indicated by the 2nd icon in the information line, readjust the tyre on the rim such that the single mark coincides with the valve (use tyre changer).
- Clamp the wheel on the balancer.
- As indicated by the 3rd icon in the information line, rotate the wheel such that the valve is exactly perpendicular to and above the main spindle.
- Enter the valve position by pressing menu key 5.

START is signalled on the screen.

- Press the START key.

A measuring run is performed. Four screens may then be displayed, as in Fig. 79, 80, 81 or 82.

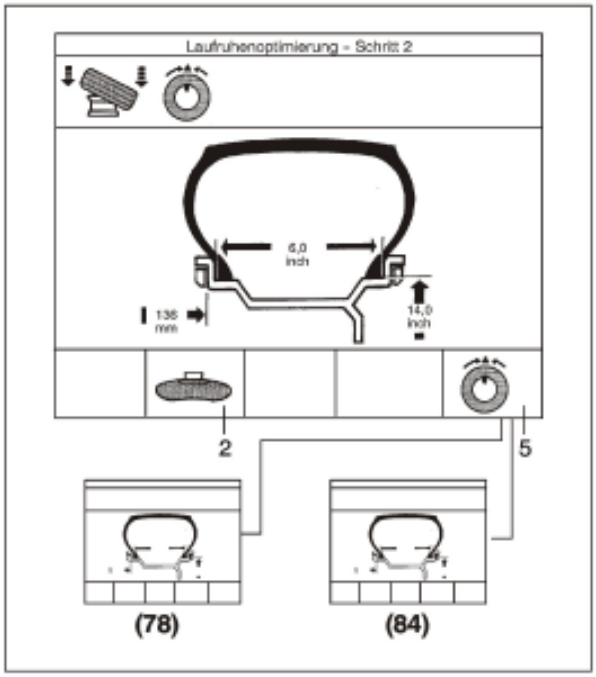


Fig. 77

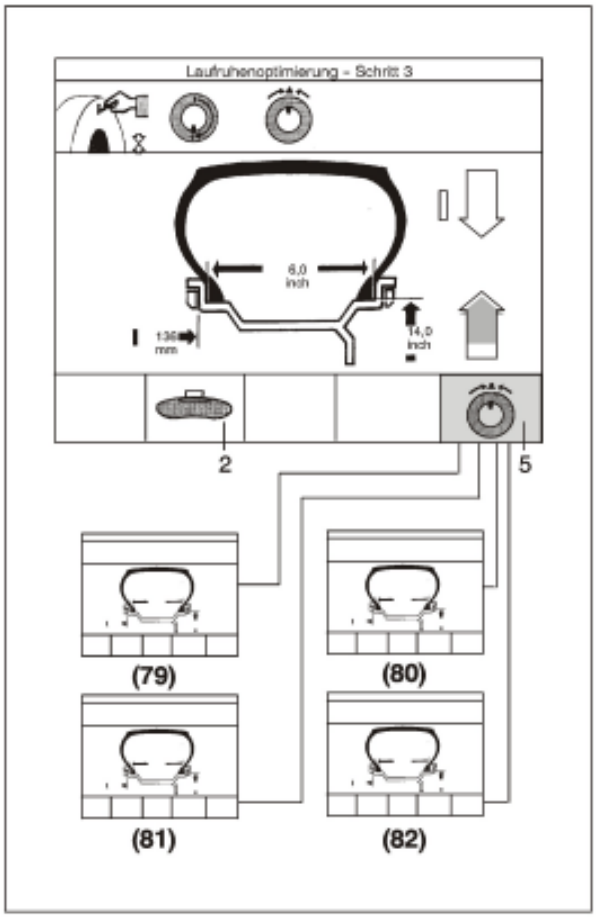


Fig. 78

Fig. 79 „Optimization - Step 4„
(3rd measuring run of tyre/rim assembly)
(Recommendation to readjust tyre on rim)

- As indicated by the 1st icon in the information line, rotate the wheel into marking position following the arrows and in this position provide a **double mark** on the tyre **outer side** exactly perpendicular to and above the main spindle.
- As indicated by the 2nd icon in the information line, readjust the tyre on the rim such that the double mark coincides with the valve (use tyre changer).
- Clamp the wheel on the balancer.
- As indicated by the 3rd icon in the information line, rotate the wheel such that the valve is exactly perpendicular to and above the main spindle.
- Enter the valve position by pressing menu key 5.

