



**CEMB** S.p.A.

22054 MANDELLO DEL LARIO (LC) ITALY  
Via Risorgimento, 9 - Tel. 0341/706.111  
Tlx 380440 CEMB I - Fax (+39-341) 700.725

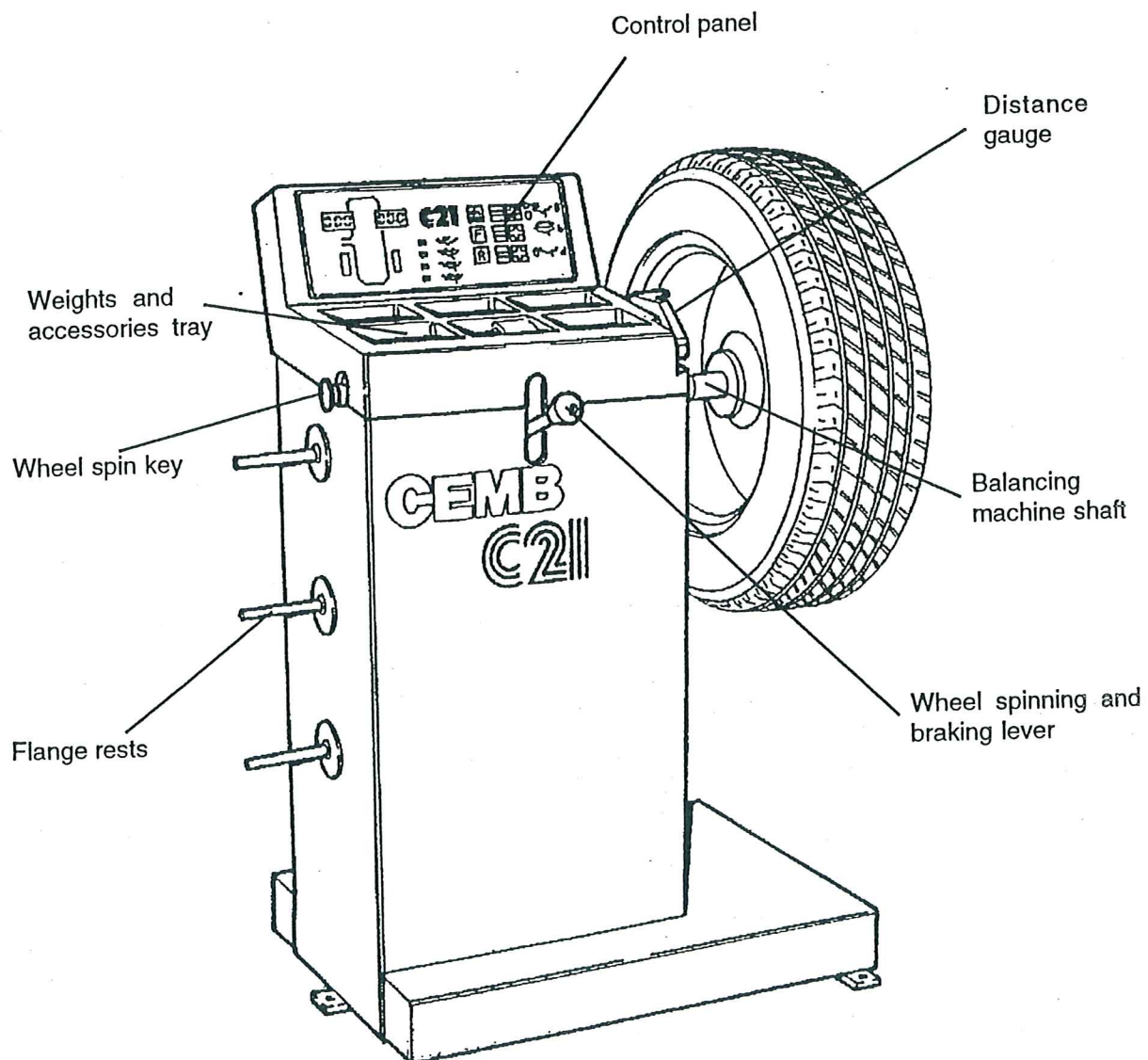
# C21

(Series B)

## MICROPROCESSOR WHEEL BALANCING MACHINE

Nr. 1034 - 1996.05

INSTRUCTION MANUAL AND MAINTENANCE GUIDE



<b>MANUFACTURING REVISION + UP-DATING</b>
-------------------------------------------

MODEL : C21

SERIES : from A to B FROM 27.02.95..... TO.....

Program version :...../.....

Software up-dating :...../.....

.....

.....

**MODIFICATIONS:**

- Mandrel assembly : used the same mandrel of C20, with separate threaded shaft terminal and fix adaptor body. With this modification, options will have to be those specific for C20 or C21/B. Cone and lockrings unchanged.
  
- Driven pulley : the same of mod. C201.
  
- Crankcase : added piezo pick-ups access window.

<p><b>DATE</b></p> <p><b>02.03.95</b></p>	<p><b>SIGNATURE</b></p>	<p><b>CEMB S.p.A.</b>                  22054 MANDELLO DEL LARIO (LC) Italy                  Via Risorgimento, 9 - Tel. 0341/731.384                  Tlx 380440 CEMBI - Fax (+39-341) 735.678</p>
-------------------------------------------	-------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

<b>- MANUFACTURING REVISION + UP-DATING</b>	
<b>1 - DESCRIPTION OF THE BALANCING MACHINE</b> .....	<b>3</b>
1.1 General Information .....	3
1.2 Technical data .....	3
1.3 Warnings .....	3
1.4 Standard safety devices .....	3
<b>2 - LIFTING AND INSTALLING</b> .....	<b>4</b>
<b>3 - POWER SUPPLY</b> .....	<b>4</b>
<b>4 - FITTING THE WHEEL</b> .....	<b>4</b>
<b>5 - CONTROL PANEL</b> .....	<b>4</b>
<b>6 - SETTING DIMENSIONS</b> .....	<b>5</b>
6.1 Manual presetting with gauge extension .....	6
6.2 Options .....	6
<b>7 - WHEEL BALANCING</b> .....	<b>7</b>
7.1 Measuring unbalance .....	7
7.2 Recalculating unbalance values .....	7
7.3 STATIC - ALU .....	8
<b>8 - OPTIMISING THE UNBALANCE</b> .....	<b>9</b>
<b>9 - SELF-CALIBRATION</b> .....	<b>10</b>
9.1 BALANCING MACHINE .....	10
<b>10 - ERRORS</b> .....	<b>11</b>
10.1 Inconstant unbalance readings .....	11
<b>11 - ORDINARY MAINTENANCE (non-specialised staff)</b> .....	<b>12</b>
11.1 Replacing protection fuses .....	12
11.2 Flanges .....	12

**EXTRAORDINARY MAINTENANCE**  
**(For expert technicians only)** .....

<b>12 - LIST OF RECOMMENDED SPARE PARTS</b> .....	<b>13</b>
<b>13 - CHANGING THE SUPPLY VOLTAGE</b> .....	<b>13</b>
<b>14 - MANAGING MACHINE PARAMETERS</b> .....	<b>14</b>
<b>15 - CHECKING THE DISTANCE GAUGE</b> .....	<b>14</b>
<b>16 - CHECKING THE POSITION SENSOR</b> .....	<b>14</b>
<b>17 - FITTING PIEZO PICK-UPS</b> .....	<b>15</b>
<b>18 - TROUBLE SHOOTING FLOW CHART</b> .....	<b>16</b>
18.1 Checking and calibrating static value (STI) .....	18
18.2 Checking and calibrating unbalance position .....	19
<b>19 - COMPUTER PCB LAYOUT</b> .....	<b>20</b>
<b>20 - MEASURING THE WHEELS AND SETTING DATA</b> <b>ON THE BALANCING MACHINE</b> .....	<b>21</b>

- BLOW-UPS OF THE BALANCING MACHINE WITH DESCRIPTION
- FLANGE PROSPECTUS (Type C20)
- APPENDICES: WIRING DIAGRAMS

# 1 - DESCRIPTION OF THE BALANCING MACHINE

## 1.1 - GENERAL INFORMATION

The C21 can be used to balance automobile, commercial vehicle and motor bike wheels statically and dynamically with accuracy. Its particular characteristics are:

- limited bulk to facilitate transport, if necessary;
- rotation driven by electric motor with patented control system;
- braking controlled by the same lever as drive;
- data can be set in inches or mm, using keys with a fast, simple increment system;
- static balancing function;
- 3 ALU functions for light alloy wheels;
- unbalance reading rounded to 5 grammes (with automatic zeroing threshold below 5 grammes) or to 1 gramme after just one wheel spin;
- values are recalculated automatically without repeating the spin;
- self-diagnosis and self-calibration in just 2 spins, using a random wheel, even one that is unbalanced;
- **Optimisation programme:** can optimise the position of the tyre on the wheel rim, providing the best compensation for tyre unbalance with the rim unbalance.

The layout of the controls makes the machine safer to use. In fact, the operator is obliged to work in a well-defined position. For this reason, the wheel protection guard is considered unnecessary in many countries.

## 1.2 - TECHNICAL DATA

Max. wheel weight.....	60 Kg
Max. power absorbed .....	300 W
Standard power supply .....	220/240 V monophasé
Balancing accuracy .....	1 gr
Min/max balancing speed .....	45/200 rpm
Wheel rim diameter.....	10" - 24" or 265 - 615 mm
Wheel rim width .....	1.5" - 20" or 40 - 510 mm
Cycle time .....	7 - 12 sec
Net weight .....	60 Kg
Machine bulk .....	890 x 500 x h = 975
Acoustic pressure level during cycle .....	< 70 dB (A)
Working environment temperature .....	0° - 50° C

## 1.3 - WARNINGS

- Read the instruction manual carefully before using the balancing machine.
- Keep the manual for future reference.
- Do not remove or modify parts of the machine, as this would stop it functioning correctly. Consult the after sales service for repairs.
- Do not use strong jets of compressed air to clean the machine.
- Use cleaning spirits to clean the plastic panels and shelves (NEVER USE ANY LIQUIDS CONTAINING SOLVENTS).
- Before you start the balancing cycle, make sure that the wheel is blocked onto the flange correctly.
- The balancing machine operator should not wear clothing with any loose parts; make sure that no unauthorised staff approach the balancing machine during a cycle.
- Make sure that no counterweights or other foreign bodies find their way into the base, as they would stop the balancing machine functioning correctly.
- Under no circumstances should the balancing machine ever be used for any purpose other than those indicated in this manual.

## 1.4 - STANDARD SAFETY DEVICES

- Two-handed control to start the balancing spin. During the spin, the operator is obliged to stay in a lateral position, away from the wheel.
- Slow rotation speed.

## 2 - LIFTING AND INSTALLING

To lift the balancing machine, leverage should only be applied to the three support points available on the base. Under no circumstances should any force ever be applied to other points, such as the mandrel, the head or the accessories panel.

Ensure that all three of the support points of the balancing machine rest on the floor. The machine does not need to be fixed to the floor in order to function correctly.

## 3 - POWER SUPPLY

**WARNING:** Power connections should only be made by specialised staff. The connection to the monophase mains should be made between live and neutral, never between live and earth. A good earth connection is vital for the machine to function correctly. CEMB declines all responsibility and its guarantee is considered null and void if the power connections are faulty.

Before connecting the machine to the power mains with the cable supplied, check that the voltage is the same as the value shown on the plate applied to the rear of the balancing machine. The scale of the power connection should reflect the electrical power absorbed by the balancing machine (see plate).

- The machine's power supply cable must be fitted with a plug that conforms to standards.
- We recommend that you provide the machine with a power connection of its own, complete with an automatic switch.
- If you connect the power line direct to the general power panel, without using any intermediate plug, we recommend you close the balancing machine's main switch with a padlock, so that its use is restricted to authorised personnel.

## 4 - FITTING THE WHEEL

The balancing machine's standard equipment when supplied includes a universal cone flange. The body of the flange with its built-in spring cannot be removed from the balancing machine shaft.

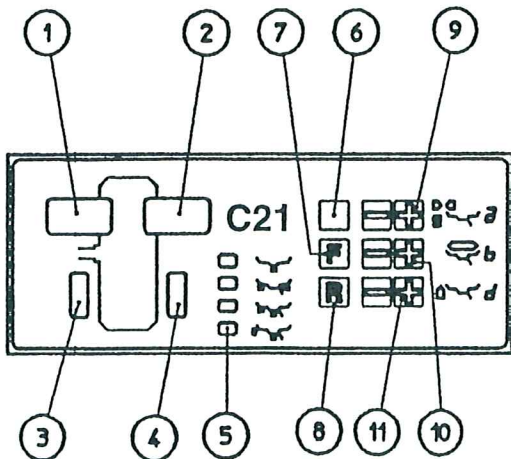
The threaded end unit is removable, so that you can fit other flanges (see PROSPECTUS enclosed).

