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English

Technical service manual

3

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Italiano

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Español

Graphics and page-setting

**T**echnical **P**ublication **O**ffice

# TRANSLATION OF ORIGINAL INSTRUCTIONS

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## SERVICE PROGRAMMES

The aim of these programmes is to make some data available, to allow the quick and easy checking of the efficiency of the various parts of the machine.

The selection is done as follows:

- press either of the two cursor buttons, then press the wheel size setting button within two seconds. In this way, the first service programme is preselected (91);
- press "cursor up" and "cursor down" to scroll backwards and forwards through the programmes available and highlight the desired programme. Each preselection determines the visualisation of the code 9X (with X varying according to the programme) on the left display and the message "Ent" flashing on the right display to indicate that "Enter" must be pressed to confirm the preselection;
- press "Enter" to confirm.

If the preselection is not confirmed within about three seconds, you will automatically exit the Service environment.

### 91 Thresholds and rounding-off Cancel/reset:

- the visualisation of the first gram of unbalance;
- rounding-off to the nearest inch for the diameter measured with the automatic sensor (only for versions with an internal automatic sensor).

When the programme is selected:

- the message "1 oF" is displayed on the right hand display;
- the message "on .5" is displayed on the left hand display (on versions with automatic internal sensor only).

During normal operation, also when the "gr x 1" unbalance visualisation mode is selected, the first gram of unbalance is not shown. In this condition, the message "1 oF" appears on the right display when programme "91" is selected. Press "Enter" to display the first gram and increase the sensitivity of the machine (the message "1 on" is shown on the right hand display). Pressing "Enter" again toggles between the two modes.

When switched on (versions with an internal automatic sensor only), the machine selects rounding off to the nearest inch by default as

the display mode for the diameters measured with the automatic sensor. In this condition, the message "on .5" appears on the left display when programme "91" is selected. Press "Enter" to view the diameters measured with the automatic sensor (**versions with internal automatic sensor only**) to a resolution of one tenth of an inch. The message "oF .5" is shown on the left hand screen. Pressing "Enter" again toggles between the two modes.

#### Important

Press "Enter" to modify the setting shown on the display on which the central element of the centred position indicator is lit. To transfer the control from one display to the other, press either of the two arrow keys.

You can exit the programme (and the service environment) by pressing the "F" key.

The programme is used to

- display the unbalance values with the maximum precision allowed, so you can balance a wheel perfectly and then carry out further checks on it;
- display with the maximum precision allowed (tenth of an inch) the correspondence between the diameter values measured with the automatic sensor and the nominal wheel values (only for versions with an internal automatic sensor).

### 93 Visualisation of software version installed

When the programme is selected:

- the message "rEL" (release) is shown on the left hand display;
- the numerical message "XX.Y", indicating the programme version installed, is shown on the right hand display.

Press "enter" to view: the date of the software version (in the format day, month, year), the model of wheel balancer and the market where it is used.

You can exit the programme (and the service environment) by pressing the "F" key.

The programme is used for checking the version of the CPU software and, if necessary, implementing the updates.

## 95 Visualisation of phase calibration coefficient

When the programme is selected:

- the string "F" is shown on the left hand display;
- the phase calibration coefficient is shown on the right hand display.

The datum is expressed in notches (whole part) and eighths of a notch (decimal part) of the encoder (a notch corresponds to about 2.8 degrees).

You can exit the programme (and the service environment) by pressing the "F" key.

The programme is used for checking that the values of the phase calibration coefficient visualised are within the envisaged gap, from -2.0 to +2.0.

## 96 Visualisation: pick-up signals and relative phase, average speed of the last spin, number of discarded periods

When the programme is selected:

the value "96" is shown on the left hand display and the flashing message "GO" is shown on the right hand display.

After selecting the programme, proceed as follows:

- mount an average sized, correctly balanced wheel on the wheel balancer (e.g. 5.5" x 14") after selecting the mode "1Gr on" with service programme 91;
- apply a weight of 100g (3.5oz) on the outer side of the rim;
- perform a spin.

The machine acquires the unbalance signals and visualises (in sequence):

- the phase displacement F between the pick-up signals in relation to the ideal value of 180°. The datum is expressed in notches (whole part) and tenths of a notch (decimal part) of the encoder (a notch corresponds to about 0.7 degrees);
- values proportional to the signal levels received from the Static and Dynamic pick-ups;
- the "Spd" value indicating the speed in rpm at which the last spin was executed;
- the number of discarded periods "Scr" relative to the total number of periods acquired "X - 7"; Normally, the number of discarded periods (X) is equal to 0. When it is other than 0 means that the spin was disturbed

(machine accidentally bumped and/or mechanical parts that scrape against the shaft while it rotates).

NOTES

- The values displayed are not dependant on the dimensions set.
- With the wheel stationary, press "Enter" to cycle through the values measured.
- Press "Enter" to display the information listed immediately after selecting the programme. the displayed data obviously refer to the last spin performed.
- Further spins may be performed without exiting the programme.
- Press "F" to exit the programme (and the service environment).