START is signalled on the screen.

- Press the START key.

A measuring run is performed, followed by the screen as shown in Fig. 82, or the error code reading E 9.

Fig. 80 „Optimization - Step 4„
(3rd measuring run of tyre/rim assembly)
(Recommendation to turn tyre over on rim)

As indicated by the 2nd icon in the information line, it is recommended that the tyre be turned over on the rim.
If the tyre cannot or is not to be turned over:

- Press menu key 3 (Fig. 80, Item 3).

The screen as shown in Fig. 85 or 86 is displayed.
If turn–over is desired:

- As indicated by the 1st icon in the information line, rotate the wheel into marking position (following the arrows) and in this position provide a **double mark** on the tyre **inside** exactly perpendicular to and above the main spindle.
- As indicated by the 2nd icon in the information line, turn the tyre over on the rim.
- As indicated by the 3rd icon in the information line, make the double mark coincide with the valve (use a tyre changer).
- Clamp the wheel on the balancer.
- As indicated by the 4th icon in the information line, rotate the wheel such that the valve is exactly perpendicular to and above the main spindle.
- Enter the valve position by pressing menu key 5.

START is signalled on the screen.

- Press the START key.

A measuring run is performed, after which a screen as in Fig. 82 or error code E 9 appears.

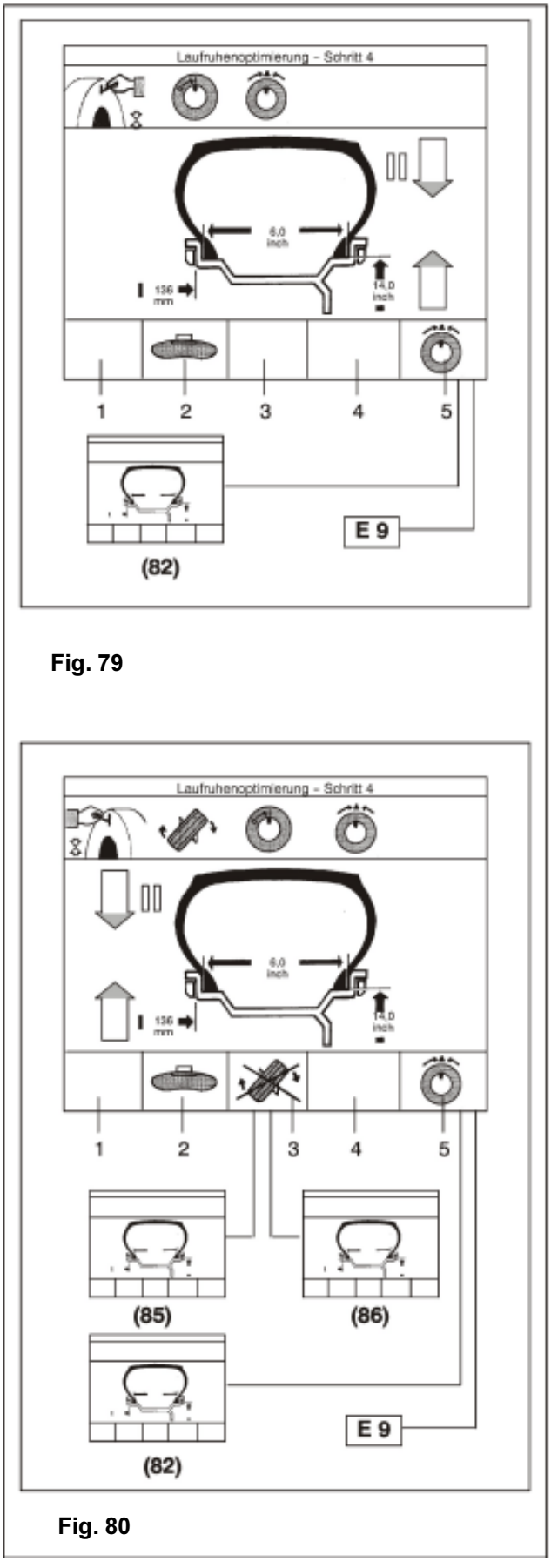


Fig. 79

Fig. 80

Fig. 81 „Optimization - Step 4„
(Optimal wheel running conditions)
(Minimization possible)

The icon in the information line shows that wheel running conditions are optimal.
Menu field 2 (Fig. 81, Item 2) is highlighted, which is a recommendation to leave the optimization program and to return to the „Balancing„ screen, Fig. 83.