**N.B.:**

- Use the cone from the rear to centre the wheel, as shown on the prospectus.
- Centre the wheel using the cone from the front, only if the first solution proves to be impossible. Check that the cone is situated in the cylindrical (accurate) area and not on the threaded (inaccurate) area when the wheel is blocked. If the cone is on the threaded area, the centering will be imperfect, which is bound to cause unbalances.

## 6 - CONTROL PANEL

Fig. 1



1. Digital display of the UNBALANCE VALUE on the inner side
2. Digital display of the UNBALANCE VALUE on the outer side
3. Digital display of the UNBALANCE POSITION on the inner side
4. Digital display of the UNBALANCE POSITION on the outer side
5. Displays showing type of correction selected
6. Key for reading unbalance <5 g. (0.3 oz) (self-calibration, selection g/oz, mm/inches)
7. Key for selecting type of correction
8. Key for recalculating, self-calibration and optimisation
9. Keys for calibrating DISTANCE manually
10. Keys for calibrating WIDTH manually
11. Keys for calibrating DIAMETER manually

# 6 - SETTING DIMENSIONS

Fig. 2

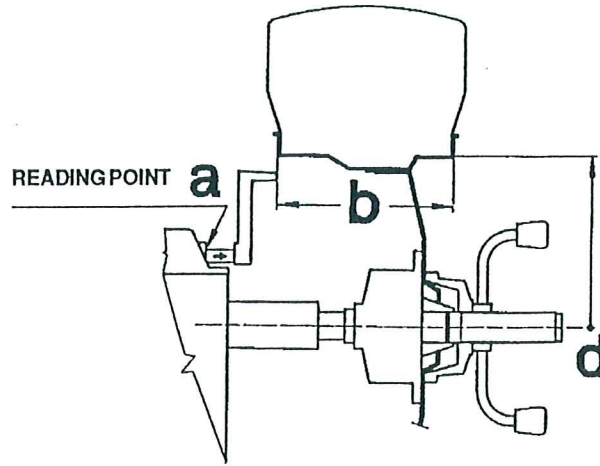


FIG. 3: DISTANCE

Using the gauge provided to determine the distance 'a' of the inner side of the wheel from the machine and then set it.

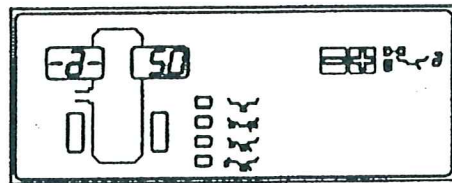


FIG. 4: WIDTH

The nominal width can usually be found on the wheel rim; if not, use the compass gauge provided to determine it, then set it.

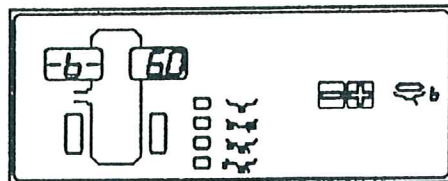
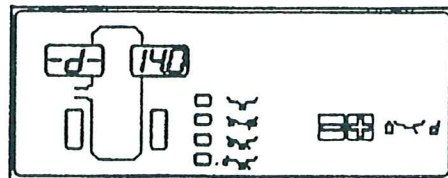


FIG. 5: DIAMETER

Set the nominal diameter 'd' as shown on the tyre.



## 6.1 MANUAL PRESETTING WITH GAUGE EXTENSION

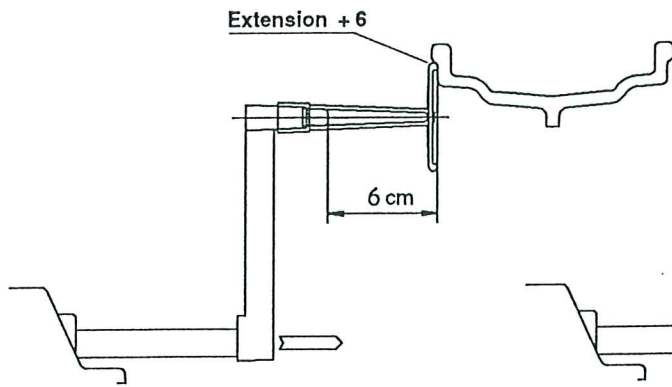


Fig. 6

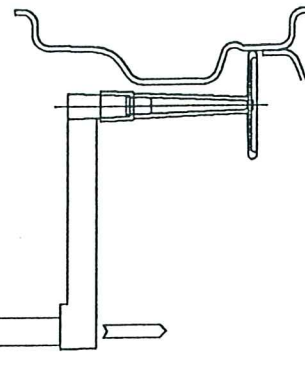


Fig. 6A

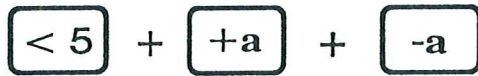
The extension increases the range of measurement of the gauge by 6 cm (fig. 6) and allows distance measurement also when the rim is of special shape (fig. 6A).

Proceed as follows:

- fit the extension on the distance gauge.
- Proceed to the distance measurement in the modes described earlier on.
- After reading value " a " on the index, reset the gauge to " 0 " and manually preset the value " a + 6 " .
- Preset the diameter and width manually as described in fig. 2.

## 6.2 OPTIONS

SELECTIONS KEPT STORED IN THE MEMORY WHEN THE MACHINE IS SWITCHED OFF:



- UNITS of unbalance measurement  
grammes/ounces

SELECTIONS LOST WHEN THE MACHINE IS SWITCHED OFF:



or



- UNITS of WIDTH measurement mm/inch  
(from "SETTING DIMENSIONS" selecting  
WIDTH).

N.B.: default in inches at every machine  
start-up.



or



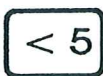
- UNITS of DIAMETER measurement mm/inch  
(from "SETTING DIMENSIONS"  
selecting DIAMETER).

N.B.: default in inches at every machine  
start-up.

UNBALANCE DISPLAYS:



(Normal) Dynamic → Static → ALU ... - → Dynamic



+



(Rapid) Static → Dynamic



+



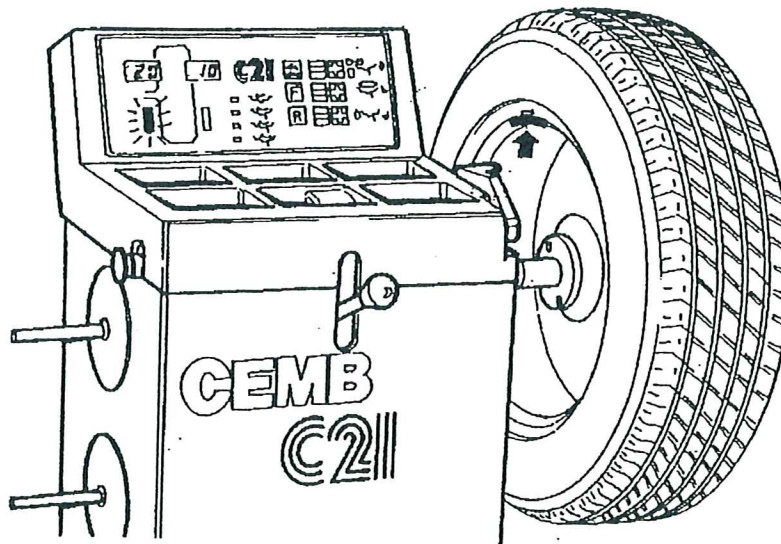
(Rapid) ALU → Dynamic

## 7 - WHEEL BALANCING

### 7.1 MEASURING UNBALANCE

- lift the front lever and press [START], keeping the lever pushed upwards to start the wheel spinning.
- Release the lever and the [START] key when the displays go off, the machine will then start making measurements.
- When the displays show the measurement values, brake the wheel by pushing the front lever downwards. Instruments 1 and 2 will keep the unbalance values in their memories.
- LEDs on displays 3 and 4 will indicate the correction position. If all the LEDs are alight, this means that the correction weight should be applied to the vertical apex.

Fig. 7: EXAMPLES OF CORRECTION ON THE INNER SIDE



### 7.2 RECALCULATING UNBALANCE VALUES

- Set the new dimensions as described above.
- Press **R** , without repeating the spin.
- The new recalculated unbalance values will be displayed.

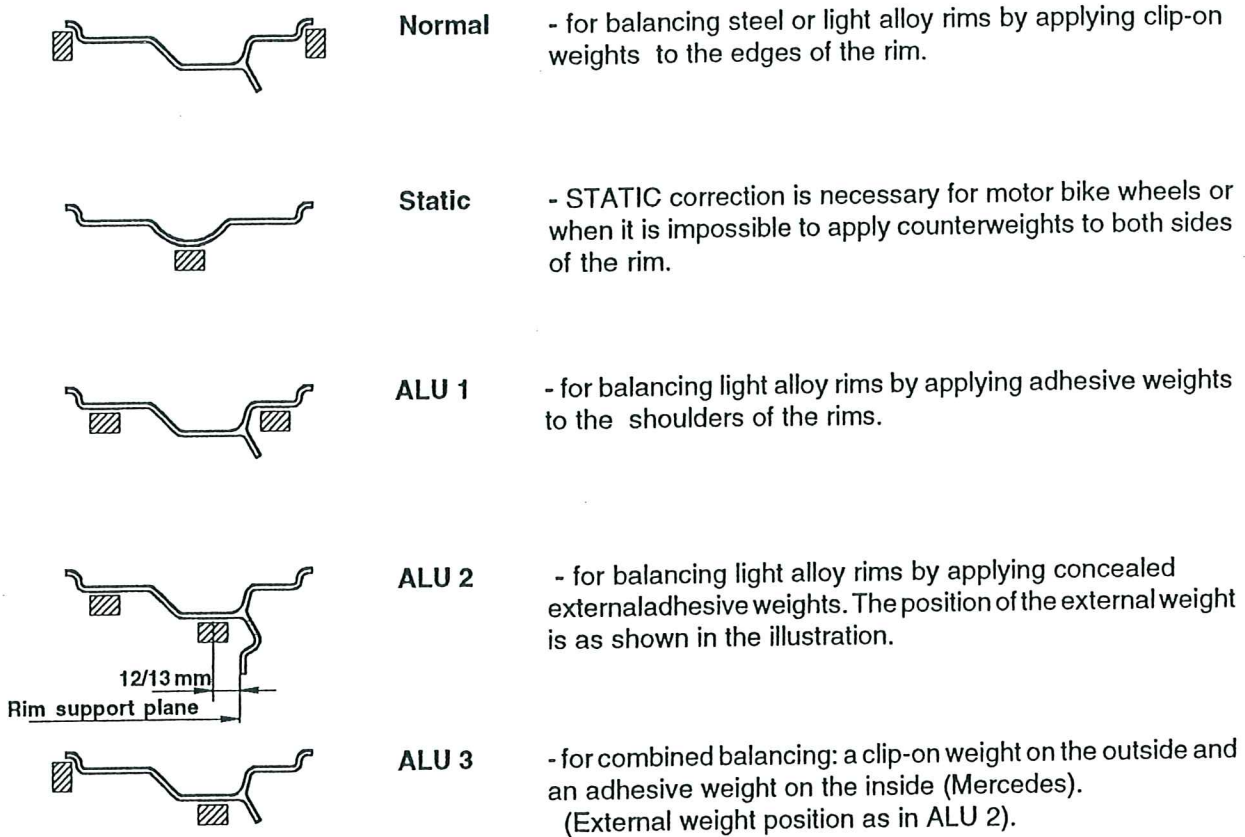


### 7.3 STATIC - ALU

The functions available enable you to display the correction weights to be placed in positions different from those normally used:

- Press **F** to select the ALU function;
- the unbalance values will be displayed corrected to take your chosen correction position into account.

Fig. 8



## 8 - OPTIMISING THE UNBALANCE

- Use this function to reduce the amount of weight to be applied to the wheel to balance it.
- Suitable for static unbalance values greater than 30 grammes.
- Improved residual tyre eccentricity can often also be achieved.

Press **R** + **- a** → **r.S.**  (Press **R** if you want to cancel the function)


Run a spin →  **180**

- The display will tell you to turn the tyre on the wheel rim. Make a chalk reference mark on the flange and the wheel rim, so that you can fit the wheel back on the flange in exactly the same position (Use the index on the mandrel shaft).

- Use a tyre remover to turn the tyre through 180° on the wheel rim.


- Fit the wheel rim back on the flange in the same position as before.

Run a spin → **45** **80%**

**Right hand display:** % value ( symbol  ) of the possible reduction in unbalance compared to the current situation of the wheel.


**Left hand display:** current static unbalance value in grammes. This is the value that can be reduced by turning the wheel rim.

Turn the wheel until the outer LEDs light up: mark **the tyre** at its vertical apex.

**45**  


**80%**  


Mark the wheel **rim** in the same way when the inner LEDs light up.

**45**  


**80%**  


- Now align the two marks.
- In the example, the 45 grammes static unbalance is reduced by 80%, leaving a residual unbalance of about 9 grammes.

