CORGHI

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English Operator's manual 57

Tel. ++39 0522 639.111 - Fax ++39 0522 639.150
www.corghi.com - info@corghi.com

TRANSLATION OF ORIGINAL INSTRUCTIONS (ITALIAN)

CONTENTS

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INTRODUCTION

The purpose of this manual is to provide the owner and operator of this machine with a set of safe and practical instructions for the use and maintenance of the balancing machine.
Follow all of the instructions carefully and your machine will assist you in your work and give long-lasting and efficient service, in keeping with our traditions.
The following paragraphs define the levels of danger regarding the machine, associated with the warning captions found in this manual.

DANGER
Refers to immediate danger with the risk of serious injury or death.

WARNING
Dangers or unsafe procedures that can cause serious injury or death.

ATTENTION
Dangers or unsafe procedures that can cause minor injuries or damage to property.

Read these instructions carefully before using the machine. Keep this manual and the illustrated material supplied with the machine in a folder near the place of operation, where it is readily accessible for consultation by the machine operator. The technical documentation supplied is considered an integral part of the machine; in the event of sale all relative documentation must remain with the balancing machine.
The manual is only valid for the machine model and serial number indicated on the nameplate applied to the machine itself.


WARNING

Adhere to the contents of this manual: the manufacturer declines all liability in the case of actions not specifically described and authorised in this manual.

NOTE
Some of the illustrations in this manual have been taken from photographs of prototypes; the standard production model may differ slightly in certain respects. These instructions are for the attention of personnel with basic mechanical skills. We have therefore condensed the descriptions of each operation by omitting detailed instructions regarding, for example, how to loosen or tighten the fixing devices on the machine. Do not attempt to perform operations unless properly qualified and with suitable experience. In case of need, please contact our nearest authorised Service Centre for assistance.

TRANSPORT, STORAGE AND HANDLING

The **basic** balancing machine packaging consists of 1 wood package containing:

- the balancing machine (M, fig.4);
- the set of accessories;
- the monitor in its packaging;
- the wheel guard and relative tubular support (C, B, fig. 7).

- Before installation, the balancing machine must be transported in its original packaging, keeping it in the position marked on the packaging. It can be transported by placing the box on a wheeled trolley or by inserting the forks of a fork-lift truck into the openings in the pallet (fig.1).
- Packing dimensions.

Length (mm)	Depth (mm)	Height (mm)	Weight (kg)	Packing weight (kg)
1440	1330	1250	345	85

- Ambient conditions in place of storage:
  - relative humidity from 20% to 95%;
  - temperature from -10° to +60°C.

ATTENTION

Do not place other items on top of the two packs, as this may result in damage.

After installation, the machine can be moved using the following methods:

- with a crane, using special equipment that holds the machine at the lifting points (fig.2); passing the supporting sling underneath the beam which supports the central unit (right-hand side of the body).
- inserting the forks of the lift truck under the machine so that the centre of the forks correspond approximately to the centre line of the cabinet (fig.3).

During these operations, make sure that the fork-lift truck is fixed to the body of the balancing machine by means of the safety screw provided (A, fig.8).

WARNING

Always unplug the power supply lead from the socket before moving the machine.

ATTENTION

Never apply force to the spin shaft when moving the machine.

INSTALLATION

WARNING

Carry out the unpacking, assembly and installation operations described in this heading with great care.
Failure to observe these instructions may result in damage to the machine and injury to the operator or other persons.
Remove the original packing material, after having positioned it as shown on the outside and **keep intact so that the machine can be safely shipped at a later date if necessary**.

ATTENTION

The regulations in force concerning safety at work must be complied with when choosing the installation position.
In particular, the machine must be only be installed and used in protected environments where there is no risk of dripping onto it.
Ambient conditions in place of operation:
- relative humidity from 30% to 80% (without condensate);
- temperature from 5° to +40°C.

ATTENTION

For the technical specifications, warnings, maintenance and all other information concerning the monitor, refer to the relative operator manuals supplied with the machine's documentation.

WARNING

The machine must not be operated in potentially explosive atmospheres.

IMPORTANT: for correct, safe use of the equipment, users must ensure a lighting level of at least 300 lux in the place of use.

If the machine is supplied with a number of separate parts that require assembly, follow the assembly procedures described below.

Fitting the monitor (fig. 5)

- Completely undo the screws which fix the front clamping bracket (A, fig. 5). Remove the retainer bracket (B, fig. 5)
- Remove the monitor from its packaging and fit the supporting foot.
- Place the monitor on the support so that the foot is centred and is touching the front of the support itself.
- Adjust the height of the front bracket so that the foot of the monitor cannot move. Lock the bracket in place by tightening the fixing screws.
- Fit the retainer bracket (B fig 5) and secure it with the bolts and the relative washers provided.
- Take the power supply lead from the monitor packaging and connect one end of it to the socket on the back of the monitor and the other end to the socket on the back of the balancing machine body (C, fig. 5a).
- Connect the monitor signal cable (D, fig. 5a) to the nine-pin connector on the back of the body.
- Any excess cable length can be stowed inside the window (E, fig. 5a) in the top of the upright which supports the monitor plate.
- Turn the monitor on/off switch to the on position.
- Switch on the balancing machine.
- Adjust the monitor image using the controls on the front and, if necessary, those on the rear. For information on the adjustment procedure, refer to the manual inside the monitor packaging.

Fixing the machine to the floor (fig.6)

- After completing assembly of the machine, place it in the chosen position, making sure that at least the spaces shown in figure 9 are left around it.
- Mark the floor at the points where the fixing holes have to be made (A, B fig. 6).
- Drill holes in the floor with a drill-bit of suitable diameter, insert the expansion plugs and position the machine in line with the holes.
- Fix the left-hand front foot (B fig.6), fitting the screws and the relative washers in the order shown in the diagram.
- Tighten the screw until the rubber foot and PVC washer are slightly compressed.
- Then secure the right-hand side of the machine by means of the two holes on the cross-beam (lift side).
- Adjust the adjustable rest (C, fig.6) so that the machine is standing firmly on the floor and then tighten the lock-nut on the adjuster bolt.

Fitting the guard (fig. 7)

- Undo the bolt (A, fig. 7) and nut which fix the bushing which supports the guard pin.
- Insert the tube of the guard (B, fig. 7) onto the supporting pin, aligning the holes in the two elements.
- Fit the bolt previously undone into the hole and fix the tube to the support by tightening the relative nut.
- Place the wheel guard (C, fig. 7) on the tube and fix it by fitting the opening/ closing handle (D, fig. 7) and the band clamps (E, fig. 7).

Fitting the lift (fig.8)

- Remove the safety screw (A, fig. 8) which prevents the lift carriage from moving during transport.
- Fit the lift handle into the wheel support plate and fix it in position using the 6 screws provided (B, fig. 8).
- Clamp the control pipelines to the plate as shown in figure 8a.
- Connect the pipeline marked with the coloured band (C, fig. 8a) to the snap connection inside the lift column.
- Connect the other pipeline to the joint inside the column (D, fig. 8a).
- Fit the flange support pin (E, fig. 8) on the accessories cabinet.
- Connect the machine's pneumatic system to the workshop distribution system. For the connection procedures, refer to the "COMPRESSED AIR HOOK-UP" section.
- Check that the lift is working correctly. Pay special attention to the section of sheathing leading from the support plate to the lift column; it must never be taut during vertical movement of the plate.

Main operating elements (fig. 4)

A Automatic distance measuring arm
B 15" colour monitor
C Keypad
D Flange holder
E Cone holder
F Accessories tray
G Weight-holder lid
H Wheel shaft
I Master switch
J Air filter regulator unit
K Handling holes
L Wheel guard
M Lift control

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ELECTRICAL HOOK-UP

On request the balancing machine can be set up by the manufacturer to operate with the power supply available in the place of installation. The set-up details for each individual machine are given on the machine data plate and on a special label attached to the power supply connection cable.

WARNING

All operations required for the electrical hook-up of the machine must be carried out exclusively by a qualified electrician.

- The electrical supply must be suitably sized in relation to:
  - absorbed power specifications indicated on the machine dataplate.
  - the distance between the machine and the power supply hook-up point, so that voltage drops under full load do not exceed 4% (10% in the case of start-up) below the rated voltage specified on the dataplate.
- The user must equip the machine with the following:
  - a dedicated power plug in compliance with the relevant electrical safety standards.
  - a suitable circuit-breaker (residual current set to 30 mA) on the mains connection
  - power line fuses in accordance with specifications in the main wiring diagram of this manual.
  - a suitable earthing system installed on the workshop mains line
- To prevent unauthorised use of the machine, always disconnect the mains plug when the machine is not used (switched off) for extended periods of time.
- If the machine is connected directly to the power supply by means of the main electrical panel and without the use of a plug, install a key-operated switch or suitable lock-out device to restrict machine use exclusively to qualified personnel.

WARNING

A good ground connection is essential for the correct functioning of the machine. NEVER connect the machine ground wire to a gas pipe, water pipe, telephone cable or other unsuitable objects.

PNEUMATIC HOOK-UP

ATTENTION

Pneumatic hook-up is only envisaged when the optional ROD and pneumatic ring-nut accessories are present.

WARNING

All machine pneumatic hook-up procedures must be carried out solely by specialist staff.

- The connection to the workshop's compressed air system must guarantee a minimum pressure of 6 bar.
- The union for connection to the compressed air system is of universal type and thus no special or additional attachments are required. A high pressure rubber hose with inside diameter 6 mm and outside diameter 14 mm must be connected to the toothed union using the hose clamp supplied with the machine.