The programme is used for

checking that the values visualised are within the envisaged gaps, i.e.:

Range	Check
phase displacement F	-2.0 - +2.0
STA pick-up signal	> 200
DIN pick-up signal	> 100
no. of discarded periods	0 ÷ 7

## 97 Visualisation of search card functions (encoder)

When the programme is selected:

- the message "POS" is shown on the left hand display;
- a numerical value between 0 and 127, varying in relation to the angular position of the shaft, on the right hand display.

If the programme is recalled immediately following the machine switch-on, the message "A 7" appears on the displays, to indicate the need to turn the shaft until the zero reference of the encoder has passed in front of the search card: at this point, the message disappears.

A spin can be performed (the message "97 GO" appears on the display), during which the impulses relative to the search card are counted. At the end of the spin, the expected value for the count (XXX) is shown on the left display and the right display (flashing) shows the actually counted value. These values remain displayed for about five seconds, after which the current angular position of the shaft reappears.

You can exit the programme (and the service environment) by pressing the "F" key.

The programme is used for checking the efficiency of the search card. As the shaft is rotated in both directions, the value must vary in real time between 0 to 127.

## 98 Visualisation of sensor functions (version with internal automatic sensor)

When the programme is selected:

- the message "di" is shown on the left hand display;
- the value in notches received from the diameter sensor is shown on the right display. Moving the lever of the sensor, the value is continuously updated.

Pressing the button for wheel data entry from the keypad (mam):

- the message "d" is shown on the right hand display;
- the value in notches received from the distance display (1 notch = 0.5 mm) is shown on the right hand display.

This value is updated by moving the sensor "in - out".

Pressing the button for wheel data entry from the keypad (mam):

- the message "Lr" is shown on the left hand display;
- the converted voltage value received from the potentiometer (width 248) is shown on the right hand display.

This value remains fixed, and is NOT updated as the external sensor is missing.

You can exit the programme (and the service environment) by pressing the "F" key.

The programme is used to check the efficiency of the sensors used for automatic data input. Moving the sensor, the values displayed must vary continuously within the following intervals:

diameter sensor: see paragraph "Diameter sensor" in chapter "Internal sensor";  
distance sensor from 4 to 240

## 99 Setting spin at prefixed speed

When the programme is selected, the default speed value set (in rpm) is displayed. By pressing the arrow keys you can modify the speed at which to carry out the acquisitions in the spins subsequently made within this programme.

You can exit the programme (and the service

environment) by pressing the "F" key.

The programme is used to check that the unbalance values are calculated with a good level of precision at all the spin speeds allowed.

## 101 performed spin counter

When the programme is selected:

- the message "LAN" is shown on the left hand display;
- the message "tot", alternating with a number value indicating the total spins performed by the machine, is shown on the right hand display.

By pressing the "Enter" key on the keypad you will see:

- the message "LAN" is shown on the left hand display;
- the message "CAL", alternating with a number value indicating the total spins performed since the last sensibility calibration, is shown on the right hand display.

By pressing the "Enter" key on the keypad you will see:

- the message "LAN" is shown on the left hand display;
- the message "PAR", alternating with a number value indicating the partial spins performed since the last machine on, is shown on the right hand display;
- You can exit the programme (and the service environment) by pressing the "F" key.

# MACHINE SOFTWARE CONFIGURATIONS

When replacing the MBE32F CPU board or carrying out the board reset diagnostic test "t4", the wheel balancer must be configured based on the machine version.

For this configuration, proceed as follows:

### Enabling the automatic sensor

- Access function 97F and rotate the unit to notch 100.
- Maintain this position and hold the dimensions button (manual wheel data entry) for approx. 5 seconds. The message "Tas" is

shown on the left hand display and the message "oFF" is shown on the right hand display.

- Press Enter to enable the sensor. The message "on" is shown on the right hand display.
- Press F to exit.

## RESETTING THE E2PROM MEMORY (T4)

Proceed as follows to perform the E2PROM calibration parameter zero-setting test t4:

- With the machine off, set the dip switch (A, fig. 3A - which is required for entering diagnostic mode) as follows: **MBE32F: SW1 DSW2 to ON.**
- Turn the wheel balancer on.
- Use the arrow keys to select the test until the following appears on the display:
  - "t 4" on the left display
  - "- - -" on the right display;
- Press the Enter button to confirm the selection. The card will automatically reset the calibration parameters; When the operation is complete the following will appear on the display:
  - "t 4" on the left display
  - "PAS" on the right display;
- turn off the machine and return the deep-switch to its original position (all switches are OFF).

## ZERO-SETTING OF THE SWINGING UNIT

If the MBE32F Mother board and/or the swinging unit must be replaced, the zero-setting of the unit itself must be performed, proceeding as follows:

- mount an average sized wheel on the machine (e.g. 5.5"X14"), preferably made of steel, and with a maximum residual imbalance of 10 grams per side.

**IMPORTANT:** to properly perform the zero-setting of the swinging unit, the wheel rim must be in perfect condition, without deformations

or abrasions or dirt in the centring hole or on the plane that rests on the swinging unit. In addition, the centring accessories must be correct for the wheel type and be clean and in perfect condition.

