Spin Trainer

SERVICE & MAINTENANCE MANUAL

REV. 2.0

TECHNOGYM®
The Wellness Company

The information contained in this manual is intended for QUALIFIED TECHNICIANS who have completed a specific TECHNOGYM training course and are authorized to perform machine start-up and adjustment procedures as well as extraordinary maintenance or repairs which require a thorough knowledge of the machine, its operation, its safety devices and working procedures.

CAREFULLY READ THE INFORMATION CONTAINED IN THIS MANUAL BEFORE PERFORMING ANY MAINTENANCE PROCEDURES ON THE MACHINE

DANGEROUS VOLTAGES PRESENT EVEN WHEN THE MACHINE IS TURNED OFF

NOTE
The information contained in this document is subject to change without notice.

Technogym does not guarantee this documentation in any way. Technogym shall not be held responsible for any errors contained in this manual and declines all liability for accidents or damages resulting from the supply, characteristics and use of this manual.

Contents

1. GENERAL NOTICES

1.1. INTRODUCTION

This document is reserved for Technogym Service technicians, and is intended to provide authorized personnel with the necessary information to correctly carry out repairs and maintenance. A thorough knowledge of the technical information contained in this manual is essential for completing the professional training of the operator.

In order to facilitate consultation, the paragraphs are accompanied by schematic illustrations highlighting the topic covered.

This manual contains notices and symbols which have a specific meaning:

 **WARNING: non observance may result in accident or injury.**

 **ATTENTION: non observance may cause damage to the machine.**

 **Information about the operation in progress.**

 **OBSERVE: observation about the operation in progress.**

1.2. RECOMMENDATIONS

Technogym recommends the following steps for planning repair procedures:

- Carefully evaluate the customer's description of the machine malfunction and ask all the necessary questions to clarify the symptoms of the problem.

- Clearly diagnose the causes of the problem. This manual provides the fundamental theoretical basis, which must then be integrated by personal experience and attendance at the training courses periodically offered by Technogym.

- Rationally plan the repair procedure so as to minimize the downtime necessary for procuring spare parts, preparing tools, etc.

- Access the component to be repaired, avoiding any unnecessary operations. In this regard it will be useful to refer to the disassembly sequence described in this manual.

1.3. GENERAL RULES FOR REPAIR PROCEDURES

1. Always mark any parts or positions which may be confused with each other at the time of reassembly.

2. Use original Technogym spare parts and lubricants of the recommended brands.

3. Use special tools where specified.

4. Consult the technical circulars, which may contain more up-to-date information on adjustments and maintenance than those contained in this manual.

5. Before starting the repair procedure, make sure that the recommended tools are available and in good condition.

6. For the procedures described in this manual, use only the specified tools.

WARNING: The tool sizes quoted in this manual are expressed in mm.

2. TECHNICAL SPECIFICATIONS

2.1. MECHANICAL CHARACTERISTICS

Width	47.5 cm
Length	165 cm
Height	121 cm
Weight	60 Kg

2.2. ELECTRICAL CHARACTERISTICS

Mains voltage	115 - 230 VAC
Frequency	50 - 60 Hz
Consumption	~ 60 Watt - 0.3 A
Fuses	5x20 3.15 A fast-blow

The mains voltage is set by means of a special jumper on the power supply circuit board. An incorrect voltage setting can cause irreversible damage to the power supply unit.

Before changing the mains voltage setting, the machine must be turned off and the mains lead unplugged from the wall outlet.

2.3. AMBIENT SPECIFICATIONS

Temperature	Operating	5° to 35° C
	Storage	-20 to 55° C
Humidity	Operating	30% to 80% non-condensing
	Storage	5% to 85% non-condensing

2.4. TECHNICAL RECOMMENDATIONS

Recommended tires		
Bicycle model	**Tire make**	**Tire model**
Street	Michelin	Hi Lite Competition 23-622
	Michelin	Select 25-622
	Michelin	Bib Sport 25 25-622
Mountain bike	any	-

Do not use tubular or tubeless tires.

The recommended tire pressure is 8 Atm for street bikes and 6 Atm for mountain bikes, in order to avoid puncturing or deforming the tire.

It is recommended to disassemble the rear brake shoes.

2.5. CONFORMITY TO REGULATIONS

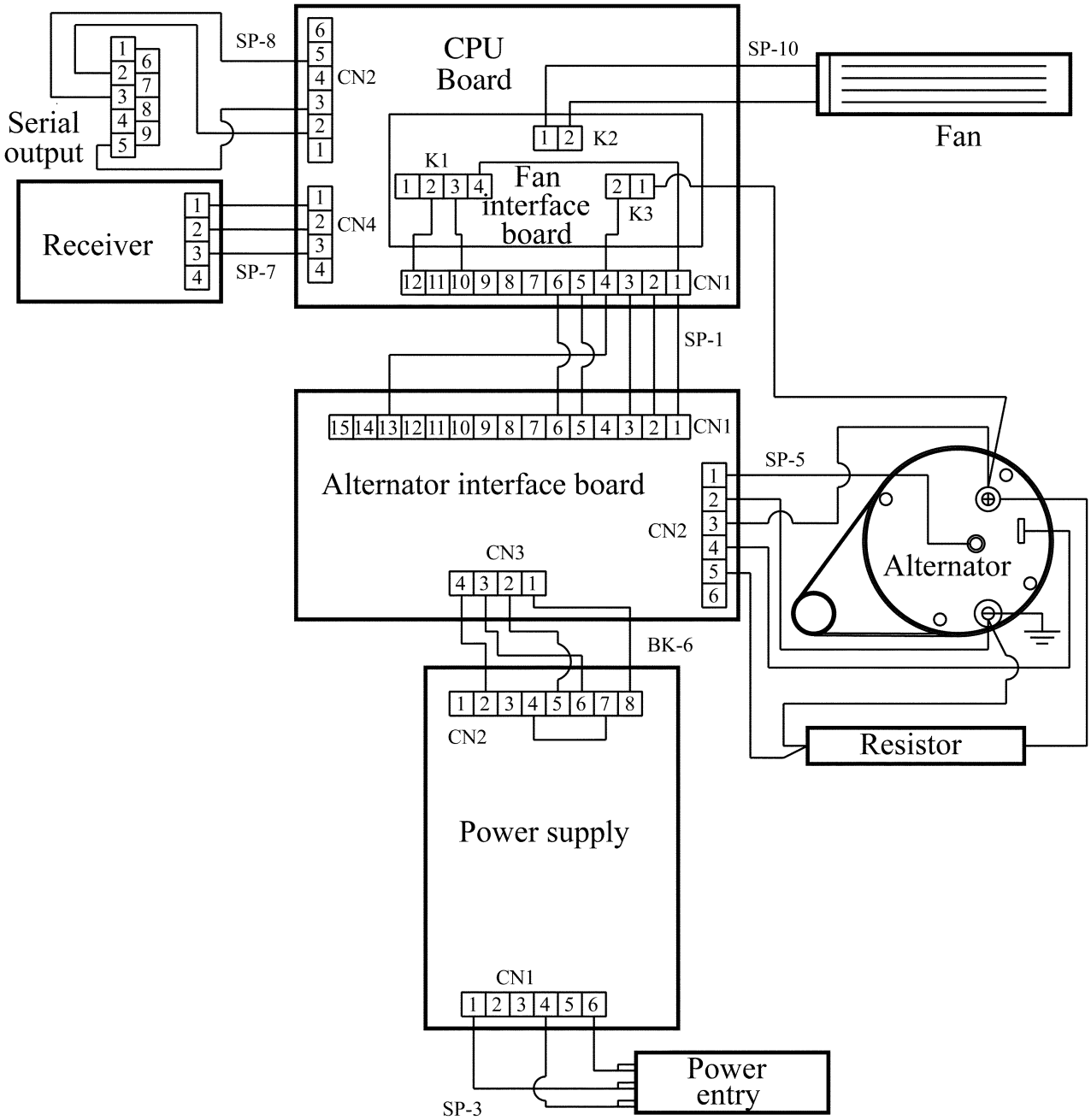
The machine conforms to the following directives:

- EMC Directive 89/336/EEC.
- LVD Directive 73/23/EEC and 93/68/EEC.

And is therefore certified with the EC Mark.

The US version of the machine conforms to the UL 2601 standard.