## 9 - SELF CALIBRATION

### 9.1- BALANCING

Proceed as follows to carry out the machine's self-calibration facility:

- Fit a random wheel on the shaft, even an unbalanced one, although preferably one of average size.
- Set the exact dimensions of the wheel fitted.

**N.B.:** If you make any mistakes while setting these values, the machine will be incorrectly calibrated, so all the later measurements will be faulty until you next carry out the self-calibration with correct measurements.

- Press + → until the positioning LEDs stop flashing and stay on fixed.

- Spin the wheel until all the displays go off.
- Release the wheel and wait (the self-calibration spin may take as much as a couple of minutes). **It is very important that the wheel is not knocked during this spin or re-accelerated after it has been released**, as the machine would then not be able to carry out the self-calibration and would stop with an error reading.

Add a 100 gramme (3.5 oz) weight to the external side in a random angular position.

- Spin the wheel as already described
- Remove the sample weight and balance the wheel as already described.

- MACHINE CALIBRATED

The values that the machine derives from the self-calibration cycle are stored automatically in a special memory, which will also keep them when the machine is switched off, so that every time that the machine is switched on again, it is ready to function correctly. Nevertheless, the self-calibration operation can be repeated as often as you like or whenever there are any doubts about the machine's correct functioning.

## 10 - ERRORS

Machine functioning may be disturbed by various kinds of malfunctions. If these are picked up by the micro-processor, they will be indicated on the display as follows:

Err.

-5-

### ERROR

### MEANING

- 
- 1 No rotation signal. May be due to a defective position pick-up, to something that stops the wheel turning.
  - 2 The wheel rotation speed has dropped below 45 rpm during the pick-up revolutions. Repeat the spin.
  - 3 Errors in the mathematical calculations, most probably caused by excessive wheel unbalances.
  - 4 The wheel is spinning in the wrong direction.
  - 6 Defective functioning in analogical part. This error code appears when the machine is switched on. Replace the PCB and then repeat the self-calibration process.
  - 7 Defect in the self-calibration values memory. Repeat the self-calibration.
  - 8 Error during self-calibration. This may be due to the second self-calibration spin having been carried out without adding the reference weight, or to an interruption in the cable to the pick-ups.

Other error messages may be communicated by the "ALU 2" LED during measuring operations.

If this LED flashes once the wheel has been accelerated to regime speed, this means that the regime speed is too fast (>200 rpm). The machine will wait for the speed to drop, when it will cut off the ALU 2 LED and make the measurements.

If the same LED flashes at random during the measurement spin, this indicates that the machine is in a waiting mode, probably because the machine has received a knock. The measurement will be repeated automatically in any case, without any further errors.

\* If the error is repeated, consult the after sales service.

### 10.1 INCONSTANT UNBALANCE READINGS

It may sometimes happen that you balance a wheel, remove it from the balancing machine and then discover that it is not balanced when you put it back on the machine.

This is not caused by faulty machine readings, but only by defects in the way the wheel was fitted onto the flange; in other words, the wheel was fitted in two different positions with respect to the balancing machine shaft.

If the wheel is fitted onto the flange with screws, maybe these screws were not tightened correctly (i.e. gradually and cross-wise) or, as is often the case, the wheel drillings may have over-generous tolerances. Small errors, up to 10 grammes (0.4 oz) can be considered normal in wheels blocked with a cone flange. With wheels blocked with screws, the error is normally larger.

If you find that the wheel is still unbalanced when it is fitted back onto the vehicle after balancing, this may depend on unbalances in the vehicle's brake drum or very often on the holes for the wheel rim screws, which are sometimes drilled with over-generous tolerances. In this case, it may be worth while rebalancing the wheels fitted on the vehicle (for example, using our models L36 or L38/2).

## **11 - ORDINARY MAINTENANCE (Non-specialised staff)**

**Attention:** Remember to switch off all power connections to the machine before carrying out any maintenance operations.

### **11.1 REPLACING PROTECTION FUSES**

Two protection fuses are set on the supply board, which can be accessed by removing the weights shelf. If you have to replace these fuses, make sure that you use others with the same electricity load. If the fault happens again, consult the After Sales Service.

### **11.2 FLANGES**

- Plastic sleeve for holding the wheel in place: keep the inner rubber ring constantly lubricated.

# EXTRAORDINARY MAINTENANCE

(For expert technicians only)

## 12 - LIST OF RECOMMENDED SPARE PARTS

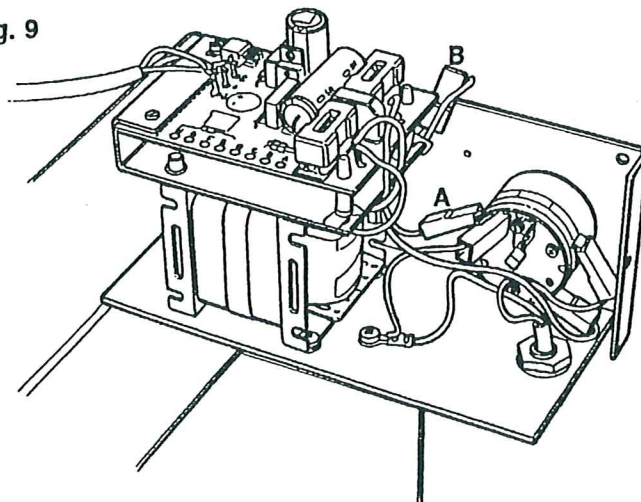
(See blow-up tables for references)

Item	CODE	Q.ty	DESCRIPTION
104	020600503	2	6005 bearing - 2Z
112	071024010	1	Complete driving pulley 29086P
114	091020205	1	Ferodo for brake 20 x 20 x 5
116	501024233	1	Special monophase motor 0.15 HP - 4-pole - LM56 - B14 220/50
116A	502024133	1	Special monophase motor 0.15 HP - 4-pole - LM56 - B14 110/60
116B	502024233	1	Special monophase motor 0.15 HP - 4-pole - LM56 - B14 220/60
130	940513394	1	Position pick-up board with cable
137	182245870	2	Balancing spring drawin no. 24587P
138	067054210	1	Handle I 222 / 55 - M10
145	140212960	3	Adaptor plate drawing no. 21296P
204	050131203	1	LEXAN panel with keyboard model 1312
221	511231002	1	Switch KL 1002 + Q 555
223	611018463	1	Transformer 30 VA drawing no. 18463P
224	940512124	1	Power supply pcb st 18558/1
225	681002000	2	Fuses 5 x 20 - 2A
228	530080353	1	CEMA series 080 ER key
229	940513111	1	SMD C21 computer pcb

## 13 - CHANGING POWER SUPPLY VOLTAGE

- Always check the power supply voltage marked by the manufacturer on the characteristics plate.
- Standard supply is 220 - 240 V / 50 Hz monophase.
- To convert to 110 V, remove the red cable "A" and replace it with the white cable "B".
- Replace the motor according to the voltage and frequency of the mains used:
  - 220 / 50
  - 220 / 60
  - 110 / 60

Fig. 9



SIMPLIFIED LAYOUT FOR ILLUSTRATION PURPOSES

## 14 - MANAGING MACHINE PARAMETERS

Press [**<5**] + [**R**] as though you were going to run the self-calibrating facility. When the position LEDs stop flashing, instead of running the cycle, press the following within 5 seconds and in the right sequence:

[**-a**] then [**+a**] then [**F**]

- After you have pressed [**-a**] and [**+a**], the displays will go off; after you have pressed [**F**], the current value of the fixed distance [**DF**] will be displayed: use [**+b**] and [**-b**] to alter it.
- Press [**+a**] to pass to changing the "**I**" value.  
The right hand display will read the current value (as a %) and the left hand display the lettering "**in.**" and the symbol "**—**" if the correction is negative, or "**-**" if it is positive. Use [**+b**] and [**-b**] to alter it.
- Press [**+a**] again. The right hand display will read the "**S**" value. Use [**+b**] and [**-b**] to alter it.  
Press [**+a**] to terminate setting.

**N.B.:** If you press the [**<5**] key at any stage while setting these three parameters, the system will interrupt the function and automatically set the machine parameters to the base values.

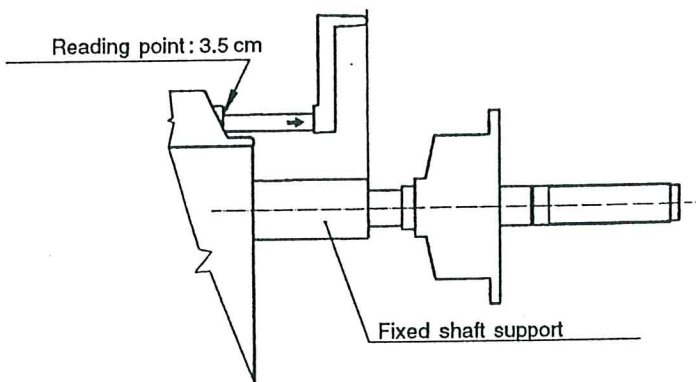
Basic configuration values:      **C21: DF = 85**      **I = +6**      **S = 330**

After altering the machine parameters, you should run its self-calibration facility again.

**N.B.:** A plate inside the machine shows the values of the calibration done in the factory.

## 15- CHECKING THE DISTANCE GAUGE

Fig. 10



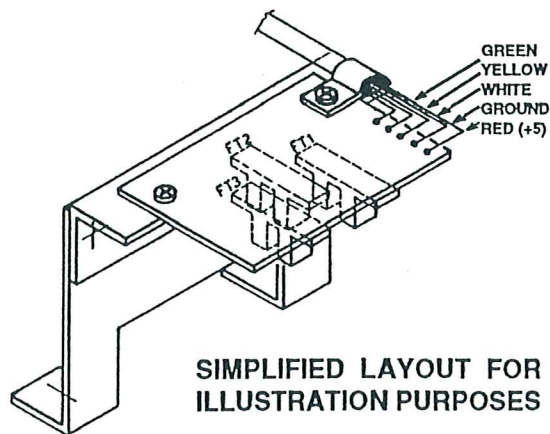
There is no adjustment on the distance gauge. The only time you have to be careful is when you change the graduated strip. This must be positioned so that it reads 3.5 at the end of the fixed index (reading point) when the rider tip is situated in the position shown in the figure.

## 16 - CHECKING THE POSITION SENSOR

Follow these instructions to check the efficiency of the position sensor:

1. Make sure that none of the three opto-couplers rubs against the phase disc or against the RESET tooth.
2. Check the following voltages, using a tester set for VDC measuring (the power supply should be on but the machine should not be turning):
  - \* +5 VDC constant between earth and the red wire
  - \* +4.5 to 4.8 VDC between earth and the yellow (RESET) wire when the RESET tooth is in the opto-coupler TC ST 2000 and "0" VDC when the RESET tooth is out of the opto-coupler.
  - \* "0" VDC to 4.5 / 4.8 VDC voltage variations between earth and the green wire (CLOCK) and between earth and the white wire (U/D) when the machine shaft is turned very slowly.

Fig. 11



**N.B.:** if you have to replace the position sensor, take off the board only by loosening the two fixing screws, but do not move the supporting bracket; this makes repositioning easier.

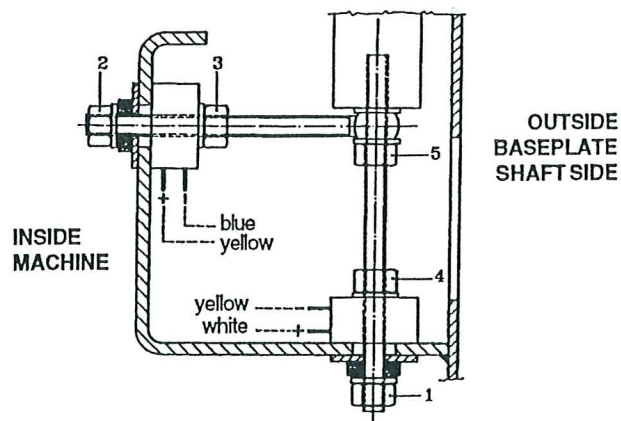
## 17 - FITTING THE PIEZO PICK UPS

### HOW TO FIT THE PIEZO PICK-UPS

Compensation or angular position problems may sometimes be caused by a fault in the piezo pick-ups. Follow these instructions to replace them:

1. Remove the weights tray.
  2. Remove nuts 1 and 2 with pertaining springs and washers.
  3. Loosen nuts 3, 4 and 5 and detach the various parts.
  4. Re-fit the new parts without tightening the nuts, observing the correct fitting sequence.
- N.B. :** the position of the coloured wires shown in the picture must be respected when fitting piezo pick-ups.