- clamp the wheel on the unit, keeping the valve in the 12 o'clock position;
- enter the wheel dimensions (either in manual mode, or in automatic mode on versions with automatic sensor);
- access function 97 as described in paragraph "97 Viewing search board functions (encoder)";
- turn the unit until notch "0" is shown on the right hand display;
- hold this position while simultaneously pressing and holding the "MAM" (dimension entry) button for approximately 5 seconds:
  - "GrP" is shown on the left hand display
  - "0" is shown on the right hand display;
- perform a spin;
- at the end of the spin, the following is displayed:
  - "GrP" is shown on the left hand display
  - "180" (flashing) on the right hand display;
- move the wheel valve to the 6 o'clock position then, **keeping the unit in this position**, loosen the ring nut and return the wheel valve to the 12 o'clock position;
- perform a second spin;
- at the end of the spin, the machine accesses function 97;
- you can exit the programme (and the service environment) by pressing the "F" key;
- check that the zero-point has been set correctly for the unit by balancing the wheel. Then, move the wheel valve to the 6 o'clock position and, keeping the unit in this position, loosen the ring nut and return the wheel valve to the 12 o'clock position;
- perform a spin. The residual unbalance obtained must be max. 5 grams per side, otherwise, repeat the procedure, paying attention to the indicated positions and the residual unbalance of the used wheel.

## DISASSEMBLING THE WEIGHT TRAY

- Undo the four screws (two M6 and two M4) fastening the weight tray.

## UPDATING THE CONTROL UNIT OF THE MBE32 CARD

### Card description

- MBE32F card. Processing board and interface with LED display.

The card is controlled by a microprocessor with relative firmware.

The MBE32F card firmware can be updated during servicing.

It should be pointed out that:

- The MBE firmware release is identified in the programme 93 with the name CPU.

## DOWNLOADING THE SOFTWARE AND FIRMWARE FROM THE INTERNET FOR CARD UPDATING

Download the software and firmware necessary for updating the board from the internet

If one or more cards needs to be updated, the FIRMWARE that is required can be downloaded from the internet.

To download the updated firmware and graphics versions from the internet, proceed as follows:

- Connect to the manufacturer's WEBSITE.
- Select "Private area".
- Enter your username, password and select "Enter".
- Select "Software Updates" in the new screen.
- In the "Keyword" field, enter the keyword that corresponds to what you want to download. For example:
- Enter "WBS" if you want to download the programming software (WBS) for updating from a PC.
- If you wish to download the **firmware** MBE32F, enter the name of the machine you want to update.

**N.B.** The downloaded files are in a compressed format (.zip) and must therefore be unzipped before they can be used.

## UPDATING THE MBE32F FIRMWARE

The application WBS is required in order to update the firmware of the MBE32F. If it is not already installed on the PC to be used for the update, it can be downloaded as explained in the previous paragraph. Then start the installation procedure by launching the "setup.exe" programme.

**IMPORTANT:** the application WBS is only compatible with Windows 98SE, 2000 and XP Professional operating systems.

- With the machine switched off set the deep-switch (A, fig. 3A) which is necessary for the programming based on the card to be updated, i.e.:

- **MBE32F: SW1 DSW1 to ON;**

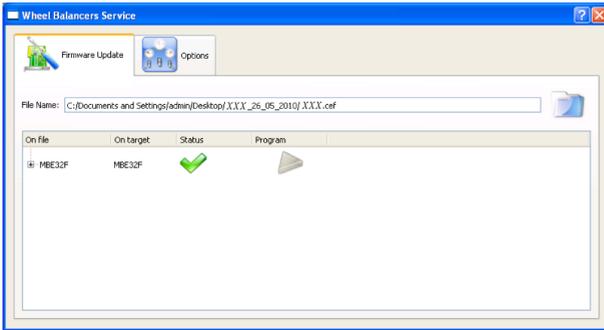


Fig.3A

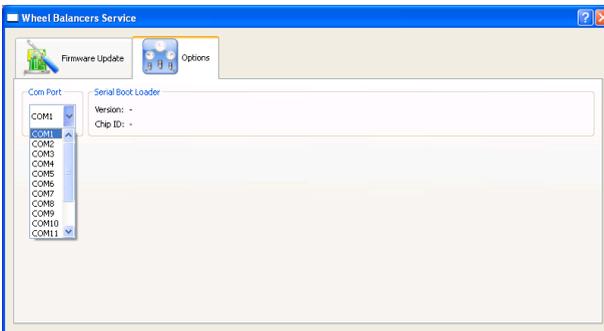
- Connect the serial cable code 4-105051 to the "JPS1A" connector of the card itself (B, fig. 3A). The other end of the cable is connected to the RS232 serial port on the PC. If the PC does not have a RS232 port use the RS232/USB adapter code 8-64500002.

If necessary, download the drivers for the adapter from the website "<http://www.ftdichip.com>"

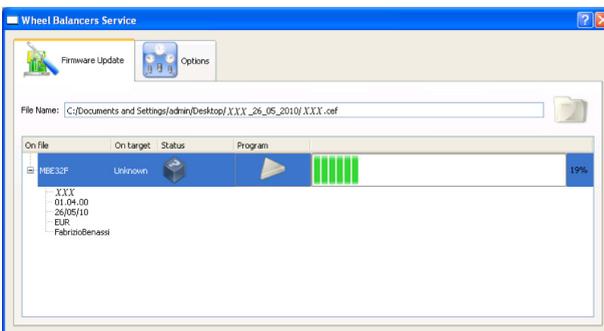
- Turn the wheel balancer on.
- Run the application WBS.
- The following control window for the WBS programme will now open.



