

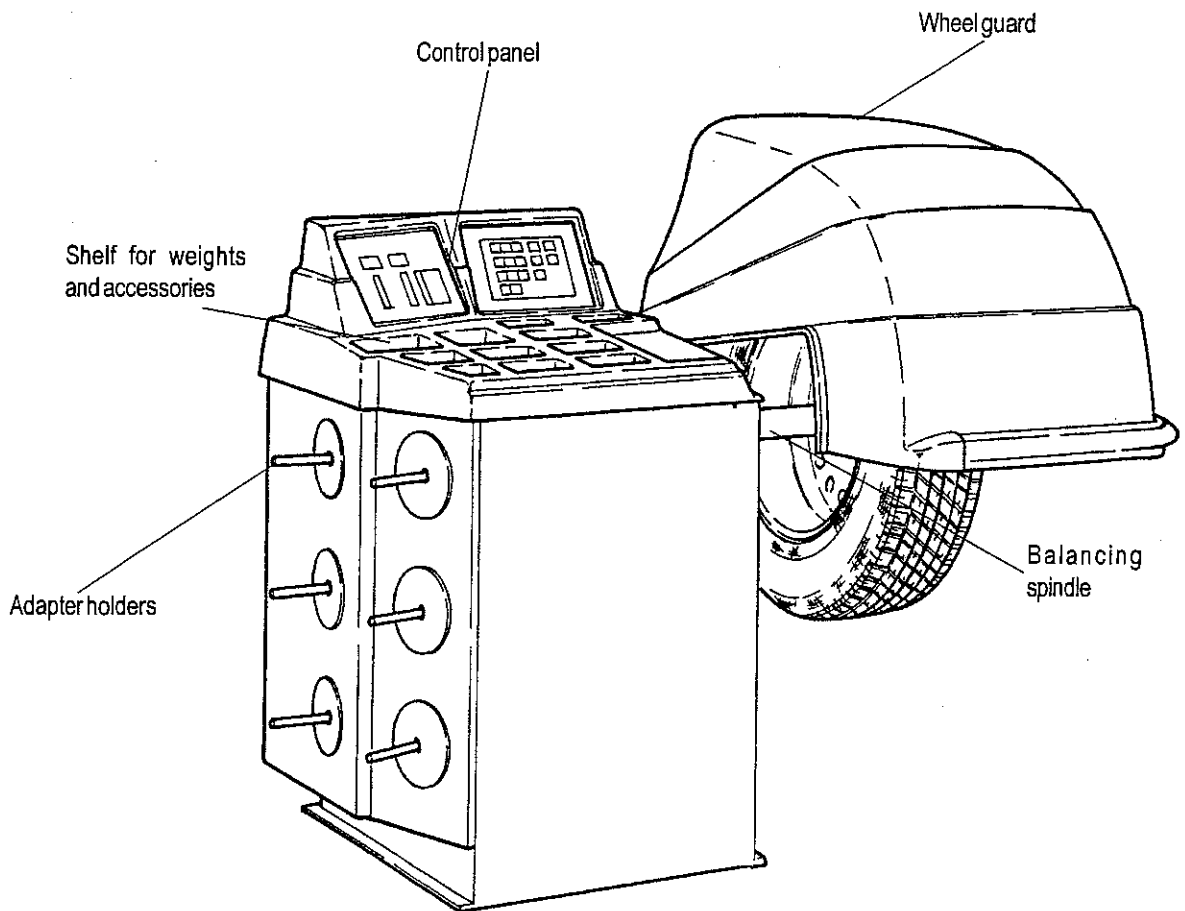


SILVER 443

WHEEL-BALANCING MACHINE WITH MICROPROCESSOR

Vers. 10 / 1998

OPERATING AND MAINTENANCE GUIDE



Cod. 3002637



**DICHIARAZIONE CE DI CONFORMITA'
CE DECLARATION OF CONFORMITY
DECLARATION DE CONFORMITE CE
CE - ÜBEREINSTIMMUNG**

GIULIANO S.r.l. - Via Guerrieri, 6 - 42 015 Correggio (RE) ITALY

dichiara sotto la propria esclusiva responsabilità che il prodotto:

declare on our own responsibility that the product:

Déclare sous son propre responsabilité que le produit:

erklärt unter ihrer eigenen Verantwortung, daß das Erzeugnis:

Equilibratrice Balancer Equilibreuse Auswuchtmaschine

SILVER 443

al quale questa dichiarazione si riferisce E' CONFORME ALLE SEGUENTI NORMATIVE:

to which declaration refers is IN CONFORMITY WITH THE FOLLOWING STANDARDS:

au quel cette déclaration se rapporte, correspond au modèle examiné et QU'IL EST CONFORME AUX NORMES SUIVANTES:

darauf diese Erklärung Bezug nimmt, dem geprüften Modell entspricht und mit den folgenden Bestimmungen übereinstimmt:

EN 292 09/91

EN 349

EN 60204-1 10/92

EN 294

EN 418

EN 439-1

EN 50081- 50082

DIR. 86/217/CEE 26/05/86

DIR. 87/404/CEE 25/06/87 modificata con
amended with

Modifiée par les directives

durch die folgenden Vorschriften verändert:

DIR. 93/68/CEE 22/07/93

In base a quanto previsto dalla direttiva

with reference to directive

D'après la directive

Der Vorschrift gemäß:

89/392/CEE

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91/368/CEE - 93/44/CEE - 93/68/CEE

Correggio, 12/10/1998

GIULIANO S.r.l.
Amm. Unico G. Maselli

Il modello della presente dichiarazione è conforme a quanto previsto nella Norma EN 45014

The model of present declaration is in conformity with directive EN 45014

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Das Modell dieser Erklärung übereinstimmt mit der Bestimmung EN 45014

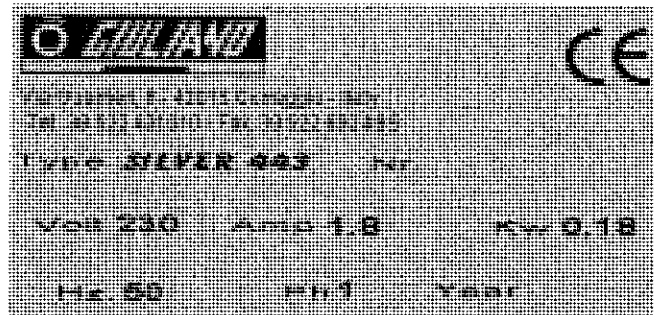
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1 - DESCRIPTION OF THE MACHINE

1.1 - GENERAL

The machine is a balancing machine with microprocessor designed for balancing wheels weighing up to 65 kg. All controls and signs stay on the front panel. The calibration system made by push-buttons allows a range of adjustment extended to uncommon tyres too (motorbikes and racing cars). Special functions are available to operate on unusual-shaped wheels and the machine is already preset for getting optional functions.

1.2 - NAMEPLATE DATA



1.3 - WARNINGS

- Before using the balancing machine, carefully read the operating guide.
- Keep this guide in a safe place for future reference.
- DO NOT remove or change any part of the machine otherwise its correct function will get compromised. For any assistance always apply to the after-sale technical service.
- DO NOT use strong jets of compressed air for cleaning.
- Use alcohol to clean the plastic parts (AVOID ALL LIQUIDS CONTAINING SOLVENTS).
- Before starting the balancing proceeding, make sure that the wheel is well locked on the adapter.
- The machine operator SHALL NOT WEAR clothes with flapping edges; make sure that unauthorized personnel do not approach the machine during the work cycle.
- DO NOT place at the base of the machine any counterweight or any other body which could compromise its correct functions.
- DO NOT use the balancing machines for purposes other than those described in this guide.

1.4 - STANDARD SAFETY DEVICES

- Stop push-button for stopping the wheel in case of emergency.
- High resistant plastic guard with shape and size designed to prevent the counterweights from flying out. A microswitch prevents starting the machine if the guard is not lowered and it stops the wheel whenever the guard is raised.

2 - HOISTING AND INSTALLATION

The balancing machine must be hoisted by levering the base from the 3 support points. Other points like the spindle, the head or the accessories shelf should never be forced. Check that the balancing machine rests on the floor at the 3 support points. There is no need to anchor the machine to the floor.

3 - ELECTRIC POWER SUPPLY

Warning: The electrical connection must be carried out by expert staff only. The connection to the single-phase mains must be made between phase and neutral; never between phase and earth. For a correct function of the machine it is always required a good earthing connection. Giuliano s.r.l. declines any responsibility in case of incorrect connection.

Before connecting the machine to the electrical mains through the relevant cable, check that the voltage correspond to that shown on the nameplate placed in the back of the machine. Rating of the electrical connection must be made on the basis of the electrical power consumption of the balancing machine (see nameplate).

- On the power supply cable it is necessary to fit a plug according with current regulations.
- It is recommended to provide the machine with its own electrical connection with relevant automatic circuit breaker.

In case the connection is made directly to the main electrical panel without using any plug it is recommended to padlock the main switch of the balancing machine in order to limit the use to the authorized personnel only.

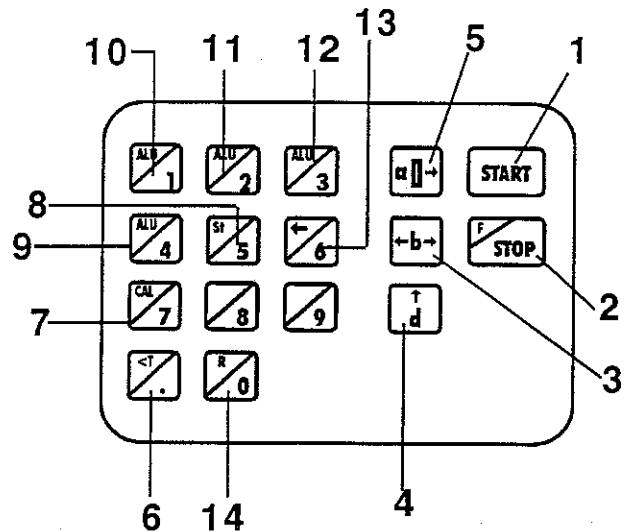
4 - TECHNICAL DATA

Max. wheel weight	65 kg.
Max. power consumption	500 W.
Standard supply	220/240V – 1ph
Balancing precision	1 gr.
Balancing speed	200 rpm
Rim diameter	10" , 24" or 265 , 615 mm.
Rim width	1.5" , 20" or 40 , 510 mm.
Cycle time	8 sec.
Net weight with guard and cone adaptor	120 kg.
Overall dimensions (including guard)	1200x1400x1670h.
Noise level in working conditions	<70 dB (A)
Admitted working temperature	between 0° and 50°C

5 - CONTROL PANEL AND DISPLAY

Control panel:

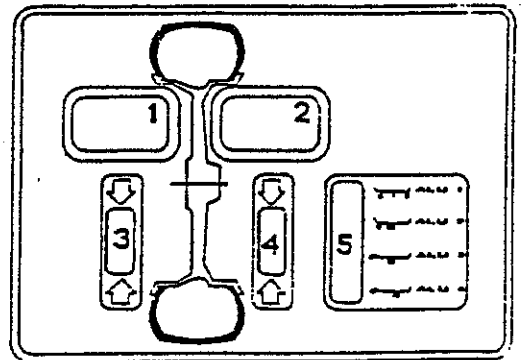
1. Cycle start
 2. Emergency
 3. Width setting
 4. Diameter setting
 5. Distance setting
 6. Left unbalance visualization
 7. [CAL/7] + [F/STOP] = self-calibration
 8. Switching into STATIC
 9. ALU 4 function
 10. ALU 1 function
 11. ALU 2 function
 12. ALU 3 function
 13. Switching into DYNAMIC
- [R/0] + [F/STOP] = dimensions window



Important: DO NOT use the pliers of any other pointed object to push the keys. To do this use your fingers ONLY.

Display:

1. Inner side unbalance digital indication
2. Outer side unbalance digital indication
3. Inner side unbalance position indication
4. Outer side unbalance position indication
5. Correction method selection



Measures window:

- | | |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [ALU/1]: | select ALU 1 |
| [ALU/2]: | select ALU 2 |
| [ALU/3]: | select ALU 3 |
| [ALU/4]: | select ALU 4 |
| [ST]: | display the static unbalance |
| [>-]: | display the dynamic unbalance |
| [>T]: | display the values under threshold |
| [F/STOP] + [CAL]: | self-calibration |
| [F/STOP] + [>T/.]: | gr./oz. selection |
| [F/STOP] + [R/0]: | unbalance values recalculation |
| [F/STOP] + [d]: | start through guard lowering when the balancing machine is under unbalance display condition (when the display switches off, it means that the keys have been recognized). |
| [F/STOP] + [b]: | unbalance optimization |
| [a]: | distance setting |
| [b]: | width setting |
| [d]: | diameter setting |
| [START]: | motor starting |
| [F/STOP]: | motor stopping only when the wheel is turning |

Dimensions window:

- [R/0] + [9] : numerical keys to set values of different dimensions
- [F/STOP] + [a] : mm./inch. selection. Push this sequence after having pressed [b]-key in case you want to change the width measure value; push it after having pressed [d]-key if you want to change the diameter measure value. The machine is preset in Inch. measure value, which will appear whenever switching on the machine.
- [F/STOP] + [R/0] : When one of the dimensions is shown onto the display, by pushing these keys the display will go back and show the measure results and it will recalculate the unbalance in case of change of one of the dimensions. On the contrary, if the display shows the measure results, a brief pressure on this key will let the display show, one after the other for a couple of seconds, 'a' 'b' and 'd' dimension: right after having shown 'd' dimension, it will automatically go back to unbalance value display.
- [F/STOP] + [b] : Unbalance optimization

How to enable START by guard lowering:

Push 'F' + 'd' at the same time when the balancing machine is under unbalance visualization condition. When the display switches off it means that the keys have been recognized.

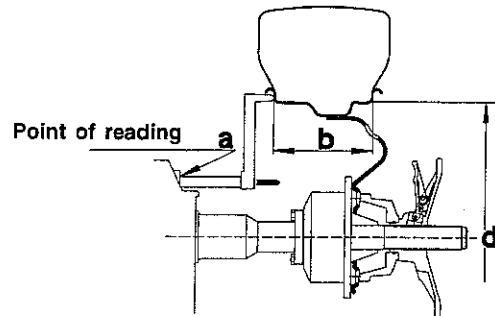
Selection of the dimension measure value:

Select the dimension whose measure value you want to change (diameter or width).

Push 'F' + 'a' at the same time.

Whenever switched on, the balancing machine will propose **INCH**. measure value.