2.6. WIRING DIAGRAM



2.6.1. CONNECTORS

- CPU board

name	type of connector	connection
CN1	AMP MATE-N-LOCK 12-pin F.	to alternator interface board
CN2	AMP MODU II 6-pin M.	to serial connector
CN4	AMP MODU II 4-pin M.	to cardio receiver

- Fan control board

name	type of connector	connection
K1	AMP MODU II 4-pin M.	to CPU board (logic)
K2	AMP MODU II 2-pin M.	to fan
K3	AMP MODU II 2-pin M.	to CPU board and alternator (power)

- Power supply

name	type of connector	connection
CN1	PANDUIT 6-pin	to mains power supply
CN2	PANDUIT 8-pin	to alternator interface board

- Alternator interface board

name	type of connector	connection
CN1	AMP MATE-N-LOCK 15-pin F	to CPU board
CN2	AMP MATE-N-LOCK 6-pin F	to alternator
CN3	AMP MODU I 4-pin M.	to power supply

2.6.2. WIRING

Cable SP-1 consists of 3 sections terminating in a connector that plugs into CN1 on the CPU board. In the interests of simplicity, these 3 sections are described separately below:

SP-1: Internal connecting cable – machine control CPU – Alternator interface board			
CPU/CN1	**Signal**	**Color**	**Alter. board/ CN1**
1	+12 V	Red	1
2	+ 5 V	Orange	2
3	ground	Black	3
4	-12 V	Blue	13
5	Alternator RPM X 6	Violet	5
6	Alternator control frequency	Brown	6

On some machines, the signal designated +12 V in the above table is actually 10.5 V.

SP-1: Internal connecting cable – fan power supply Fan control board – CPU – Alternator				
Fan control board / K3	**Signal**	**Color**	**CPU/CN1**	**Alternator**
1	+12 V	Red	-	Resistor +
2	-12 V	Blue	4	-

SP-1: Internal connecting cable – fan control Fan control board – CPU			
Fan control board / K1	**Signal**	**Color**	**CPU/CN1**
2	ground	Black	12
3	Fan enable	Brown	10
4	+12 V	Red	1

SP-8: Serial connector cable CPU – Serial connector			
CPU/CN2	**Signal**	**Color**	**Serial connector**
2	Tx	Red	2
3	Rx	Black	5
5	ground	Orange	3

SP-7: Heart rate meter cable CPU – Cardio receiver			
CPU/CN4	**Signal**	**Color**	**Receiver**
1	+5 V	Red	1
2	Pulse per beat	Blue	2
3	ground	Black	3

SP-10: Fan power supply cable Fan control board – Fan			
Fan control board / K2	**Signal**	**Color**	**Fan**
1	Power supply	Red	1
2	ground	Blue	2

BK-6: Low voltage power supply cable Power supply – Alternator interface board			
Power supply CN2	**Signal**	**Color**	**Alter. interface board / CN3**
2	+ 5 V	Yellow	4
5	+ 12 V	Red	2
6-7-4	ground	Black	3
8	- 12 V	Blue	1

SP-5: Alternator cable Alternator interface board – Alternator – Resistor				
Alter. interface board / CN2	**Signal**	**Color**	**Alternator**	**Resistor**
1	Alternator RPM X 6	Violet	Red eyelet 4	-
2	Resistor -	Blue	Yellow eyelet 6	
		Blue		Yellow eyelet 4
3	Resistor +	Red	Yellow eyelet 6	
		Red		Yellow eyelet 4
5	ground	Black	-	
4	Excitation	Orange	Red Faston	

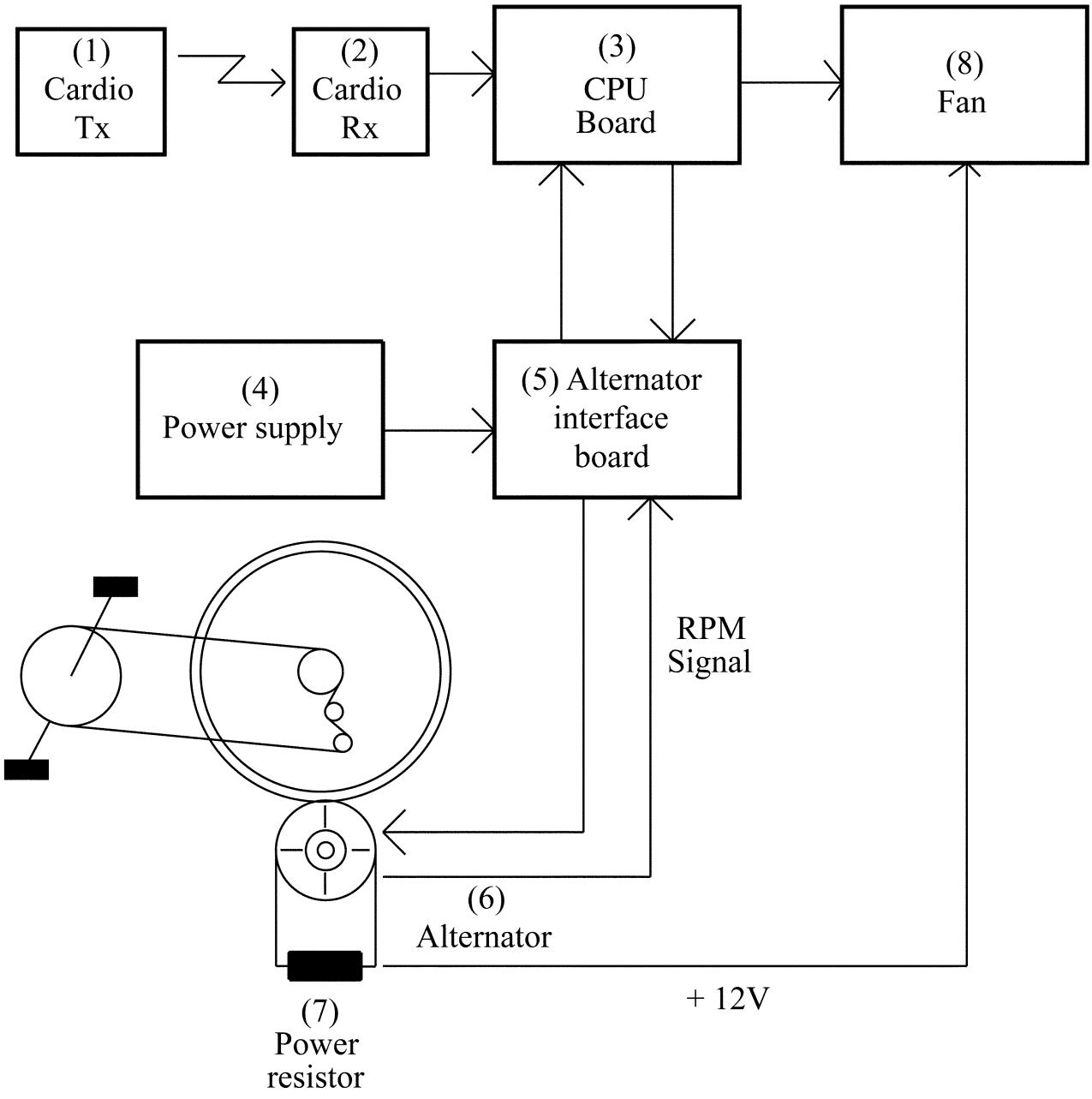
SP-3: High voltage power supply Power input socket – Power supply			
Input socket	**Signal**	**Color**	**Power supply CN1**
Yellow Faston	Ground	Yellow	1
Red Faston	Live	Blue	4
Red Faston	Neutral	Black	6

The above is a simplified description of cable SP-3 and does not detail the ground node connections.

3. PRINCIPLES OF OPERATION

3.1. BLOCK DIAGRAM

The block diagram of the machine is shown in the figure below:



(1) CARDIO TRANSMITTER

It is worn by the person using the machine, and transmits to the cardio receiver one pulse for every heart beat that is detected.

(2) CARDIO RECEIVER

It is connected to the machine's CPU board and receives the pulses sent by the transmitter. Its reception area is approximately a circle of 1 meter of radius. If there is electromagnetic noise (produced by high voltage lines, radio transmitters, monitors, motors, etc.) within its reception area, the receiver becomes saturated and stops receiving any signal. If there are 2 transmitters within its area of reception, it will receive signals from both, and may produce an error or irregular reading.