Menu field 4 (Fig. 81, Item 4) shows that weight minimization (smaller balance weights) is possible.

To return to the balancing program (Fig. 83):

- Press menu key 2 (Fig. 81, Item 2).

The screen in Fig. 83 appears.

To perform minimization:

- Press menu key 4 (Fig. 81, Item 4).

The screen in Fig. 79 or 80 appears.

Fig. 82 „Optimization - Step 4„
(Optimal wheel running conditions)
(Optimal weight minimization)

If optimization has been performed:
The icon in the information line shows that optimization was carried out correctly and has been completed successfully (Fig. 82, information line).

If minimization has been performed:

The minimization icon is shown next to O.K. in the information line of screen 82, showing that minimization was carried out correctly and has been completed successfully.

To return to the balancing program (Fig. 83):

- Press menu key 2 (Fig. 82, Item 2).

The screen in Fig. 83 appears.

Fig. 83 „Balancing„
(Display of amount and location of unbalance)

- Balance the wheel according to the readings.

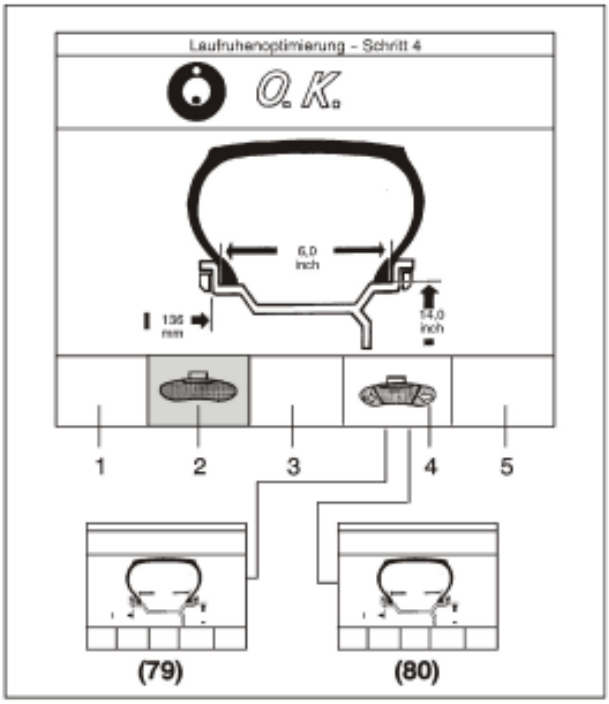


Fig. 81

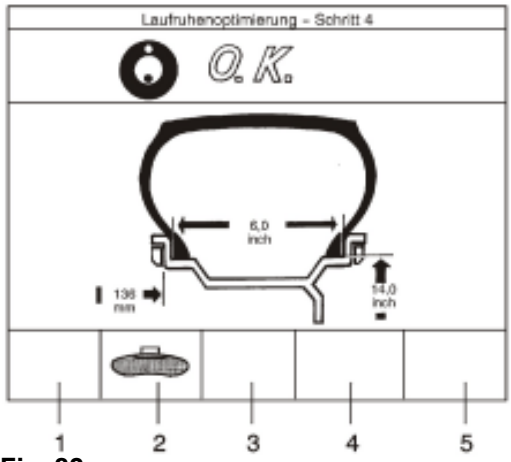


Fig. 82

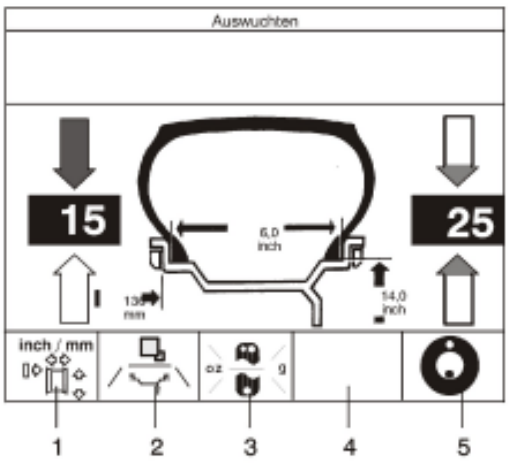


Fig. 83

Fig. 84 „Optimization - Step 3„
(Optimal wheel running conditions)

Menu field 2 (Fig. 84, Item 2) is highlighted, which is a recommendation to leave the optimization program and to return to Fig. 83 „Balancing„.
This means that the last measurement revealed that no considerable improvement can be expected from continuing the optimization program even though continuation is possible.