Fig. 12



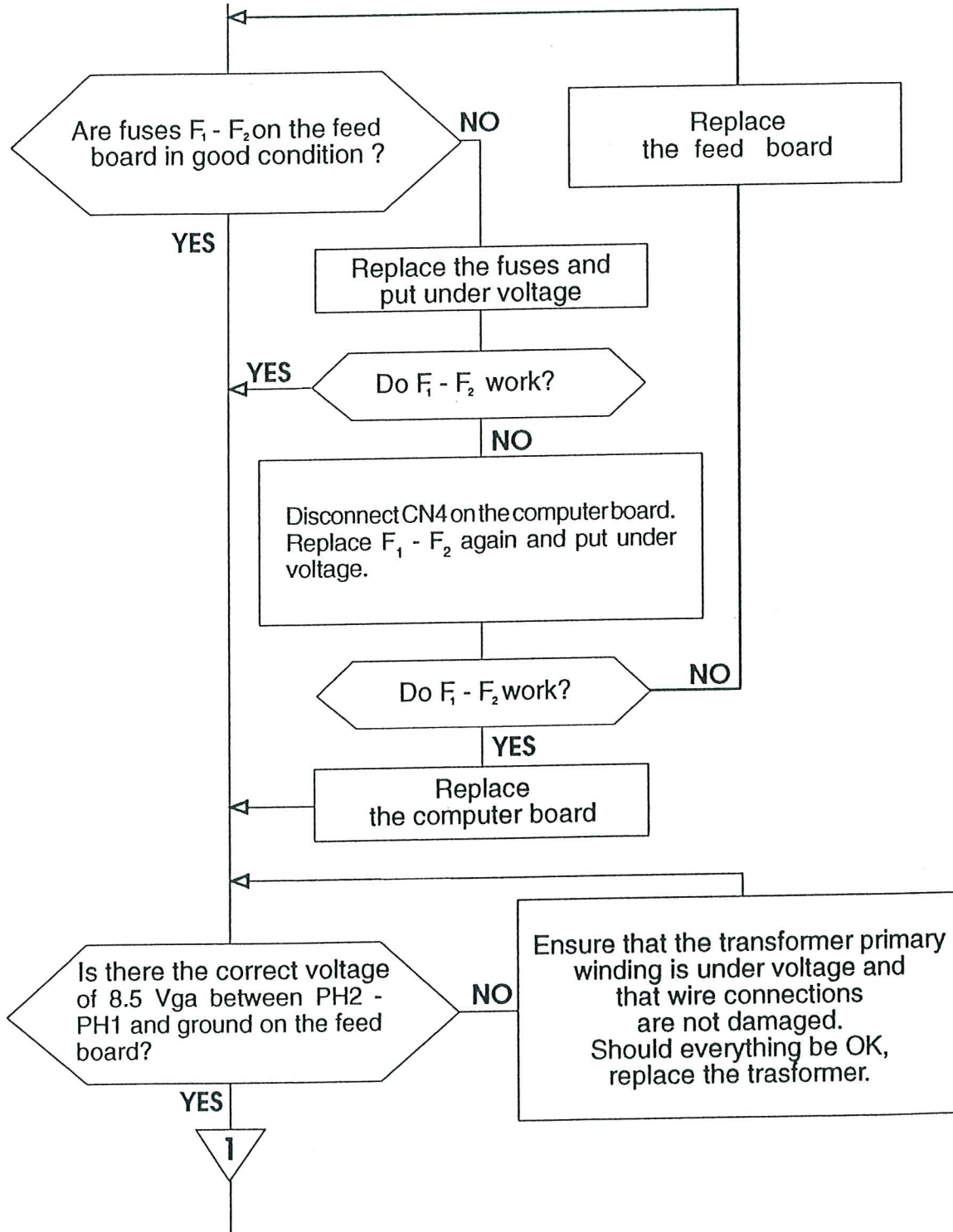
5. Use a wrench to tighten nut 5; nuts 3 and 4 can be tightened by hand (1/2 a turn with a wrench if necessary). The mandrel shaft should be kept perfectly in line during these operations.
6. Re-fit the springs and nuts 1 and 2, which must be tightened completely, in order to recover the springs' elasticity, and then loosened half a turn, thus giving the piezo parts the correct load (you can use a torque wrench calibrated for 400 Kg.cm).
7. Smear a plentiful layer of silicone on the piezo parts.
 

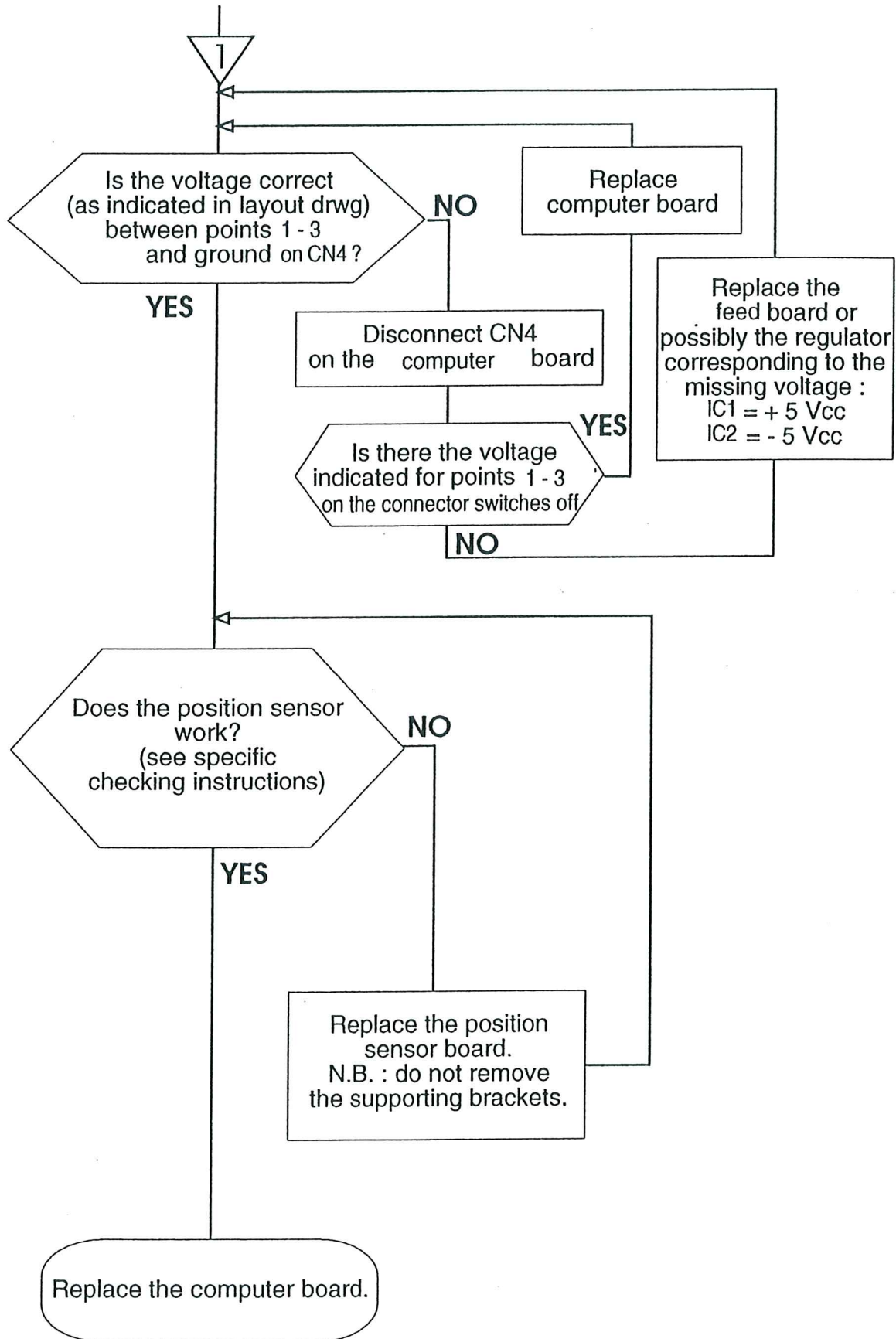
**(N.B.:** the piezo crystals must have an insulation of at least 50 Mohm to function properly).
8. Re-fit the cover and the weights tray.



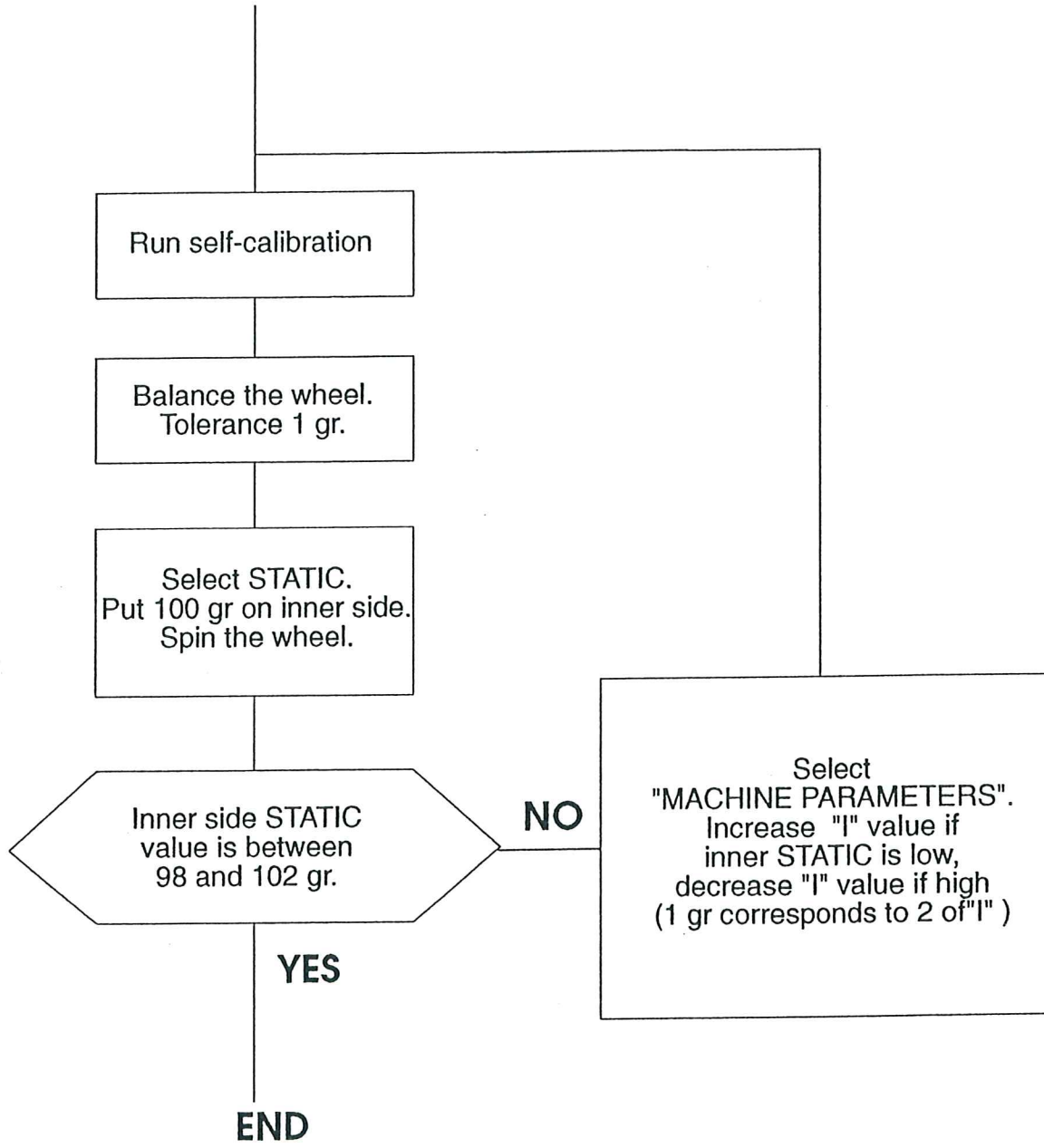
## 18 - TROUBLE SHOOTING FLOW CHART

**N.B.:** if you disconnect the CN5 (computer board) from the MOTOR [START] key, the instrumentation will also function with a manual spin.  
 - If you replace the computer board, set the machine parameters indicated on the technical characteristics plate.