SAFETY REGULATIONS

WARNING

Failure to observe these instructions and the relative danger warnings can cause serious injury to the operator or other persons.
Do not use the machine until you have read and understood all the danger/ warning/attention notices in this manual.
This machine must be used only by qualified and authorised personnel. A qualified operator is construed as a person who has read and understood the manufacturer's instructions, is suitably trained, and is conversant with safety and adjustment procedures to be adhered to during operations. Operators are expressly forbidden from using the machine under the influence of alcohol or drugs capable of affecting physical and mental capacity.
The following conditions are essential:

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- read and understand all the instructions on how to use the machine;
- have a thorough knowledge of the capacities and characteristics of the machine;
- keep unauthorised persons well clear of the area of operation;
- make sure that the machine has been installed in compliance with established legislation and standards;
- make sure that all machine operators are suitably trained, that they are capable of using the machine correctly and that they are adequately supervised during work;
- do not touch power lines or the inside of electric motors or other electrical equipment until the power has been disconnected;
- read this manual carefully and learn how to use the machine correctly and safely;
- always keep this manual in a place where it can be readily consulted when working with the machine and do not fail to refer to the manual whenever in need of confirmation or explanations.

WARNING

Do not remove or deface the Safety, Danger or Instruction decals. Replace any missing or illegible Safety, Danger or Instruction decals. Replacement decals can be obtained from your nearest manufacturer dealer.

- When using and carrying out maintenance on the machine, observe the unified industrial accident prevention regulations for high voltage industrial equipment and rotating machinery.
- Any unauthorised alterations made to the machine automatically release the manufacturer from any liability in the case of damage or accidents as a result of such alterations. Specifically, tampering with or removing the machine's safety devices is a breach of the regulations for industrial accident prevention.

WARNING

During work and maintenance operations, always tie up long hair and do not wear loose clothing, ties, necklaces, wristwatches or any other items that may get caught up in the moving parts.

Key to warning and instructions labels

Never apply force to the spin shaft when moving the machine.

Keep hands well away from the points shown to avoid crushing during wheel raising and lowering operations.

Wheel lifting operations must be carried out with the greatest care. To avoid the risk of the wheel tipping over, it should be held with one hand when the carriage is in motion.

Unplug the power supply cable before carrying out maintenance/ assistance work on the machine.

Do not lift up the guard when the wheel is turning.

GENERAL CHARACTERISTICS

- Low balancing speed (80 rpm for truck wheels / 120 rpm for car wheels):
  - minimises wheel spin times;
  - reduces risks due to rotating parts;
  - allows energy saving.
- Automatic sensor for distance measurement and for adhesive weight application in the Alu P programs.
- Automatic wheel stop at end of spin.
- STOP button which stops the machine immediately and locks the wheel shaft.
- Lift with safety handle which prevents tipping over of the wheel and simplifies handling operations
- Cover with trays to take weights of all types.
- Automatic start-up when guard is lowered.
- High resolution 15 inch colour monitor: essential support for the execution of the latest programs
- Graphics allowing operators to learn how to use the machine quickly and easily.
- Simple, intuitive keyboard for data input and program selection.
- Interactive Help function gives explanations about the program in which it is recalled.
- Possibility of selecting different languages
- Processing unit with several microprocessors (16 bit)
- Resolution: 1 gr (0.1 oz) in car function
  10 gr (0.5 oz) in truck function
- Wide selection of programs so that the machine is easy to use immediately
- Imbalance display in grams and ounces
- Imbalance display rounding setting.
- types of balancing available:
  - Standard dynamic on both sides
  - Alu / Alu P seven different routines for aluminum rims
  - Static on a single side
- "**Shift plane**" program (in Alu P mode) for use of weights in multiples of five grams in car function and of 50gr in truck function (i.e. the weights available with no need for intermediate sizes).
- "**Hidden weight**" program (in ALU P) in order to sub-divide the outer plane balancing adhesive weights into two equal weights positioned behind the rim spokes
- "**Weight division**" program (motorcycle programs) to divide the weight into two equivalent values to be placed on either side of the spoke.
- **Flash OPT** programs for rapid optimisation of operating noise levels (for quietest possible operation).
- **Standard OPT** programs (available on request).
- General utility programs:
  - Calibration
  - Personalisation
  - Partial and total spin number counter
  - Setting of the 3 most widely used programs
  - Servicing
  - Self-diagnostics

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- Three separate working environments, allowing three different operators to work in parallel with no need to set the data again.
- RPA, automatic wheel positioning in the position where the balancing weight has to be applied.
- Visual check; this function allows visual verification of wheel and rim roundness defects.

TECHNICAL SPECIFICATIONS

- Power supply voltage ..... single-phase 115V±10% - 60Hz; 230V ±10% - 50Hz
- Total power ..... 320 W
- Balancing speed:
  - For truck wheels ..... 80 rpm
  - For car wheels ..... 120 rpm
- Maximum imbalance value displayed:
  - For truck wheels ..... 1990 gr (70 oz)
  - For car wheels ..... 999 gr (35 oz)
- Average wheel spin time
  - For truck wheels (8"x22,5") ..... 18 s
  - For car wheels (6"x15") ..... 8 s
- Shaft diameter ..... 46 mm
- Working ambient temperature ..... from 5 to 40°C

Machine dimensions (fig. 10)
- depth with guard closed ..... 1350 mm
- depth with guard open ..... 1550 mm
- width with lift carriage at rest ..... 1950 mm
- width with lift carriage extended ..... 2600 mm
- height with guard closed ..... 1360 mm
- height with guard open ..... 2100 mm

Working range for truck wheels
- rim width ..... from 4" to 22"
- rim diameter ..... from 12" to 30"
- maximum wheel-machine distance ..... 400 mm
- maximum wheel width with guard ..... 700 mm
- maximum wheel width without guard ..... 800 mm
- maximum wheel diameter with guard ..... 1220 mm
- maximum wheel diameter without guard ..... 1380 mm
- maximum wheel weight ..... 200 kg

Working range for car wheels
- rim width ..... from 1.5" to 22"
- rim diameter ..... from 7" to 30"
- maximum wheel-machine distance ..... 400 mm

- Compressed air supply pressure ..... min 6, max 15 bar
- Weight of machine without accessories ..... 255 kg
- Weight of machine without accessories and without lift ..... 198 kg
- Noise level when running ..... < 70 dB(A)

MACHINE OUTFIT

The following parts are supplied together with the machine:

- Weight clip pliers .....code 900203841
- Threaded hub .....code 900238304
- Caliper for truck wheel width measurement .....code 900239556
- Bag of expansion plugs .....code 802239121
- Hose clamp 13 - 15 .....code 900403751
- 100 gram weight .....code 900430573
- 300 gram weight .....code 900439516
- Spanner CH 12 .....code 900601771

OPTIONAL ACCESSORIES

Please refer to relevant accessories catalogue.

GENERAL CONDITIONS OF USE

The equipment is intended for professional use only.

WARNING

Only one operator may work on the equipment at a time.
The balancing machines described in this manual must be used **exclusively** to measure the entity and position of imbalances on motor vehicle wheels, within the limits specified in the technical specifications section. Furthermore, models with motors must be provided with a suitable guard, fitted with a safety device, which must be lowered during the spin operation.

WARNING

All other uses, apart from those described, are to be considered improper and unreasonable.

WARNING

Starting the machine without the wheel clamping equipment is forbidden.

WARNING

Do not use the machine without the guard and do not tamper with the safety device.

ATTENTION

Cleaning or washing the machine with compressed air or jets of water is forbidden.

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WARNING

Only original manufacturer equipment should be used during operation.

WARNING

Get to know your machine. The best way to prevent accidents and obtain top performance from the machine is to ensure that all operators know how the machine works.
Learn the function and location of all the commands.
Carefully check that all commands on the machine are working efficiently.
To avoid accidents and injury, the machine must be installed properly, operated correctly and serviced regularly.

USING THE WHEEL CENTRING ACCESSORIES

Standard truck wheel centring flanges
The following parts are provided:
- Step flange with diameters 220 and 280 mm for rear pre-centring of bus and HGV wheels.
- Step flange with diameters 160, 176 and 200 mm for rear pre-centring of truck, van and trailer wheels.
- Stop flange with holes for fitting the tapered pins.
- Standard set of five tapered screws for centring rims with fixing holes from Ø 18 to Ø 35 mm.
- Set of five maxi tapered screws for centring rims with fixing holes from Ø 28 to Ø 47 mm on the flange.

The procedure for centring a wheel using the parts described above must be carried out as follows:
Fit the step flange suitable for the type of rim to be balanced on the balancing machine and fix it to the balancing machine flange using the two screws provided;
- fit the pins of the RFT caliper into two adjacent fixing holes on the rim (fig. 11);
- find the scale on the RFT caliper gauge corresponding to the number of fixing holes in the rim (e.g. **10**) and on it read the diameter of the circumference on which these holes are arranged and the number which identifies the corresponding holes on the stop flange (e.g. **225; 6**);
- fit the tapered screws (standard or maxi) suitable for the diameter of the holes in the rim on the stop flange**, in the holes identified by the number found previously**. The screws must be fixed so that the nuts are on the numbered side of the stop flange;
- fit the wheel on the balancing machine shaft as described in the "USING THE LIFT CARRIAGE" section, taking care that the central hole of the rim is mated correctly with the step flange.