6 - DIMENSIONS SETTING



Distance setting:

Push key 'a' and digit the wanted value through the numerical keyboard. In case of mistake, push key 'a' again to cancel the last selection.

Any other not numerical key will enter the new data. **ATTENTION:** the distance setting range is: 0÷25 cm.

Any value out of this range will be considered as an error and **the display will show "Err"**.

To amend any possible error, digit the correct numerical value again.

Width setting:

Push key 'b' and digit the wanted value through the numerical keyboard. In case of mistake, push key 'b' again to cancel the last selection.

Any other not numerical key will enter the new data. **ATTENTION:** the width setting range is: 1,5÷20 inch. or 40÷510 mm.

Any value out of this range will be considered as an error and **the display will show "Err"**.

To amend any possible error, digit the correct numerical value again. To change the width measure value, press keys 'F'+ 'a'.

Diameter setting:

Push key 'd' and digit the wanted value through the numerical keyboard. In case of mistake, push key 'd' again to cancel the last selection.

Any other not numerical key will enter the new data. **ATTENTION:** the diameter setting range is: 10÷24 inch. or 265÷615 mm.

Any value out of this range will be considered as an error and **the display will show "Err"**.

To amend any possible error, digit the correct numerical value again. To change the diameter measure value, press keys 'F'+ 'a'.

Important: It is possible to start self-calibration function by pushing keys [F/STOP] + [CAL] from any setting window. In case of interruption of the self-calibration sequence, the system is automatically brought back to the measure window.

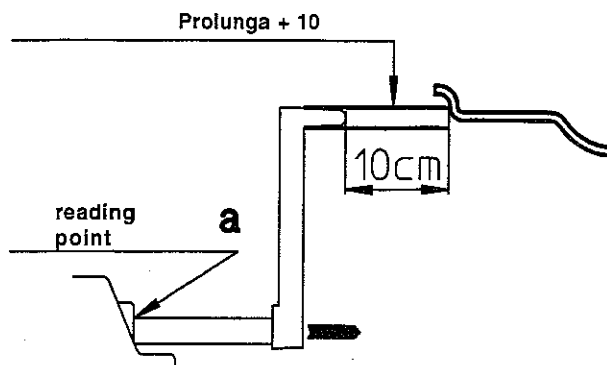
6.1 SETTING FOR MOTORBIKE WHEELS

Fig. 6

When the wheel dimensions do not allow a standard measurement, it is necessary to operate as described herebelow:

- Insert the extension into the distance gauge.
- Extend the distance gauge until it touches the inner side of the rim.
- Read value "a" on the index, let the distance gauge go back to "0" and proceed to the manual setting of value "a+10" (full scale 25 cm.).

Set diameter and width as described in chap. 6 Dimensions setting



7 - WHEEL BALANCING

- Turn the master switch on 1.
- Install the wheel on the machine and prearrange the setting of the panel as described at page 6..
- The settings can be set or changed even after starting the function.
- Lower the guard.
- Press START key. In a few seconds the wheel is automatically brought to a running state and then stopped again. **Indicators 1 and 2 will store the unbalance values.**
- **Indicators 3 and 4 will show the correct position by means of lighted diodes. The lighted diodes inform that the correction weight must be put on the top of the vertical.**

IMPORTANT

For a good balancing it is commonly acceptable that the unbalance indication stays below 10-12 gr. (0.4-0.5 oz.). With silver 443 it is very easy to balance with a tolerance of only 5 gr. or even less (0.3 oz.)

7.1 UNBALANCE READING KEY

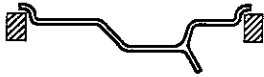
By pushing key [**<T**] when the machine is not running, it is possible to read and correct, whenever necessary, the residual unbalance lower than 5 gr. (0.3 oz.) (wheels for special performances). **Under normal conditions the indicators 1 and 2 show 0 for any unbalance value lower than 5 gr. (0.3 oz.)**

7.2 - STATIC AND ALU FUNCTIONS

(Balancing of motobike, alloy and special constructed rims)

Set the machine as described at page 6.

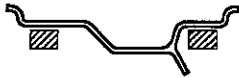
The available ALU functions can be selected at any time and allow the indication of the correction weights to be put in different positions other than the standard one. Push the relevant key to select the wanted function. For each function the microprocessor processes and stores very quickly on indicators 1 and 2 the actual values of the compensation weights modified according to the position of the correction weight.



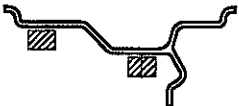
NORMAL: Balancing of steel or light alloy rims with the application of clip-on weights onto the rim's edge.



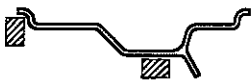
STATIC: Static correction is necessary when operate with motorbike wheels or when it is not possible to put the counterweight on both sides of the rim.



ALU1: Balancing of light alloy rims with application of adhesive weights onto the rim's shoulders.



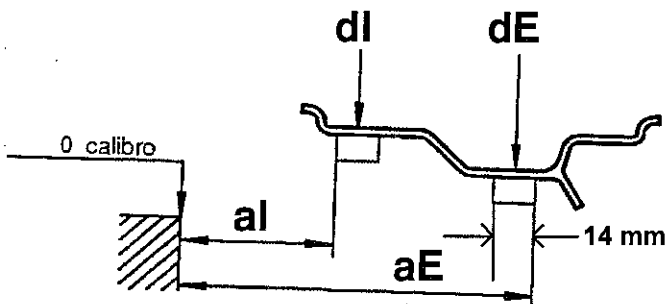
ALU2: Balancing of light alloy rims with hidden application of external adhesiveweight.



ALU3: Combined balancing through the application of a clip-on weight onto the outer side of the rim and an adhesive weight onto the inner side (Mercedes).



ALU4: Combined balancing through the application of an adhesive weight onto the outer side of the rim and a clip-on weight onto the inner side.



ALU S special function: Necessary when operating with special-shaped alloy rims where ALU 2 function doesn't grant enough approximation. Press key (8) from measure window: all ALU indicators will light up. Proceed measuring as described herebelow:

DIMENSIONSSETTING:

al ⇒ Press key (a) and digit the wanted value (in cm.) through the numerical buttons.

aE ⇒ Press key (b) and digit the wanted value (in cm.) through the numerical buttons.

dl ⇒ Press key (d) and digit the wanted value (in inch. or mm.) through the numerical buttons.

dE ⇒ Press (F)+(d) at the same time when the display shows dl value: digit the wanted value (in inch. or mm.) through the numerical buttons and enter the data by pressing one of keys "a", "b" or "d"

Note: per default $dE=0.8 \times dl$
At any setting of dl the system automatically shows $dE=0.8 \times dl$

The system automatically calculates the distance between the barycenters of the weights considering them about 14 mm. large.

To visualize the unbalance according to the set dimensions, press the keys (F)+(R) at the same time: if a first wheel running had been started, the system automatically recalculates the unbalance, otherwise let a new wheel running start.

8 - SELF-CALIBRATION

To carry out the self-calibration of the machine, proceed as described herebelow:

- Fix a wheel on the shaft, even if it's not balanced yet. We suggest a standard-sized tyre.
- Digit the exact measures of the installed wheel.

ATTENTION: the setting of wrong measures will compromise the correct setting of the machine and all following measurements.

To get good values it will be therefore necessary to repeat the self-calibration proceeding.

- Press first key (**F/STOP**) and the, keeping it pressed, also press key (**CAL/7**). The display will show "**CAL**" to ask for a confirmation of self-calibration request. If you want to confirm, just keep the keys above pressed until the display stops blinking. In case you let one of the keys free during the waiting time, self-calibration will not be carried out and the machine goes back to its ON condition (**display showing 00**).
- At the end of the first spin, the display will show "**ADD 100**" whilst the LEDs showing the position on outer side of the rim start blinking. It is now necessary to add a 100 gr. weight on the **OUTER** rim edge in whichever position.
- Press **START**. At the end of the spin the machine is set. It will appear the indication **END CAL** on the display. Remove the 100 gr. weight. Now the machine is ready for balancing.


The values that the machine senses during the self-calibration cycle are automatically stored into a special memory which keeps them even after switching off. At any further switching on the machine is ready to function correctly. The self-calibration cycle can be repeated whenever you want or, in any case, whenever you have any doubt on the correct function of the machine.

9 - UNBALANCE OPTIMIZATION

To reduce the unbalance press keys (**F/STOP**) + (**b**) at the same time. The display will show "**r.S.**". Press **START** to carry out the first measurement. Once the first spin has been completed, the display will ask you to rotate the tyre on the rim. Proceed as described herebelow:

- Mark both flange and rim with a reference sign, so that you can re-assemble the rim on the flange in its present position.
- Remove rim from flange and let the tyre rotate onto the rim of 180° (by means of a tyre-changer).
- Re-assemble the rim onto the flange matching the reference signs previously marked.
- Press **START** to execute the second spin.

ATTENTION: To get the best results in measuring, it is very important to carry out the hereabove operations with the utmost care and precision.

RIGHT DISPLAY: percentage value of the possible unbalance reduction. NOTE: on the display the symbol % will appear as "  "

LEFT DISPLAY: value of the real static unbalance of the wheel. This value is necessary to decide if it's convenient to reduce the unbalance as suggested. It would be infact useless to execute the reduction proceeding, even with 90% indication, if the real unbalance is not more than 3-4 gr.

POSITIONNING LED INDICATORS:

- Let the wheel turn by hand until the **OUTER LEDs** light up and mark the **tyre** in its upper point (in the same position where the weight should be fitted).
- Let the wheel turn again until the **MIDDLE LEDs** light up and mark the **rim** in its upper point.
- In order to reduce the unbalance let the tyre turn on the rim until the two marks match each other. During this operation whenever pressing key **(F/STOP)** will stop the unbalance reduction proceeding and will let go back to the wheel unbalance value.

At the end of optimization function the enabled keys are the following:

(F/STOP) : which allows to go back to wheel unbalance value **(the display shows 000 000)**

(START) : which enters the wheel unbalance measurement.

(F/STOP)+(b) : which repeats the unbalance reduction proceeding going back to waiting-for-**(START)** condition for first spin **(the display shows "r.S")**

10 - UNBALANCE SPLIT RUNNING

SPLIT function is enabled only with static unbalance or ALU-S outer side and it is useful to **hide the eventual adhesive weights placed behind the spokes to correct the unbalance.**

Press keys **(F)+(9)** at the same time.

Use the numerical keys to digit the number of spokes wanted in the range **3-12** (in case the number shown by the display is the good one it will not be necessary to re-digit it).

Place one of the spokes up to the vertical and press key **(F)**.

Static unbalance

- The indication "**St**" will appear on the outer side.
 - Let the wheel turn slowly until an unbalance value appears on the inner side display; place one adhesive weight of same value inside the spoke placed in the upper part of the vertical.
- Now the wheel is balanced.

ALU-S unbalance

- An unbalance value appears on the inner side; place a weight of same value in the position shown by the LEDs.
 - Let the wheel turn slowly until an unbalance value appears on the outer side display; place an adhesive weight of same value inside the spoke placed in the upper part of the vertical.
 - Let the wheel turn slowly until the second unbalance value appears on the outer side display; place an adhesive weight of same value inside the spoke placed in the upper part of the vertical.
- Now the wheel is balanced.

To visualize the unbalance value with 1 gr. precision press key **(<T)**.

To go back to standard visualization of unbalance, press:

- **(START)** to execute a new spin;
- **(F)** to go back to the unsplitted unbalance visualization;
- **(a),(b), (d)** to set the new dimensions and cancel SPLIT function.

11 - ERRORS

When the machine is working it could be possible to find different causes of malfunctioning that, if detected by microprocessor, will be shown on display 1-2 with indication "Err" followed by a number.

The meaning of these errors is the following:



- Err 1)** There is no rotation signal. The position trasducer could be defective, the motor has failed to start or maybe something prevents the wheel to turn.
- Err 2)** During the detecting rounds the speed has lowered under 60 n/l'
- Err 3)** A mistake is occurred in calculation proceeding. Much probably this is due to a wrong self-calibration and, consequently, to too high unbalance values. Repeat self-calibration.
- Err 4)** The motor turns in reverse direction.
- Err 5)** The guard was not lowered before starting the spin.
- Err 7)** Mistake in storage of self-calibration values. Repeat self-calibration.
- Err 8)** Mistake occurred during self-calibration. It could be given by second spin carried out without adding the reference weight or by the detectors cable which could be disconnected.
- Err 12)** Mistake occurred in calculation proceeding when using SPLIT unbalance function. Repeat the unbalance measurement and reset SPLIT.
- Err 15)** Mistake occurred when setting dimensions for ALU-S due to:
 $aE < aI$
 $(aE - aI) < 3.5 \text{ cm}$

11.1 - UNBALANCE VARIABLE INDICATIONS

After having balanced a wheel, removed it from the machine and then installed again it could happen to find out it is not balanced.

This doesn't depend on an uncorrect indication of the machine but on a wrong installation of the wheel onto the flange. This means that the wheel has been installed in two different position according to the axle of the machine shaft.

If installation of the wheel onto the flange is made by means of screws, it can be that the screws have not been tighten correctly, in a crossing gradual way one after the other or (as it often comes) that the drilling of the rim has been executed with too wide tolerances.

Unrelevant errors, up to 10 grams (.4 oz.) are to be considered as a normally acceptable if the wheel is locked by means of a cone. For wheels locked by means of screws or stud bolts the error is usually higher.

If after having balanced the wheel and installing it on the vehicle you find out it is not balanced, this can depend on unbalances in brake drum or very often on the holes for rim and drum screws, which are often drilled under too wide tolerances. In this case it could be usefull a retouch by means of a wheel-mounted balancing machine.

12- STANDARD MAINTENANCE (Ordinary staff)

Before carrying out any operation always disconnect the electrical power supply.

12.1 BELT TENSION ADJUSTING

- 1.** Remove one after the other: the distance gauge, the measure panel, the head and the tools-shelf taking care not to pull out the electrical connections.
- 2.** Loosen the four fixing screws of the motor support and move all giving the belt the right tension.
- 3.** Tighten the four screws and make sure that the belt, when moving, doesn't move sideways due to the wrong alignment of the pulleys.

12.2 REPLACING THE FUSES

Two safety fuses are placed on the power supply board, which is accessible only after having removed the tools-shelf. In case of replacement it is necessary to use fuses of same power.

Should the failure occur again please apply to the After Sale Technical Service.