- Select the "Folder" icon and load the previously downloaded file with the .cef extension for the firmware version to be updated into the programme.
- Select the Options tab and select the COM serial port onto which the programming cable is connected on the PC.



- Launch the firmware update and select the "START" icon to start the programming process.



- The message "OK 100%" is shown to indicate that the programming process has been completed successfully.
- After the programming procedure, close the application, switch off the machine and return the dip-switch to the original position (all switches OFF).
- If any error messages are displayed during the procedure, check the connection of the serial cable, switch the machine off and on, and repeat the programming procedure.

**IMPORTANT:** once the card FIRMWARE is updated, the E2PROM test must be performed for the zero-setting of the calibration parameters as described in the "DIAGNOSTIC PROGRAMMES" paragraph.

After performing this test, these operations must be repeated in the following order:

- configure the machine based on the machine version as described in the paragraph "MACHINE SOFTWARE CONFIGURATIONS";
- calibrate the internal sensor as described in the paragraph "INTERNAL SENSOR CALIBRATION";
- calibrate the machine sensitivity.

## INTERNAL SENSOR (ONLY for versions with the automatic sensor)

To visualise the signals of the sensors, select Function 98

### Diameter sensor [di]

Check that the total travel is 250 notches with the lever in the fully open position.

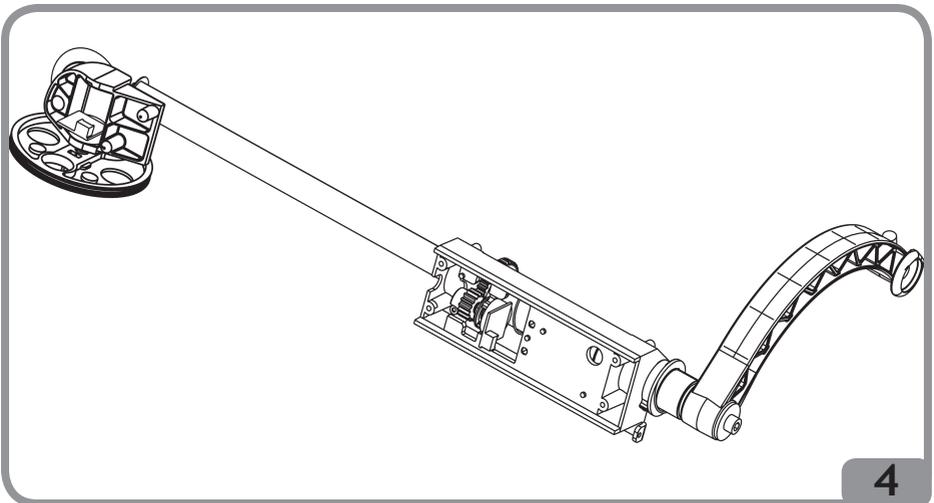
If the sensor does not read, check:

- the flat connector;
- that the sensor is correctly fitted in its housing.

If these checks do not rectify the problem,

replace the sensor as follows:

- Remove the diameter potentiometer complete with relative gear.
- Detach the gear and fit onto the new potentiometer, tightening the screw so that the gear is only partially gripped, allowing the shaft to rotate relative to the gear during the adjustment procedure described later.
- Fit the new potentiometer with relative gear onto the sensor mounting, ensuring that the gap between the gears is as small as possible in all positions.
- Reconnect the cable to the diameter potentiometer (RP2).
- Move the sensor lever into the rest position then, while holding the gear still, rotate the potentiometer shaft with a screwdriver until a value close to 5 is shown on the right hand display.
- Tighten the screw in this position to fasten the gear definitively onto the sensor shaft.
- Move the sensor lever into the fully open position and check that the electrical continuity of the potentiometer is maintained and that the gears remain correctly meshed throughout the entire travel.
- As the total travel of the potentiometer is approximately 230 values, if the rest position is set to 5, the value at the end of travel will be approximately 235.



## Distance sensor [d]

Check that total travel is 240 notches.

If the sensor (A, Fig. 4) does not read, check:

- the flat connector;
- that the sensor is correctly fitted in its housing.

If the sensor needs to be replaced:

- Remove the drive cable from the seats in the pulleys.
- Remove the large pulley, loosening the screw fastening it onto the potentiometer.
- Remove the distance potentiometer.
- Fit the new potentiometer.
- Refit the pulley onto the potentiometer, tightening the screw so that the pulley is only partially gripped, allowing shaft to rotate relative to the pulley during the adjustment procedure described later.
- Refit the drive cable, fitting correctly in the relative seats on the two pulleys.
- Reconnect the cable to the distance potentiometer (RP1).
- Move the sensor lever into the rest position (fully closed) then, while holding the pulley still, rotate the potentiometer shaft with a screwdriver until a value close to 5 is shown on the right hand display.
- Tighten the screw in this position to fasten the pulley definitively onto the potentiometer shaft.
- Move the sensor to its end of travel and check the electrical continuity of the potentiometer. As the total travel of the potentiometer is approximately 235 values, if the rest position is set to 5, the value at the end of travel will be approximately 240.
- Check that the diameter measures are correct, using wheels with known dimensions or a special tool. To obtain these values to a resolution of one tenth of an inch, see paragraph Thresholds and rounding-off.