To return to the balancing program (Fig. 83):

- Press menu key 2 (Fig. 84, Item 2).

The screen in Fig. 83 appears.

To perform optimization:

- Proceed according to Fig. 78.

Fig. 85 „Optimization - Step 4„

The screen in Fig. 85 offers three possibilities:

To go back to the screen as in Fig. 80 - „Optimization - Step 4„ (recommendation to turn tyre over on rim) and to continue optimization:

- Press menu key 3 (Fig. 85, Item 3).

or

To continue the program according to Fig. 79:

- Press menu key 5 (Fig. 85, Item 5).

or

To return to the balancing program (Fig. 83 „Balancing„):

- Press menu key 2 (Fig. 85, Item 2).

Fig. 86 „Optimization - Step 4„

Optimization or minimization (in this case with minimization icon in the information line) without turning the tyre over has been completed successfully. If the tyre were to be turned over on the rim it might be possible to improve wheel running conditions, or to achieve weight minimization. It is still possible to go back to the screen as in Fig. 80 –Recommendation to turn tyre over on rim– or to the balancing program.

To go back to Fig. 80 - Recommendation to turn tyre over:

- Press menu key 3 (Fig. 86, Item 3).

The screen as shown in Fig. 80 is displayed.

To return to the balancing program (Fig. 83):

- Press menu key 2 (Fig. 86, Item 2).

The screen as shown in Fig. 83 is displayed.

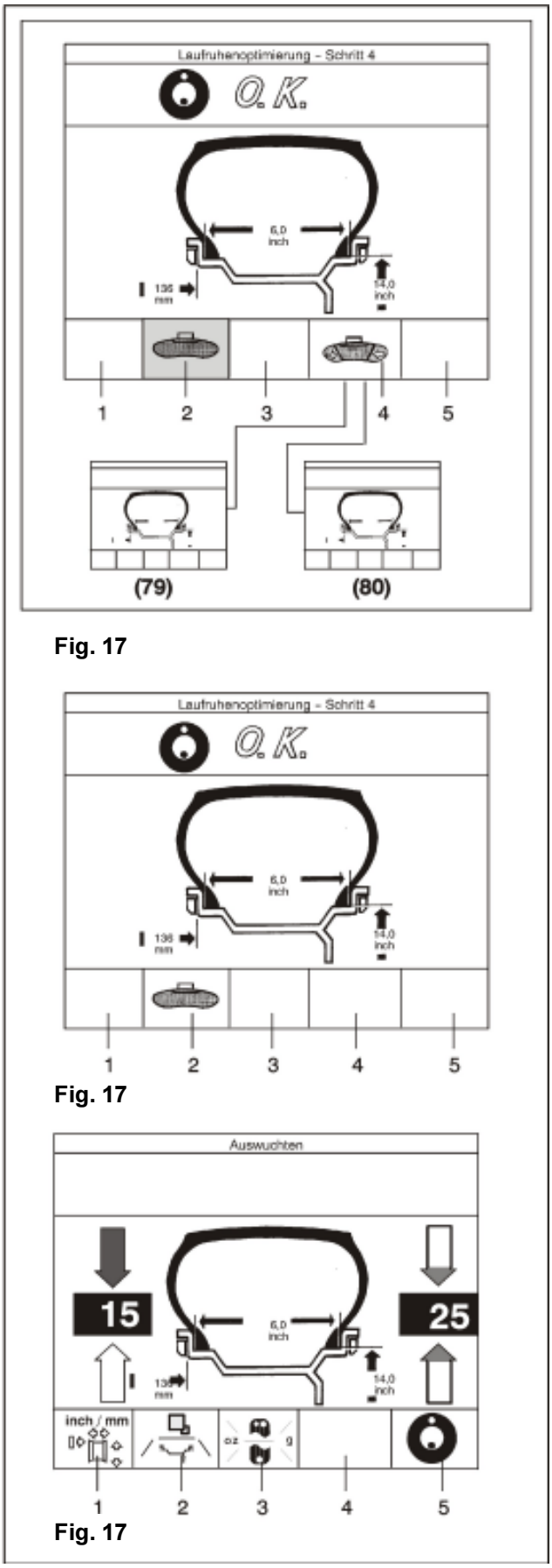


Fig. 17

Fig. 17

Fig. 17

Error codes

The machine is provided with an error indication system where a difference is made between errors in operation and functional errors.