SPECIAL MAINTENANCE

(Only for authorized technician)

LIST OF RECOMMENDED SPARE PARTS (Refer to the exploded view)

Item	Q.ty	DESCRIPTION
130	1	Adaptor plate st 19378
126	1	Flat belt PU 12 940x25
209	1	Keyboard panel Mod. 1430
238	1	Electronic board C31/2
227	2	Fuse 5x20 – 2A
232	1	Switch KL 1002+Q555
224	1	Power board (without resistance) C31/2
231	1	Transformer 30 VA type C31/2

SPECIFIC PARTS FOR MACHINES AT 220V

116	1	Single-phase motor 220V/50Hz – 0.25 HP – LM63C4 – B3
210	1	Complete power supply plate
226	1	Resistance 50W – 10 Ohm
229	1	Condenser 10MF

SPECIFIC PARTS FOR MACHINES AT 110V

116A	1	Single-phase motor 220V/50Hz – 0.25 HP – LM63C4 – B3
210A	1	Complete power supply plate
226A	2	Resistance 50W – 10 Ohm (in parallel with 5 Ohm)
229A	1	Condenser 25MF

CHANGE OF POWER SUPPLY VOLTAGE

(see recommended spare parts list and topographic power diagram)

The wheel-balancer can work either at 110V or at 220V.

To change the power supply voltage it is necessary to proceed as described herebelow:

1. Replace motor
2. Replace the whole power supply plate or carry on the following modifications on the plate itself:
 - A. Replace condenser
 - B. Connect the transformer wire to contact T1 placed onto the power supply board, according to the requested voltage (**Red for 220V – White for 110V**)
 - C. Connect in parallel another resistance **50W-10Ω** to the braking resistance.

110V R=100W -5Ω

220V R=50W-10Ω

MACHINES PARAMETERS HANDLING

Press keys **(F/STOP)+(CAL/7)** as for self-calibration. When the LEDs stop blinking, instead of performing the spin, press the following keys within 5 seconds in the right sequence:

(a) then **(b)** then **(F/STOP)**

After having pressed **(a)** and **(b)** the displays switch off and after having pressed **(F/STOP)** the real value of fixed distance **(DF)** appears: change through **the numerical keyboard**.

Press **(a)** to move to modify value "I".

The **right display** will show the real value **(in %)** and the left one will show "I" together with symbol "—" if correction is negative, or "-/" if it is positive. Use key **(b)** to change sign (+/-) and numerical keys to change value.

When pressing key **(a)** the right display shows value **"S"**: use the **numerical keys** to change it.

Press **(a)** to finish.

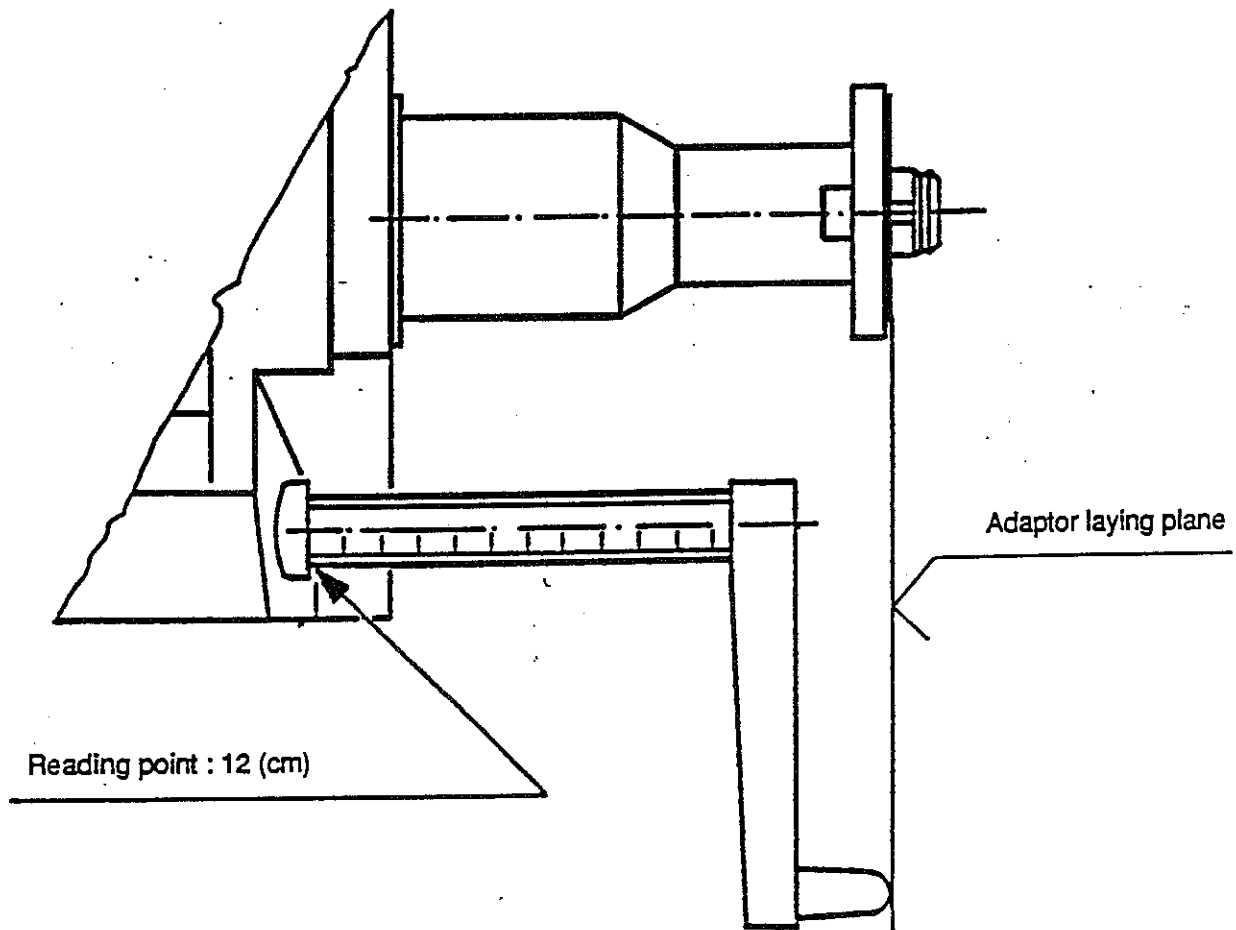
Attention: If key **(STOP)** is pressed during one of the three parameters setting phases, the system will automatically interrupt the function and set the machine under basic parameters.

Basic configuration values: **DF= 124 I=+3 S=325**

After having changed the machine parameters carry on a new self-calibration.

Note: inside the machine, on a specific nameplate, you can read the setting values through which the machine was set by manufacturer.

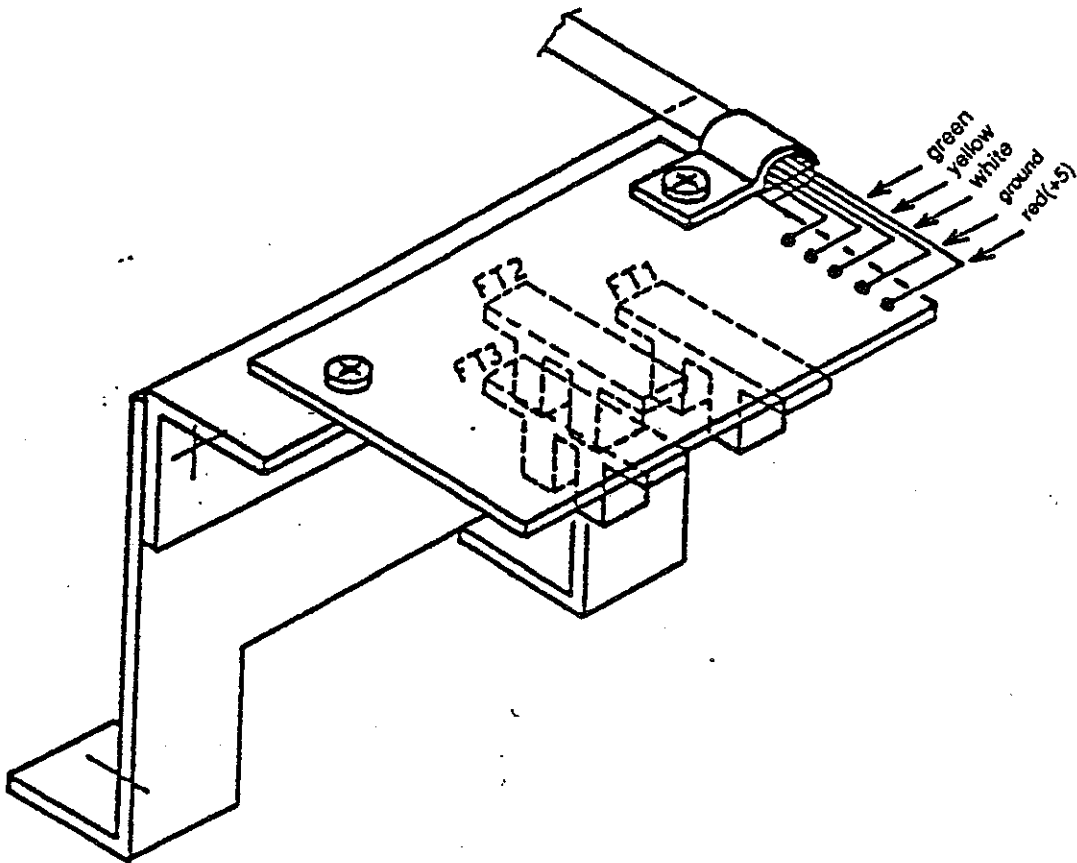
FIG. 3
CHECKING THE DISTANCE GAUGE



This gauge does not require any adjustment.

The only attention to be paid to, happens in case of replacement of the graduated strip. This strip must be positioned as follows: when the point is in coincidence with the adaptor laying plane, the line which indicates 12 must be at the limit of the white nylon bush. (reading point).

FIG. 4
CHECKING THE POSITION PICK UP

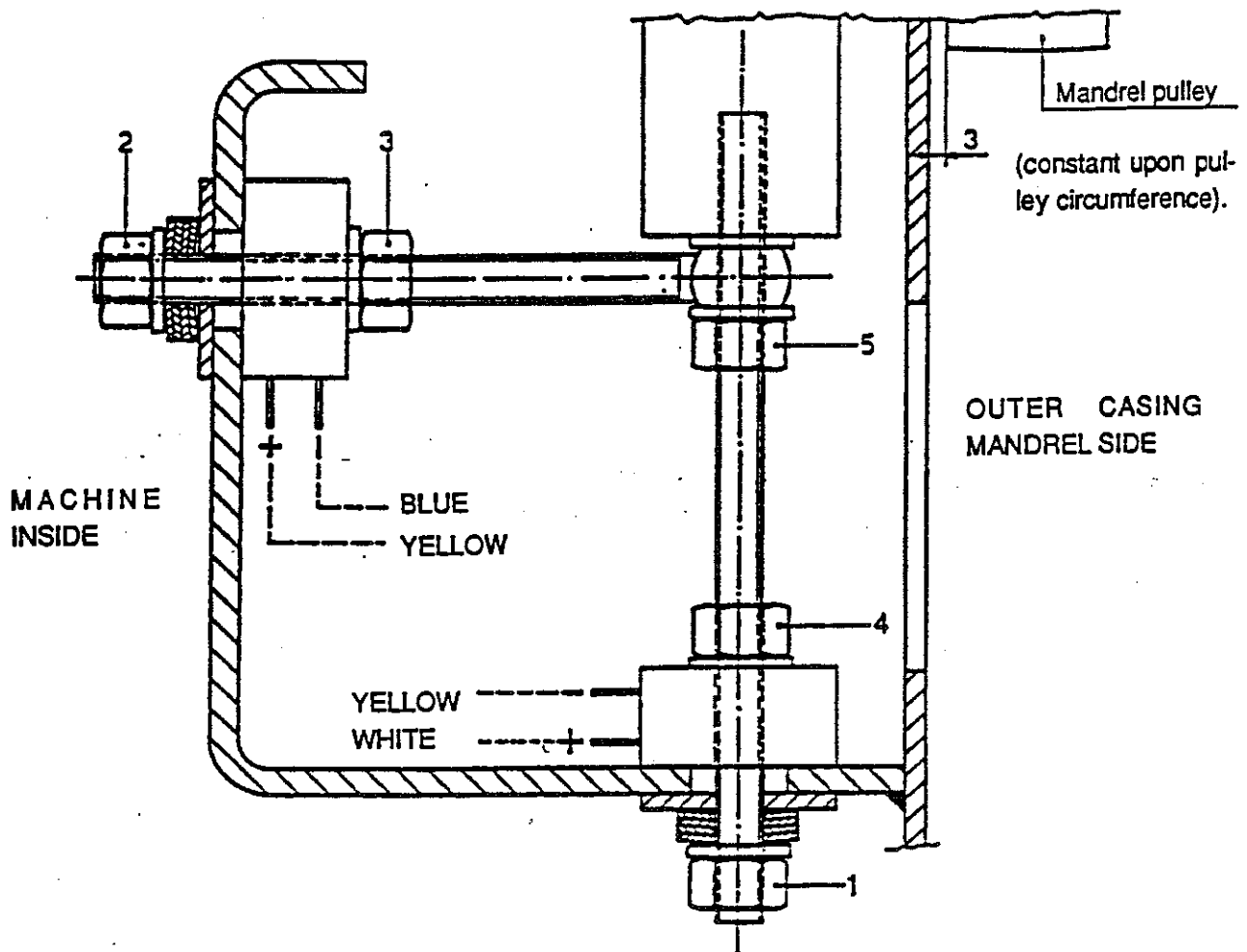


To check the efficiency of the position pick up, it is necessary to operate as follows :

1. Make it sure that the three opto-couplers do not have any friction against the phase disc or against the RESET tooth.
2. Using a tester, with setting for Vdc measuring, check the following voltages (powered machined but not turning machine).
 - +5 Vdc constant between ground and the red wire
 - +4,5 + 4,8 Vdc between ground and the yellow wire (RESET) when the RESET tooth is in the opto-coupler TC ST 2000. "0" Vdc when the RESET tooth is out of the opto-coupler.
 - + 4,5 + 4,8 Vdc between ground and the green light (CLOCK).
 - "0" Vdc to +4,5 + 4.8 voltage variations between ground and the white wire (U/D) by tuning the machine shaft very slowly.

IMPORTANT : In case the position pick up must be replaced, take off the board only by loosening the two fixing screws, but do not move the supporting bracket; this makes repositioning easier.