### Notes:

Bear in mind that the nominal diameter of the wheel (i.e. 14") refers to the rest planes of the tyre beads, which are obviously inside the rim. The values measured are with reference to external planes and, as a result, are smaller than the nominal values due to the thickness of the rim itself. These differences are compensated for by sensor calibration, which corrects the measured values so that they match nominal values and can be easily understood by the user. Obviously, as compensation is based on the thickness of the rim used in the calibration

procedure, there may be a slight deviation from the nominal value (max. 0.2 - 0.3 inches) in values measured subsequently on rims with different thicknesses. This does not indicate imprecision and simply reflects reality.

To ensure that the nominal and measured geometric values match satisfactorily throughout the entire range possible, the wheel mounting shaft and the sliding sensor shaft must be correctly aligned relative to one another. The centrelines of the two shafts must be perfectly parallel both horizontally and vertically, and must be correctly spaced.

As the shafts are aligned correctly in the factory, no further adjustment is necessary in the event of replacing a potentiometer.

## INTERNAL SENSOR CALIBRATION

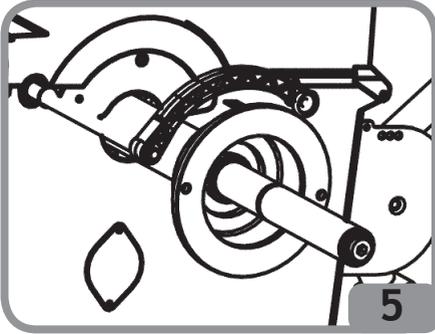
The internal sensor must be calibrated in the following cases:

- the machine displays message E 4 (sensor calibration not performed);
- the MBE32F main board has been replaced or the "t4" board reset diagnostic test has been performed. In this case, the setting must be performed to enable the operation of the internal automatic sensor, proceeding as follows:
- access function 97F and rotate the unit to notch 100;
- maintain this position and hold the dimensions button (manual wheel data entry) for approx. 5 seconds. The message "tAS" will appear on the left display, and "oFF" will appear on the right display;
- press Enter to enable the sensor. The message "on" is shown on the right hand display;
- press F to exit.
- the shaft assembly has been replaced;
- the internal sensor unit has been removed in order to replace the diameter and/or distance sensor.

The procedure for calibrating the internal sensor is as follows:

- press "Enter" twice from within the "cal" programme to access the sensor calibration function

- the "CAL" message will appear on the left display, and two flashing "E's will appear on the right one;
- move the internal sensor lever against the outer surface of the swinging unit housing as shown in figure 5;



- press "Enter" to calibrate diameter;
- move the lever against the outer surface of the shaft assembly housing;
- press "Enter" to calibrate distance;
- return the sensor to the rest position.

Once calibration is complete, the machine automatically enters ME mode.

If the calibration has been performed successfully, an acoustic consent signal is emitted. If the message A 20 is displayed, this indicates that the position of the sensor during the calibration phase is incorrect. Position it correctly, as already described, and repeat the procedure.

If the message persists, access function 98F and check that the distance and diameter values are read correctly and check that the rest position is set correctly, referring to paragraph "98 Viewing sensor functions (version with automatic internal sensor)".

## PICK-UP REPLACEMENT AND ADJUSTMENT

To replace the pick-ups, follow this procedure:

- Disconnect the connector for the pair of pick-ups from the MBE32F board.
- Loosen the pick-up fastener nuts completely.
- Loosen the nut and locknut fastening the tie-rods to the shaft assembly.
- Loosen the locknuts for each of the pick-ups.
- Unscrew the vertical tie-rod from the shaft

assembly.

- Detach the horizontal tie-rod from the vertical tie-rod.

Remove each pick-up from its respective tie-rod

- Fit the new pair of pick-ups, ensuring that the pick-up marked with +1 (static) is installed against the horizontal retainer wall with the marking facing up, and that the pick-up marked with +2 (dynamic) is mounted against the vertical retainer wall, with the marking facing inward.
- Fit the static pick-up tie-rod into the eye on the dynamic pick-up tie-rod.
- Tighten the static pick-up tie-rod to the end of its thread onto the shaft assembly.
- Snug (without tightening) the nut and locknut compressing the dynamic pick-up tie-rod onto the shaft assembly, ensuring that the toe-rods do not touch the sides of the slots.
- Snug the locknuts of each pick-up, so that the sensors are gripped gently.
- Fit the spring pack and tighten the static pick-up nut to a torque of 20 Nm.
- Fit the spring pack and tighten the dynamic pick-up nut to a torque of 20 Nm.
- Fully tighten the dynamic pick-up tie-rod nut and locknut.

**WARNING:** to ensure that the machine functions correctly, the procedure for installing the pick-ups must be followed exactly as described.

- Reconnect the pick-up connector.
- Perform a number of settling-in spins.
- Calibrate sensitivity.