(3) CPU BOARD

This is the heart of the machine, which controls all the machine functions by executing the program stored in EPROM. It receives information from the user (age, weight, etc.) during set-up of the training session, from the cardio receiver (user's heart rate) and from the alternator interface board for displaying workload data (Watt and RPM). It controls the difficulty level selected with the "↑" "↓" keys or according to the chosen training program.
Through an RS-232 cable it is possible to print out the data of the current training session on a serial printer

(4) POWER SUPPLY

Receives the mains voltage at its input and outputs the DC voltages (+5 V, +12 V and −12 V) which supply the display and the alternator interface board.

(5) ALTERNATOR INTERFACE BOARD

Receives from the display a square-wave signal whose frequency is proportional to the selected level of difficulty, and converts it into a DC excitation voltage for the alternator. Receives the RPM signal from the alternator, which it filters and sends to the display for calculating the speed of rotation.

(6) ALTERNATOR

Is put into rotation by the user, and generates a resistance to the movement proportional to the excitation voltage received from the alternator interface board. It also generates the RPM signal (6 pulses per revolution) necessary for counting the number of revolutions and hence measuring the speed. Its rotation produces energy which is dissipated by the power resistor.

(7) POWER RESISTOR

Has the function of dissipating the energy produced by the alternator.

(8) FAN

Cooling fan for the person using the machine, which is put into operation by pressing a button on the display. Because the fan is powered by the alternator output voltage, it does not run when the machine speed is zero, and its airflow increases as the power generated by the alternator increases.

4. ACCESSORIES

4.1. CONNECTING TO THE TGS

The machine can be connected to the Technogym System by means of the 9-pin D-type connector situated on the back of the display, which provides the RS 232 serial port for connecting the TGS reader.

Although this serial port is the same one used for connecting to a serial printer, the cable for connecting this serial port to the CPU is different from the one used for connecting to the printer.

The serial port is connected to the CPU by the cable described below, which is supplied in the upgrade kit:

TGSRN2XT: Internal cable CPU - 9 pin connector			
CPU/CN2	**Signal**	**Color**	**DB9 male**
1	+ 12 V	yellow	1
2	Tx	brown	3
5	Rx	white	2
6	ground	green	5

To prevent interference with the cardio receiver, route the cable behind cable SP-1 and connector CN1 of the CPU board.

For all further information, including troubleshooting, refer to the following manual: “Technogym System: Installation Guide”.

4.2. CONNECTING TO THE PRINTER

The machine can be connected to a printer through the 9-pin D-type connector situated on the back of the display, which provides the RS 232 serial port for connecting the printer with the following cable:

A441: Printer cable CPU – 9 pin connector			
DB9	**Signal**	**Color**	**DB25**
2	Tx	Brown	3
3	Rx	Blue	2
5	ground	Black	7

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5. INSTALLATION INSTRUCTIONS

5.1. SPECIFICATIONS AND REQUIREMENTS

For correct machine installation, make sure that:

1. The machine is installed on a level surface that is free of vibrations and has sufficient carrying capacity for the combined weight of the machine and user.
2. The environment is dust or sand free.
3. The environment meets the operating temperature and humidity conditions specified in paragraph 2.3. .
4. The machine is not positioned close to sources of heat, sources of electromagnetic noise (television sets, electric motors, antennas, high voltage lines, appliances etc…) or medical equipment.
5. To eliminate any interference with the cardio receiver, there should not be any transmitters at a distance of 100 cm from the display.
6. The mains voltage must match the value specified on the machine rating plate.
7. The electrical system must be provided with an efficient ground connection.
8. The wall outlet used should be reserved for the machine and have a rating of at least 60 Watt.
9. The machine can be connected in cascade with other machines. It is recommended to connect only machines of the same type in cascade, up to a maximum of 5 machines. In this case, make sure that the wall outlet has a power rating of at least 300 Watt.
10. Position the mains lead of the machine where is will not be underfoot. For this purpose, it is recommended to use the special trackways supplied with the machine.

5.2. INSTALLATION

To correctly install the machine, proceed as follows:

1. Ensure that the specifications and requirements for installation have been met (see paragraph 5.1.).
2. Remove the machine from its packing materials: one carton fixed to a wooden pallet for overseas shipment, one nylon bag for Italy.
3. Position the machine as specified above, on a level surface that is free of vibrations and has sufficient carrying capacity for the combined weight of the machine and the user.
4. Assemble the bicycle.
5. Connect the mains lead to the inlet socket on the machine.
6. Place the on/off switch in the “0” position.
7. Plug the mains lead into the electrical outlet.

5.3. FIRST POWER-ON

After completing the installation procedure, the machine is ready to be powered up. To turn on the machine, simply toggle the on/off switch from the 0 position to the 1 position.

When the machine is turned on it will perform a power-on test which:

- sounds the buzzer;
- lights all the LEDs.

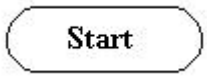
At the end of the power-on test the machine enters standby mode, awaiting a keyboard command.

To check the correct operation of the machine:

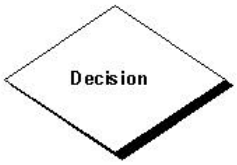
- start exercising;
- check that the speed display varies accordingly;
- check that the incline, and hence the effort level, varies when the "↑" and "↓" keys are pressed, and that the corresponding difficulty level LEDs come on and off;
- check that the fan comes on when the "Fan ON/OFF" key on the display is pressed;
- put on the heart rate transmitter and check that the machine correctly measures the heart rate value.

6. TROUBLESHOOTING

The troubleshooting procedures are shown in the form of flow charts. In order to facilitate consultation, the following standard box shapes are used.



This type of box is the START point of the troubleshooting procedure. It typically contains a description of the problem or malfunction.



This type of box represents a decision point in the troubleshooting procedure. It typically contains a description of the CHECK to be made, with an outcome that can be either a positive (YES) or negative (NO) response.

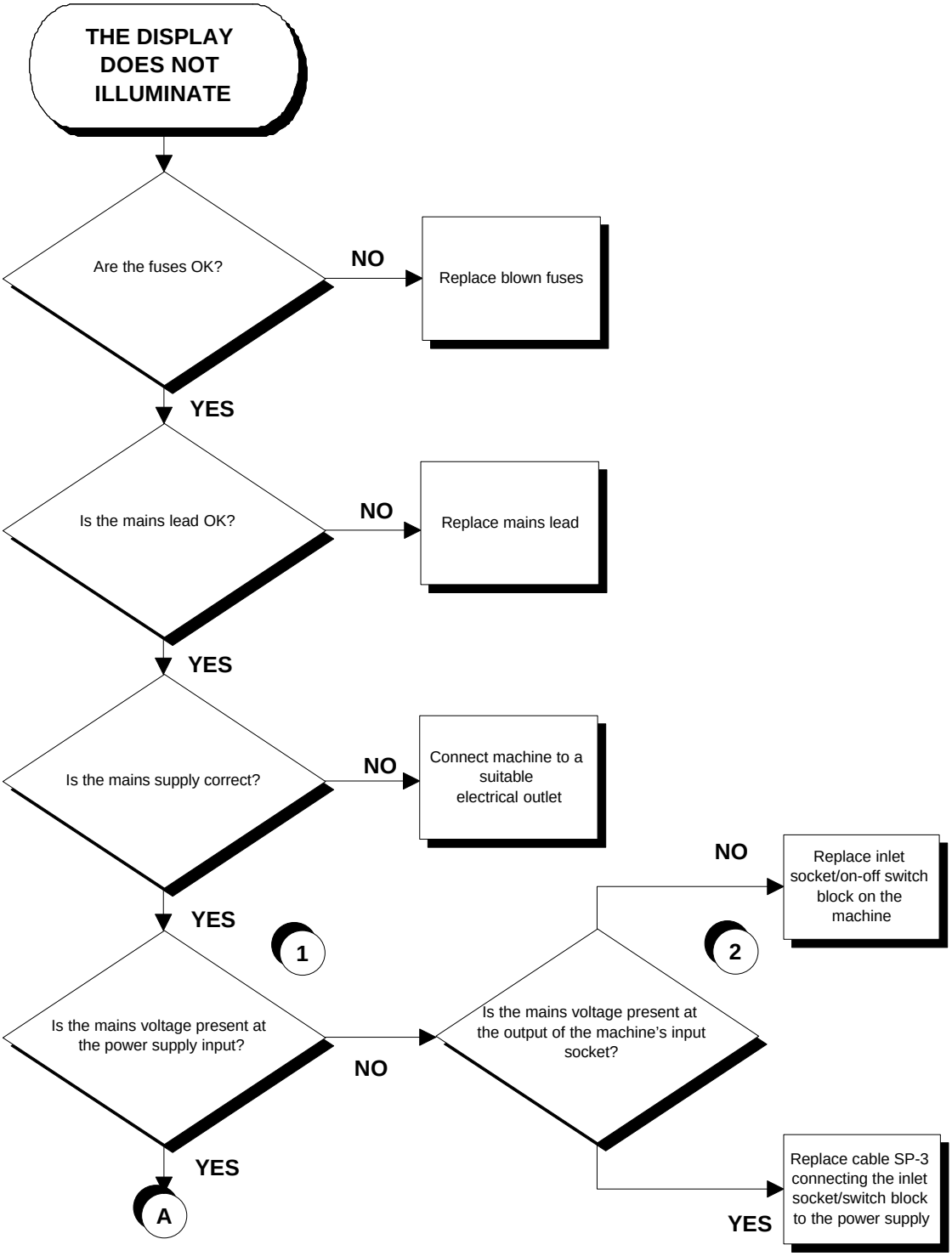
This type of box is a step in the troubleshooting procedure where an ACTION must be carried out. It typically contains a description of the ACTION necessary to resolve the problem. Therefore, after executing the specified ACTION:

1. Check whether the problem has been resolved;
2. If the problem persists, it is recommended to resume the troubleshooting procedure from the point before the action was carried out.

A circled number (such as that shown on the left) next to a box of the troubleshooting procedure indicates that detailed instructions for performing that particular check or action are provided at the end of the flowchart.

A circled letter (such as that shown on the left) is used to highlight a point in the procedure. Typically, this indicator is used in page changes.

6.1. THE DISPLAY DOES NOT ILLUMINATE



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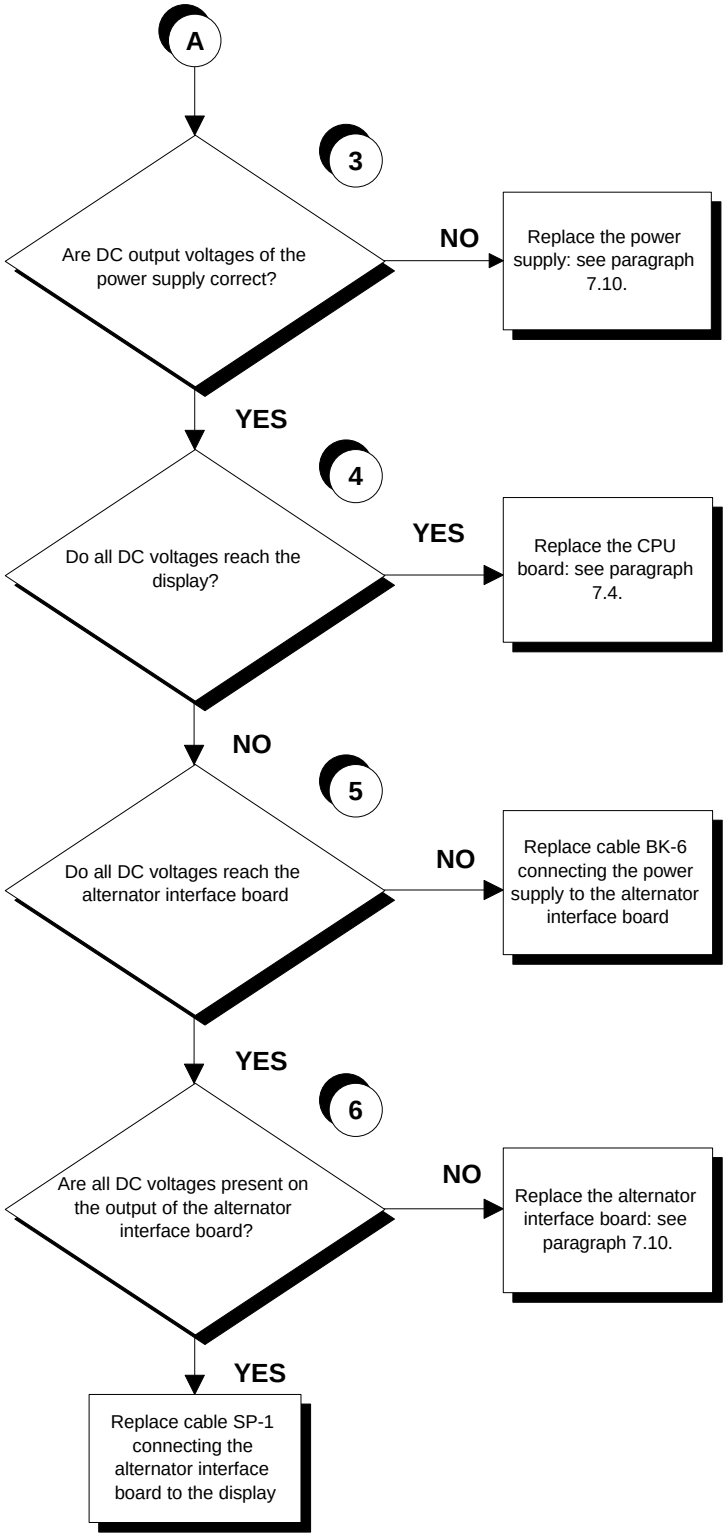


Follow the procedure step by step to correctly diagnose the problem. Take particular care with the checks highlighted by circled numbers, which are described in detail below:

(1) Disconnect connector CN1 from the power supply. Place the tester probes on pins 4 and 6 of the connector. The measured voltage should be approximately 220 VAC or 110 VAC depending on the mains electricity supply.

(2) As for step (1) but with the tester between terminals L1 and N1 of the inlet socket / on-off switch block.

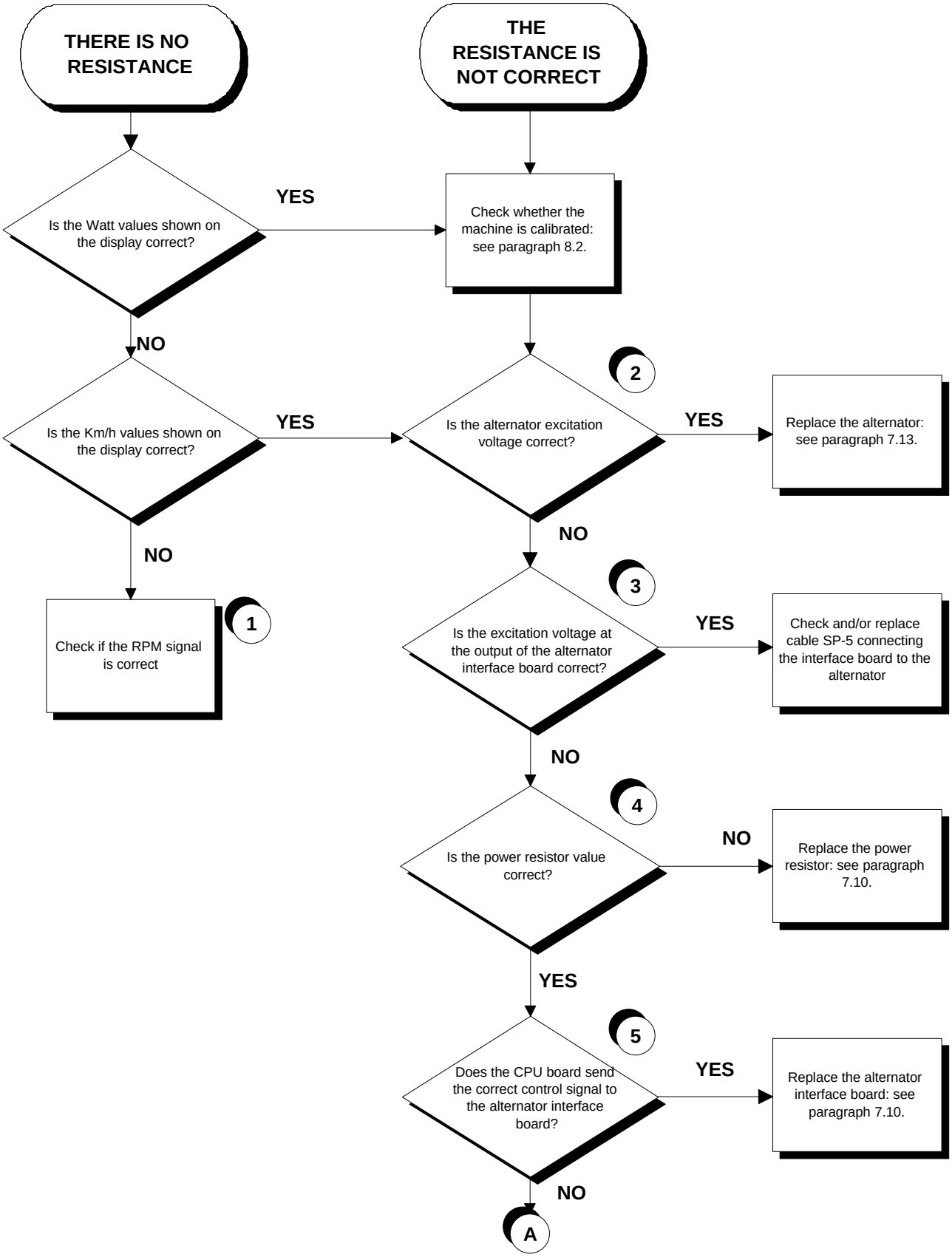
(3) Slightly lift connector CN2 on the power supply to access the pins with the tester probes. Check that all the output voltages of the power supply are correct, referring to paragraph 2.6.2. “Wiring”.