Note
The rear contact between the rim and the flange is intended to pre-centre the wheel; it is therefore absolutely normal for there to be some play between the

diameter of the rim's central hole and the diameter of the flange step.
The wheel is centred exactly when the tapered screws are fitted!
- Fit the stop flange on the balancing machine by fitting the tapered screws into the holes in the wheel;
- fix the wheel and stop flange by tightening the ring-nut as appropriate.

The following is a table summarising rim characteristics, indicating the corresponding diameter for pre-centring on the step flanges.

Ø of step flange (mm)	Ø of central hole in rim (mm)	No. and diameter (mm) of fixing holes in rim
160	160.1	6x205
	161	6x205
	163.5	6x222.3
	164.3	6x222.3
176	176	10x225
200	202	6x245
220	220.1	10x285.75
	221.4	10x285.75
	221.5	10x285.75
	221	8x275
	221	8x285
280	281	10x335

TRILEX type truck wheel centring flanges

The following flanges are available:
-Adapter flange for centring wheels with Trilex, Monolex and Unilex (tubeless) rims 20" in diameter, with 18° angle, typical of the European market (Trilex FISCHER).
- Adapter flange for centring wheels with Trilex, Monolex and Unilex (tubeless) rims 20" and 22.5" in diameter, with 28°angle, typical of the American (DAYTON) market, but also found on the European market.
- Adapter flange for centring wheels with Trilex, Monolex and Unilex (tubeless) rims 24" and 22.5" in diameter, with 28° angle, typical of the American (DAYTON) market.

Note
The diameters stated above refer to the outside circumference of the Trilex rim; the diameter of the centring flange is obviously smaller and may be common to rims having different diameters (e.g.: 20" and 22.5").

The procedure for centring a wheel using the parts described above must be carried out as follows:
- remove the threaded part of the shaft (threaded hub). This limits horizontal movement of the carriage, necessary when fitting the wheel, and prevents problems of interference between the lift carriage columns and the flange arms;
- fit the Trilex flange suitable for the type of rim to be balanced on the balancing machine and fix it to the balancing machine flange using the two screws provided;
- fit the wheel on the balancing machine shaft as described in the "USING THE LIFT CARRIAGE" section, taking care that the central hole of the rim is mated correctly

with the step flange.
- secure the wheel on the flange, placing the clamps on the edge of the rim correctly and fully tightening the screws which fix the clamps to the flange arms.

Note

Considering the coupling inaccuracies of this type of rim, it is essential to centre the wheel on the flange with the greatest care to obtain good results.

Truck wheel centring cones

The following parts are available:
- medium-sized two-sided cone for centring wheels with central hole:
  - from Ø 160 to Ø 176 mm on small side;
  - from Ø 200 to Ø 202 mm on large side;
- large two-sided cone for centring wheels with central hole:
  - from Ø 220 to Ø 222 mm on small side;
  - Ø 281 mm on large side;
- two-sided spacer for use with the cones above.

The procedure for centring a wheel using the parts described above must be carried out as follows:
- fit the spacer on the balancing machine so that the smaller side is on the outside if using the medium-sized cone, or the larger side on the outside if using the large cone;
- fix the spacer to the flange of the balancing machine using the two screws provided;
- fit the wheel on the balancing machine shaft as described in the USING THE LIFT CARRIAGE section. **Do not lower the lift!**
- Then fit the cone on the shaft with the side suitable for the diameter of the rim hole facing towards the rim itself;
- fit the ring-nut and tighten firmly to lock the wheel effectively in place;
- lower the lift.

Note

For accurate centring using the cones; it is of vital importance that the rim's central hole is not misshapen!

Car wheel centring accessories

The cones are used to balance the wheels of vans and off-road vehicles and car wheels having central hole with diameter larger than that of the shaft (46 mm). The following parts are available:

- single small cone for centring wheels with central hole from Ø 47.5 to Ø 64mm;
- medium-sized two-sided cone for centring wheels with central hole from Ø 60 to Ø 115mm;
- large two-sided cone for centring wheels with central hole from Ø 110 to Ø 165mm;
- adapter disc for centring wheels with rear contact circumference smaller in diameter than the flange. Normally used with wheels which require the small cone;
- spacer for use with van and off-road vehicle wheels having central hole requiring the use of the large cone.

The procedure for centring a car wheel using the parts listed above is similar to that described for the truck cones.

There is also a universal flange for centring car wheels with closed rim or with central hole smaller in diameter than the shaft (46mm).

It must be used as follows:

- remove the threaded part of the shaft (threaded hub);
- fit the flange on the balancing machine shaft, fixing it with the screw provided;
- fit the pins of the RFT caliper in two adjacent fixing holes on the rim and measure the distance between them (fig. 12);
- arrange the threaded pins of the quick flange so that there is one pin for each hole in the wheel and the distance between them is that measured earlier using the RFT caliper.

In case of wheels with six holes, three pins have to be used.

- Pre-tighten the nuts of the connecting-rod pins so that there is just a little resistance when they are turned.

For correct centring it is essential not to tighten the nuts completely at this stage, to allow them to settle into position when the wheel is clamped onto the flange later.

- Fit the wheel on the flange and secure it with the nuts provided.
- Definitively tighten the nuts which secure the connecting-rod pins.

SWITCHING ON THE MACHINE

Switch on the machine using the switch on the left-hand side of the body (I fig. 4). The balancing machine performs a checking test, and if no malfunctions are noted it emits a beep and displays the logo and the personalisation data, after which it awaits input of the wheel's geometrical data.
Press any key to display the image of the imbalance values (fig. 13); the status initially active will be:
- truck wheel balancing function (indicator in the top left-hand corner of the screen);
- balancing mode active: dynamic (DYN);
- values displayed: 000 000;
- display in steps of 50 grams (1 ounce).

At this point, the user may set the data of the wheel to be balanced or select one of the programs available.

GENERAL NOTES ON THE MAIN MENU

The graphics are based completely on icons (drawings which recall the function of the key) to be selected to activate the respective functions; to aid understanding there is also a status line, at the bottom of the screen, subdivided into three fields: description of the meaning of the icon selected (the one surrounded by the yellow frame) indication of the machine status (x1 / x5 - x10 / x50 ; g / oz)
indication of the active environment (active program)
All these indications are in the language already selected.

The bottom of the monitor contains the icons (main menu, MM) subdivided into four groups :

- The first group, of three icons, contains the functions relating to the balancing process types.
- The second group, also of three icons, contains the UTILITY programs; in this group the user may enter three UTILITY programs of his choice (the procedures for inserting them are described in the operating procedures). The three icons shown above are simply an example.
- The third group, of two icons, offers the UTILITY functions (additional programs for use of the machine) and the SETTING functions (machine operation setting procedures).
- The fourth group, of just one icon, offers the Help function; if activated, it shows the information needed for work within the active procedure.

To select the icon required, us the  and  arrow keys until the yellow surround is around the icon of choice, then press the  key.

All the functions which do not appear in the Main Menu are grouped together in submenus (also of icon type) which open when the main icon is selected.

To access a submenu, select the main icon; this will display the new icons, arranged vertically above the selected icon. Press the and arrow keys for pre-selection of the submenu icons.
Once the submenu has been opened, the Main Menu icon is replaced by the Exit icon, which allows the submenu to be closed without making any selection.

The subdivision and functions of the individual main menu icons are explained below:

Dynamic (standard) balancing: recalls the conventional method for balancing a wheel on both sides using clip-on weights.

ALU dynamic balancing programs: recalls the various procedures for balancing light alloy wheels, known as ALU programs.

ALU 1P balancing program: provides precise calculation of the balancing weights to be applied on the inner rim disc (adhesive weights).

ALU 2P balancing program: provides precise calculation of the balancing weights to be applied on the inside of the wheel (clip weights) and the inner rim disc (adhesive weights).

ALU 1 balancing program: provides statistical calculation of the balancing weights to be applied on the inner rim disc (adhesive weights).

ALU 2 balancing program: provides statistical calculation of the balancing weights to be applied on the inside of the wheel (clip weights) and the inner rim disc (adhesive weights).

ALU 3 balancing program: provides statistical calculation of the balancing weights to be applied on the inner part of the (inside and outside) of the rim (adhesive weights).

ALU 4 balancing program: provides statistical calculation of the balancing weights to be applied on the inside (clip weights) and on the outside of the inner part (adhesive weights) of the rim.

ALU 5 balancing program: provides statistical calculation of the balancing weights to be applied on the inner part (adhesive weights) and on the outside (clip weights) of the rim.

Static balancing program: allows balancing of both truck and car wheels on a single plane.

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Activates selection of the utility programs: allows access (by displaying them) to the icons relating to the general utility programs for operation of the machine.

Recall other icons: displays the second series of icons.

Working environments: allows selection of the active user from three available. Personalised machine settings are associated to each user.

Truck / car function: modifies the general setup of the machine depending on the type of wheel to be balanced (truck wheels or car wheels).

Optimisation: activates the procedure for optimisation of the rotating weights.

Position search: brings the wheel into the correct position for application on both sides in alternation.

Manual data input: activates the procedure for manual input of the wheels' dimensional values.

Second series of icons:

Spin counter: displays the total and partial count of the wheel spins performed.

Visual check: this function is active with the guard open and spins the wheel at low speed to allow a visual check on its roundness.

Sensor calibration: activates the program for calibrating the measurements made with the distance sensor.

Sensitivity calibration: activates the program for calibrating the imbalance measurements.

Service program: recalls the diagnostics program, useful for the technical after-sales service.