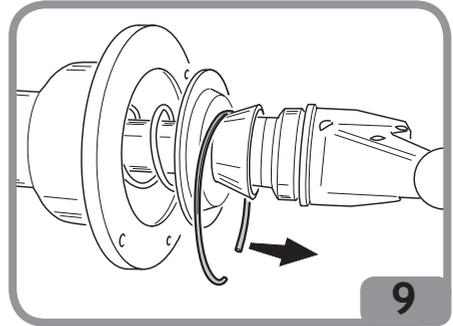
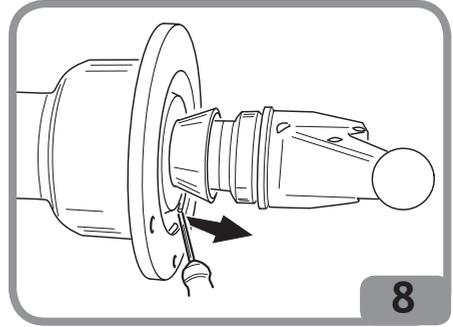
## REPLACEMENT OF THE COMPLETE SWINGING UNIT

After verifying that the assembly is effectively the cause of the machine malfunction, replace as follows:

- Remove the weight tray.
- Disconnect the motor power cable from the main board.
- Remove the pick-ups as described in the paragraph REPLACING AND ADJUSTING PICK-UPS.
- Remove the drive belt as described in the paragraph REPLACING AND ADJUSTING THE BELT.
- Disconnect the encoder board connector cable.
- Remove the encoder board mounting from the shaft assembly.
- Undo the two M12 fastener screws and remove the swinging unit (F, Fig.7).
- Fit the new swinging unit, tightening the 2 screws to a recommended torque of 75 Nm
- Refit the encoder board mounting on the new shaft assembly.
- Connect the encoder board connector cable.
- Refit and adjust the 2 pick-ups as described in the paragraph REPLACING AND ADJUSTING PICK-UPS.
- Refit and adjust the belt as described in the paragraph REPLACING AND ADJUSTING THE BELT.
- Close the weight tray.
- Perform the swinging unit zero-position setting procedure (see paragraph "SETTING ZERO POSITION OF SWINGING UNIT) and the sensitivity calibration procedure.

If it is necessary to disassemble the spring located inside the unit bell, proceed as follows:

- Fit a cone on the threaded hub;
- compress the spring with the fastener ring nut;
- using a screwdriver, remove the ring as shown in figures 8 and 9.



## SPIN DEVICE

### Replacing and adjusting the belt

- Remove the weight tray;
- Undo the belt tensioner tie-rod locknut;
- Loosen the belt tensioner tie-rod;
- Remove the belt;
- Fit the new belt;

- Set the belt tension by tightening the tie-rod (recommended tension frequency 200Hz). The tension must be measured using the specific instrument. Only in the case that suitable equipment is not available, approximate tension can be performed so that when pressing your finger on the middle of one of the two branches, the belt flexion is approx. 10mm.

**WARNING:** excessive belt tension can cause, with machine use, damage to the motor bearings and/or motor shaft failure.

a too slow belt can cause a decrease in performance, excessive noise at the beginning and when braking and rapid wear to the belt itself.

- Fasten the locknut.

## Replacing the motor

- Remove the weight tray.
- Disconnect the motor power cable from the main board.
- Remove the drive belt as described in the paragraph Replacing and adjusting the belt.
- Completely undo the belt tensioner tie-rod locknut.
- Undo the two screws fastening the motor mount to the casing.
- Undo the four screws fastening the motor to the motor mount.
- Reassemble, following the procedure for removal in reverse order.
- Fit the belt, referring to the paragraph "Replacing and adjusting the belt".

## MOUNTING AND DEMOUNTING THE WHEEL GUARD

### (machine version with wheel guard)

- Fasten the guard mounting to the rear wall of the casing with the four screws supplied.
- Connect the microswitch cable, located inside the guard mount, to the cable exiting from the hole in the back of the wheel balancer casing.
- Fit the guard on the tube.
- Fasten the guard to the pipe with the six snap fasteners.

If the guard works incorrectly (e.g. when the guard is lowered, the machine does not spin, or vice versa), check:

- that the microswitch cable is connected correctly to the MBE32F board
- that the microswitch actuator cam is correctly adjusted

If these checks do not rectify the problem, replace the microswitch as follows:

- Disconnect the microswitch cable from the cable exiting the hole in the rear wall of the wheel balancer casing.
- Remove the microswitch from the guard mount.

Refit, following the procedure for removal in reverse order.

## TROUBLESHOOTING

The wheel balancer is equipped with self-test and self-diagnosis programmes supplying information about most possible faults and the relative interventions (refer to the list of error messages and the paragraph "Troubleshooting" in the User Manual).

There are, however, irregular working conditions that the machine is not able to recognise, and which are listed below.

### Warning !

**For all electrical irregularities, before replacing a card you are advised to check:**

- the effectiveness of the wiring between those components probably involved in the malfunctioning. In particular, check:
  - that the connectors are correctly inserted;
  - that the contacts are correctly fixed to the ends of the individual wires of the cables;
  - the stability of the mains voltage in the area where the machine is installed and the efficiency of the earthing system of the shop;
  - for damage to the protection fuses installed in the power supply panel.