FIG. 5
FITTING THE PIEZO PICK-UP



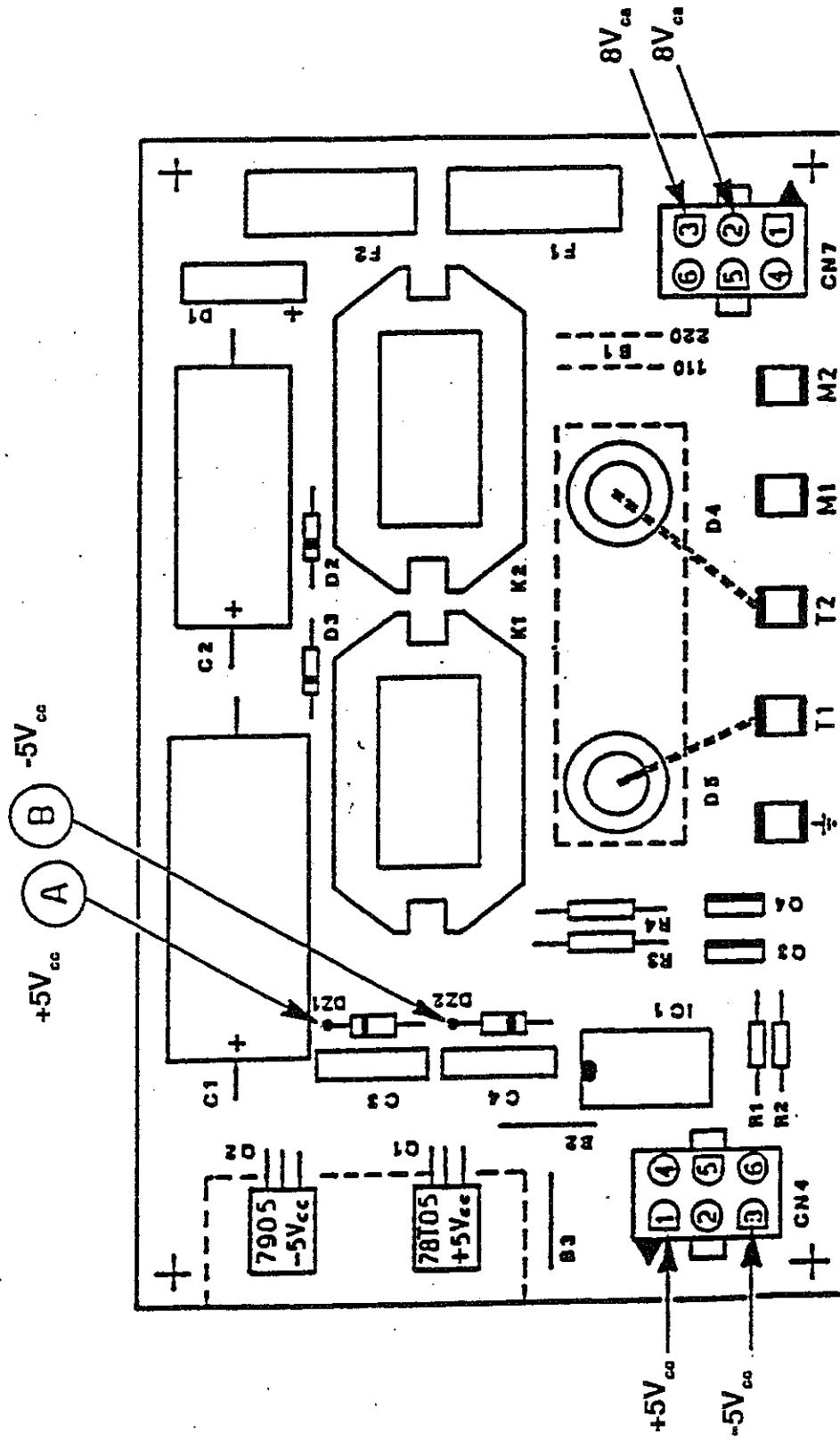
INSTRUCTIONS HOW TO FIT THE PIEZO PICK-UP

Sometimes compensation or angular positions problems may be caused by a fault in the piezo pick-ups. To replace them operate as follows :

1. Remove side cover and weight tray.
2. Take off nuts 1 and 2 with pertaining springs and washers.
3. Loosen nuts 3, 4 and 5 and detach the various parts.
4. Re-fit the new parts without fixing the nuts and following the correct fitting sequence.
NOTE : the piezo parts must be fitted paying attention to the position of the colour wires as shown in the drwg.
5. Fix nut by means of a wrench. Nuts 3 and 4 must be fixed by hand (eventually 1/2 turn by wrench). Keep mandrel shaft accurately in line.
6. Re-fit the springs and nuts 1 and 2, which must be fully locked to recover the springs elasticity and then loosened half a turn, thus giving the piezo parts the correct load.
7. Smear a plentiful layer of silicone on the piezo parts.
(NOTE : a correct efficiency of piezo crystals is assured by an insulation rate over (50 Mohm).
8. Re-fit side cover and weight tray.

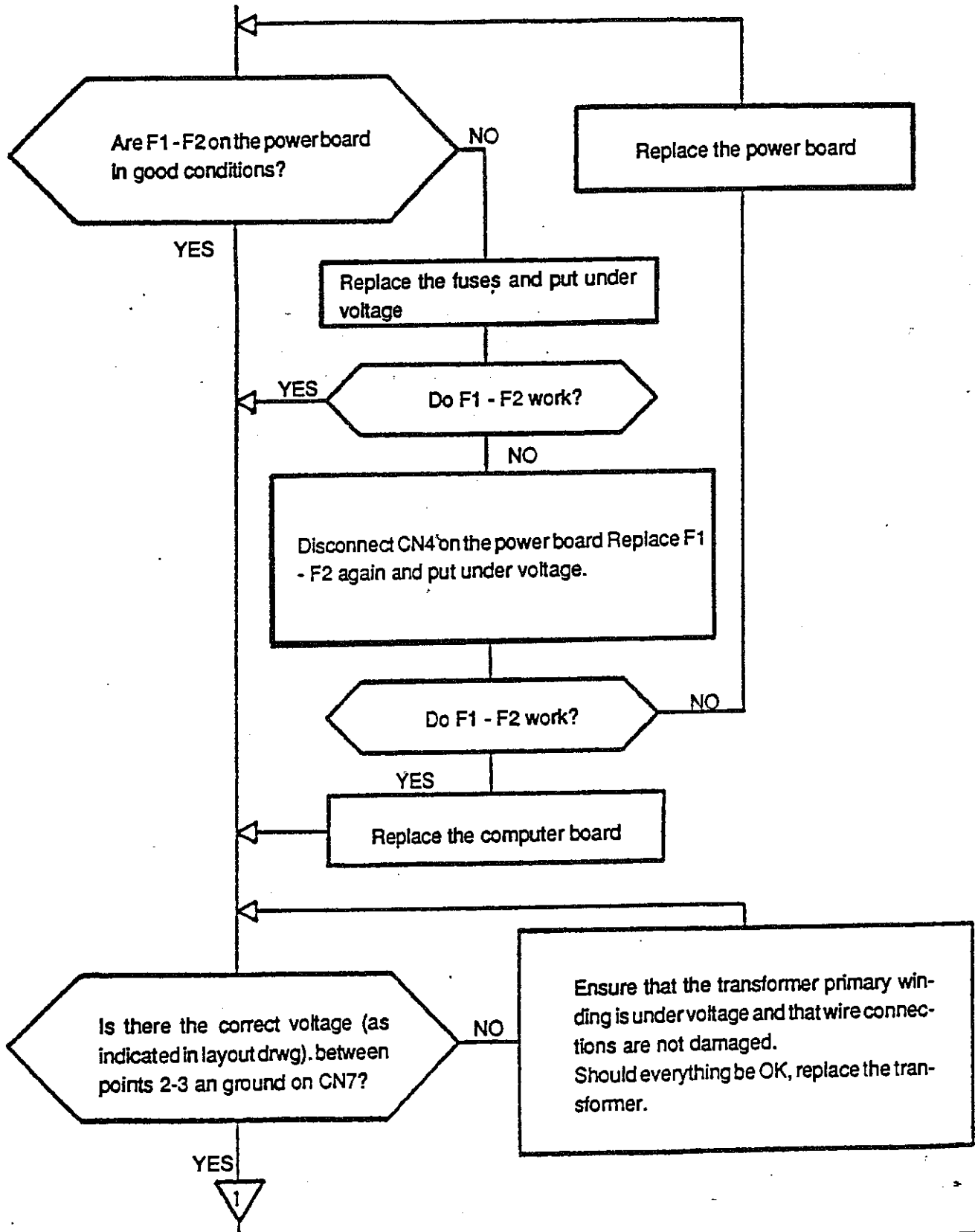
FIG. 6

POWER SUPPLY BOARD LAYOUT DRWG.



TROUBLE SHOOTING FLOW CHART

NOTE : Before making any checking detach the connection of braking resistance R5 on relay K2. Reconnect R5 only at the end of checking.