Activate setup program selection: allows access, by displaying them, to the icons relating to the programs for setting the balancing machine's operating parameters.

Preferential program setting: activates the procedure for setting of three preferential programs to be placed in the main icon bar.

Modify wheel spin counter: program not available.

Set automatic position search: opens the submenu with the icons which allow activation or deactivation of the function for automatic wheel position search at the end of the wheel spin.

Imbalance unit of measurement setting: activates the icons for selecting the unit of measurement and the rounding with which the imbalance values are to be displayed (grams / ounces).

Language setting: activates the icons for entering the language in which the operating messages are required to appear.

Company data setting: activates the procedure for setting the data (name, address, etc.) which will be displayed in the screen-saver logo.

Help: recalls the information linked to the current video page to the screen. If an error message is present, the first information

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recalled relates to the types of error which may occur.
The instructions recalled with this icon are an addition to (and not a replacement of) this operator manual to all intents.

The other icons, which can be described inside the individual programs, will be described directly in the respective operating phases.

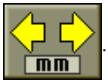
BALANCING TRUCK OR CAR WHEELS

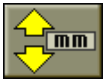
The ET88 balancing machine is able to balance both truck and car wheels.
Since there are substantial differences between the two balancing modes, the appropriate balancing environment has to be selected in advance as described below in the UTILITY PROGRAMS section. However, during the wheel spin the machine is able to detect whether the wheel fitted on the shaft is in the truck or car category; if the wheel category found is not the same as the function currently selected, a warning message will appear on the screen.

WHEEL DATA INPUT

The machine envisages automatic input of the distance value and input of the width and diameter by means of the keypad.

- Bring the automatic sensor arm (A, fig. 4) into contact with the inside of the rim as shown in fig. 14. The image relating to the geometrical dimensions of the wheel appears on the screen. **Take the greatest care to position the arm correctly in order to obtain precise reading of the data**.
- Keep the arm in contact with the rim until the machine has acquired and displayed the wheel distance value.
- Check the value measured and then return the arm to the rest position. The machine now prepares for input of the width.
  If an incorrect value has been acquired during the measurement operation, move the arm to the rest position and then repeat the operation.
- Measure the width of the rim using the special calliper (fig. 15).
- Modify the width value displayed by pressing the  or  arrow keys and set the number required,
- Press the  key to confirm the value entered.

The WIDTH can be set in millimetres, or values already set can be converted from inches to millimetres by selecting the **width input in millimetres** icon  .

- Select the  icon for input of the diameter in inches or the  icon if the measurement is available in mm.
- Modify the diameter value displayed by pressing the arrow keys  or  and set the number required.

The  **or**  **arrow keys can be kept pressed for rapid increase or decease of the values set previously.**

- Press the  key to confirm the value entered.
- To conclude the wheel data input phase, select the  **Exit** icon or perform a wheel spin.

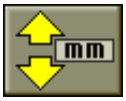
If the automatic measuring arm fails to operate, **the geometrical data can be entered in manual mode by following this procedure.**

- select the icon  in the utility submenu ()
- the video page for manual setting of the data appears on the screen. It contains the following icons:

Enter width in inches: enables entering of the rim width in inches.

Enter width in millimetres: enables entering of the rim width in millimetres.

Enter diameter in inches: enables entering of the rim diameter in inches.



Enter diameter in millimetres: enables entering of the rim diameter in millimetres.

Enter distance in millimetres: enables entering of the distance between the rim and the machine body in millimetres.

Exit: returns the program to the video page with the imbalances.

Help : shows the help information relating to the manual setting of data.

- After selecting the icon, press the  and  arrow keys until the value required appears in the box relating to the parameter to be entered.
- Press the  key to confirm the value.

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- Select a new icon to set another parameter.

- To stop manual data setting, press the  **Exit** icon.

The values to be set are the nominal values of the rim; for the distance, simply read the value indicated on the graduated rule of the sensor after it has been placed in contact with the inside of the rim (fig. 12a).
If the width of the rim is not known, measure it using the caliper provided (fig. 13).

WHEEL SPIN

Wheel spin takes place automatically when the guard is lowered, or can be triggered by pressing the START key (coloured green) with the guard lowered.
A special safety device stops rotation if the guard is raised during the spin; in this case, the **Err Cr** message appears.
During position search and when visual run-out check is activated, the wheel is able to turn at low speed with the guard raised.

WARNING

Starting the machine without the guard and/or with the safety device incorrectly positioned or tampered with is forbidden.

WARNING

Never raise the guard before the wheel has come to a stop.

WARNING

If, due to a fault on the machine, the wheel keeps spinning permanently, switch off the machine at the master switch or unplug the plug from the power supply panel (emergency stop). Then wait until the wheel stops before raising the guard.

USING THE WHEEL SHAFT LOCK

The wheel shaft lock is used to simplify fitting and removal of wheels using the relative centring accessories, and during application of the balancing weights.
To activate the lock device, press the **STOP** button (the red one).
The wheel is released:
- by pressing the **STOP** button again;
- by performing a wheel spin;
- after 30 seconds.

Pressing the **STOP** button with the wheel in motion stops the wheel spin before completion.

BALANCING PROGRAMS

- Standard dynamic balancing
- dynamic balancing of wheels with alloy rims
- static balancing.

The balancing programs described are available in both truck and car functions and can be accessed by selecting the first three icons on the left of the main menu.

Before starting a balancing operation, proceed as follows:
- fit the wheel on the hub using the most suitable flange; see the guidelines provided in the data bank ;
- secure the wheel so that no movements are possible during the wheel spin and braking phases;
- remove any balancing weights, stones, dirt or other foreign bodies from the wheel;
- enter the wheel data correctly.

Dynamic balancing (STANDARD)

This balancing mode is automatically recalled by the machine at switch-on; if a different balancing program is active, select the  icon from the main menu.

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The video page relating to this program appears on the screen (fig.13).
Now proceed as follows :
- Enter the wheel data correctly.
- Spin the wheel by pushing down on the guard.

To obtain the highest precision in the results, do not apply any undue stresses to the machine during wheel spin.
- wait for the wheel to stop automatically and for the imbalance values calculated to appear.
- select the first side to be balanced.
- turn the wheel until the central element of the corresponding position indicator illuminates.

- lock the wheel in position by pressing the **STOP** key to simplify the weight application procedure which follows;
- apply the balancing weight indicated, in the position on the rim corresponding to 12 o'clock.
- release the wheel by pressing the **STOP** key again;
- repeat the operations listed above for the second side of the wheel.
- carry out another wheel spin to check the balancing precision. If this is not considered satisfactory, modify the value and position of the weights applied previously, following the guidance provided by the balance control diagram (fig.16).

Remember that especially for large imbalances, an error of a few degrees in placing of the weight may lead to high residues (up to 5-10 grams for car wheels and 50-100gr for truck wheels) in the subsequent check.

WARNING

Check that the system which fits the weight to the rim is in optimum condition. A weight which is not properly or correctly fitted may come off as the wheel rotates, creating a potential danger.

If the "RPA" (position centred) program is active, at the end of each balancing wheel spin the machine stops the wheel in the position for application of the weight on the inside; if this balancing weight is equal to zero, the wheel is stopped in the position for the outside. If the **START** key is pressed with the guard raised, automatic search for the second side position begins.

This function is described in greater detail in the AUTOMATIC POSITION SEARCH section.

Static balancing

A wheel can be balanced by applying a single counterweight on one of its sides or in the centre of the well; in this case, the wheel is balanced statically. However, there is still the risk of dynamic imbalance, which becomes more significant as the width of the wheel increases.

- Press the  Static balancing program icon from the main menu.

Now only one indicator for the position search is present on the image displayed;
- set the wheel diameter value (in static mode, there is no need to enter the width and distance values);
- spin the wheel;
- at the end of the spin turn the wheel until the central element of the position indicator illuminates;
- lock the wheel in position by pressing the STOP key, to simplify the weight application stage which follows;
- fit the balancing weight at 12 o'clock (it makes no difference whether it is on the inside or outside of the rim or in the centre of the well). If the weight is placed in the centre of the well,it will be on a diameter smaller than the nominal diameter of the rim, so during the diameter setting stage a diameter value 2 or 3

inches below the nominal diameter will have to be entered if the wheel is to be balanced correctly.
Bear in mind that it is often possible to obtain better results if the weight is divided into two equal parts, for placing on either side of the rim.

- Perform a checking wheel spin to check the precision of the balancing operation.

Balancing aluminum (ALU) wheels

To balance aluminum wheels we usually use self-adhesive weights that are positioned differently from the clip weights used in standard balancing (fig. 17). There are various ALU balancing programs, specially designed to work with rims of this type.

These programs are recalled from the main menu using the icon,  which opens the submenu of seven icons in two groups: ALU P and normal ALU programs.

ALU 1P and ALU 2P programs

These programs are used for maximum precision balancing on light aluminum rims that **require the application of both weights on the same side (inner) in relation to the rim disk.**

After selecting the icon,  select one of the two icons relating to the ALU P programs.

 **ALU 1P**  **ALU 2P**

The screen shows the video page for measuring imbalances on alloy wheels.

Wheel data acquisition (ALU P)

With the ALU P programs the user can define the balancing planes on which the stick-on weights are to be applied with absolute precision, and in relation to the specific shape of the rim. However, bear in mind that in order to reduce the size of the weights to be applied, it is best to select balancing planes as far apart as possible; if the distance between the two planes is less than 37 mm (1.5") the message "Err 5" is displayed.
To perform the measurement:

- Move the end of the inner automatic sensor in correspondence with the plane chosen for application of the **inside** weight. In Alu 1 P, the centre of the groove on the end of the arm, in which the adhesive weight for application will be placed (fig.18a) is taken as reference. In Alu 2 P reference is made to the edge of the rim, since the inside weight is of the traditional clip-on type (fig.14).