The table below summarises the general wiring diagram.

### The machine does not switch on

Using a voltmeter, check there is a power supply voltage on the terminal board of the Mother board.

#### 1) If there is no voltage on the Mother board, check:

- that the power socket and the relative protection fuses are in proper working order;
- the correct connection of the plug to the machine power supply cable;
- the mains cable is not damaged;
- the main switch is working correctly.

#### 2) If there is voltage on the Mother board, check:

- the presence of the voltages envisaged on the Mother board, i.e. from 90V to 253V;
- that the relative signalling LED "LD1" lights up;
- the correct wiring of the power supply cable of the MBE32F Mother board, and the correct insertion of its connectors;
- any short-circuits on the peripheral devices.

For this purpose, detach all the cables of the

connectors of the Mother card, apart from the power supply one, and try to switch on the machine;

If the above checks have not pointed out any faulty components, the MBE32F Mother board should be replaced.

### **Pressing the START key and/or lowering the guard, the machine does not perform the spin**

In this case, the different causes can be distinguished on the basis of the display indications.

#### **1) If the graphics remain on the display with the unbalance values previously calculated.**

The Mother card is not receiving or perceiving the START signal arriving from the keycard or the micro-switch.

Check:

- the correct operation of the automatic start microswitch associated with the wheel guard casing (with the guard lowered, the contact of the switch must be closed);
- the correct wiring of the automatic start microswitch;
- the correct operation of the Start key.

If the above checks have not pointed out any faulty components, the MBE32F Mother board should be replaced.

#### **2) If the geometric data of the wheel appear on the display.**

The Mother card receives the signal from the START key or the micro-switch, but the subsequent command is not carried out.

Check:

- for damage to the spin motor, checking that it is powered with the relative mains voltage. In the case of damage, replace the motor;
- for damage to the coil of relay "RL2", which is used to power the spin motor. If the relay operates correctly, after pressing START (or lowering the guard) there will be a mechanical tone coming from the Mother board. Otherwise, replace the MBE32F board.

If the above checks have not pointed out any faulty components, replace the Mother card.

#### **3) The displays show the message "A Cr".**

The START button was pressed on the keypad

Check:

- that the guard is lowered when a spin is performed (pressing the START button);
- the correct operation of the automatic start microswitch associated with the wheel guard casing (with the guard lowered, the contact of the switch must be closed).

- on machine versions with no wheel guard, check the state of the jumper on connector JMCR1 on the main board.

If the above checks have not pointed out any faulty components, replace the Mother card.

#### **4) The displays show the message " E 30".**

If you hear a strange noise, check the status of the pinion.

If the wheel starts to rotate normally, check the operation of the encoder card, see paragraph "Service programmes".

If the motor does not start up:

- check that the motor power supply cable is connected correctly;
- check motor operation.

If when commanding the spin (or when lowering the guard or pressing the Start key and the button) the wheel turns in the opposite direction (i.e. toward the operator), replace the Mother board.

In fact this irregularity is caused by the incorrect operation of the relay "RL1", which manages the inversion of current for wheel braking.

### **When switched on, the machine is blocked (it does not accept any command)**

Check:

- that all keys on the keypad are undamaged, i.e. that none of them remains constantly closed due to damage. In this case replace the defective key or the entire Mother board;
- that no key remains pressed down permanently due to the incorrect assembly of the Mother board on the support panel.

Every time a new board is mounted on the panel, maximum attention is required so that the keys, which are directly welded on the Mother board, work correctly. To do so, the following is necessary:

- tighten the four nuts fixing the boards, which are located near its corners;
- rub the two nuts located near the keys;
- press down on all panel keys and check their

working condition;

- tighten the two nuts carefully so that the keys remain in contact with the polyester film, but without being excessively tightened.

### **When the machine is switched on, the motor is powered**

Probably, the relay "RL2" which is used to power the spin motor does not function correctly, i.e. it remains activated permanently. In this case, replace the MBE32F Mother board.

### **The diameter and/or distance values acquired automatically with the sensors differ from the effective values (machine version with automatic sensor)**

Within the service environment, check the efficiency of the sensors (paragraph "Internal sensor").

For slight variances (maximum one inch), noted above all with alloy rims of greater thickness than usual, bear in mind the consideration already outlined in the paragraph specified above.

### **The wheel balancer produces inconsistent imbalance values for a number of successive spins (differences greater than 5 grammes for imbalance values of approximately 30 grammes)**

Check (in this order):

- the machine is resting firmly on the floor and the feet are undamaged;
- the wheel is well blocked on the shaft i.e. there is no sliding between the wheel and the resting flange during the spin phase.
- To check this condition, make two reference marks with a piece of chalk, one on the flange and the other on the wheel, perfectly in line with each other. Check there has been no reciprocal movement between the two reference points after a few spins;
- the two pick-ups are correctly tightened (refer to the values of the signals visualised on the service page);
- the efficiency of the Mother card, replacing it with a new one.

If the above checks have produced a favourable

result, replace the swinging unit and, if necessary, check for any noise from the bearings.