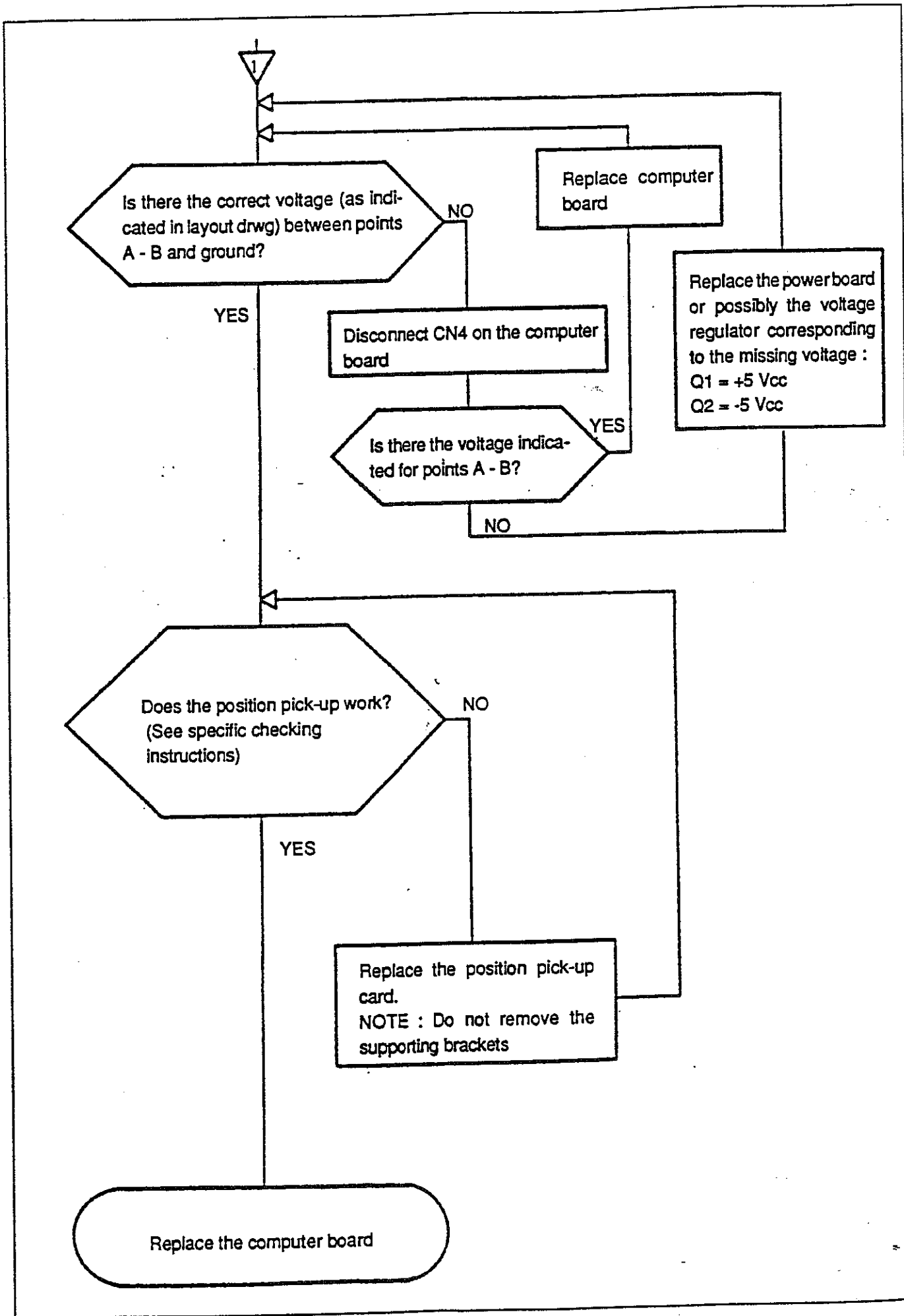


FIG. 7
POWER SUPPLY LAYOUT DRWG

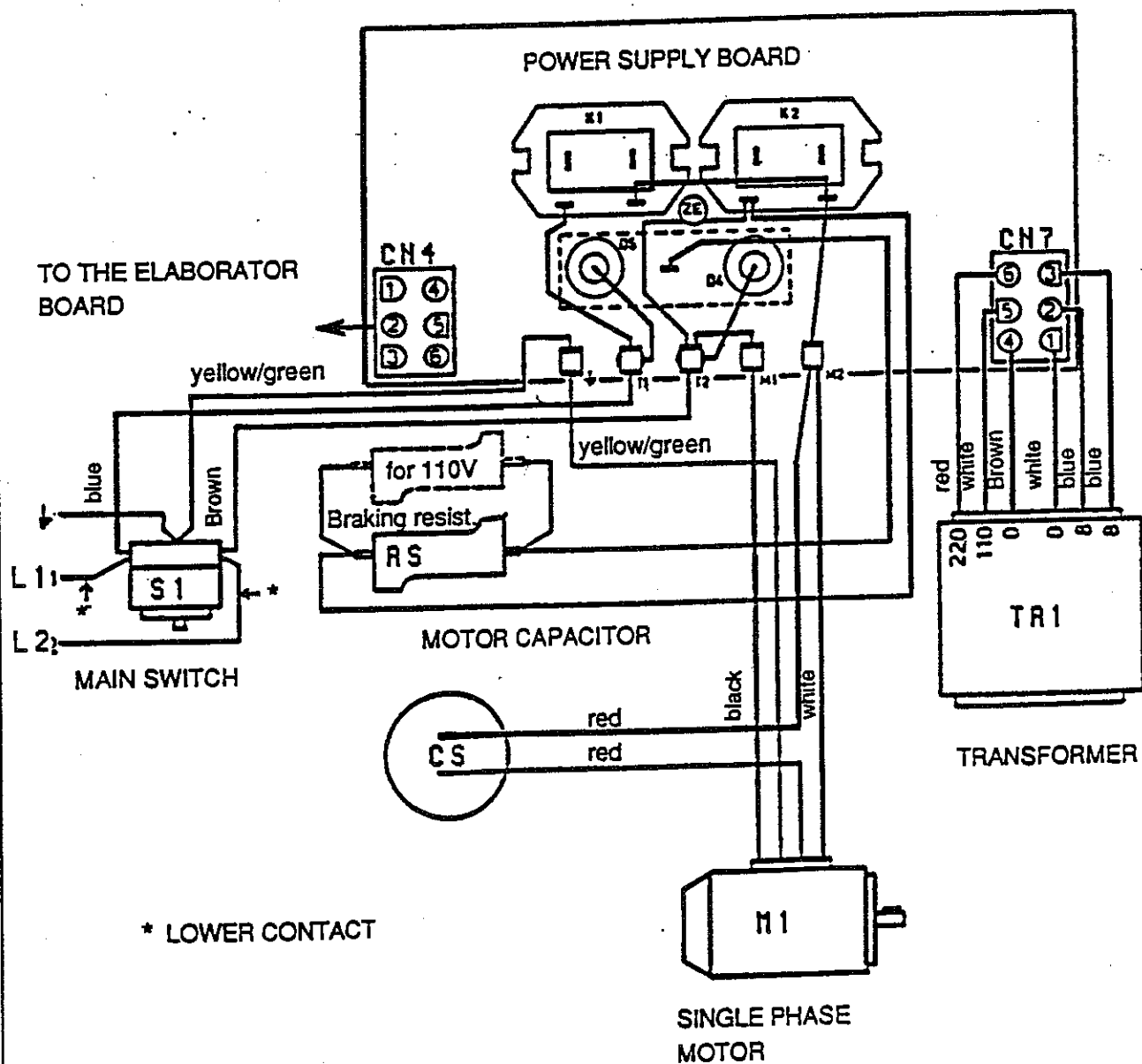
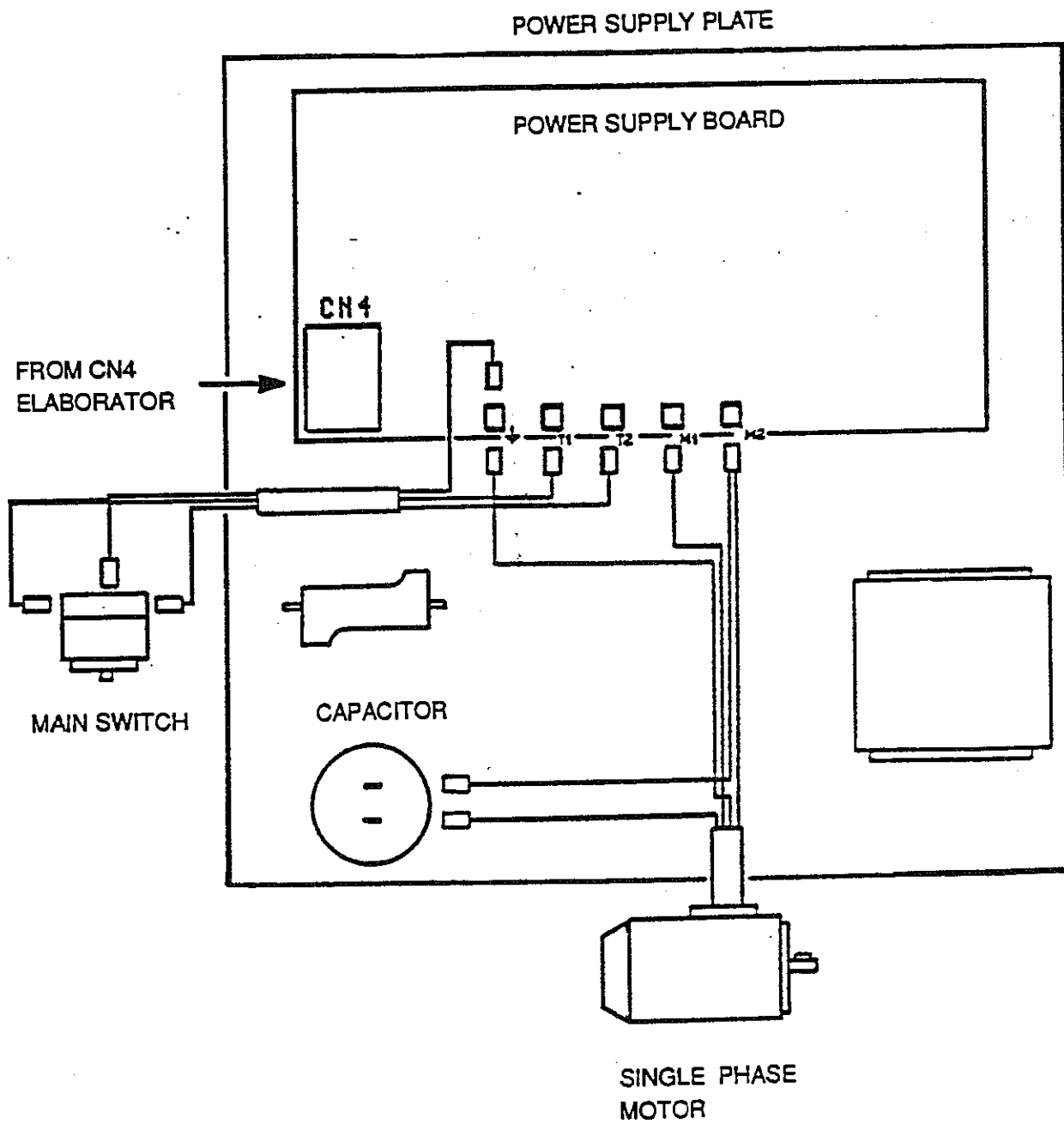


FIG. 8
REPLACING THE POWER SUPPLY PLATE

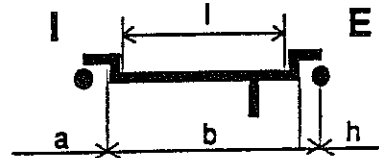


WHEEL MEASUREMENT AND SETTING THE BALANCING MACHINE

Obviously an exact and precise calibration is becoming more and more important, and the introduction of the buttons ALU means it is indispensable to know how to measure the rims and how to interpret the information which is shown on the balancing machine.

Therefore we hereby propose to explain how the dimensions set on the machine are automatically altered so as to obtain the distances of the correction planes. These are calculated as passing through the centre of gravity of the correction weights.

If we consider a typical rim :



Here the measurement l represents the width of the rim, as stated by the manufacturer. This will differ from the distances between the correction planes due to the thickness of the rim and the physical dimensions of the counter-weight. The weight's centre of gravity is found at distance h from the support on the rim's edge. The balancing machine will automatically correct the set data by adding $2xh = 6\text{mm}$ to the measurement. Measurement b , made by the gauge, usually is more precise even if very similar to distance l . These two measurements differ by only the width of the plate, usually about 2mm per part. This difference, small as it is, means we are able to obtain an accurate calibration, set either according to the internal width of the rim l or the external width b . We recommend an addition of a quarter of an inch to the values indicated by rim manufacturers.

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

N.B.

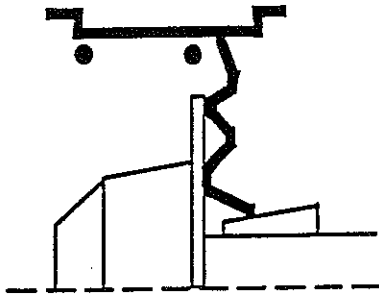
l = internal side
 E = external side

ALU 1



a = value a + $3/4$ "
 b = value b - 12"
 d = value d - 1"

ALU 2



$$a = \text{value } a + 3/4''$$

$$b = \text{adaptor plane distance } -1'' - a$$

$$dI = \text{value } d - 1''$$

$$dE = \text{value } d - 3''$$

ALU 3



$$a = \text{value } a + 3/4''$$

$$b = \text{value } b - 3/4''$$

$$dI = \text{value } d - 1''$$

$$dE = \text{value } d$$

ALU 4



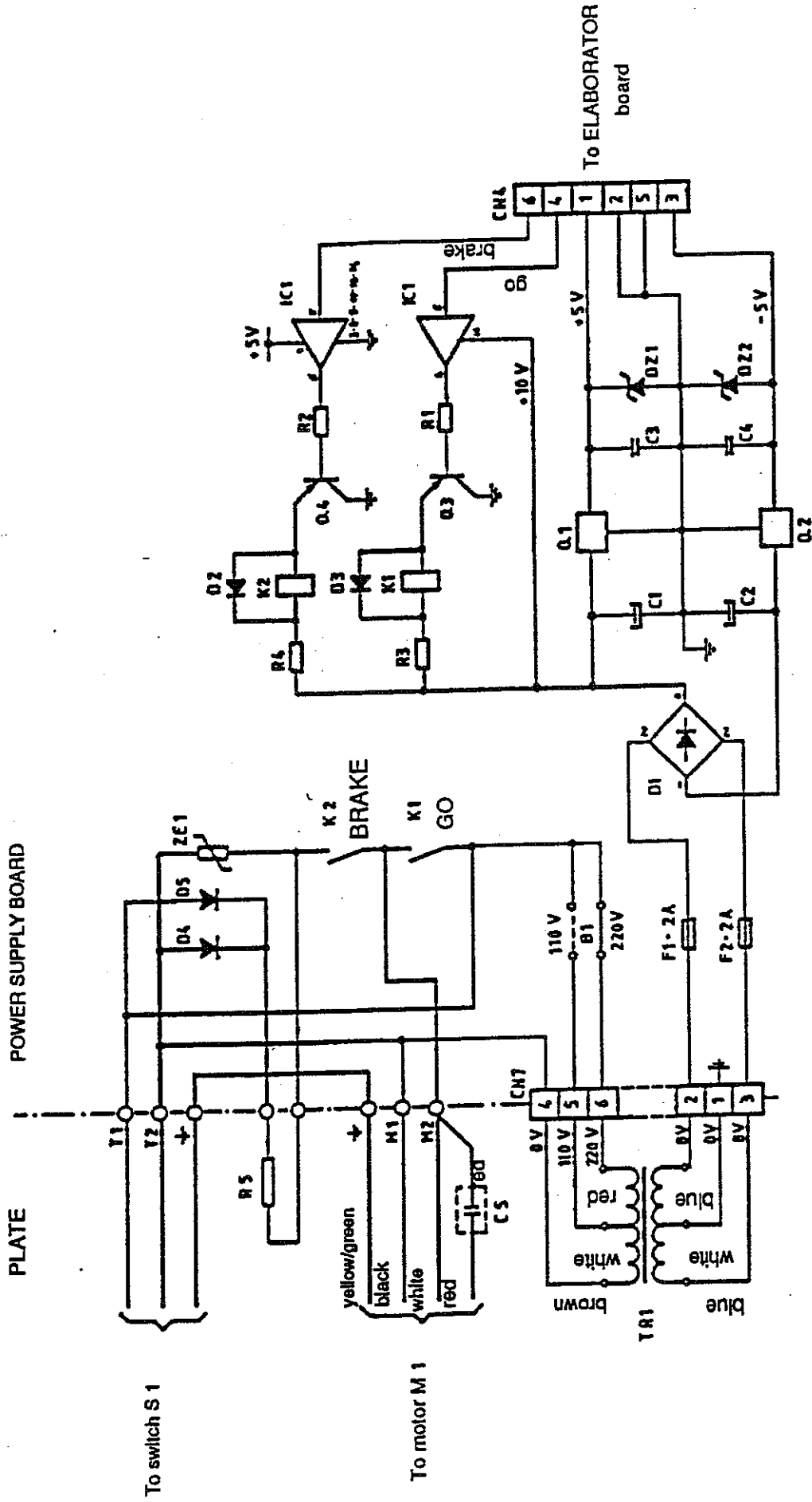
$$a = \text{value } a$$

$$b = \text{value } b - 3/4''$$

$$dI = \text{value } d$$

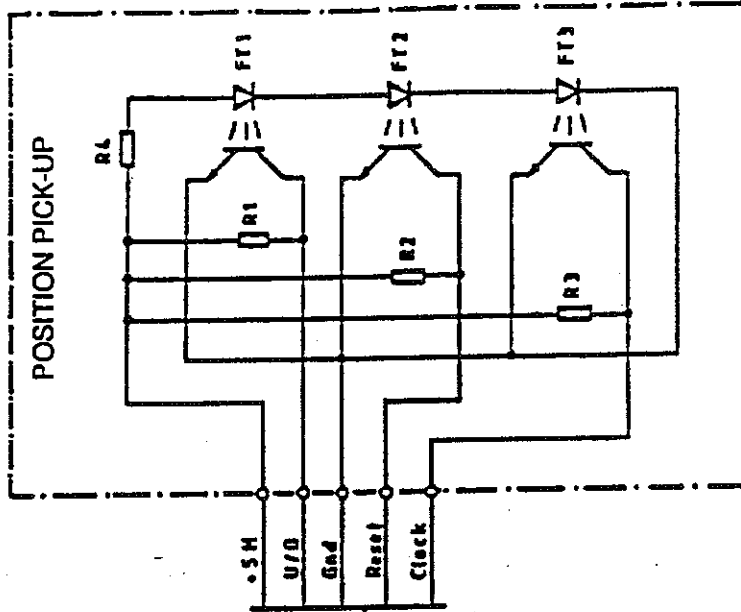
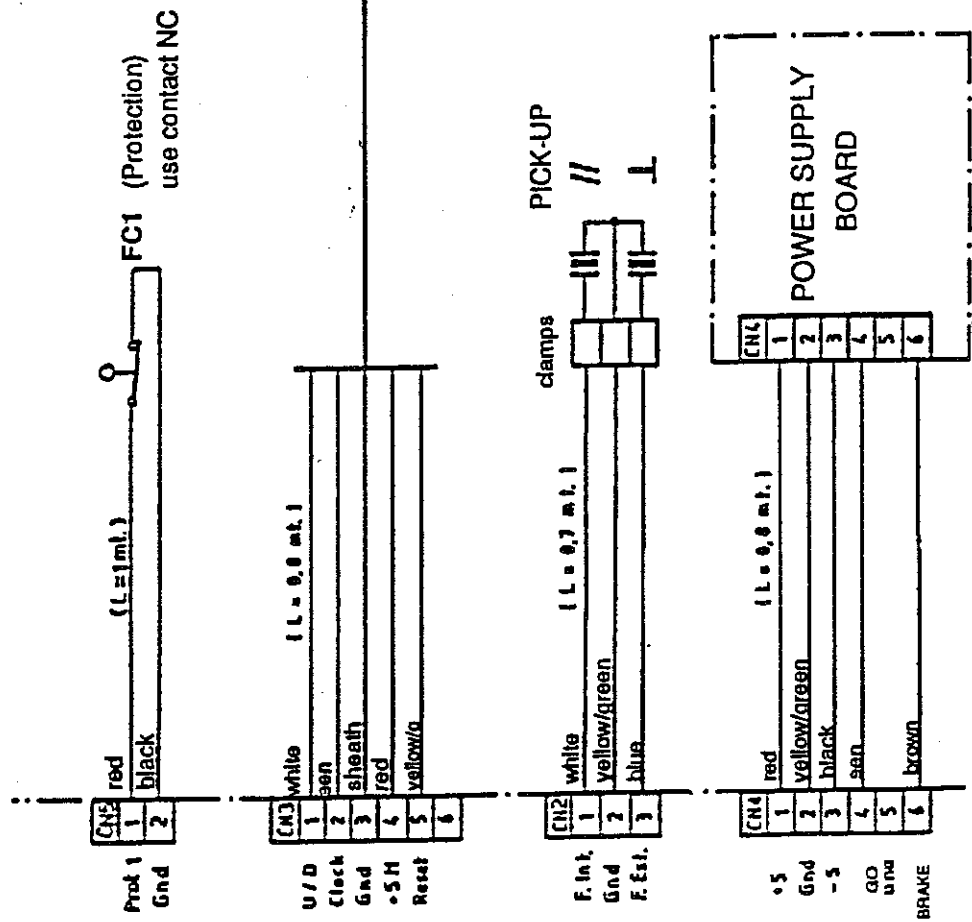
$$dE = \text{value } d - 1''$$