(4) As for step (3) but on connector CN1 of the display CPU board.

(5) As for step (3) but on connector CN3 of the alternator interface board.

(6) As for step (3) but on connector CN1 of the alternator interface board.

6.2. THE RESISTANCE IS NOT CORRECT



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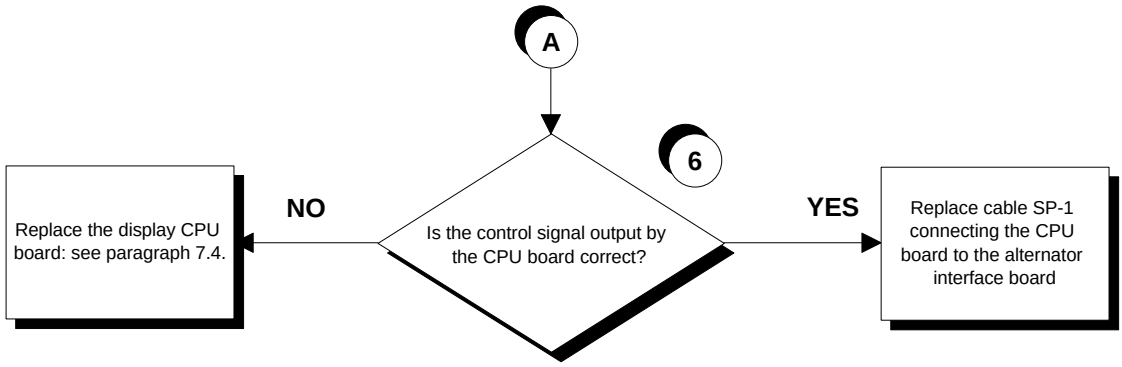


Follow the procedure step by step to correctly diagnose the problem. Take particular care with the checks highlighted by circled numbers, which are described in detail below:

(1) Perform the troubleshooting procedure described in paragraph 6.3. "The speed value is incorrect".

(2) Place the tester probes between the orange (positive) and black (negative) cables on the alternator. Select the "Manual Training" function on the display and start pedaling on the machine. Vary the incline while maintaining the speed specified in Table 6.2-1: the excitation voltage should vary as shown in the same table.

V = 13 Km/h	EXCITATION VOLTAGE (VDC)		WAVEFORM FREQUENCY (Hz)	
INCLINE (%)	ALTERNATOR	ALTERNATOR INTERFACE BOARD		CPU BOARD
		4-5/CN2	6-3/CN1	6-3/CN1
1	0.61	0.61	10	10
3	4.65	4.65	160	160
6	7.60	7.60	398	398
9	10.39	10.39	505	505

Table 6.2-1

Note that the above voltages and frequencies are nominal values.

(3) As for point (2) but with the tester between pins 4 (positive) and 5 (negative) of connector CN2 on the alternator interface board.

(4) Disconnect all the cables from the 2 power resistor terminals. Place the tester probes on the 2 terminals and measure the value of the resistance.

WARNING: Because all tester probes have a non zero internal resistance, which varies depending on the model and may be in the same order as the quantity being measured, the following procedure is recommended:

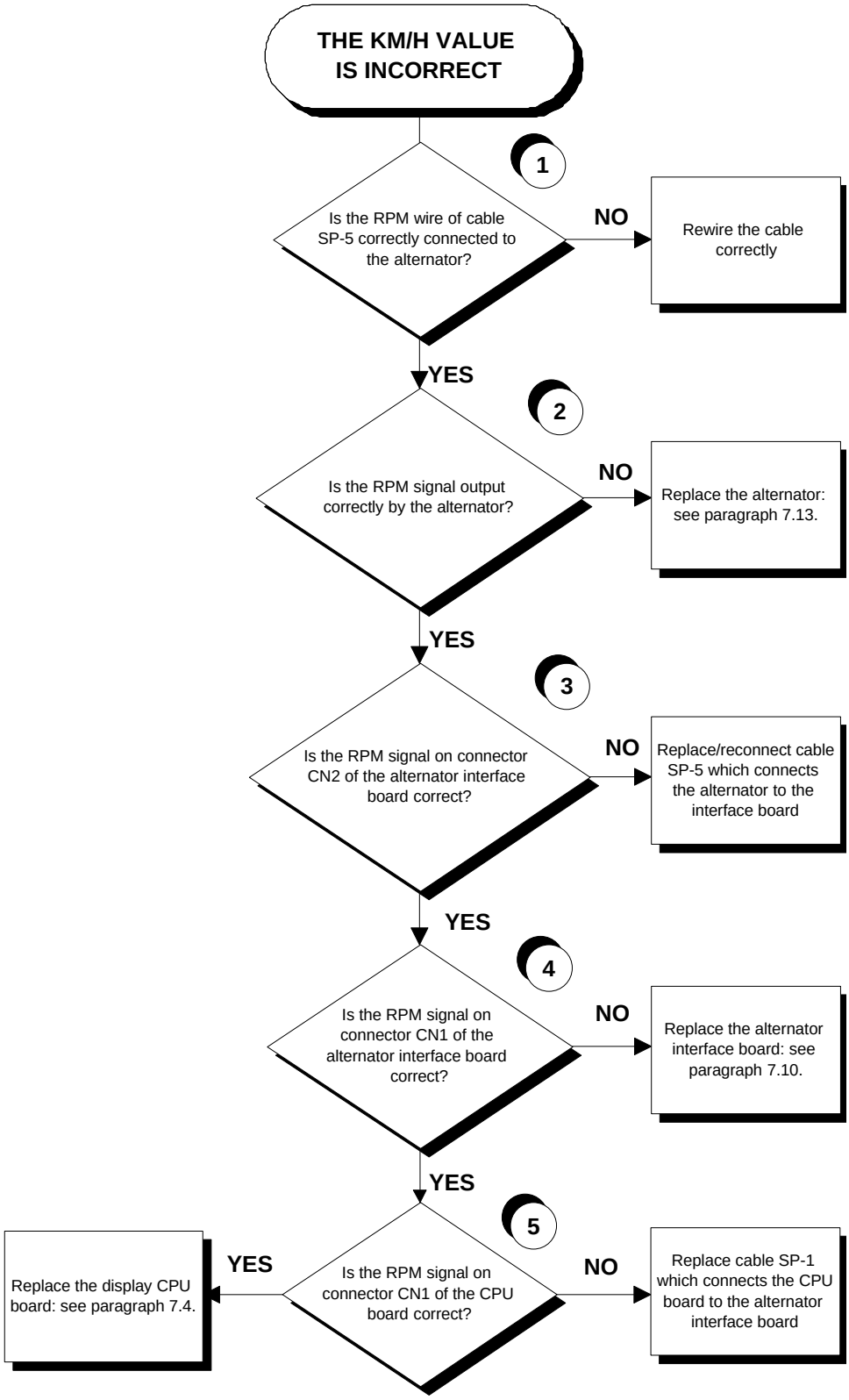
- Measure the internal resistance of the probes by short-circuiting them with each other;
- Measure the resistance of the power resistor. The true resistance value is obtained by subtracting the short-circuit resistance of the probes from the measured value.

The correct value for the power resistor is approximately 0.5 Ω.