Functional errors are read out on the right side of the information line by a three–digit number on a red background which informs the service technician where the system error is to be found.

- If necessary, press the HELP key for the address of the company responsible for service of the machine.
- Call the John Bean service.

Errors in operation are read out on the right side of the information line by icons on a red background. The icon explains the situation and gives the exact error code.

- Press the HELP key to call an explanation of the situation.
- Take remedial action as explained below.
- Delete the error code by pressing the ESC key.

The error code list is subdivided as follows:

a) Error cause
b) Effects of the error
c) Remedy, or deletion of error code.

E1 Input of wrong rim dimensions

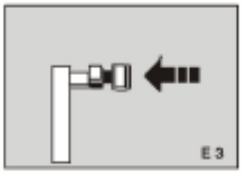
a) Input of rim dimensions is incomplete or incorrect.
b) The measuring run is not started. A check is made after the start of a measuring run or when changing into the „Balancing„ screen.
c) Determine rim dimensions correctly and enter.

E2 Wheel guard not closed

a) The wheel guard was not closed when the START key was pressed.
b) The measuring run is not performed.
c) The error code is deleted upon closing the wheel guard, or upon pressing the ESC key.

E3 Gauge arm not in home position

a) When the measuring run was started the gauge arm was not in home position.
b) The measuring run is not performed.
c) The error code is deleted by restoring the gauge arm to home position, or by returning it by at least 25 mm



E5 Range of electrical unbalance compensation exceeded

a) The admissible unbalance was exceeded during compensation of residual unbalance in the wheel adaptor, the main spindle or during readjustment.

c) Delete error code with the ESC key; reduce unbalance and repeat electrical compensation.

E6 Calibration weight not fitted

a) During readjustment or basic adjustment the calibration weight was not fitted in the threaded bore in the basic body of the wheel adaptor.

c) Delete error code with the ESC key, repeat adjustment.

E7 Choice of balancing mode for this wheel type is not possible

a) Choice of balancing mode is only possible for wheel type 1, 2 or 5.

c) Delete error code with the ESC key. Select wheel type 1, 2 or 5, then choose a balancing mode.

E8 No input of valve position

a) In the optimization/minimization program the START key was pressed without previous input of valve position.

b) The measuring run is not started.

c) Position wheel so that the valve is exactly perpendicular to and above the main spindle. The error code is deleted on pressing the right–hand menu key.

E9 Incorrect execution of optimization run

a) An error in operation occurred, or the wheel was not correctly centred with respect to the clamping means, or the tyre with respect to the rim.

b) The unbalance measured during the check run shows excessive deviation from the calculated nominal value.