Make absolutely certain that the end of the sensor is positioned in an area free of discontinuity, so that the weight can be applied in the same position.

- Keep the arm in position. After two seconds the machine will give a beep to confirm that the distance value has been acquired.
- Bring the end of the automatic sensor arm onto the plane chosen for application of the outside weight (fig. 18b), as already described for the inside of the rim.
- Keep the arm in position and wait for the beep of confirmation.
  If the measuring arm is returned to the rest position after acquisition of the data for

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one plane only, or if the data of the outside plane have been acquired before those of the inside plane, the message “Err 23” appears and the data entered are ignored.

- The machine now presets for input of the nominal diameter of the wheel.
- Modify the diameter value displayed by pressing the arrow keys or and set the number required.

The diameter can be set in millimetres or the values already set can be converted from inches to millimetres by selecting the 

Diameter input in millimetres icon.

The arrow keys can be kept pressed for rapid increase or decrease of the values set earlier.

- To conclude the wheel data setting phase, select the  **Exit** icon.
- Carrying out a spin.

Attaching balancing weights (ALU P fig.19)

- Select the plane where the first balancing weight is to be applied.
- Rotate the wheel until the central element of the corresponding position indicator is illuminated.

If the balancing weight is of the **traditional clip type** (inside plane in ALU 2P), position the balancing weight at **12 o’clock**. If, on the other hand, the weight is of the **adhesive type**:

- centre it inside the cavity in the weight holder end of the measuring arm (a, fig.19), with the backing paper of the adhesive strip facing up. Then remove the backing paper.
- Move the sensor until the two reference lines (in yellow) in the window provided on the screen.
- Rotate the end of the sensor until the weight adhesive strip is in position in correspondence with the rim surface.
- Press the push button (c, fig.19) to eject the weight and make it stick to the rim.
- Return the sensor to the rest position.
- Repeat this process for the application of the second balancing weight.
- Carry out a test spin to check the accuracy of the balancing.

In order to be sure that the weight sticks to the rim the surface must be perfectly clean. If necessary, clean the rim surface with a suitable detergent.

“Mobile planes” program (only available with ALU P programs)

This function is automatically activated when an ALU P program is selected.
It modifies the positions chosen for application of the adhesive weights in order to allow the wheel to be perfectly balanced using commercially available adhesive weights. This means that the balancing weights to be fitted to the rim will always be multiples of five grams for car wheels and multiples of fifty grams for truck wheels. This means there is no need to round the weights to be applied up or down or to cut them to come closer to the real imbalance values. The result is a significant improvement in balancing precision.
Normally the machine modifies the weight application positions on the basis of criteria preset by the program.

"Hidden weight" program
(only available on demand with ALU P programs)

This program sub-divides the outside balancing weight into two combining weights, located in a hidden position behind the two spokes on the aluminum rim.

- First select either the ALU 1P or the ALU 2P program; the selection is used making the icons  **ALU programs** and then  **ALU 1P** or  **ALU 2P**.
- On the icons bar, the  **Hidden weight** icon appears instead of the "static balancing program" icon.
- When this icon is selected, a window will appear on the screen.
- Press the  and  or  and  and arrow keys to set the number of spokes in the rim to be balanced; the OFF messages indicates that this function is not required.
- Bring one spoke to 12 o'clock and press  ; this will memorise the number and position of the spokes.
- The imbalance is shown on the monitor, including the two position indicators for the outside plane. The imbalance value shown for this plane refers to the indicator in the centreed position condition.

The application of each of the two balancing weights is carried out as described in the ALU P programs "attaching balancing weights" section.
The HIDDEN WEIGHT function is combined with the SHIFT PLANES function to allow the use of balancing weights which are multiples of 5 grams in the car function and 50 grams in the truck function.

Standard ALU programs (ALU 1, 2, 3, 4, 5)

The ALU standard programs take into account the different positions for the application of the weights (fig.17) and provide correct imbalance values **maintaining unchanged the nominal wheel data input for aluminum rims**.
To activate these programs, proceed as follows :

- select the icon  **ALU programs;**
- select one of the icons.

 **ALU 1 balancing program:** provides statistical calculation of the balancing weights for application on the inner rim disc, as shown in the relative icon.

 **ALU 2 balancing program:** provides statistical calculation of the balancing weights for application on the side and on the inner rim disc, as shown in the icon.

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ALU 3 balancing program: provides statistical calculation of the balancing weights for application, as shown in the icon.

ALU 4 balancing program: provides statistical calculation of the balancing weights for application, as shown in the icon.

ALU 5 balancing program: provides statistical calculation of the balancing weights for application on the inner rim disc and the outside of the rim, as shown in the icon.

- Once a wheel spin has been performed, when the centred position is reached the screen indicates where the balancing weights have to be placed in relation to the program chosen.
- Set the nominal geometrical data of the wheel as described in the ENTERING THE WHEEL DATA section. The machine will calculate new width and diameter values using corrections on a statistical basis. If these values are outside the normally accepted range stated in the TECHNICAL DATA section, the message "Alu Err" is displayed.
- Perform a wheel spin and proceed as described for dynamic balancing. When the centred position is reached, the screen shows the indication of where the balancing weights have to be placed in relation to the program selected.

Some slight residual imbalance may remain at the end of the spin test due to the considerable difference in shape found in rims with the same nominal diameters. To counter this, change the amount and position of the weights in accordance with the "balance check" diagram (fig.16) until an accurate balance status has been obtained.

Flash OPT optimisation program

This program has been made even simpler and faster than other types of Flash OPT program; in most cases, the results obtained can be compared with those of the Standard program described below, using fewer wheel spins and therefore speeding up the procedure.
For guidance on this procedure, refer to the next section, bearing in mind that the flash version of the program must not be accessed until a wheel spin has been performed.
The Flash OPT program automatically skips the first phase with the rim only (OPT 1) and the start of the procedure is indicated by Flash OPT.
The calculations made by this program are based on the imbalance values obtained during the last wheel spin performed; for this reason, the last spin must have been carried out with the wheel on which the quick optimisation procedure is to be used.

OPT 1

- Turn the wheel until the valve is at 12 o'clock.
- Select the  icon to memorise the position of the valve.

OPT 2

See OPT3 of the Standard OPT program.

OPT 3

See OPT4 of the Standard OPT program.

OPT optimization program
(optional)

The OPT program allows the minimisation of any residual vibrations noticeable when the vehicle is running even after precision balancing. These vibrations are normally due to wheel roundness faults. The optimisation procedure allows identification of the optimal position for the tyre on the rim, in order to minimise the eccentricity of the rim - tyre combination.
To recall this program, proceed as follows:

- select the  **Utility programs** icon;
- select the  **Optimisation** icon;

A window now opens in which the machine informs the user whether or not it is necessary to carry out the optimisation procedure; the evaluation is based on the imbalance values detected during the last wheel spin performed, which must therefore refer to the wheel under consideration.
this accesses the first phase of the program.

OPT 1

- Fit **the rim** on the machine **without the tyre.**
- Turn it until the valve (or hole, although it is preferable to work with the valve already fitted) is at 12 o'clock.
- Select the  icon to memorise the position of the valve.
- Perform a wheel spin.

At the end of the spin, the system moves on to the second phase of the program.

OPT 2

- Take the rim off the machine.
- Fit the tyre on the rim.
- Fit the complete wheel on the machine.
- Turn it until the valve is at 12 o'clock.

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Select the  icon to memorise the position of the valve.

Perform a second wheel spin.
At the end of the spin, the system moves on to the third phase of the program.

OPT 3

Following the instructions on the monitor.
- turn the wheel until the valve is at 6 o'clock (the arrow at the bottom changes from yellow to green);
- make a chalk mark on the outside wall of the tyre at 12 o'clock;

confirm that the mark has been made by selecting the  icon.

The image on the screen now changes.
- Take the wheel off the machine.
- Turn the tyre on the rim until the mark made previously is in line with the valve (rotation through 180°).
- Put the wheel back on the machine.

Then following the new instructions on the monitor:
- Turn the wheel until the valve is at 12 o'clock.
- Select the  icon to memorise the position of the valve.
- Perform a third spin.

The monitor shows a window displaying the imbalance values of the wheel as it is mounted on the balancing machine; **when the wheel is brought into the position indicated by the yellow arrow, the current imbalance values are replaced by the imbalance values and the percentage improvement which can be obtained by shifting the tyre on the rim again**. If no improvements are possible, the machine still displays the weights calculated with tyre shift; however, the percentage improvement indicator will have a minus sign and the top of the window will be red (instead of green).
If the improvement is considered insufficient or it is not possible to reduce the imbalances, the user can select the  **Exit** icon and perform a wheel spin to balance the wheel; otherwise, the system moves on to the fourth and final phase of the program.

OPT 4

Following the instructions on the monitor:
- turn the wheel until it is in the position shown by the position indicator ;
- Make a **double chalk mark** on the **outside** wall of the tyre at 12 o'clock. If the screen indicates that the tyre should be mounted on the rim the other way round, make the two chalk marks on the **inside** of the tyre wall.
- Remove the wheel from the balancing machine.
- Rotate the tyre (switching around if necessary) on the rim, until the mark made previously corresponds with the valve (rotation through 180°).