POWER WIRING DIAGRAM

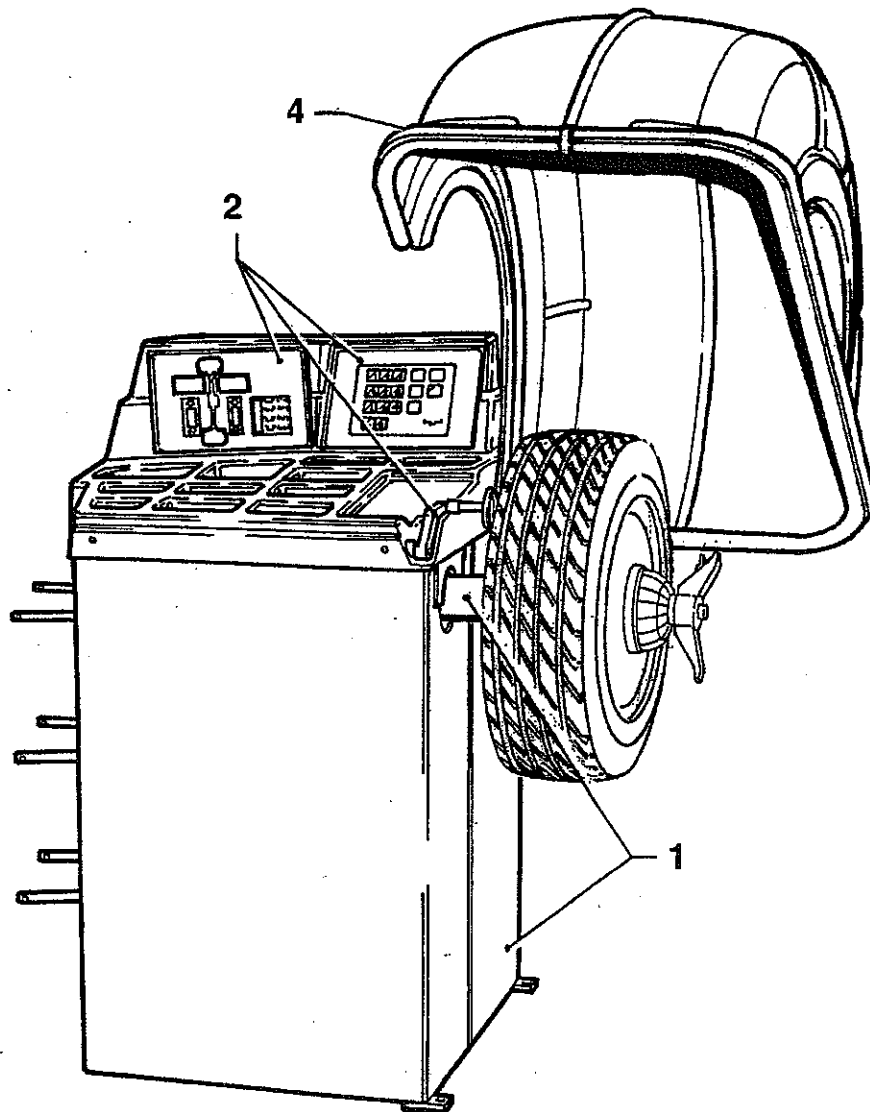


WIRING DIAGRAM

ELABORATOR BOARD



SILVER 443 (H)

**TAVOLE ESPLOSE****TAV. 1**

MANDRINO - MOTORE -
BASAMENTO -
DATORE DI FASE

TAV. 2

CALIBRO DISTANZA -
POTENZA - PANNELLO

TAV. 4

PROTEZIONE RUOTA

EXPLODED VIEW**DRWG. 1**

SHAFT ASSEMBLY - MOTOR -
CASING - POSITION PICKUP

DRWG. 2

RIM DISTANCE GAUGE -
POWER UNIT - PANEL

DRWG. 4

WHEEL GUARD

VUES ECLATEES**VUE 1**

BROCHE - MOTEUR -
EMBASE - DONNEUR DE
PHASE

VUE 2

CALIBRE DISTANCE -
PUISSANCE - PANNEAU

VUE 4

PROTECTION ROUE

DETAILZEICHNUNGEN**ZEICHN. 1**

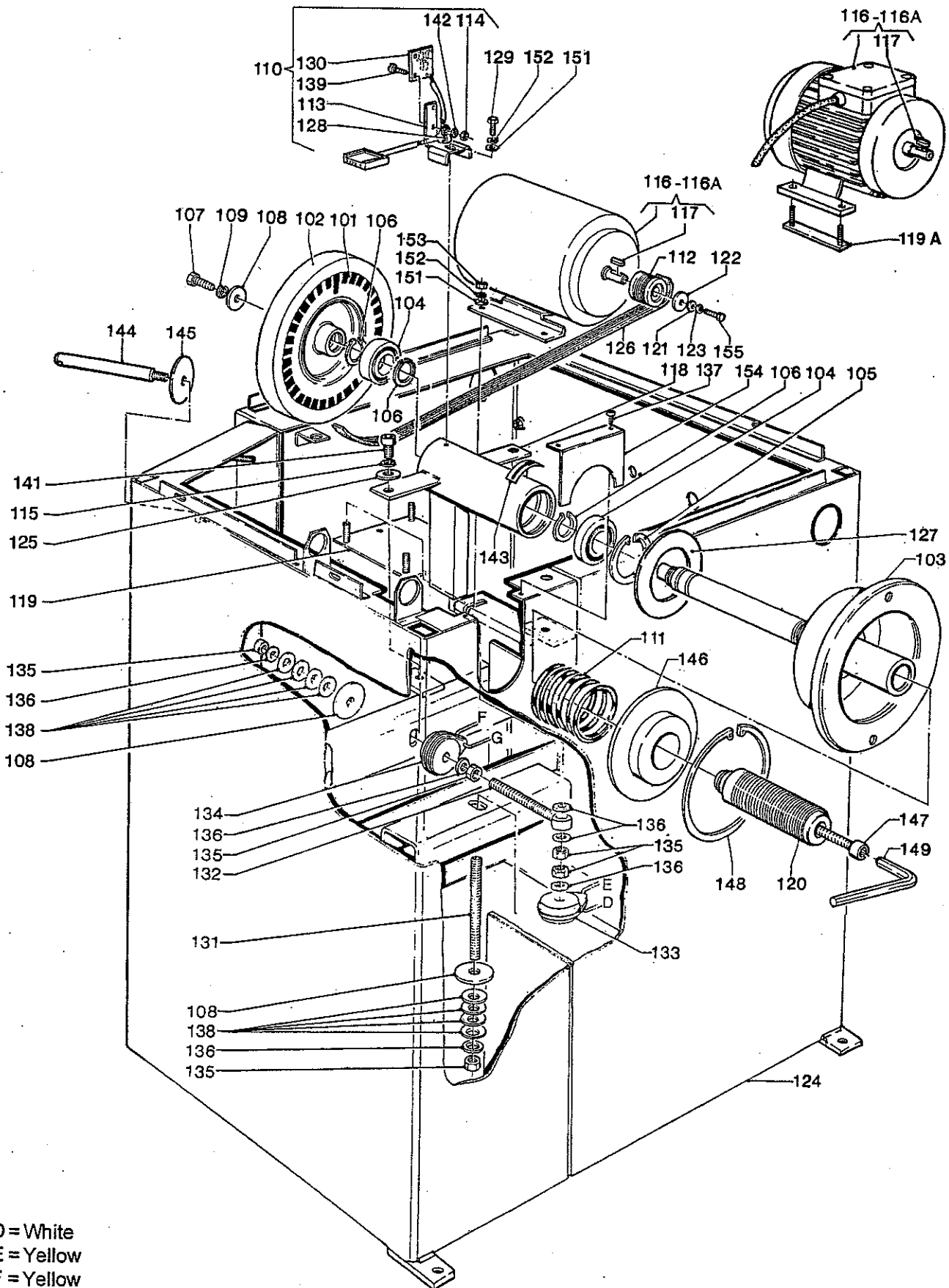
AUFNAHMEDORN - MOTOR -
UNTERBAU -
PHASEGEBER-

ZEICHN. 2

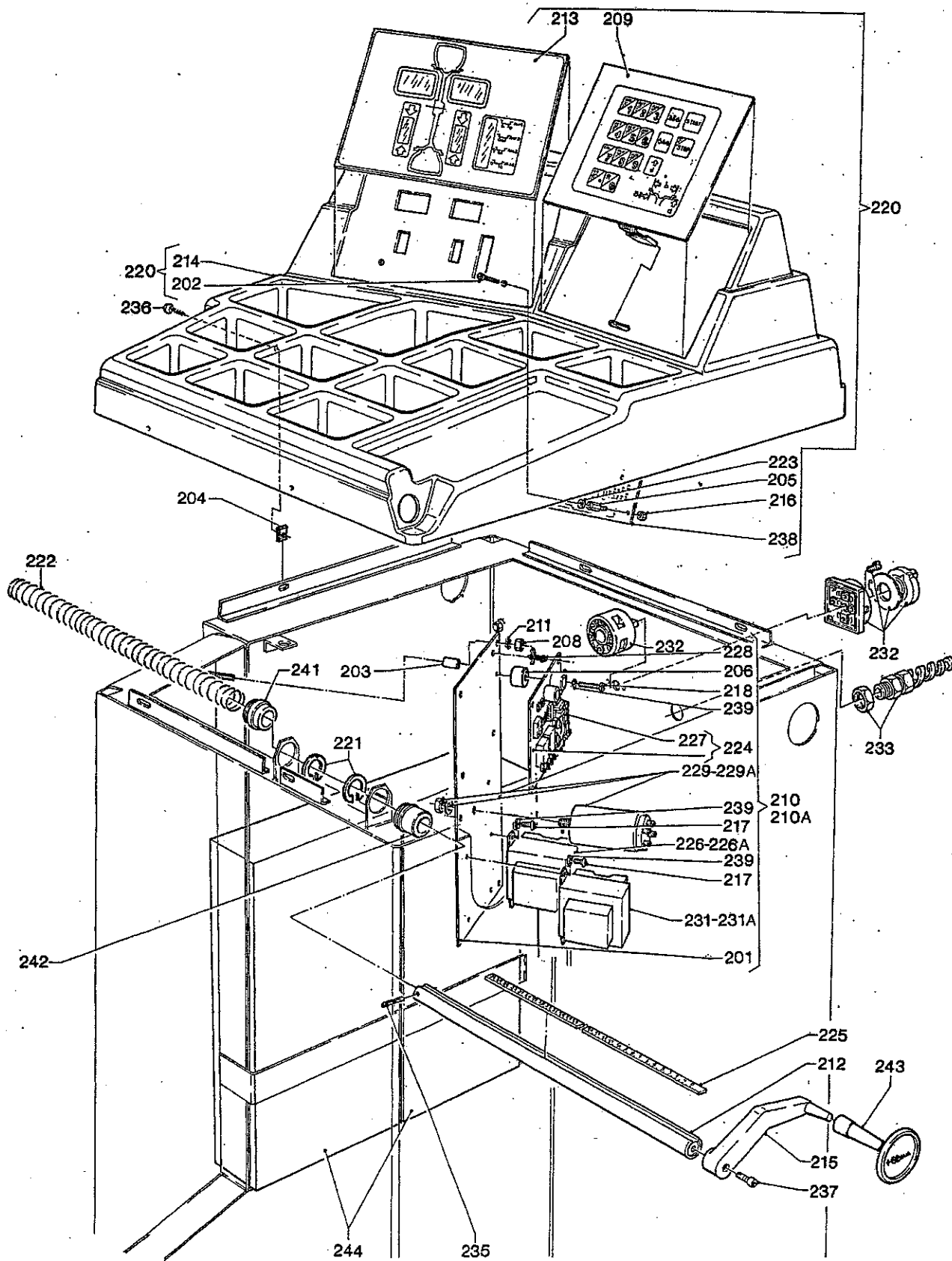
ABSTANDSERFASSUNG -
STROMEINHEIT -
STEUERTAFEL