(5) As for point (2) but with an oscilloscope (if available) between pins 6 (probe) and 3 (ground) of connector CN1 on the alternator interface board.

(6) As for point (5) but with the oscilloscope between pins 6 (probe) and 3 (ground) of connector CN1 of the display CPU board.

6.3. THE SPEED VALUE IS INCORRECT



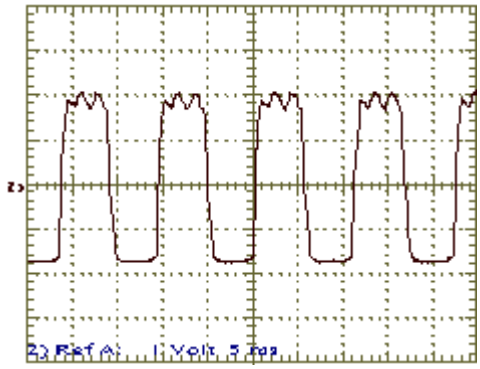
Follow the procedure step by step to correctly diagnose the problem. Take particular care with the checks highlighted by circled numbers, which are described in detail below:

(1) Check whether the black and violet wires, which connect the alternator to pins 1 and 5 of CN2 on the alternator interface board, are correctly connected.

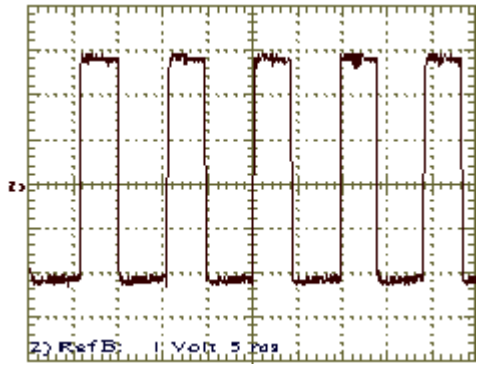
(2) Place the probes of an oscilloscope between the violet wire and the alternator ground. When the speed is varied at 0% incline, the waveform frequency should vary as shown in the table below:

SPEED (Km/h)	FREQUENCY (Hz)
10	81.6
15	122
20	164
25	204
30	245

The signal at the alternator output and on connector CN2 of the alternator interface board should be as shown below:



while on connectors CN1 of the alternator interface board and CN1 on the CPU board the following square wave should be obtained:

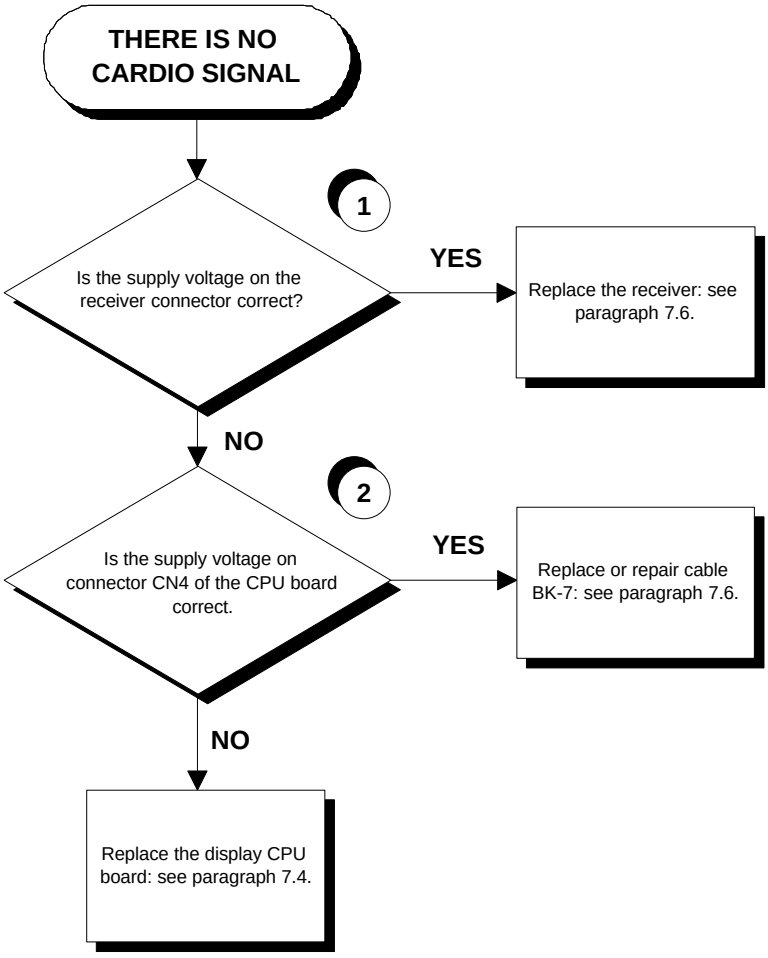


(3) As for step (2) but with the oscilloscope probes between pins 1 (probe) and 5 (ground) of connector CN2 on the alternator interface board.

(4) As for step (2) but with the oscilloscope probes between pins 5 (probe) and 3 (ground) of connector CN1 on the alternator interface board.

(5) As for step (2) but with the oscilloscope probes between pins 5 (probe) and 3 (ground) of connector CN1 on the display CPU board.

6.4. THERE IS NO HEART RATE SIGNAL



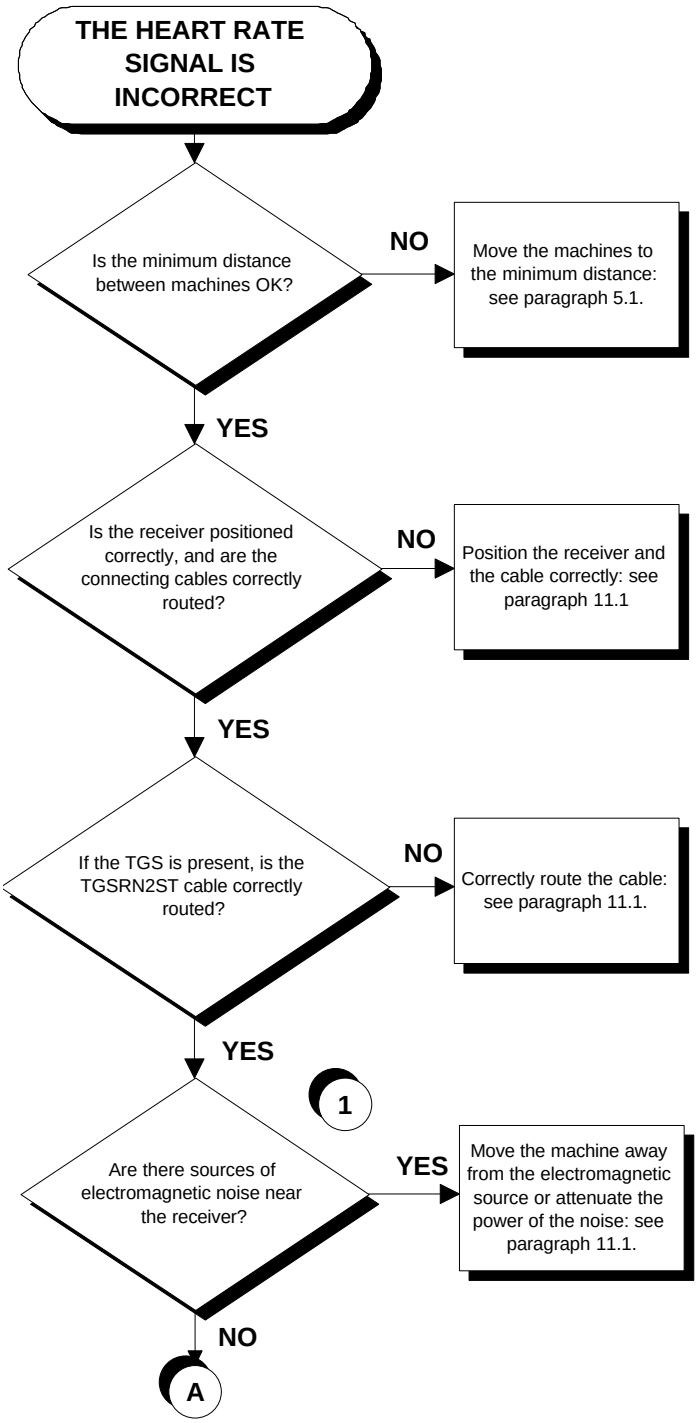
Follow the procedure step by step to correctly diagnose the problem. Take particular care with the checks highlighted by circled numbers, which are described in detail below:

(1) Place the tester probes between pins 1 (signal) and 3 (ground) (corresponding to the red and black wires) of the 4-pin cardio receiver connector: the voltage should be +5Vdc.