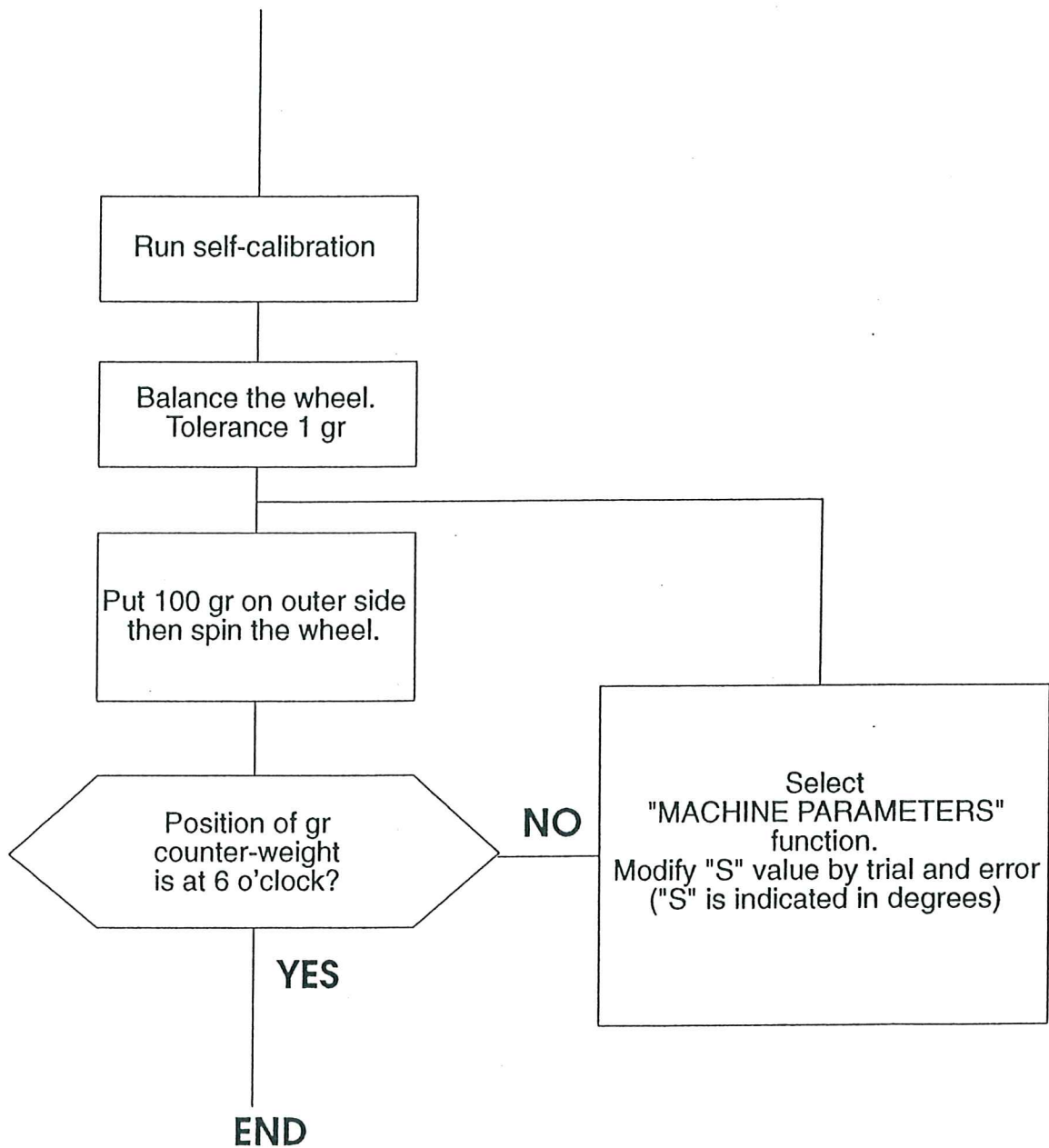




# 18.1 CHECKING AND CALIBRATING STATIC VALUE (STI)

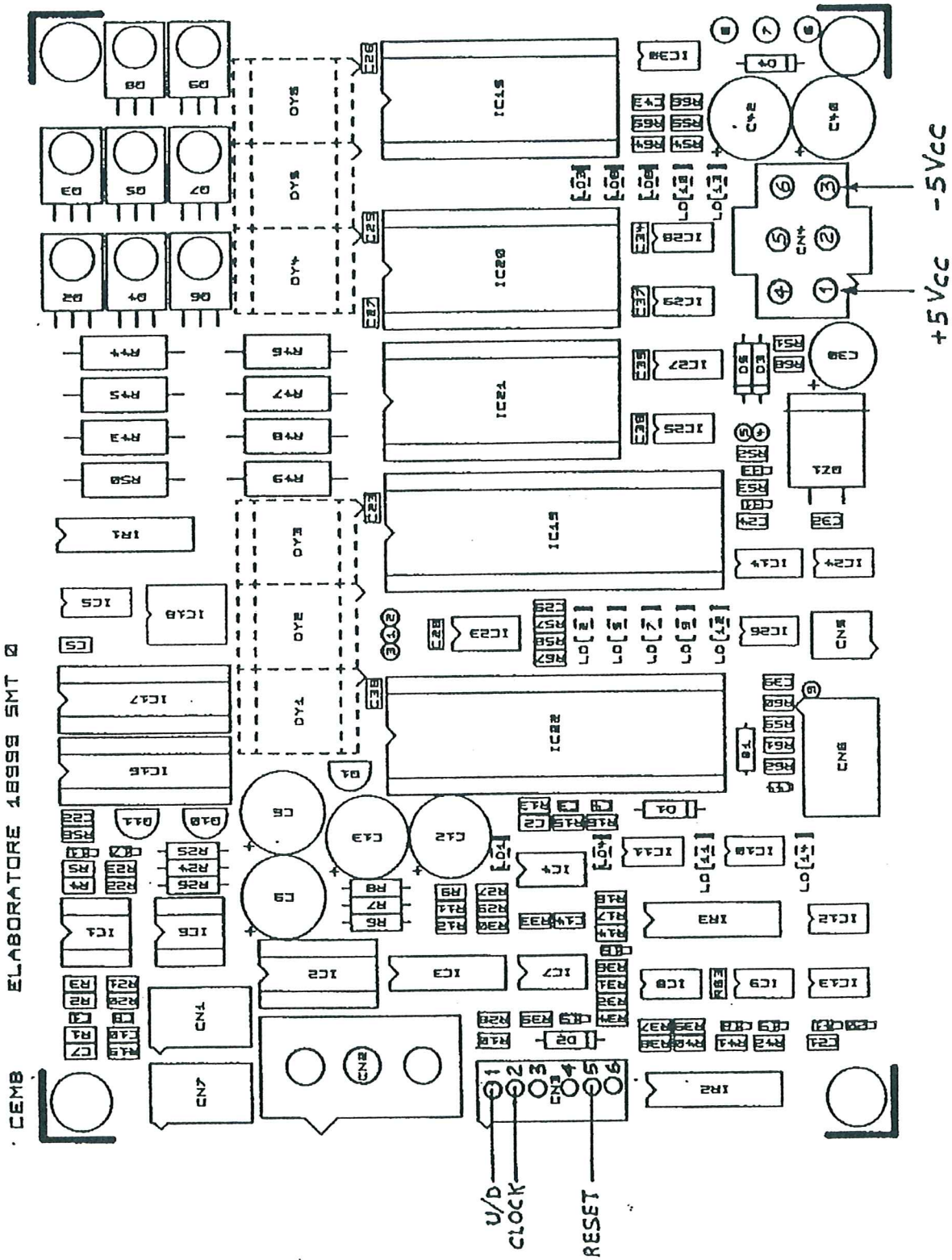


## 18.2 CHECKING AND CALIBRATING UNBALANCE POSITION



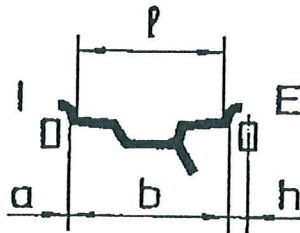
# 19 - COMPUTER PCB LAYOUT

Fig.13



## 20 - MEASURING THE WHEELS AND SETTING DATA ON THE BALANCING MACHINE

The need for increasingly accurate calibrations and the introduction of ALU keys have made it important to define exactly how wheel rims must be measured and how the balancing machine interprets the data entered. For this reason, it is useful for the machine operator to understand how the machine automatically alters the dimensions set in order to obtain the distances of the correction planes, which are defined as passing through the barycentres of the correction weights.



If we consider a typical rim, the measurement "l" represents the rim width, as stated by the manufacturer. This will differ from the distance between the correction planes because of the thickness of the rim and the physical dimensions of the counter-weight, whose barycentre is situated at a distance "h" from the support on the rim's edge.

The balancing machine will automatically correct the data set by adding  $2 \times h = 6 \text{ mm}$  to the measurement. Measurement "b", made using the gauge, is usually more precise, even though it may be very similar to the distance "l", known to the rim user. These two measurements differ by only the width of the sheet metal, which is usually about 2 mm per side.

Although this difference is very small, it enables us to obtain an accurate calibration by setting either the internal width "l" or the external width "b" of the rim, at random.

We recommend you add a quarter of an inch to the values indicated by the rim manufacturers.

As for ALU functions, in addition to the systematic corrections related to the counter-weight's centre of gravity as explained above, the machine also carries out the following approximations :

### ALU1



#### ALU 1

a = value a set +3/4"  
 b = value b set -1 1/2"  
 d = value d set -1"

### ALU2



#### ALU 2

a = value a set +3/4"  
 b = flange plane distance -1/2" -a  
 d<sub>I</sub> = value d set -1"  
 d<sub>E</sub> = value d set -2 1/2"

### ALU3



#### ALU 3

a = value a set  
 b = flange plane distance -1/2" -a  
 d<sub>I</sub> = value d set  
 d<sub>E</sub> = value d set -2 1/2"

### ALU4

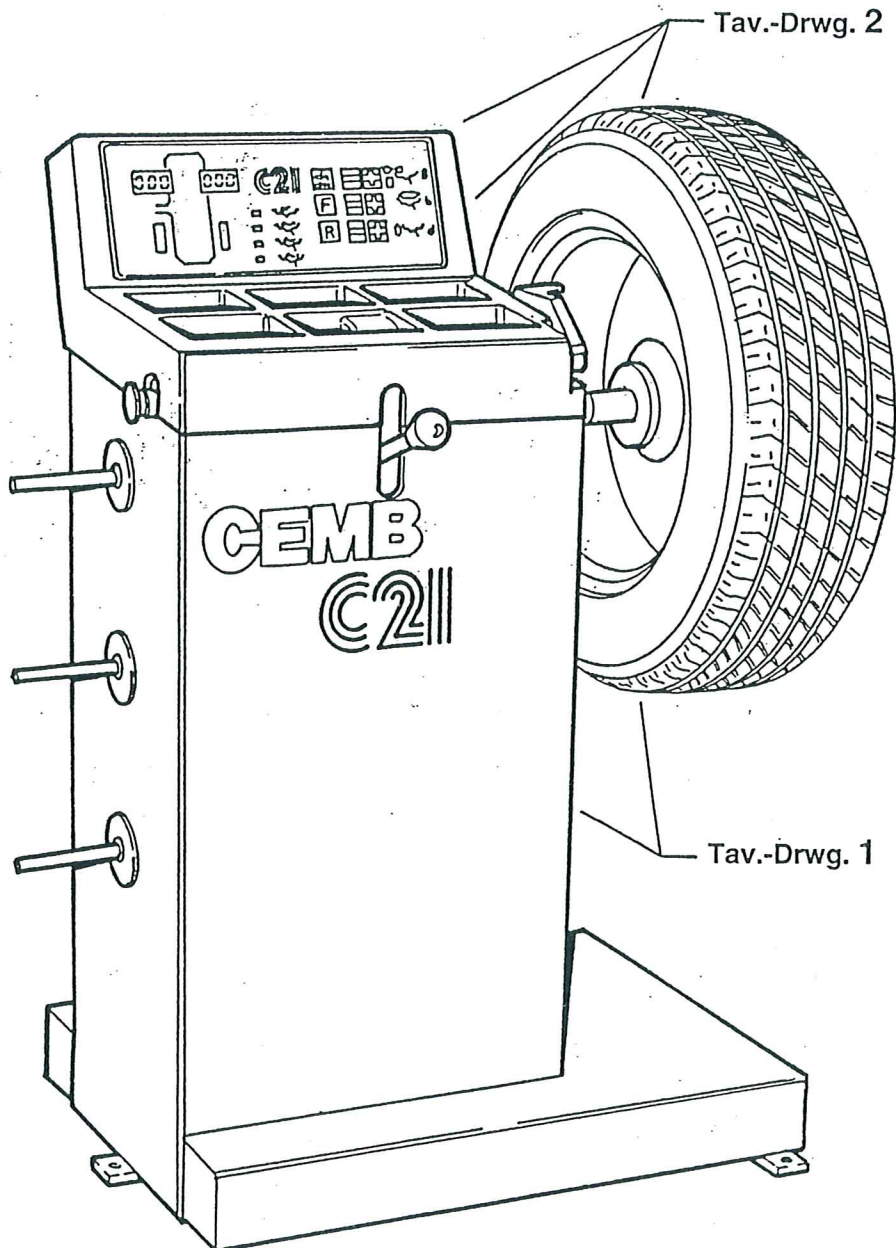


#### ALU 4

a = value a set  
 b = value b set -3/4"  
 d<sub>I</sub> = value d set  
 d<sub>E</sub> = value d set -1"