- Re-fit the complete wheel on the balancing machine.
Following the instructions on the right hand part of the monitor:
- Rotate the wheel until the valve (or hole) is at 12 o'clock.
- select the  icon to memorise the position of the valve.
- Carry out the fourth spin.
With the completion of the fourth spin, the optimization program has been completed and the weights to be added to balance the wheel will be displayed on the monitor.

If an error has been made that may negatively affect the end result, the machine will indicate this error with the "Err 6" message. This means that the entire procedure should be repeated from the beginning. The error message will disappear when one of the available functions is selected.

Special cases

1. If the user does not wish to perform the spin with rim only, the first phase can be skipped. To do this, after selecting the OPT program, activate the 

   Skip first OPT phase icon. Then fit the wheel complete with tyre on the balancing machine and carry out the other phases (2, 3 and 4) as previously described. The results obtained are less precise than those provided by the complete procedure.
2. At the end of the second or third spin, the screen may show the OUT 1 and OUT 2 messages, respectively

   In this case, it is advisable to exit from the program by selecting the 
   Exit icon.
   The values of the weights necessary to balance the wheel will appear on the screen.
   This shortens the procedure, which means doing without a modest improvement in the final results; however, it is possible to continue with the optimisation procedure.
3. At the end of the third spin, the screen may inform the user that the tyre should be fitted on the rim the other way round. If the user does not wish to do this, or if it is not possible, the  **Disable tyre reversal** icon should be selected; the machine will provide the instructions for completion of the program without reversing the tyre.

   The  **Enable tyre reversal** icon reactivates the reversal function.
4. The user can exit from the optimisation procedure at any moment by simply selecting the  **Exit** icon.

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5. If a different working environment is recalled between one phase of the OPT procedure and the next, on return to the OPT environment performance of the procedure restarts from the point where it was interrupted.

UTILITY PROGRAMS

Utility programs are all functions of the balancing machine which are useful for its operation but not closely linked to normal use.

To display the list (menu) of utility programs, simply select the  **Utility programs** icon; the icons corresponding to this submenu are now accessible.

Recall other icons

The utility programs contain a large number of functions, and therefore, for reasons of clarity, the icons have been divided into two groups, displayed separately. This  **Recall other icons** icon is used to display the two groups of icons in alternation.

Trucks / cars balancing environment selection

Select the balancing environment according to the type of wheel to be balanced. After the list of the utility programs is displayed:

- select the  Trucks / Cars balancing environment selection icon;

The active balancing environment is indicated on the top left-hand side of the main screen.

Sensitivity calibration for truck wheels

This program should be run whenever the settings appear to be out of tolerance or when the machine requests self-calibration spontaneously by displaying the “Err 1” message.

- Set the machine for balancing truck wheels ( icon);
- select the  icon;
- select the  **Sensitivity calibration** icon;
- Select a wheel **of average size and weight (e.g.: 8”x22,5”) preferably with a limited imbalance**, and fit to the shaft.
- Enter the correct wheel data.
- perform an initial wheel spin;
- on completion of the spin, turn the wheel until it is in the position shown by

the position indicator and the message “300” appears (“10” oz if the mode with display in ounces has been selected);
- apply a sample weight of 300 grams (10 oz) to the **INSIDE** of the rim, at 12 o'clock.
- perform a second wheel spin;
- on completion of the spin, remove the sample weight from the inside and turn the wheel until it is in the position shown by the position indicator and the message “300” (or “10”) appears;
- apply the sample weight of 300 grams (10 oz) to the **OUTSIDE** of the rim, at exactly 12 o'clock;
- perform a third wheel spin.

If the calibration program has been completed successfully, this will be confirmed by a message of approval. If not the “Err 3” message will be displayed. In this case the calibration should be repeated correctly, checking that the weight used actually corresponds to 300 g (“10” oz.).
The self-calibration program ends with the display showing the imbalance values for the wheel (ignoring the sample weight).

NOTES
- Remember to **remove the 300 g (10 oz.) weight** at the end of the procedure.
- The  **Exit** icon can be selected at any moment to break off execution of the program.

THE CALIBRATION DESCRIBED ABOVE IS VALID FOR ANY TYPE OF TRUCK WHEEL!

Sensitivity calibration for car wheels

This program should be run whenever the settings appear to be out of tolerance or when the machine requests self-calibration spontaneously by displaying the “Err 1” message.

- Set the machine for balancing truck wheels ( icon);
- select the  icon;
- select the  **Sensitivity calibration** icon;
- Select a wheel **of average size and weight (e.g.: 5”x14”) preferably with a limited imbalance**, and fit to the shaft.
- Enter the correct wheel data.
- perform an initial wheel spin;
- on completion of the spin, turn the wheel until it is in the position shown by the position indicator and the message “100” appears (“3.5” oz if the mode with display in ounces has been selected);
- apply a sample weight of 100 grams (3.5 oz) to the **INSIDE** of the rim, at exactly 12 o'clock.
- perform a second wheel spin;

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- on completion of the spin, remove the sample weight from the inside and turn the wheel until it is in the position shown by the position indicator and the message “100” (or “3.5”) appears;
- apply the sample weight of 100 grams (3.5 oz) to the **OUTSIDE** of the rim, at exactly 12 o'clock;
- perform a third wheel spin.

If the calibration program has been completed successfully, this will be confirmed by a message of approval. If not the “Err 3” message will be displayed. In this case the calibration should be repeated correctly, checking that the weight used actually corresponds to 100 g (“3.5” oz.).
The self-calibration program ends with the display showing the imbalance values for the wheel (ignoring the sample weight).

NOTES

- Remember to **remove the 100 g (3.5 oz.) weight** at the end of the procedure.
- The  **Exit** icon can be selected at any moment to break off execution of the program.

THE CALIBRATION DESCRIBED ABOVE IS VALID FOR ANY TYPE OF CAR WHEEL!

Sensor calibration

This must be carried out when the machine requests it by displaying the message Err 4, or when a difference is noticed between the distance values measured and those read on the millimetre rule on the sensor rod.
After displaying the list of utility programs:

- select the  Recall other icons icon;
- select the  **Sensor calibration** icon;
- bring the sensor to the rest position;
- select the  **Confirm sensor calibration** icon to confirm the position of the sensor;
- extract the sensor arm to a distance of 200 mm. To read the distance, use the rule on the sensor rod;
- select the  **Confirm sensor calibration** icon to confirm the position of the sensor;
- extract the sensor arm to a distance of 400 mm. To read the distance, use the rule on the sensor rod;
- select the  **Confirm sensor calibration** icon to confirm the position of the sensor

If the calibration has been carried out successfully, a message of consent is

temporarily displayed. On the other hand, display of the message “Err 20” indicates that the position of the sensor during the calibration was not correct. Position it correctly, as described previously, and repeat the procedure.

The  **Exit** icon can be selected to exit from the program without performing the calibration.

ATTENTION

- **It is essential to perform the calibration procedure with the greatest care; any errors in this phase will have repercussions on all the subsequent distance measurements.**
- **On completion of the sensor calibration procedure, the sensitivity calibration should also be carried out.**

Automatic position search (RPA)

It is possible to switch from one centred position to the other by selecting the

 **Position search** icon; whenever this icon is selected, the system switches from the centred position of one side to that of the other. The automatic position search on the second side can also be carried out by pressing the START button with the guard raised.
This function is only active if it is enabled in the settings.

Visual check on roundness of the wheel.

This function allows the wheel to be started up at low speed with the guard open. This makes it possible to perform a visual check for any geometrical irregularities of the rim and the wheel.
After displaying the list of utility programs:

- select the  **Recall other icons** icon;
- select the  **Visual check** icon and keep the  key pressed for all the time required to make the check on the wheel. When the  key is released, the wheel shaft locking device is activated automatically.

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Working environments

This balancing machine allows three different operators to work at the same time, thanks to its three different working environments.

- To recall a working environment, select the  **working environment** icon. after displaying the list of utility programs.
- A submenu appears on the right, displaying three different working environments (operator 1,2,3).
  The yellow selection rectangle is located on the current operator.
- Use the arrow keys  and  , move the selection rectangle to the operator required and press  .

When a new operator is selected, the machine restores the parameters active at the time of the latest recall.
The parameters which can be saved are:
- balancing function active (trucks / cars).
- Balancing mode: dynamic, Alu x, static.
- Wheel dimensions: distance, diameter and width or those relating to the ALU active.
- OPT; last OPT passage.

The general machine settings remain the same throughout all the working environments: grams/ounces, sensitivity x5/x1 (x10/x50), threshold, etc.

Spin counter

After obtaining the utility menu on the display, proceed as follows:

- select the  **Recall other icons** icon;
- Select the  **Spin Counter** icon.

A window will be displayed on the video showing the values of the two counters:
- the first value shows the number of spins carried out since the machine was last switched on (when the machine is switched off, this value is zero-set);
- the second value shows the number of spins that the machine has carried out in its entire operational lifetime.

To eliminate display of the counters, press  (the only icon active is **Exit**). 

Service

This program displays the data that is used to test the operation of the machine and identify any malfunctions on the machine devices. This data is of no practical use to the user and should only be used by technical assistance personnel.

SETTINGS

The setting programs comprise the functions which personalise operation of the balancing machine and are normally used on installation.

To display the list (menu) of setting programs, simply select the  **Setting programs** icon; now the icons corresponding to this submenu are available:

Personalisation

This program allows the user to memorise a number of data as desired, such as: name, town, street, telephone number, advertising slogans, etc.
The data will then be displayed on the first video page and in the printout.