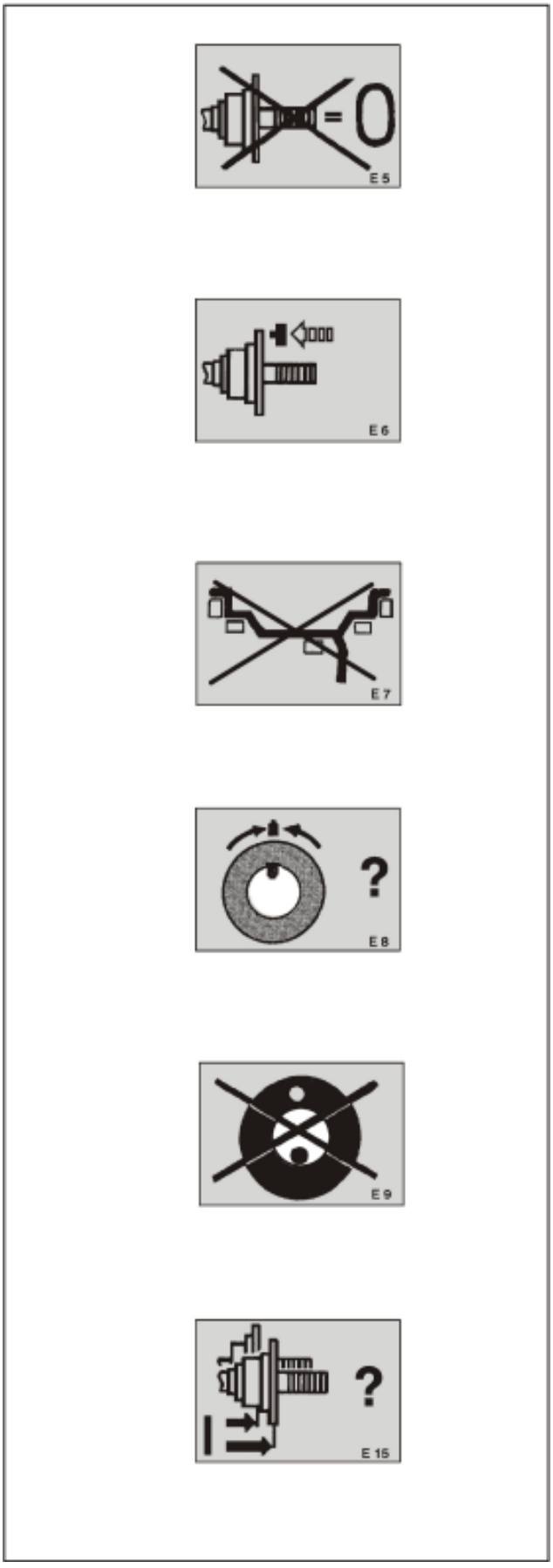
c) Press the HELP key, or read the operation manual and repeat the optimization run.

E15 Corrective terms out of range during readjustment

a) During readjustment the corrective terms were higher, or lower, than the programmed reference value.

b) Probably the distance between wheel adaptor and machine is different to the one during basic adjustment, or transducer sensitivity has changed considerably.

c) Use the wheel adaptor supplied with the machine, or carry out basic adjustment (John Bean service).



E16 Calibration weight fitted by mistake

a) During the first readjustment run the calibration weight was fitted by mistake.

c) Unscrew the calibration weight and repeat the first measuring run.

E17 Wheel slips on wheel adaptor

a) No wheel is clamped, or clamping nut is not tightened. The wheel is not driven properly, the main spindle accelerates too quickly.

b) Drive is stopped.

c) Tighten clamping nut. If a measuring run is to be carried out without wheel, press START key longer than usual.

E19 Measuring run was interrupted

a) The measuring run was interrupted upon operation of the STOP key, or raising of the wheel guard (depending on mode of operation).

b) The readings are not correct results.

c) Repeat the measuring run.

H20 No Possibility to re-locte the correction position with the gauge arm

a) To re-locate the correction position, the following conditions must be met:
- Balancing mode Alu 2 S or Alu 3 S.
- The correction plane was scanned with the gauge arem aftre the balancing mode was chosen.
- Dynamic unblanace readings are chosen.

b) The error code is deleted automatically as soon as the gauge arm is in the home position.

c) Choose balancing mode and scan correction plane(s) once again.

H21 The indexed position is not the one for this correction plane

a) When the gauge arm was approached to the correction plane for an adhesive weight (re-locating of weight fitting position) the position indexed was not the one for this correction plane.

b) The error code is deleted as soon as the gauge arm is in the home position.

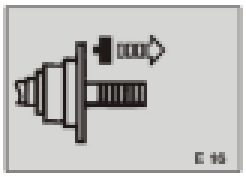
c) Index to correct position and fit the adhesive weight.

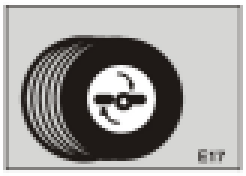
H80 No provision made for readjustment during basic adjustment

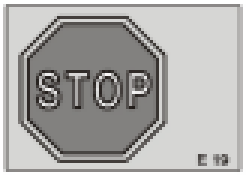
a) Basic adjustment was not carried out completely.

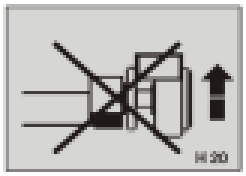
b) Readjustment by operator is not possible.

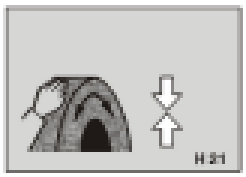
c) Call John Bean service.