(2) Place the tester probes between pins 1 (signal) and 3 (ground) (corresponding to the red and black wires) of connector CN4 on the display CPU board: the voltage should be +5Vdc.

6.5. THE HEART RATE SIGNAL IS INCORRECT

In some case the machine may show “Err” on the heart rate display.



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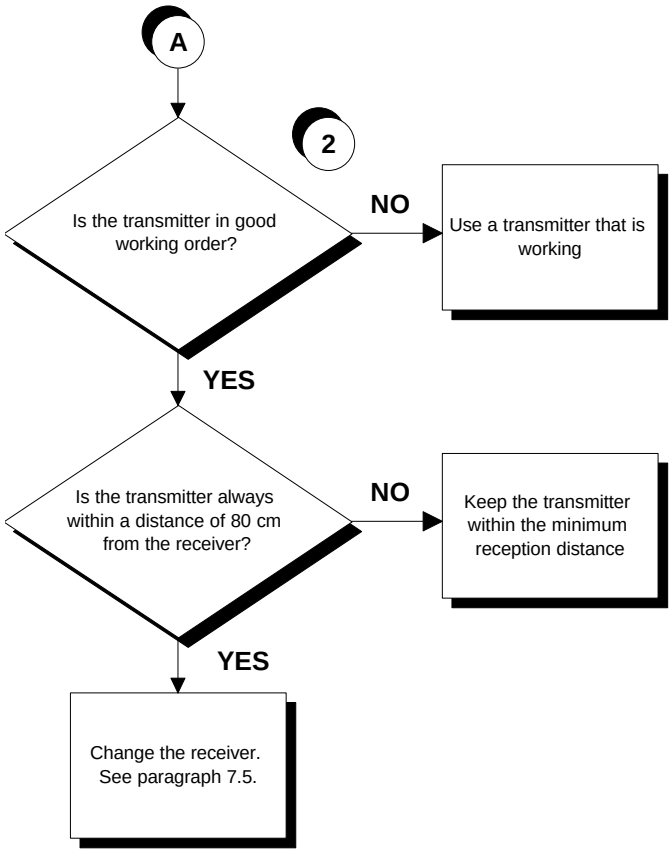
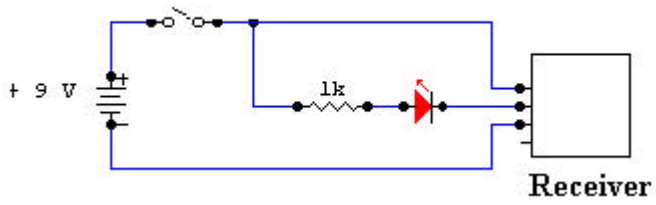


Follow the procedure step by step to correctly diagnose the problem. Take particular care with the checks highlighted by the circled numbers, which are described in detail below:

(1) To check for electromagnetic noise near the machine, use a frequency signal monitor constructed as shown in the schematic below:

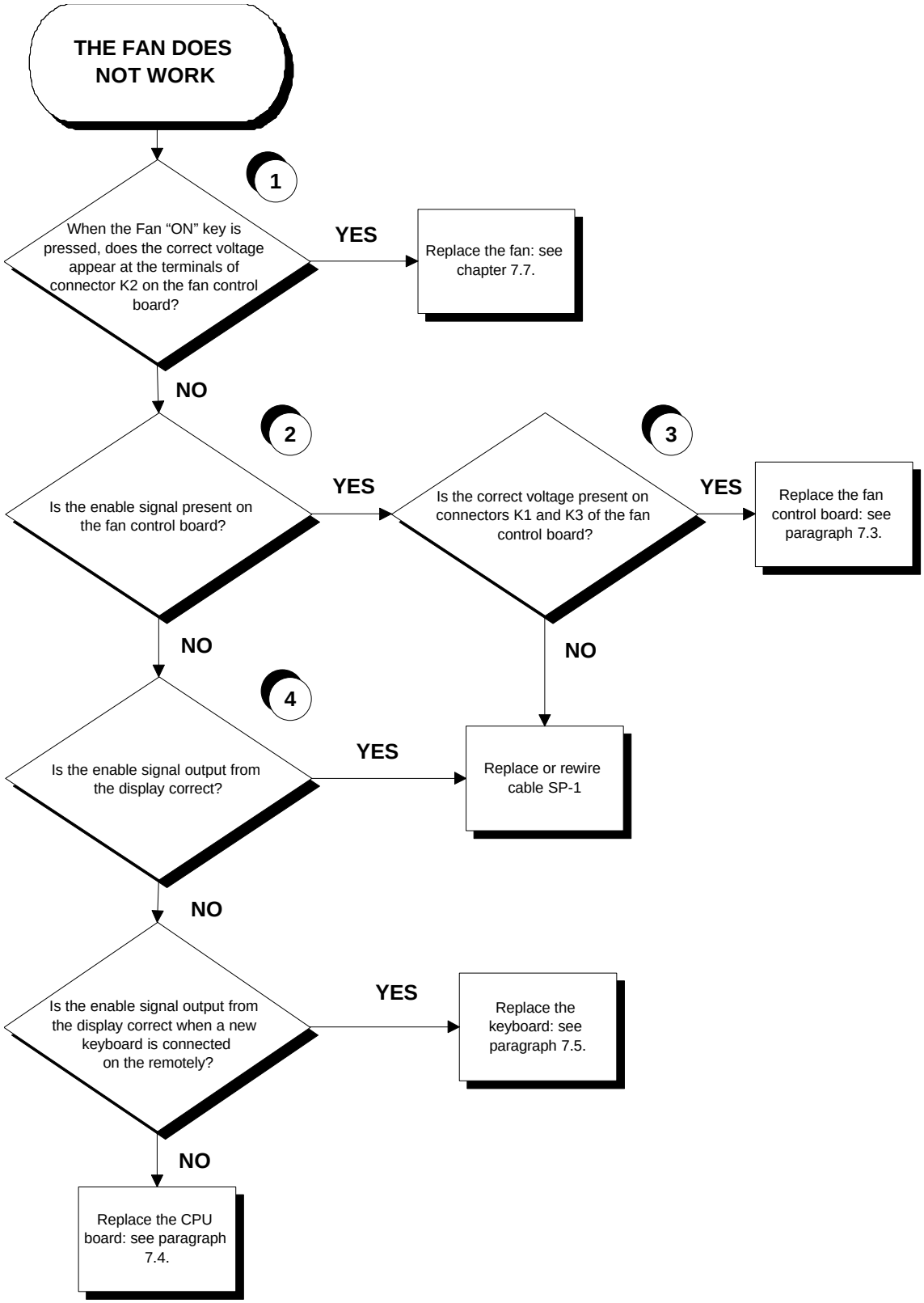


The circuit lights the LED for every heart beat and/or disturbance that is received: in this way it possible to determine whether there is any interference, and identify its sources.

(2) Check the battery power level, using a tester if possible. Otherwise use a receiver or another “reference” machine to check operation up to a distance of about 80 cm from the receiver.

WARNING: Consult paragraph 11.1. "Technical notes on cardio receivers” in the Appendix.

6.6. THE FAN DOES NOT WORK



Follow the procedure step by step to correctly diagnose the problem. Take particular care with the checks highlighted by the circled numbers, which are described in detail below:

WARNING: Carry out all these operations with the alternator in rotation.