After displaying the list of setting programs:

- select the  **company data setting** icon.
- The screen shows a video page where the data can be set, comprising:
  - 5 lines on which the data can be typed (in the top left-hand corner of the screen);
  - a keyboard for setting the characters;
  - 5 icons for the commands;
  - 1 exit from program icon;
  - 1 Help icon.
- Use the arrow keys to select the character to be typed.
- Confirm the selection by pressing  .

The command icons are:

Move to next line; used to shift the cursor onto the line after the current line. If there is already a word on the new writing line, it will automatically be deleted.

Move to previous line; used to shift the cursor onto the line before the current line.If there is already a word on the new writing line, it will automatically be deleted.

Delete last character entered; moves the cursor one place to the left, deleting the character present.

Set upper/lower case; selects upper and lower case characters alternately.

Recall logo: allows display of the initial image with the personalisation data. This image appears spontaneously if the machine is inactive for a given period.

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To return to the previous working condition, press the  key.

The data set are memorised when the user exits from the program, i.e. when the  **Exit** icon is selected.

Users are advised to set their name and surname on the first line, the name of their town on the second, their street on the third and their telephone number on the fourth, with the advertising slogan on the last two lines.

Language

The language of the machine messages that appear on the monitor can be selected.
After obtaining the setting programs menu on the display, proceed as follows:

- select the  **language setting** icon;
- the screen shows a list of flags, e.g.  (English),  (German),  (Italian);
- select the flag corresponding to the language required; in case of doubt, the name of the language activated by the flag chosen can be seen in the bottom right-hand corner of the screen ;
- press the  key to activate the language.

The only way to exit from this program is to select one of the listed languages, after which the imbalance image page returns to the screen.

The  icon allows a new group of language to be recalled to the screen.

Imbalance display in grams/ounces

This sets the unit of measurement (grams or ounces) and the rounding (x1gr, x5gr or x10gr, x50gr) with which the imbalance values are displayed.
After the list of setting programs has been displayed, proceed as follows:

- select the  **Imbalance unit of measurement setting** icon.

If the machine is preset for balancing truck wheels, the following group of icons will appear:

Set grams x10; displays the imbalance values in steps of 10 grams.

Set grams x50; displays the imbalance values in steps of 50 grams.

Set half an ounce: displays the imbalance values in steps of half an ounce.

Set ounces; displays the imbalance values in ounces.

If the machine is preset to balance car wheels, the following group of icons will appear:

Set grams x1; displays the imbalance values gram by gram;

Set grams x 5; displays the imbalance values 5 grams by 5 grams;

Set tenths of an ounce; displays the imbalance values in steps of one tenth of an ounce;

Set quarters of an ounce; displays the imbalance values in steps of a quarter of an ounce.

- Select the display mode required and press the  key.

After the selection, the new setting is memorised and the image of the imbalances reappears on the screen.

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Automatic position search setting

Activates/deactivates automatic wheel positioning at the end of the wheel spin.

After displaying the list of setting programs, proceed as follows:

- select the 

Set automatic position search (RPA) icon.

The following icons appear on the screen:

Set RPA; enables the rapid wheel positioning procedure;

Disable RPA; disables the wheel positioning procedure.

- Select the setting required and press the  key.

After selection, the new setting is memorised and the image of the imbalances reappears on the screen.

Number of spins

The icon of reference is  **Modify spin counters.**

Function not available.

Setting preferential programs

This function allows the user to set three icons of his choice in the main icons bar.
After displaying the list of setting programs, proceed as follows:

- select the  **Set preferential programs** icon;
- the screen shows the list of all the utility program icons (see this chapter for the functions of the individual icons);
- select the three icons in the order in which they are required to appear, from left to right;
- the system exits from the program on selection of the third icon.

To exit from the program without changing the current settings, select the **Exit** icon. 

ERROR MESSAGES

The machine can recognize a certain number of incorrect operations and will signal them with appropriate messages on the display.

Err 1 Error in first sensitivity calibration.
The sensitivity calibration procedure should be carried out.

Err 3 Error in the execution of the sensitivity calibration procedure.
Make sure that the sample weight has been applied and repeat calibration.

Err 4 Sensor calibration error.
The sensor calibration procedure should be carried out.

Err 5 Incorrect wheel data for aluminum wheel balancing program.
Correct the dimensions set.

Err 6 Error made during the OPT procedure (optimization).
Repeat the procedure from the beginning.

Err 7 The machine is temporarily unable to select the program requested.
Carry out a spin and repeat the request.

Err 8 Printer out of service; printer not present; printer failure.

Err 9 Imbalance value over 999 grams with car wheels or over 1990 grams with truck wheels.
Reduce the imbalance and repeat the wheel spin.

Err 10 a) Internal distance sensor not in rest position (completely in) when the machine is switched on.
Switch off the machine, return the sensor to its correct position and switch on again.
b) Potentiometer malfunction. Select the **Manual data input** icon  to disable the sensors and enter the data by hand.
Call in the technical service.

Err 13 Attempt to perform calibration with incorrect wheel- machine distance.
Repeat calibration after fitting a spacer ring to alter the distance or use a different wheel.

Err 20 Sensors in incorrect position during calibration.
Bring them to the position indicated and repeat the calibration.

Err 23 Incomplete or incorrect data entered in ALU P.
Repeat acquisition process correctly.

Err 25 Program not available on this model.

Err 27 Wheel did not stop within the maximum allowed time.
If this message appears frequently contact your service centre.

Err 28 Encoder error. If this message appears frequently contact your service centre.

Err 30 During the wheel spin the wheel has not started to rotate within the maximum permitted time. Repeat the wheel spin; if the error persists call in the technical after sales service.

Err 31 Optimisation procedure already started by another user.

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Cr Err Spin carried out with wheel guard up. Lower the guard in order to carry out the spin.

Err Rot "Zero" reference not found. Turn the wheel shaft by hand until the error message disappears.

USING THE LIFT CARRIAGE

The lift carriage on the ET88 balancing machine is able to lift truck wheels weighing up to 200kg. For correct operation, the supply pressure of the pneumatic circuit must be at least 6 bar. This circuit has a pressure regulator filter which can be set at a maximum value of about 10 bar.

WARNING

No type of procedure intended to vary the setting of the operating pressure of the relief valves or pressure limiter is permitted.
The manufacturer declines all responsibility for damage caused by tampering with these valves.

WARNING

Great care must be taken during movement and lifting operations to prevent accidental crushing of the hands and feet.

WARNING

The wheel must be held in the correct position with one hand during movement and lifting operations to prevent it from falling from the support.

Fitting the wheel

- Fit the step flange most suitable for the type of wheel to be balanced on the balancing machine shaft;
- extract the lift carriage and completely lower the wheel support surface;
- place the wheel on the carriage support surface. The inside of the wheel must be as close as possible to the lift columns (fig. 20);
- raise the wheel using the control lever provided (M, fig. 4), until the inside hole of the wheel is centred in relation to the shaft;
- push the lift towards the balancing machine until the wheel is resting on the step flange fitted earlier; naturally, the balancing machine shaft will pass through the hole in the centre of the wheel;
- press the STOP button to engage the shaft lock and thus simplify the procedures which follow;
- centre the rim correctly on the correct diameter of the flange;
- fix the wheel using the counter-flange and the locking ring-nut;
- disengage the brake by pressing the STOP button again. In all cases, the brake will disengage automatically after 30s;
- lower the lift by moving the control lever in the DOWN direction, and push it into the rest position (towards the balancing machine body).

Removing the wheel

- Extract the lift by pulling it by the handle until the two columns are close to the inside of the wheel;
- raise the lift by moving the control lever in the ⏲ UP direction, until the support surface is touching the tyre.

  Important

  In this condition, push the lever in the ⏲ UP direction for a moment longer so that the lift surface is pressed slightly against the tyre, to compensate for the slight lowering of the wheel caused on release due to the elastic effect of the pneumatic cylinders.
- Release the wheel by removing the locking ring-nut and the counter-flange;
- pull the lift outward until the entire wheel is removed from the shaft (to allow it to be lowered);
- lower the lift completely by moving the control lever in the DOWN direction;
- Unload the wheel from the support surface.

BALANCING ACCESSORY AVAILABILITY STATUS

This check allows the user to make sure that wear has not altered the mechanical specifications of flanges, cones, etc., beyond the specified limits.
A perfectly balanced wheel, removed and replaced in a different position, cannot show an imbalance of over 10 grams for car wheels and 100 grams for truck wheels. If the imbalance is higher, check all the accessories with care and replace any that show dents, abnormal wear, bent flanges, etc.
Always remember that if you are using a cone to centre the wheel on the shaft, you will never obtain good results if the hole in the rim is not perfect, i.e.: off-centre or out-of-round. Results are always better when the wheel is centreed with the rim holes.
It should be remembered that any difference between the way the wheel is mounted on the vehicle and the way it is mounted on the balancing machine will undoubtedly generate a certain degree of imbalance.
This can only be eliminated with “on vehicle balancing”, using a finishing balancing machine to complement the work on the bench balancing machine.

TROUBLESHOOTING

Listed below are faults that the user can remedy if the cause is found to be among those indicated.
Any other defect or malfunction will require the attention of a qualified technician: contact your nearest manufacturer service centre.