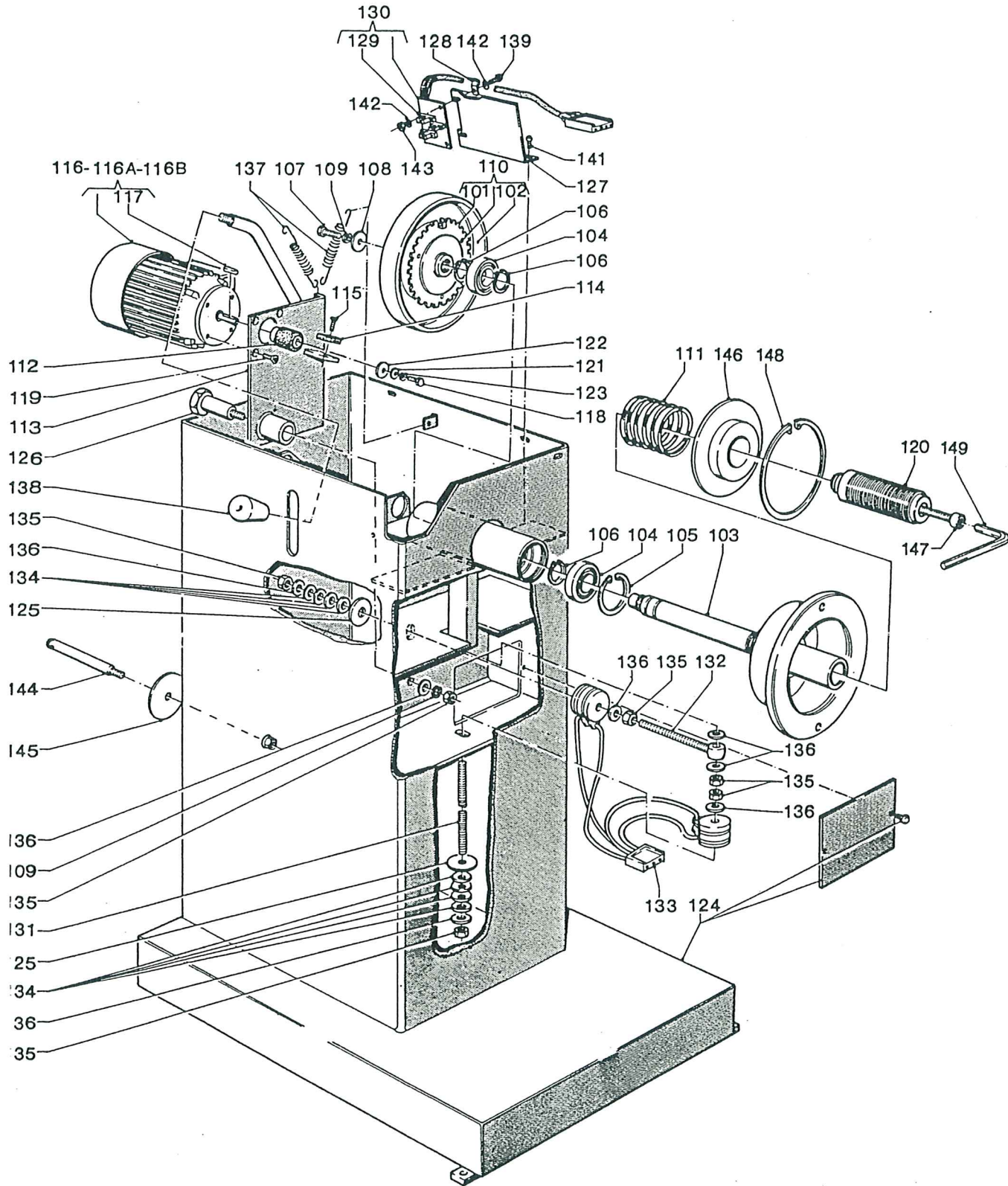
N.B.: I = INNER SIDE  
 E = OUTER SIDE

TAVOLE ESPLOSE EQUILIBRATRICE C21  
EXPLODED VIEW OF WHEEL BALANCER C21  
(SERIES B)



TAV. 1 - BASAMENTO E MANDRINO  
DRWG. 1 - CASING AND SHAFT ASSEMBLY

TAV. 2 - TESTATA DI MISURA E CALIBRO DISTANZA  
DRWG. 2 - MEASURING HEADSTOCK AND RIM DISTANCE GAUGE



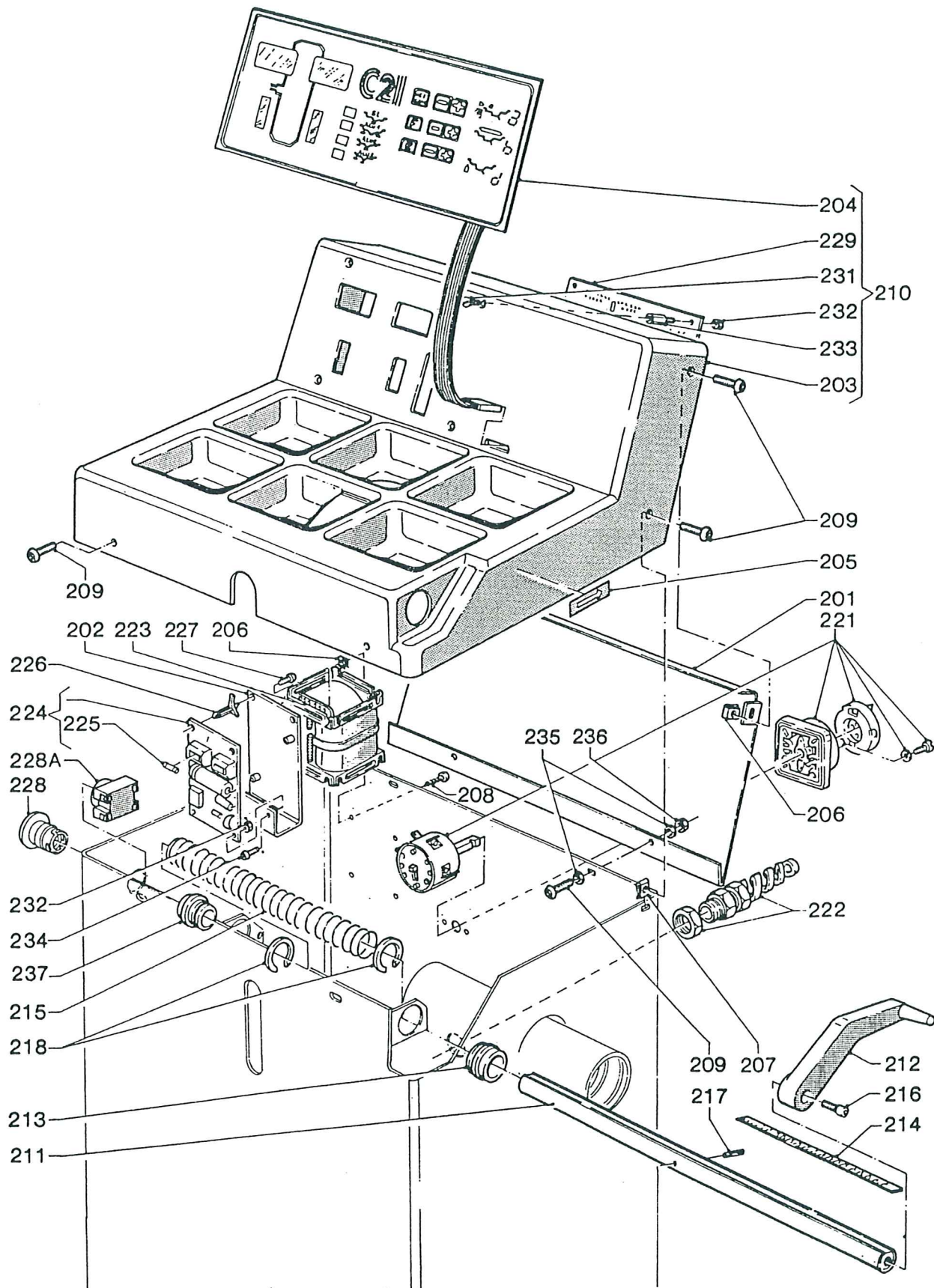
TAV. 1 - BASAMENTO E MANDRINO

DRWG. 1 - CASING AND SHAFT ASSEMBLY



IAV. I - C21 (Series B) - Particolari reperibili in commercio - Parts on the market

Item	CODE	Q.ty	DESCRIZIONE	DATA	DESCRIPTION
101	420720037	1	Disco di fase	20037P	Phase disc
102	940103677	1	Puleggia condotta	27554G	Driven pulley
103	940103816	1	Albero completo	29325G	Complete shaft
*104	020600503	2	Cuscinetto	6005 - 2Z	Bearing
*105	342000047	1	Anello SEEGER	47 I UNI 7437	SEEGER ring
*106	341000025	3	Anello SEEGER	25 E UNI 7435	SEEGER ring
*107	311220120	1	Vite	TE M10x25 UNI 5739	Screw
*108	326035001	1	Rosetta piana	Ø 11/30/2.5 UNI 6593	Flat washer
*109	325046010	2	Rondella elastica	Ø 10 UNI 1751	Elastic washer
110		1	Puleggia condotta completa		Complete driven pulley
111	181198630	1	Molla	19863P	Spring
112	071024010	1	Puleggia motrice completa	29086P	Complete driving pulley
113	420324452	1	Staffa porta motore	FB24452G	Motor bracket
114	091020205	1	Ferodo per freno	20x20x5	Brake lining
*115	315231034	1	Vite	TS M4x10 UNI 6109	Screw
116	501024233	1	Motore monofase speciale	0.15CV 4 poli LM56 B14 220/50	Special one-phase motor
116A	502024133	1	Motore monofase speciale	0.15CV 4 poli LM56 B14 110/60	Special one-phase motor
116B	502024233	1	Motore monofase speciale	0.15CV 4 poli LM56 B14 220/60	Special one-phase motor
117		1	Chiavetta motore	3x3x20	Motor key
*118	311220038	1	Vite	TE M4x20 UNI 5739	Screw
*119	313220054	4	Vite	TSEI M5x16 UNI 5933	Screw
120	311220038	1	Terminale filettato	FM 26898P	Terminal
*121	325035004	1	Rosetta piana	Ø 4 UNI 6592	Flat washer
*122	325035007	1	Rosetta piana	Ø 6x18 UNI 6593	Flat washer
*123	325046004	1	Rosetta elastica	Ø 4 UNI 1751	Elastic washer
124	940083819	1	Basamento completo	FB 29087G	Complete base plate
125	420716593	2	Rondella per molle a tazza	16593P	Washer for cup springs
126	420424647	1	Perno staffa	FB 24647P	Bracket pin
127	420729088	1	Sostegno datore di fase	FB 29088P	Position pick-up holder
128	420610639	1	Fermacavo in alluminio	10639P	Cable retainer in aluminium
129	547000370	3	Fotocellula	TCST 2000	Photo-cell
130	940513394	1	Scheda datore di fase con cavo		Position pick-up board with cable
131	105110165	1	Barra filettata	M10x165	Threaded bar
132	105114744	1	Tirante ad occhio	M10x130	Eye rod
133	940702255	1	Gruppo piezo STATICO-DINAMICO		STATIC-DYNAMIC piezo assembly
*134	345122515	8	Molla a tazza	A25 Ø 12.2/25/1.5	Belleville washer
135	321232010	6	Dado esagonale	M10 UNI 5588	Hexagonal nut
*136	325035010	7	Rosetta piana	Ø 10 UNI 6592	Flat washer
137	182245870	2	Molla bilanciamento	24587P	Balancing spring
*138	067054210	1	Impugnatura	I 222 / 55 - M10	Handle
*139	314231018	2	Vite	TC M3x10 UNI 6107	Screw
*141	314232034	2	Vite	TCB M4x10	Screw
*142	325035003	4	Rosetta piana	Ø 3 UNI 6592	Flat washer
*143	321232003	2	Dado esagonale	M3 UNI 5588	Hexagonal nut
144	105132900	3	Piolo porta flange	13290P	Adaptor pin
145	140212960	3	Piattello appoggio flange	21296P	Adaptor plate
146	217019864	1	Coperchietto	19864P	Cover
*147	312120137	1	Vite	TCEI M0x160 UNI 5931	Screw
*148	344200118	1	Anello SEEGER	SB 118	SEEGER ring
*149	114008002	1	Chiave esagonale maschio	mm 8	Allen wrench