ZEICHN. 4

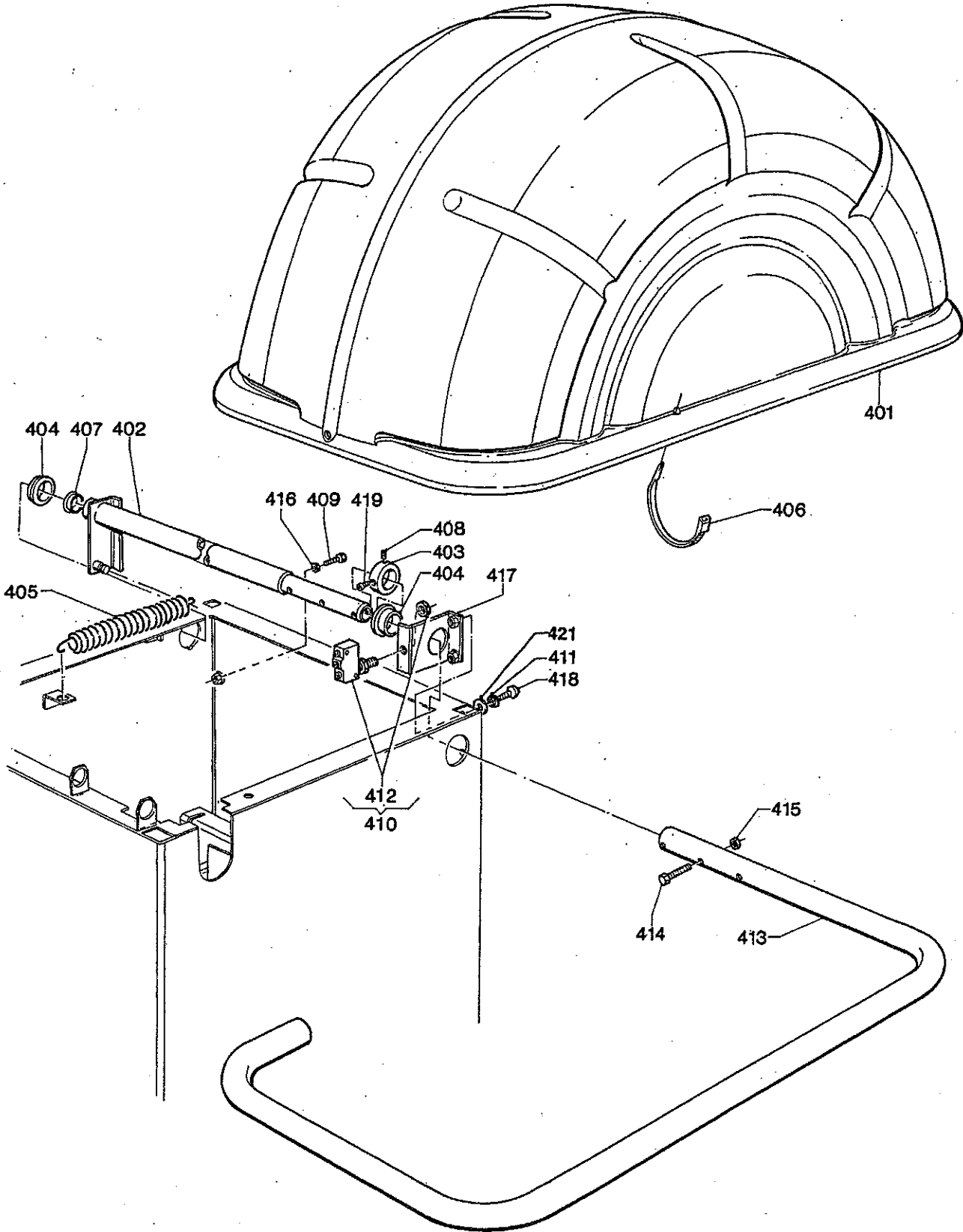
RADSCHUTZ



1 - (Series H) - *Particolari reperibili in commercio - *Parts on the market					
Item	CODE	Q.ty	DESCRIZIONE	DATA	DESCRIPTION
101	04FM38621	1	Disco di fase		Phase disc
102	42FM39093	1	Puleggia condotta	DV27554G	Driven pulley
103	42FM36931	1	Albero completo (+25)		Complete shaft (+25)
*104	020600503	2	Cuscinetto	6005 - 2Z	Bearing
*105	342000047	1	Anello SEEGER	47 I UNI 7437	SEEGER ring
*106	341000025	3	Anello SEEGER	25 E UNI 7435	SEEGER ring
*107	311220120	1	Vite	TE M10x25 UNI 5739	Screw
*108	326035011	3	Rosetta piana	Ø 11/30/2.5 UNI 6593	Flat washer
*109	325046010	1	Rosetta elastica	Ø 10 UNI 1751	Elastic washer
110	86SD40051	1	Datore di fase completo		Complete position pick up
111	181198630	1	Molla	19863P	Spring
112	071024009	1	Puleggia motrice		Driven pulley
113	42SD36228	1	Supporto datore di fase		Support for position pick up
*114	321232003	2	Dado esagonale	M3 UNI 5588	Hexagonal nut
*115	325046008	2	Rosetta elastica	Ø 8 UNI 1751	Elastic washer
116	501054293	1	Motore monofase ELCO	220-240V/50-60 Hz - 0.18Kw 30781P - B3 - 4p.	ELCO Single-phase motor
	501054213	1	Motore monofase BIMA	230V/50-60 Hz - 0.18Kw 4 poli - 63/B3	BIMA Single-phase motor
116A	502054193	1	Motore monofase ELCO	110-115V/50-60 Hz - 0.18Kw 30781P - B3 - 4p.	ELCO Single-phase motor
	502054114	1	Motore monofase BIMA	115V/50-60 Hz - 0.18Kw 4 Poli - 63/B3	BIMA Single-phase motor
117		1	Chiavetta motore	4x4x16	Motor key
118	42FM36929	1	Gruppo lamine completo (+25)		Complete leaf spring set (+25)
119	420330809	1	Piastra motore ELCO	DV30809P	ELCO motor plate
119A	42FG42391	2	Piastrina motore BIMA		BIMA motor plate
120	940103565	1	Terminale filettato	FM 26898P	Terminal
*121	325035004	1	Rosetta piana	Ø 4 UNI 6592	Flat washer
*122	325035007	1	Rosetta piana	Ø 6,6x18 UNI 6593	Flat washer
*123	325046004	1	Rosetta elastica	Ø 4 UNI 1751	Elastic washer
124	42BV42840	1	Basamento	42 FB 42840	Base plate
*125	326035009	2	Rosetta piana	Ø 9/24/2 UNI 6593	Flat washer
126	080077007	1	Cinghia rigida	Poly V - TB2 - 770 - 7 creste	Rigid belt
127	04FM40630	1	Parapolvere		Dust cover
128	420610639	1	Fermacavo in alluminio	10639P	Aluminium cable retainer
*129	311220072	1	Vite	TE M6x20 UNI 5739	Screw
130	67M38954F	1	Scheda datore di fase con cavo		Position pick-up board with cable
131	105110165	1	Barra filettata	M10x165	Threaded bar
132	105114744	1	Tirante ad occhio	M10x130	Eye rod
133	940701232	1	Gruppo piezo (cond. bianco/giallo)	STATICO	Piezo assembly (white/yellow leads)
134	940701233	1	Gruppo piezo (cond. giallo/blù)	DINAMICO	Piezo assembly (yellow/blue leads)
*135	321212010	5	Dado esagonale per piezo	M10 UNI 5588 R80	Hexagonal nut for piezo
*136	325035010	6	Rosetta piana	Ø 10 UNI 6592	Flat washer
*137	314931069	2	Vite autofilettante	Ø 4.2 x13 UNI 7687	Self-tapping screw
*138	345122515	8	Molla a tazza	A25 Ø 12.2/25/1.5	Belleville washer
*139	314231018	2	Vite	TC M3x10 UNI 6107	Screw
*141	312120093	2	Vite	TCEI M8x16 UNI 5931	Screw
*142	325035003	2	Rosetta piana	Ø 3 UNI 6592	Flat washer
143	040010101	2	Freccia adesiva senso rotazione		Adhesive arrow sens of rotation
144	105132900	6	Piolo porta flange	13290P	Adaptor pin
145	140212960	6	Piattello appoggio flange	FB 21296P	Adaptor plate
146	217019864	1	Coperchietto	19864P	Cover
*147	312120137	1	Vite	TCEI M0x160 UNI 5931	Screw
*148	344200118	1	Anello SEEGER	SB 118	SEEGER ring
*149	114008002	1	Chiave esagonale maschio	mm 8	Allen wrench
*151	325035006	5	Rosetta piana	Ø 6 UNI 6592	Flat washer
*152	325046006	5	Rosetta elastica	Ø 6 UNI 1751	Elastic washer
*153	321232006	4	Dado esagonale	M6 UNI 5588	Hexagonal nut
154	42FB33514	1	Coperchietto basamento		Metal frame cover
*155	311220036	1	Vite	TE M4x18 UNI 5739	Screw



TAV. 2 - (Series H) - *Particolari reperibili in commercio - *Parts on the market					
Item	CODE	Q.ty	DESCRIZIONE	DATA	DESCRIPTION
201	420627556	1	Piastra elettrica	27556G	Electric plate
*202	315231015	4	Vite	TS M3x6 UNI 6109	Screw
203	420419574	3	Distanziale piastra elettrica	19574P	Distance bar for electric plate
*204	329007041	6	Dado	RAPID NJ 704/1	Nut
*205	527034980	4	Distanziale	M3 h7 GA 3498	Distance bar
206	420627865	1	Blocchetto di raffreddamento	27865P	Cooling system
*208	321232006	3	Dado esagonale	M6 UNI 5588	Exagonal nut
209	05PR36491	1	Pannello	LEXAN	Panel
210	86SZ37414	1	Piastra potenza completa	230 V	Complete plate (Power supply)
210A	86SZ37404	1	Piastra potenza completa	115 V	Complete plate (Power supply)
*211	325047006	3	Rosetta zigrinata	Ø 6	Knurled washer
212	420527876	1	Asta calibro distanza	27876P	Rim distance gauge
213	05PR36492	1	Pannello display	LEXAN	Display panel
214	14FB35290	1	Testata portapesi	25552G	Head with weight-tray
215	217019286	1	Indice calibro distanza	19286P	Index for distance gauge
*216	321232003	4	Dado esagonale	M3 UNI 5588	Exagonal nut
*217	317232034	4	Vite	T ½T croce M4x10	Screw
*218	314231040	1	Vite	TC M4x30 UNI 6107	Screw
220	86PR37559	1	Pannello completo		Complete panel
*221	344100300	2	Anello elastico	SS30	Elastic ring
222	181206560	1	Molla calibro distanza	20656P	Rim distance gauge
*223	325035003	4	Rosetta piana	Ø 3 UNI 6592	Flat washer
224	67M36951A	1	Scheda potenza		Power board
225	040142902	1	Fascia graduata	Mod. 1429	Graduated strip
226	611000312	1	Trasformatore frenatura	30VA 230 - 0/50	Braking transformer
226A	611000310	1	Trasformatore frenatura	30VA 115 - 0/25	Braking transformer
*227	681002000	2	Fusibili	DM5x20 - 2A	Fuse
*228	527006175	4	Distanziale in nylon per scheda	37 - 1693 - 1100	Nylon spacer for cards
229	568001058	1	Condensatore	10MF 450V Faston vite/screw M8 (230V)	Capacitor
229A	568002557	1	Condensatore	25MF 450V FASTON vite/screw M8 (115V)	Capacitor
231	611000306	1	Trasformatore alimentazione	30 VA 230 - 9/9	Suppling transformer
231A	611000301	1	Trasformatore alimentazione	30 VA 115V 9/9	Suppling transformer
232	511231002	1	Interruttore	KL 1002 + Q555	Switch
*233	526003246	1	Pressacavo flessibile	3246 "HEYCO"	Cable circlip
*235	335310040	1	Spina elastica	Ø 4x30 UNI 6873	Elastic connector
*236	314931069	6	Vite autofilettante	TCB Ø 4.2x13 UNI 7687	Self-threading screw
*237	312120071	1	Vite	TCEI M6x16 UNI 5931	Screw
238	86SC37558	1	Scheda elaboratore		Computer board
*239	325035004	5	Rosetta piana	Ø 4 UNI 6592	Flat washer
241	217019283	1	Boccola corta	19283P	Short bush
242	217019284	1	Boccola lunga	19284P	Long bush
243	217030700	1	Prolunga calibro + 60	FC 30700P	Distance gauge + 60
*244	301100007	2	Massello in cemento	11 Kg	Cementing block



4 - MG4

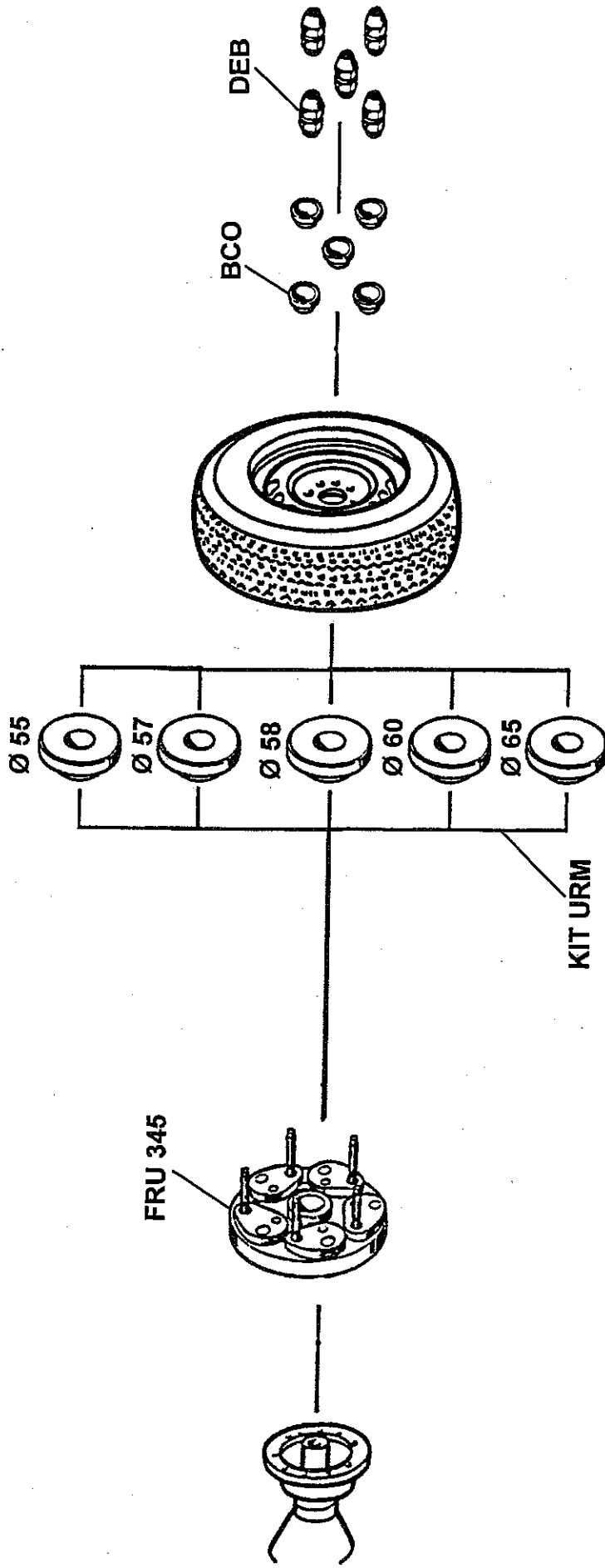
- *Particolari reperibili in commercio - *Parts on the market