The machine fails to switch on (the monitor remains off and there is no light showing at the main switch)

No power at the socket
➥ Check the mains power is present.
➥ Check the electrical power circuit installed in the workshop.
Defective machine plug
➥ Check that the plug is undamaged.

The machine fails to switch on (the monitor remains off even with the light showing at the main switch)

One of the FU1 ÷ FU6 fuses of the transformer has blown
➥ Replace the blown fuse.
The power supply adapter FU4 fuse has blown (LED 3 is off).
➥ Replace the blown fuse.
The monitor has not been switched on (only after installation)
➥ Switch on the monitor by pressing the push button on the monitor front panel (behind the black frame on the front level window).
The monitor power supply connector (located on the rear part of the monitor) has not been correctly inserted
➥ Check that the connector is correctly inserted.

The distance values measured with the automatic sensor are not the same as the values read on the millimetre rule.

The sensor has not been positioned correctly during measuring.
➥ Bring the sensor to the position shown in fig. 14 and follow the instructions in the ENTERING THE WHEEL DATA section.
The sensor is not calibrated.
➥ Carry out the sensor calibration procedure.

The automatic sensor does not work.

The sensor was not at rest at switch-on (Err 10) and the  **Manual data input icon has been selected, disabling control of the automatic sensor.**
➥ Switch the machine off, return the sensor to the correct position and switch it back on.
The sensor is not calibrated.
➥ Carry out the sensor calibration procedure.
The FU2 and/or FU3 fuses on the power supply circuit board have blown.
➥ Replace the blown fuse.

The wheel fails to spin when the START control is activated (the machine does not start).

The wheel guard is raised

➥ Lower the wheel guard (CrErr is diplayed).

The FU1 and/or FU5 fuses on the power supply circuit board have blown.

➥ Replace the blown fuse.

The machine displays unsteady imbalance values.

The machine has been jolted during the spin

➥ Repeat the spin, taking care not to disturb the machine while measuring is in progress.

The machine is not soundly installed on the flooring

➥ Check the installation and adjust the support feet, using shims if necessary.

The wheel is not properly clamped

➥ Tighten the clamping ring-nut firmly.

Several spins are required in order to balance a wheel.

The machine has been jolted during the spin

➥ Repeat the spin, taking care not to disturb the machine while measuring is in progress.

The machine is not soundly installed on the flooring

➥ Check the installation and adjust the support feet, using shims if necessary.

The wheel is not properly clamped

➥ Tighten the clamping ring-nut firmly.

The machine is not correctly calibrated

➥ Carry out the sensitivity calibration procedure.

The geometrical data are not correct

➥ Check that the data corresponds to the dimensions of the wheel and correct, if necessary.

➥ Carry out the sensor calibration procedure.

MAINTENANCE

WARNING

The manufacturer declines all liability for claims deriving from the use on non-original spares or accessories.

WARNING

Before carrying out any adjustments or performing maintenance operations, disconnect the electrical power supply from the machine and make sure that all moving parts are suitably immobilized.

WARNING

Do not remove or modify any parts of the machine except in the event of service interventions.

ATTENTION

Keep the work area clean.
Do not clean the machine with compressed air or jets of water.
When cleaning the area take steps to avoid raising dust as far as possible.

- Keep the balancing machine shaft, the clamping ring-nut, the cones and the centring flanges clean. Clean using a brush dipped in environmentally friendly solvents.
- Handle cones and flanges with care to avoid the risk of dropping them and causing damage that would affect centring precision.
- When not in use, store cones and flanges in a place where they are protected from dust and dirt.
- Use ethyl alcohol to clean the level window.
- Calibrate the machine at least once every six months.

ENVIRONMENTAL INFORMATION

Following disposal procedure shall be exclusively applied to the machines having the crossed-out bin symbol on their data plate  .

This product may contain substances that can be hazardous to the environment or to human health if it is not disposed of properly.
We therefore provide you with the following information to prevent releases of these substances and to improve the use of natural resources.

Electrical and electronic equipments should never be disposed of in the usual municipal waste but must be separately collected for their proper treatment.
The crossed-out bin symbol, placed on the product and in this page, remind you of the need to dispose of properly the product at the end of its life.
In this way it is possible to prevent that a not specific treatment of the substances contained in these products, or their improper use, or improper use of their parts may be hazardous to the environment or to human health. Furthermore this helps to recover, recycle and reuse many of the materials used in these products.

For this purpose the electrical and electronic equipment producers and distributors set up proper collection and treatment systems for these products.
At the end of life your product contact your distributor to have information on the collection arrangements.

When buying this new product your distributor will also inform you of the possibility to return free of charge another end of life equipment as long as it is of equivalent type and has fulfilled the same functions as the supplied equipment.

A disposal of the product different from what described above will be liable to the penalties prescribed by the national provisions in the country where the product is disposed of.

We also recommend you to adopt more measures for environment protection: recycling of the internal and external packaging of the product and disposing properly used batteries (if contained in the product).

With your help it is possible to reduce the amount of natural resources used to produce electrical and electronic equipments, to minimize the use of landfills for the disposal of the products and to improve the quality of life by preventing that potentially hazardous substances are released in the environment.

RECOMMENDED FIRE-EXTINGUISHING DEVICES

When choosing the most suitable fire extinguisher consult the following table:

	Dry materials	Inflammable liquids	Electrical fires
Water	**YES**	NO	NO
Foam	**YES**	**YES**	NO
Dry chemical	YES*	**YES**	**YES**
CO_2	YES*	**YES**	**YES**

YES* Use only if more appropriate extinguishers are not on hand and when the fire is small.

WARNING

The indications in this table are of a general nature. They are designed as a guideline for the user. The application of each type of extinguisher will be illustrated fully by the respective manufacturers on request.

GLOSSARY

Following there is a brief description of some of the technical terms used in this manual.

BALANCING CYCLE
Sequence of operations performed by the user and the machine, starting from the beginning of the wheel spin, to the time that the wheel is braked to a standstill after the unbalancing signals have been acquired and the relative values calculated.

CALIBRATION
See SELF-CALIBRATION

CENTRING
Procedure for positioning the wheel on the spin shaft with the aim of ensuring that the rotation axis of the wheel is aligned with the centre of the shaft.

CONE
Conical components with centre hole which, when inserted on the spin shaft, serves to centre wheels with centre holes whose diameter is between maximum and minimum values.

DYNAMIC BALANCING
Operation in which imbalance is corrected by the application of two weights, one on each side of the wheel.

FLANGE (Balancing machine)
Disk that mates with the disk of the wheel mounted on the balancing machine. The flange also serves to keep the wheel perfectly perpendicular to its axis of rotation.

FLANGE (centring accessory)
Device serving to support and centre the wheel. Also keeps the wheel perfectly

perpendicular to its axis of rotation.
The centring flange is mounted on the balancing machine shaft by means of its central hole.

ICON
Video representation of a key with graphics indicating the relative command.

IMBALANCE
Non-uniform distribution of the wheel mass that results in the generation of centrifugal force during rotation.

SELF-CALIBRATION
A procedure whereby suitable correction coefficients are calculated by starting from known operating conditions. Self-calibration improves the measurement precision of the machine by correcting, within limits, calculation errors that may arise due to alteration of the machine's characteristics over the course of time.

SENSOR (Measuring arm)
Mobile mechanical element brought into contact with the rim in a preset position to measure its geometrical data. The data can be measured in automatic mode if the sensor is equipped with suitable measurement transducers.

SPIN
Procedure starting from the action that causes the wheel to rotate and the successive free rotation of the wheel.

SPINNER
Device for clamping the wheel to the balancing machine. The spinner features elements for engaging to the threaded hub, and lateral pins that are used to tighten it.

STATIC BALANCING
In static balancing only the static component of the imbalance is corrected. This is achieved by fitting a single weight - usually at the centre of the rim channel. The accuracy of this system increases as the width of the wheel decreases.

THREADED HUB
Threaded part of the shaft that is engaged with the spinner to clamp the wheel. This component is supplied disassembled from the machine.

GENERAL ELECTRIC LAYOUT DIAGRAMS

Fig. 21

AP1	Power supply and controls board
AP2	Mother board (CPU)
AP3	Keyboard
AP4	Monitor
AP5	Search board
AP6	Printer
AP7	PWM board
AP8	Graphic card fpga2
AP9	Voice synthesis board
AP10	Display board
AP11	Alphanumeric display piloting board
AP12	Optic sensor board
B1	Speaker
BP1	Internal pick-up
BP2	External pick-up
BR1	Encoder
C1	Capacitor
CF	Compact flash
EV1	Fan
FU..	Fuse
KM1	Remote switch
M1	Motor
QS1	Master switch
QS2	Three-pole reverser
R1	Resistor
RP1	Internal distance potentiometer
RP2	Diameter potentiometer
RP3	External distance potentiometer
RP4	REB potentiometer
RP5	ROD potentiometer
RP6	Voice synthesis volume potentiometer
SA1	Switch
SB1	START button
SB2	STOP button
SB3	Brake button
SB4	ENTER button
SQ1	Safety guard microswitch
SQ2	START microswitch
SQ3	Brake pedal microswitch
SQ4	Wheel spin device safety microswitch
SQ5	STOP microswitch
ST1	Motor overload cutout
TC1	Power supply transformer
V1	Diode
VC1	Diode rectifier
XB1	Connector
XS1	Power supply socket
XT1	Terminal board
YA1	Motor coil
YA2	Brake / motor disconnection coil
YV1	Wheel spin solenoid valve
YV2	Brake solenoid valve
Z1	Mains filter
Z2	Motor filter

Note

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Note