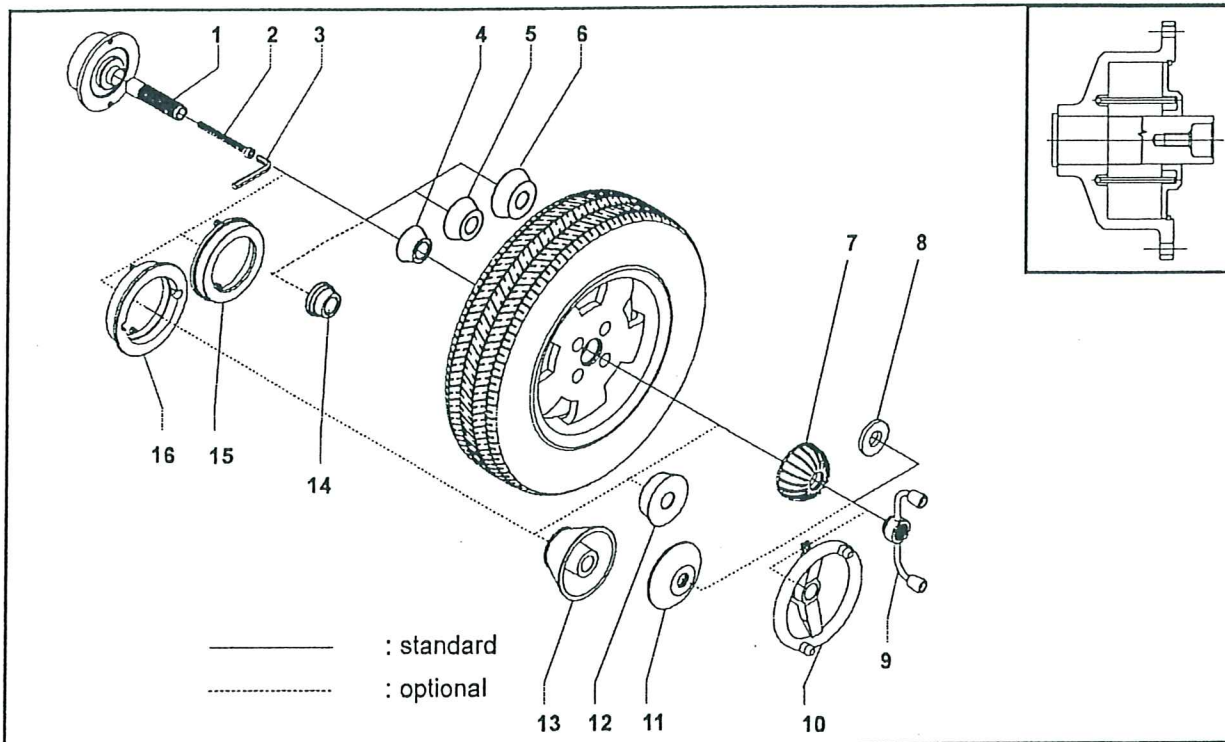
TAV. 2 - TESTATA DI MISURA E CALIBRO DISTANZA

DRWG. 2 - MEASURING HEADSTOCK AND RIM DISTANCE GAUGE

TABLE 021 (Series B) - Particulars repertory in commercio - Parts on the market

Item	CODE	Q.ty	DESCRIZIONE	DATA	DESCRIPTION
201		1	Coperchio posteriore	24453P	Rear cover
202	420619747	1	Squadra fissaggio scheda PW	19747P	PW board fixing bracket
203	143245591	1	Testata portapesi	24559G	Weight-tray headstock
204	050131203	1	Pannello LEXAN con pulsantiera	mod. 1312	Panel with puch-button board
205	040010101	1	Freccia adesiva senso rotazione		Stick-on arrow (direction of rotation)
*206	329007041	6	Dado	RAPID NJ 704/1	Nut
*207	329007043	4	Dado	RAPID NJ 704/3	Nut
*208	314931069	4	Vite autofilettante	TCB Ø 4,2x13	Self-threading screw
*209	311220034	8	Vite testa larga	M4x10	Large head screw
210	940503110	1	Testata C21		Headstock C21
211	420524622	1	Asta calibro distanza	24622P	Distance gauge rod
212	217019286	1	Indice calibro	19286P	Gauge index
213	217019283	1	Boccola corta per calibro	19283P	Gauge short bush
214	040142902	1	Fascia graduata	Mod. 1429	Graduated strip
215	181192870	1	Molla per calibro	19287P	Gauge spring
*216	312120071	1	Vite	TCEI M6x16 UNI 5931	Screw
*217	335310040	1	Spina elastica	Ø 4x30	Elastic pin
*218	341000028	2	Anello SEEGER	28e UNI 7435	SEEGER ring
221	511231002	1	Interruttore	KL 1002 + Q555	Switch
*222	526003243	1	Pressacavo flessibile	tipo 3243 "HEYCO"	Cable clip clip
223	611018463	1	Trasformatore	30 VA 18463P	Transformer
224	940512124	1	Scheda alimentatore	18558/1	Power supply board
225	681002000	2	Fusibile	5x20 - 2A	Fuse
*226	527006175	2	Distanziale in nylon per scheda	37-1693-1100	Nylon spacer for board
*227	314232034	2	Vite	TCB M4x10 UNI 7687	Screw
228	530080353	1	Pulsante	CEMA series 080 ER	Button
228A	530080011	1	Contatto	CEMA series 080 BF11V	Contact
229	940513111	1	Scheda elaboratore	"SMD" C21	Computer board
*231	315231015	4	Vite	TCB M4x10	Screw
*232	321232003	6	Dado esagonale	M3 UNI 5588	Hexagon nut
*233	527034980	4	Distanziale	M3 GA/3498 7 mm	Spacer
*234	314231018	2	Vite	TC M3x10 UNI 6107	Screw
*235	325035004	4	Rosetta piana	Ø 4 UNI 6592	Flat washer
*236	321232004	2	Dado esagonale	M4 UNI 5588	Hexagonal nut
237	217019284	1	Boccola lunga calibro	19284P	Long gauge bush

UNIVERSAL CONE ADAPTORS



CARATTERISTICHE GENERALI

- Per bloccaggio di ruote con foro centrale
- Per modelli con corpo flangia a cono incorporato nell'albero della macchina, completo di molla precaricata.
- Coni in acciaio temperato e albero rettificato

GENERAL FEATURES

- For locking wheels with central hole.
- For models with cone adaptor body incorporated in machine shaft and pre-load, built-in spring.
- Hardened steel cones and ground shaft.

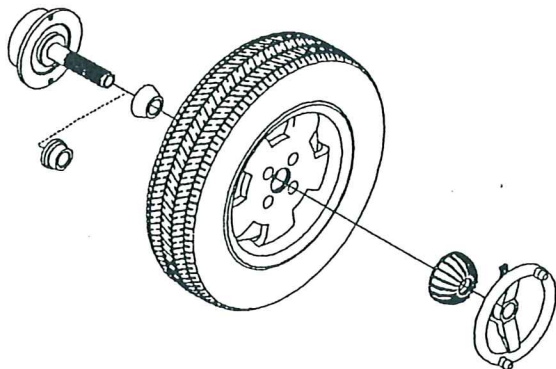
rif.	code	data			
opt = optional	1	940103565	Terminale filettato		
	2	114008002	Chiave esagonale maschio		
	3	312120137	Vite		
	4	940013747	Cono		
	5	940013748	Cono		
	6	940013749	Cono		
	7	218226503	Manicotto		
	8	218158213	Rondella in nylon		
	9+7	940012692	Ghiera economica (lancio manuale)		
	10+7	940013859	Ghiera rapida con volantino (lancio manuale) - quick lockring with handwheel (hand spun)		
9	940011941	A			
	341000012	B			
	217019150	C			
	10	940012977		A	
		331220059		B	
		331220055		C	
		940012975		D	
		331220055		C	
		940012974		E	
		183237600		F	
940013860		G			
312120067		H			
321232006		M			
218295313	N				
217295353	O				
325035006	P				
312120073	Q				
<p>Obbligatorio nei paesi CEE per macchine vendute senza protezione ruota (velocità inferiore a 100 1/min) Compulsory in EC countries for machines without wheel guard (balancing speed &lt; 100 RPM)</p>					
11 opt.	940013665	Manicotto per grandi Ø e cerchi in lega	cap for large Ø and alloy rims RL		
12 opt.	940013443	Cono speciale	special cone Japan 26168/P Ø 102 ÷		
118					
13 opt.	940010608	Cono	cone 5°/L 16588/P Ø 97 ÷ 170		
14 opt.	940010448	Cono speciale a gradini	special stepped cone MT 17162/P Ø 56.5;57;66.5;72.5		
15 opt.	940013325	Distanziale	spacer WD		
16 opt.	940010537	Disco (da usare con rif. 13)	ring (to be used with item 13) G/36		

01/97

# UC 20

## MONTAGGIO DELLA RUOTA SULLA FLANGIA FITTING THE WHEEL ONTO THE ADAPTOR

La flangia deve essere utilizzata con centraggio dall'interno in modo che il cono sia sulla zona cilindrica (precisa) e non sulla zona filettata (non precisa).



*Adaptor must be used in the "back-cone" method so that cone is on the cylindrical part (accurate) and not on the threaded part (innaccurate).*

### Centraggio ruota dall'interno :

- montare in sequenza il cono adatto con conicità verso l'esterno, la ruota, la ghiera completa di manicotto 7;
- il manicotto concavo viene sostituito dalla rondella in nylon 8 per ruote in lega leggera con mozzo sporgente.

### Wheel centering from the inner side :

- fit the suitable cone (conicity towards the outer side) and, in sequence, the wheel. the lockring complete with hollow sleeve 7;
- the hollow sleeve is replaced by the nylon washer 8 for light alloy rims with protruding hub.

## FLANGE UNIVERSALI UNIVERSAL ADAPTOR

### CARATTERISTICHE GENERALI

- Per modelli con corpo flangia a cono incorporato nell'albero della macchina.
- Per modelli sottoindicati togliere il terminale filettato.

### GENERAL FEATURES

- For models with cone adaptor body incorporated in machine shaft.
- For models hereunder, remove the threaded end.

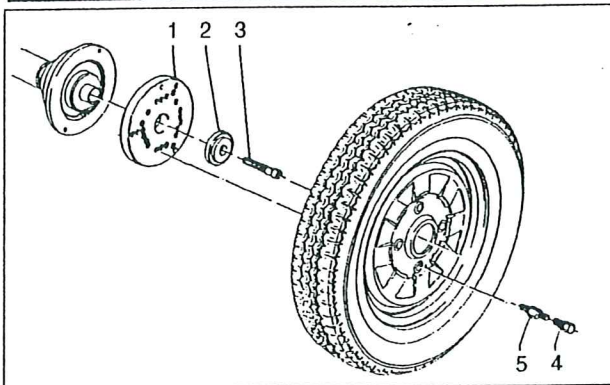
### Particolarmente adatto per ruote con foro cieco

- Flangia a fori con colonnette di centraggio, ottima precisione utilizzando i mozzi di centraggio opzionali.

### Particularly fit for blind hole wheels

- Drilled adaptor with centering pins, very high accuracy by using the optional centering hubs.

## AC 20 940013566

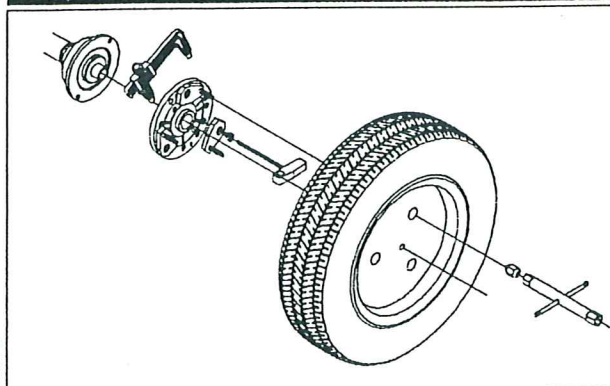


rif.	code	data
1	940013381	Disco flangia adaptor disc dis. 25761/G
2	940013567	Mozzo serie/B hub -dis. 26912/P
3	312120121	Vite TCEI M10x30 UNI 5931 screw
4	101257640	Dado MF per ruote francesi nut for french wheels
5	101257630	Dado con doppio cono Ø 60/90 nut with double cone

Fori attacco Fitting holes	Autovetture Car models	Mozzo di centraggio Centering hub
3x98	Citroën AX - 87	
4x98	Filmo	Ø 58
4x100	Renault R21	Ø 60.15 OP2
4x101.6	Mini Metro	Ø 65 OP2
4x108	Peugeot 205 - Citroën BX	Ø 65 OP2
3x115	Citroën Visa	
3x130	Renault R4 - R5	
3x160	Citroën 2CV - Peugeot 403/40	