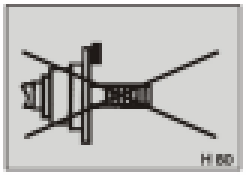












H81 No provision made for temperature compensation of transducers

a) Basic adjustment was not carried out completely.

b) This error code is only an alarm. The readings might be incorrect.

c) Delete the error code with the ESC key. Call the Hofmann service.

H82 Machine was subjected to vibrations (self–test)

a) During the self–test the machine was subjected to outside vibrations.

b) Update of the self–test data was not possible. The error code is read for 2 seconds. Then another self–test is started. (Do not touch the machine for approx. 7 seconds.)

c) During the error code reading the self–test can be aborted by pressing the ESC key.

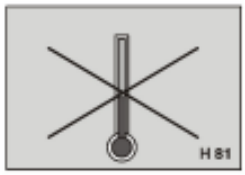
E83 Vibration of the machine interfered with the measuring run

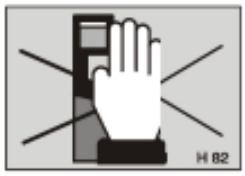
a) During unbalance measurement the signals of the transducers reached a level which could not be converted correctly by the A/D converter.

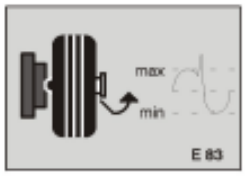
b) Vibration of the machine falsified the result of the measuring run; measurement was interrupted.

c) Repeat the measuring run.

F Fatal error codes signal defects in the machine which can only be remedied by John Bean service technicians.







Maintenance

Prior to maintenance or repair work disconnect the machine from the mains supply and protect against unintentional switching on (pull mains plug, or turn off main switch and lock).

The 9.7 wheel balancer requires almost no maintenance. It's bearings are greased for life and sealed.

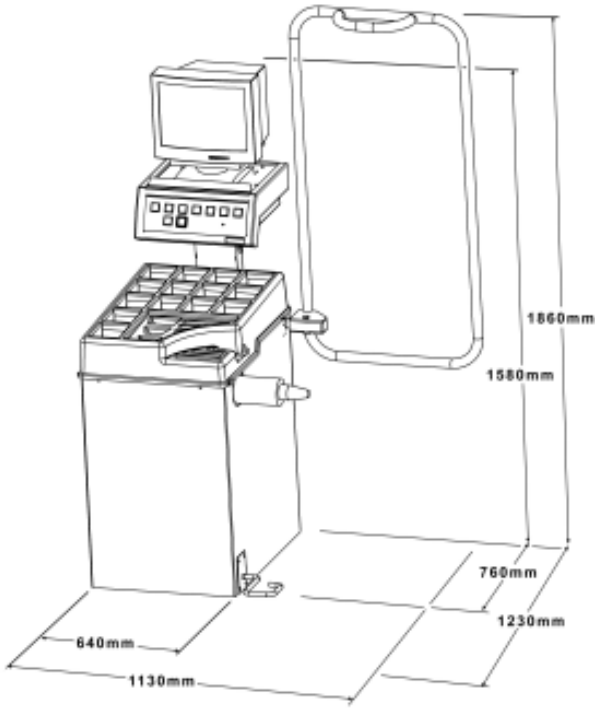
If defects occur which cannot be eliminated by the user (e.g. error code E 100 and above), contact the Hofmann after–sales service.

Particular attention should be paid to the cone of the spindle and the clamping means. Balance quality depends considerably on their condition. Therefore they should be kept clean. If not in use they should be lightly lubricated with non–corrosive oil and stored under appropriate conditions.

TECHNICAL SPECIFICATIONS

Maximum tyre diameter	1117mm (44")
Maximum tyre width	483mm (19")
Maximum rim diameter	
● Automobile wheels	432mm (17")
● Special applications	610mm (24")
Maximum rim width	355mm (14")
Maximum wheel weight	65kg (143lbs)
Power supply	230Vac/50Hz
Balancer weight	140kg (310lbs)
Shipping weight	160kg (354lbs)
Balancer dimensions	
● Height (H)	1580mm (62")
● Floor area (L x W)	760x640mm (29"x25")
● Envelope size (LxWxH)	1230x1130x1860mm (48”x44”x73”)
Shipping dimensions	
● (L x W x H)	1220x800x1120mm (48”x32”x44”)

The information and specifications in this manual are based on the latest information available at the time of publication. The product manufacturer reserves the right to change the specifications at any time without notice.



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