### **It is impossible to balance the wheel: applying the weights indicated by the wheel balancer, and performing a check spin, new unbalance values appear at random**

Make the checks listed in the previous point.

Check also:

- that the geometric dimensions set are correct;
- the machine is not out of calibration (carry out the sensitivity calibration procedure);
- the cable connecting the search card (encoder) to the Mother board is correctly inserted and wired;
- the search card (encoder) is working correctly (via the values visualised in Function 97 - see the paragraph "Service programmes"). An operational defect in the search card prevents the machine from correctly calculating the position of the unbalances. In this case it is necessary to check:
  - that the photodiodes of the search card are clean;
  - the mechanical adjustment of the fork in relation to the search disk.

Replace the search board if the fault persists. If the fault still does not disappear, replace the Mother card.

### **The motor remains activated, keeping the wheel in traction, and the current spin does not end**

Perform all checks on the Mother board that were listed in the previous point.

Probably, the relay "RL2" which is used to power the spin motor does not function correctly, i.e. it remains activated permanently. In this case, replace the MBE32F Mother board.

If instead after sampling (i.e. acquisition of wheel unbalance signals) in fall, the machine continues to spin the wheel instead of braking, check the operation of the relay "RL1" which inverts the current for braking.

If the relay functions correctly, at the beginning of braking, you will hear a mechanical tone coming from the Mother board. Otherwise, replace the MBE32F board.

### **During a spin:**

\* the machine remains blocked with the beeper activated;

\* unknown characters appear on the display;

• the machine resets.

The fault (usually sporadic) can arise due to the temporary absence of a power supply to the Mother card, or owing to a disturbance or malfunctioning of the Mother card.

Check:

- the correct wiring of the power supply cable of the Mother card, and the correct insertion of its connectors;
- check especially the available power supply voltage values (power supply values between 90Volts and 270Volts);
- the decoupling of the motor power supply cables from the signal cables.

If the above checks have not pointed out any faulty components, replace the Mother card.

### **The brake at the end of the cycle is too long, or noisy**

Check:

- If the bell of the swinging unit or the motor pulley slides on the belt during the braking phase. Then check the tension of the driving belt (nominal frequency 200Hz);
- check the operation of the relay "RL1", which inverts the current for braking.

If the relay functions correctly at the end of the cycle, you will hear a mechanical tone coming from the Mother board. Otherwise, replace the MBE32F board.

### **The spin device is noisy**

Check:

- If the bell of the swinging unit or the motor pulley slides on the belt during initial acceleration. Then check the tension of the driving belt (nominal frequency 200Hz);
- the motor is not mechanically damaged.

### **Touching the metal parts of the wheel balancer, you get an electric shock**

Check the efficiency of the earthing connection of the socket (essential for the correct operation of the machine as well as for safety purposes).

- the earth cable is correctly connected inside the machine and on the internal machine parts.

## MESSAGES ON THE DISPLAYS

The machine can recognise a certain number of malfunction conditions and signals them to the user by visualising the relevant messages on the displays.

### - A - Notice Messages

- A 5** Dimension settings not correct for an ALU programme. Correct the set dimensions.
- A 7** The machine is temporarily unable to select the requested programme. Perform a wheel spin, then repeat the request.
- A 11** Internal sensor not in the rest position. Return the sensor to the rest position (completely in). If the message does not disappear, internal sensor operation can be disabled by pressing the "Enter" key.
- A 20** Sensor in an incorrect position during calibration. Bring it to the position indicated and repeat the calibration.
- A 23** Incomplete or incorrect data entry in ALU P. Repeat the input correctly.
- A 26** Programme available only after selecting one of the following programmes: ALU 1P / ALU 2P / Motorcycle Dynamic / Motorcycle ALU or if selected in the Motorcycle Programme but with the wheel NOT in the centred position.
- A Stp** Wheel stop during the spin phase.
- A Cr** Spin performed with the guard raised. Lower the guard to perform the wheel spin.

### - E - Error messages

- E 1** No sensitivity calibration. Perform the sensitivity calibration procedure.
- E 2** Error condition on sensitivity calibration. Repeat the sensitivity calibration procedure.
- E 4** Error condition on sensor calibration. Perform the sensor calibration procedure

- E 6** Error condition when executing optimisation program. Repeat the procedure from the beginning.
- E 27** Excessive braking time. If the problem persists, call in the technical support centre.
- E 28** Encoder counting error. If the error occurs frequently, call in the technical support centre.
- E 30** Wheel spin device failure. Switch off the machine and call in the technical support centre.
- E 32** The wheel balancer has been jolted during the reading phase. Repeat the wheel spin.
- E F0** Error in reading the 0 notch.

### Other messages

- CAL GO** Wheel spin for calibration.
- GO ALU** Wheel spin with Alu programme selected.
- GO d15** Wheel spin with Motorcycle Dynamic programme selected.
- GO A15** Wheel spin with Motorcycle ALU programme selected.
- St** Wheel spin with Static programme selected.
- Hid n** Setting of number of spokes in "Hidden Weight" programme.
- CCC CCC** Unbalance values greater than 999 grams.

A large rectangular box containing 20 horizontal dashed lines, intended for handwriting practice. The lines are evenly spaced and extend across the width of the box.