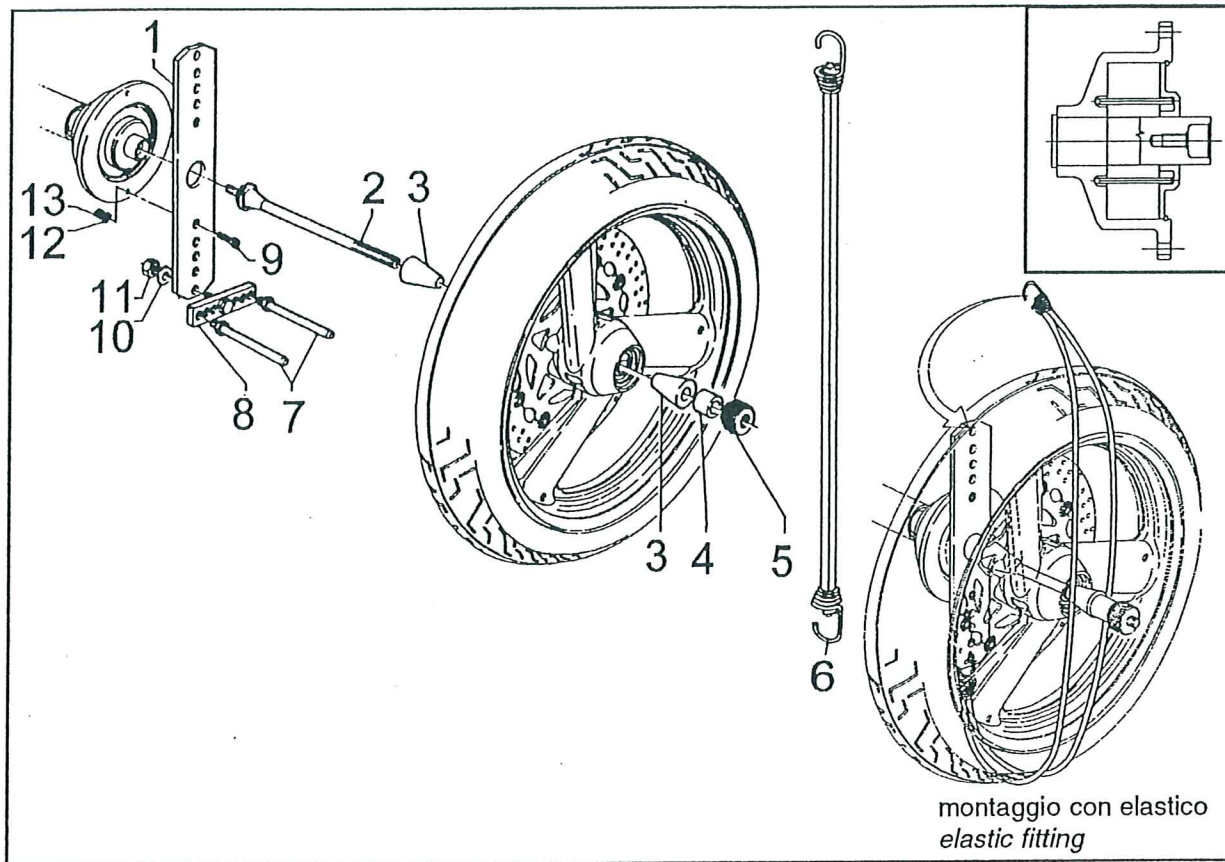
## UH 20 940013778 94FF32069

## UH 20 UH 20/F



Per ruote di autoveicolo a 3/4/5 fori su Ø 95 ± 215 mm  
- Flangia universale rapida. Rilevare con calibro in dotazione la distanza tra due fori sulla ruota, regolare la posizione di due colonnette con il calibro, bloccare tutte le colonnette, montare e bloccare con i dadi la ruota.

*For motor vehicle wheels with 3/4/5 holes on Ø 95 ± 215 mm*  
- Universal quick adaptor. Take distance between two holes of wheel (using appropriate caliper) and adjust two studs correspondingly. Lock all studs, mount wheel and block it with the nuts.



RM 20/15

RM 20/12

opt = optional

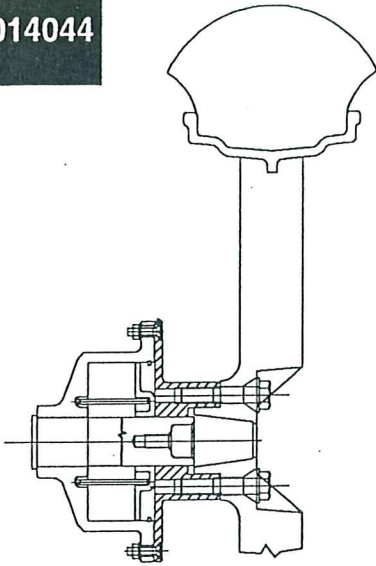
rif.	code	Code 940013572 - Ø 15
1	940013569	corpo flangia adaptor body 26922G
2	940013571	albero shaft Ø 15 26924P
3	940013562	distanziale conico conical spacer Ø 15-25 26916P
3 opt	424116877	distanziale conico conical spacer Ø 15-35 16877P
4	424119871	distanziale spacer Ø 14 19871P
5	424119870	ghiera di bloccaggio lockring 19870P
6	940013796	elastico elastic Ø 6 L=540 28845P
7	424215606	perno mobile movable pin 15606P/4
8	424115606	piastrina plate 15606P/1
9	315231064	vite screw TS M6x25 UNI 6109
10	325035013	rosetta piana flat washer Ø 13x24 UNI 6592
11	321232012	dado nut M12 h=12 UNI 5587
12	325035006	rosetta piana flat washer 6.4x12.5 UNI6592
13	321232006	dado nut M6 UNI 5588

04/96

rif.	code	Code 940014041 - Ø 12
1	940013569	corpo flangia adaptor body 26922G
2	940013570	albero shaft Ø 12 26923P
3	940013561	distanziale conico conical spacer Ø 12-25 26915P
3 opt	424216877	distanziale conico conical spacer Ø 12-35 16877P
4	424119873	distanziale spacer Ø 11 19873P
5	424119872	ghiera di bloccaggio lockring 19872P
6	940013796	elastico elastic Ø 6 L=540 28845P
7	424215606	perno mobile movable pin 15606P/4
8	424115606	piastrina plate 15606P/1
9	315231064	vite screw TS M6x25 UNI 6109
10	325035013	rosetta piana flat washer Ø 13x24 UNI 6592
11	321232012	dado nut M12 h=12 UNI 5587
12	325035006	rosetta piana flat washer 6.4x12.5 UNI6592
13	321232006	dado nut M6 UNI 5588

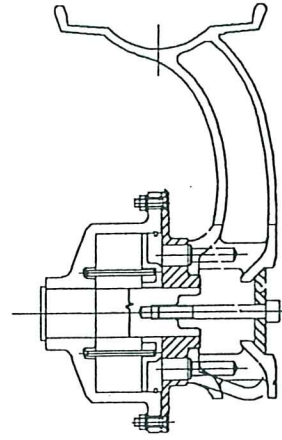
**K100/20**  
**Code 940014044**

BMW



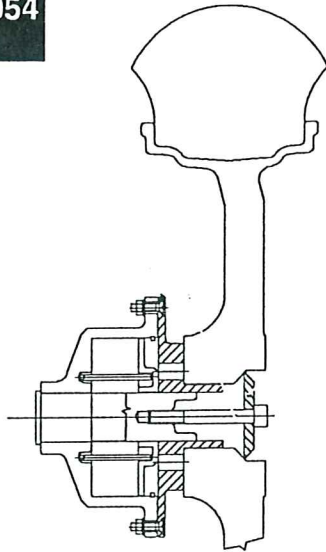
**916/20**  
**Code 940014053**

Ducati



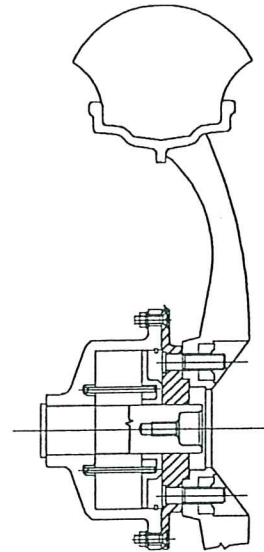
**NTV/20**  
**Code 940014054**

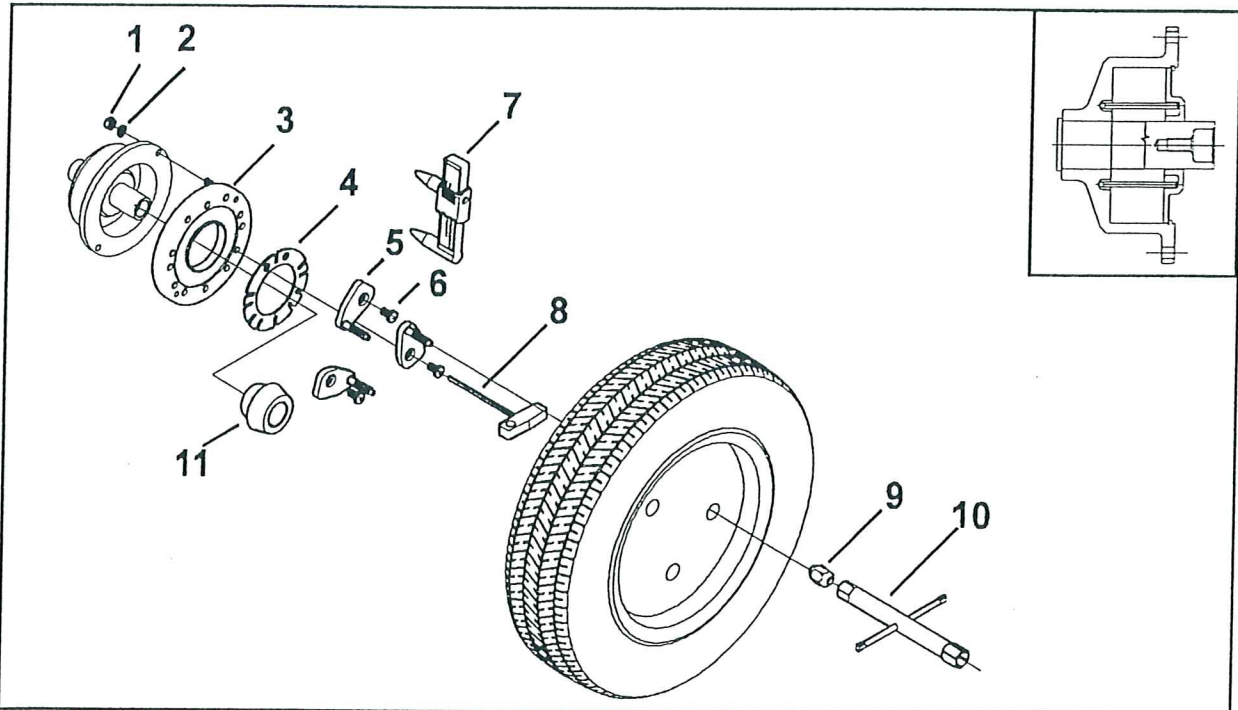
Honda



**VFR/20**  
**Code 940014055**

Honda





### CARATTERISTICHE GENERALI

Flangia universale per ruote con o senza foro centrale. Il cono supplementare (brevetto CEMB) consente di centrare la ruota sul foro centrale, migliorando la precisione di equilibratura.

Adatta per qualsiasi ruota di autoveicolo a 3, 4 o 5 fori su Ø da 95 a 210 mm.

Per equilibratrici con bloccaggio manuale o pneumatico.

### GENERAL FEATURES

Universal adaptor for wheels with or without central hole. The additional cone (CEMB patent) allows to center the wheel on the central hole, thus improving balancing accuracy.

Fit for any motor-vehicle wheels with 3, 4 or 5 holes on Ø 95 up to 210 mm.

For wheel balancers with manual or pneumatic locking.

## 94FF33437 UH20/2

ref.	code	data		
1	321232008	N° 2 Dado	Nut	M8 UNI5588
2	325035008	N° 2 Rosetta piana	Flat washer	Ø 8,4x17
3	40FF33438	N° 1 Corpo flangia	Adaptor body	
4	40FF33439	N° 1 Disco di guida	Guide disc	
5	40FF33440	N° 5 Bielletta completa	Complete stud bracket	
6	40FF33441	N° 5 Vite calibrata	Screw	
7	940052253	N° 1 Calibro	Gauge	
8	115006002	N° 1 Chiave esagonale	Hexagonal key	6 mm
9	40FF33442	N° 5 Dado con cono	Nut with cone	60° - Rsf 10
10	112019220	N° 1 Chiave tubo esagonale	Hexagonal socket spanner	19/22
11	40FF33454	N° 1 Cono di centraggio	Centering cone	Ø 52 ÷ 72,5

opt = optional

### MONTAGGIO

- modificando la conformazione (3; 4; 5) non smontare la vite gialla.
- il cono (11) migliora in generale la precisione di centraggio della ruota; i dadi (9) devono essere serrati manualmente uno dopo l'altro con forza non eccessiva.
- la flangia può essere usata anche senza l'utilizzo del cono (11).

### MOUNTING INSTRUCTIONS

- when changing hole pattern (3 or 4 or 5) do not unlock the yellow screw .
- the use of cone (11) improves wheel centering accuracy; nuts (9) must be locked by hand, one by one (not too tight).
- the adaptor can be used without cone (11) too.