Item	CODE	Q.ty	DESCRIZIONE	DATA	DESCRIPTION
401	14FW32049	1	Protezione monopezzo		One-piece wheel guard
402	42FW34988	1	Tubo protezione		Tube for guard
403	42FW32989	1	Anello di fermo telaio		Frame lock ring
404	217019275	2	Boccola per telaio tubolare	19275P	Tube frame brush
405	182099630	1	Molla per protezione 401	9963	Spring for protection 401
	182310350	1	Molla per "SILVER"		Spring for "SILVER"
*406	523031916	3	Fascetta nera fissaggio protezione	31916	Black fixing guard strip
*407	213011873	1	Tappo	Ø 30 - DP 1187	Plug
*408	319216068	1	Vite (estremità piana)	STEI M6x10 UNI 5923	Screw (flat end)
*409	311220099	1	Vite	TE M8x45 UNI 5739	Screw
410	940592882	1	Cavo con microinterruttore		Cable with microswitch
*411	325046008	2	Rosetta elastica	Ø 8 UNI 1751	Elastic washer
412	517141308	1	Microinterruttore di sicurezza	PIZZATO MS20	Safety microswitch
413	42FW32988	1	Telaio tubolare		Tube frame
*414	311120124	3	Vite	TE M10x45 UNI 5737	Screw
*415	321212010	3	Dado esagonale	M10 UNI 5588 R80	Hexagonal nut
*416	321232008	1	Dado esagonale	M8 UNI 5588	Hexagonal nut
417	42FW33191	1	Supporto per protezione		Guard support
*418	317224093	2	Vite	TBEI M8x16	Screw
*419	317224068	1	Vite	TBEI M6x10	Screw
*421	325035008	2	Rosetta piana	Ø 8 UNI 6592	Flat washer

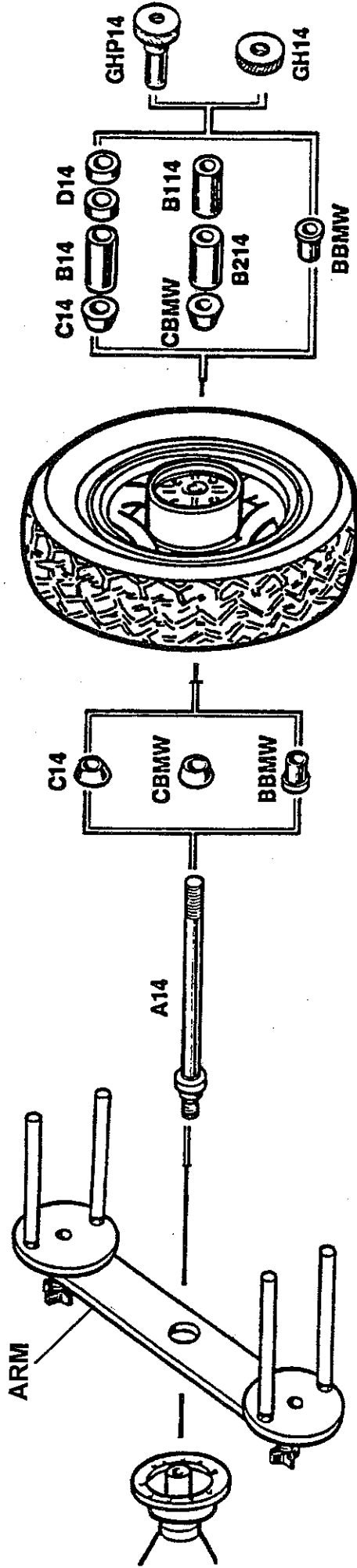


**SCHEMI DI MONTAGGIO
ACCESSORI PER EQUILIBRATRICI**

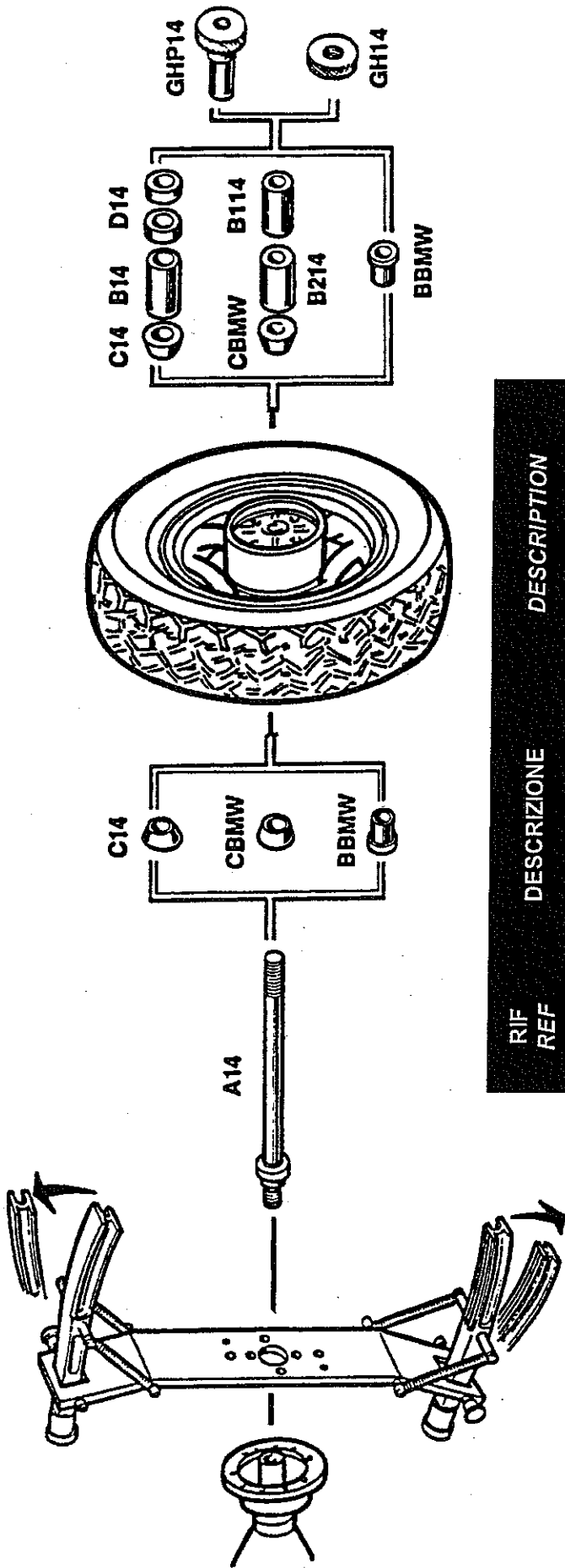
**WHEEL-BALANCERS ACCESSORIES
MOUNTING DIAGRAMS**



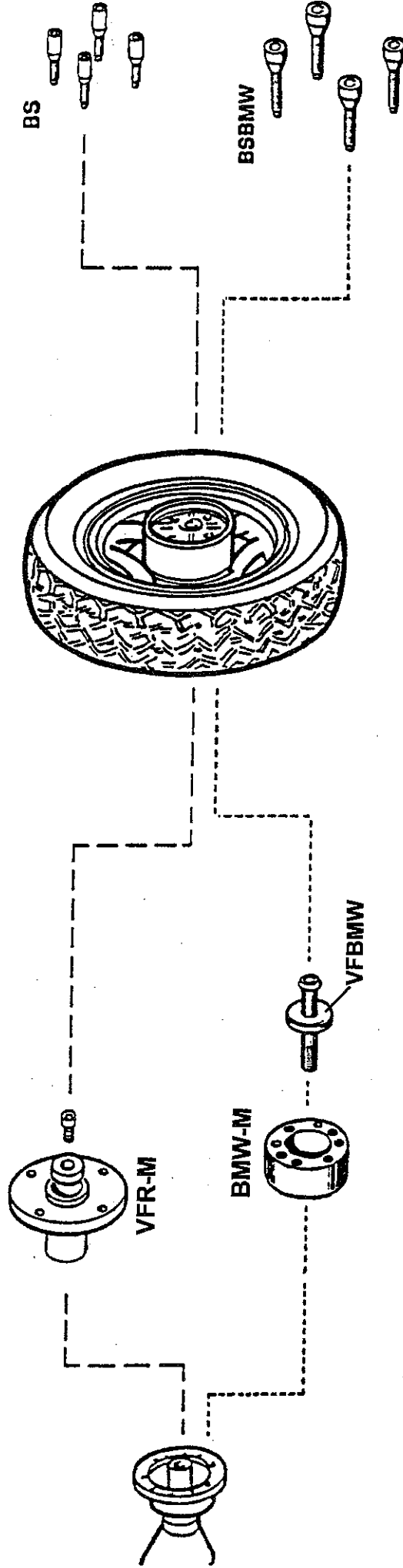
RIF REF	DESCRIZIONE	DESCRIPTION
FRU345	Flangia universale	Universal flange
KIT URM	Kit centraggio ruote	Kit for wheels centering
BCO	Boccola conica	Conical bushing
DEB	Dado bifrontale (conico-sferico)	(conical-spheric) nut for wheel fixing



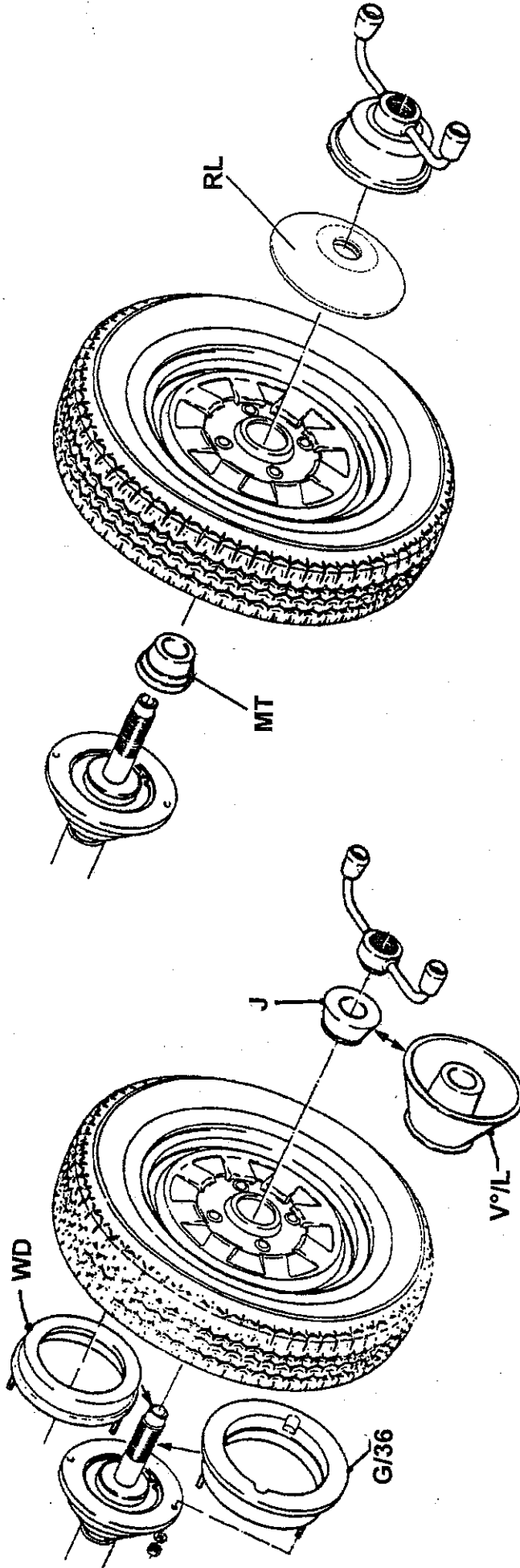
RIF REF	DESCRIZIONE	DESCRIPTION
A14	Albero porta ruota Ø 14	Wheel holding shaft Ø 14
C14	Cono centraggio Ø 14	Centering cone Ø 14
B14	Boccola mm 17x14	Bushing mm 17x14
D14	Distanziale esterno Ø 14	Spacer Ø 14
GH14	Ghiera per albero Ø 14	Collet for shaft Ø 14
GHP14	Ghiera con prolunga Ø	Collet with extension Ø 14
BMW	Boccola ruote BMW	Bushing BMW wheels
B114	Boccola mm 20x14	Bushing mm 20x14
B214	Boccola mm 25x14	Bushing mm 25x14
CBMW	Cono per ruote BMW	Cone for BMW wheels



RIF REF	DESCRIZIONE	DESCRIPTION
A14	Albero porta ruota Ø 14	Wheel holding shaft Ø 14
C14	Cono centraggio Ø 14	Centering cone Ø 14
B14	Boccola mm 17x14	Bushing mm 17x14
D14	Distanziale esterno Ø 14	Spacer Ø 14
GH14	Ghiera per albero Ø 14	Collet for shaft Ø 14
GHP14	Ghiera con prolunga Ø	Collet with extension Ø 14
BBMW	Boccola ruote BMW	Bushing BMW wheels
B114	Boccola mm 20x14	Bushing mm 20x14
B214	Boccola mm 25x14	Bushing mm 25x14
CBMW	Cono per ruote BMW	Cone for BMW wheels



RIF REF	DESCRIZIONE	DESCRIPTION
VFR-M	Flangia autocentrante ruote moto HONDA VFR	Self-centering flange for HONDA VFR motorcycle wheels
BMW-M	Flangia autocentrante ruote moto BMW	Self-centering flange for BMW motorcycle wheels
VFBMW	Vite fissaggio flangia HONDA VFR	Fixing screw for HONDA VFR flange
BS	Bullone speciale	Special Bolt
BSBMW	Bullone speciale BMW	BMW special bolt



RIF REF	DESCRIZIONE	DESCRIPTION
WD	Distanziale per ruote molto larghe	Spacer for very large wheels
G/36	Disco G/36 con grani e dadi per fori Ø 97 - 170 mm.	Disk with security dowels and nuts for holes Ø 97 - 170mm.
V°/L	Cono supplementare per fori Ø 97 - 170 mm.	Cone for wheels with hole Ø 97 - 170 mm.
J	Cono per ruote con foro Ø 102 - 118 mm.	Cone for wheels with hole Ø 102 - 118 mm.
MT	Cono speciale per ruote di auto tedesche Ø 56,5 - 57-66,5-72,5	Special cone for German car-wheels Ø 56,5 - 57-66,5-72,5
RL	Manicotto per ruote in lega	Hollow sleeve for alloy rims