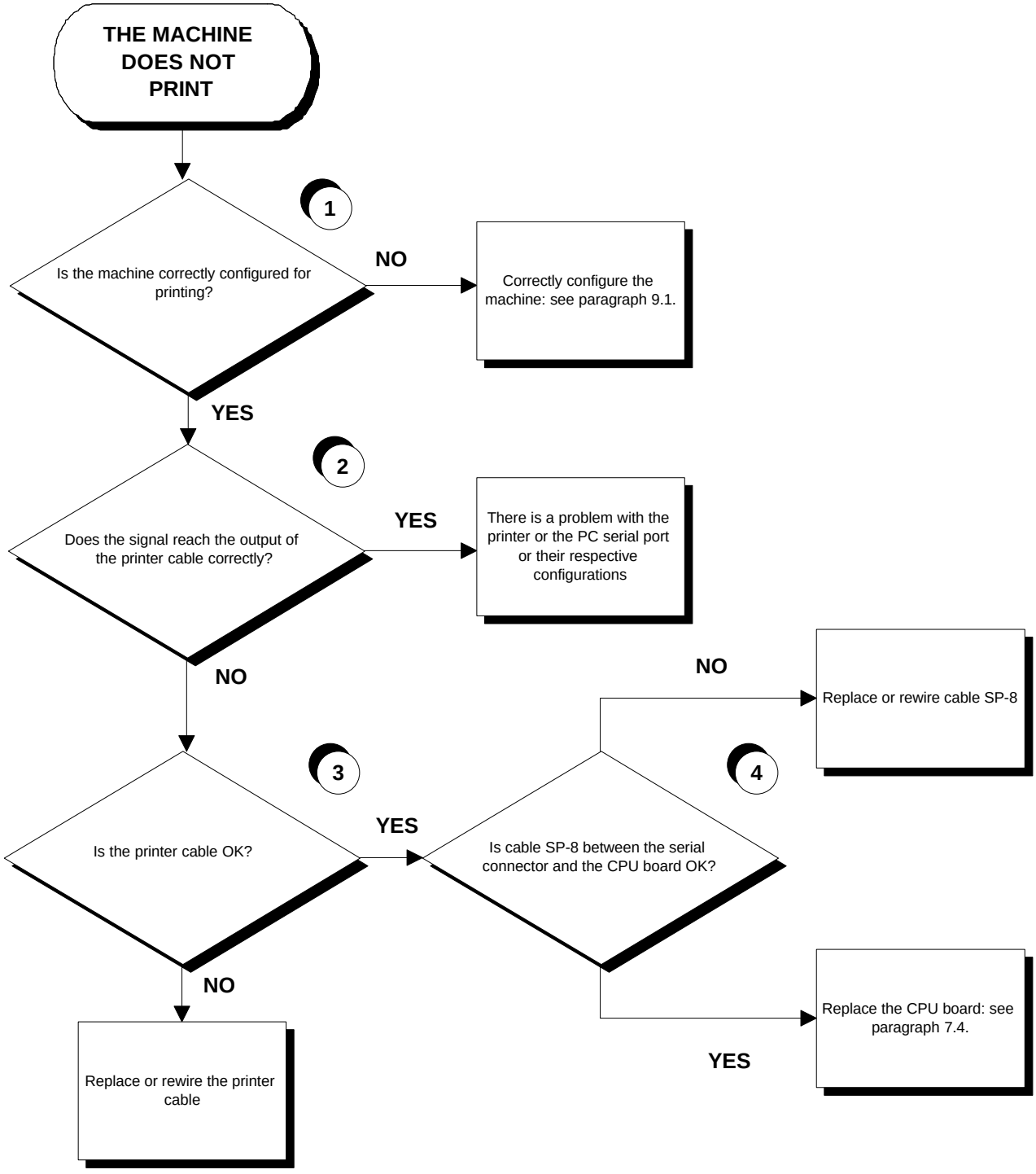
(1) Place the tester probes between pins 1 (+12V) and 3 (ground) of connector K2 of the fan control board: the measured voltage should be +12Vdc.

(2) Place the tester probes between pins 3 (signal) and 2 (ground) of connector K1 on the fan control board: the measured voltage should be +5Vdc.

(3) Place the tester probes between pins 4 (signal) and 2 (ground) of connector K1 of the fan control board: the measured voltage should be +12Vdc. Place the tester probes between pin 1 (signal) and 2 (ground) of connector K3 on the fan control board: the measured voltage should be +12Vdc.

(4) Place the tester probes between pins 1 (signal) and 12 (ground) of connector CN1 on the CPU board: the measured voltage should be +12Vdc.

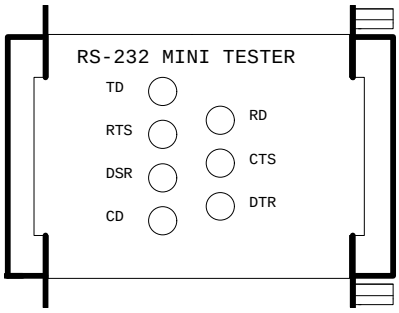
6.7. THE MACHINE DOES NOT PRINT



Follow the procedure step by step to correctly diagnose the problem. Take particular care with the checks highlighted by the circled numbers, which are described in detail below:

(1) Open the display and configure the 4 dip-switches as detailed in paragraph 9.1. .

(2) To perform this check, use the RS-232 tester:



Connect the tester on the output connector printer cable A441, while the other end is connected to the machine. Select any training program: as soon as the last input is confirmed and training starts, the machine will transmit the data through the serial port. The RD LED should blink red.

(3) Use a tester to check the continuity of printer cable A441: see paragraph 4.2. “Connecting to the printer”.

(4) Use a tester to check the continuity of cable SP-8: see paragraph 2.6.2. “Wiring

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7. DISASSEMBLY OF COMPONENTS

7.1. DISASSEMBLING THE DISPLAY

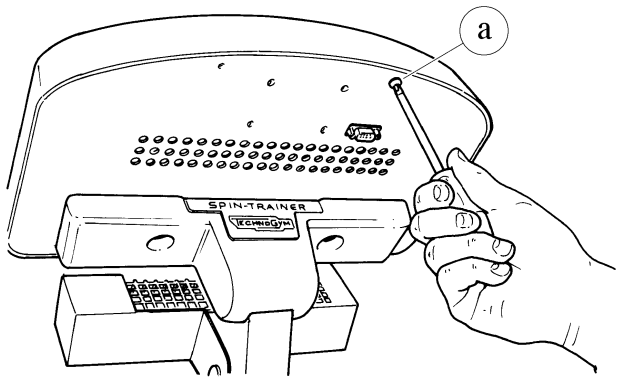

Figure 7.1-1

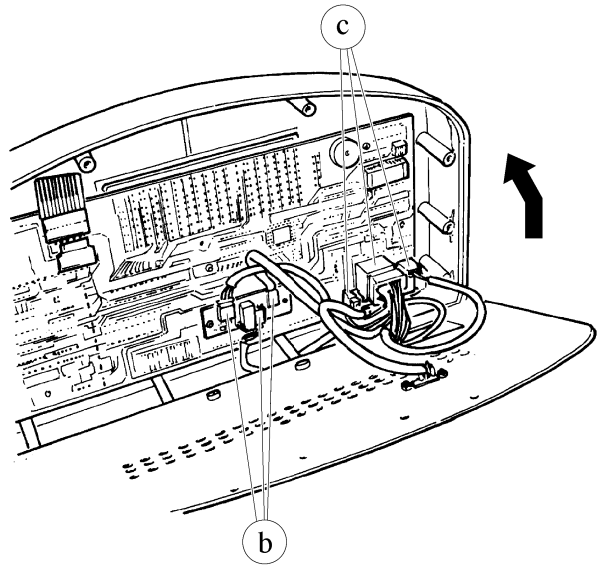

Figure 7.1-2

1. Turn off the machine and unplug the mains lead from the wall outlet.

2. Unscrew the 7 self-tapping screws **a** which fix the DISPLAY, using a large Phillips screwdriver.

Support the DISPLAY before removing the last screw.

3. Open the DISPLAY.

To remove the DISPLAY:

1. Disconnect connectors **b**.
2. Disconnect connectors **c**.
3. Remove the DISPLAY.

To reassemble the DISPLAY, carry out the above steps in reverse order.

7.2. DISASSEMBLING THE EPROM

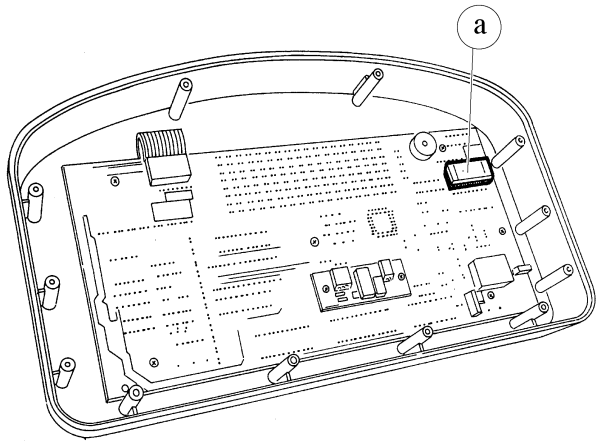

Figure 7.2-1

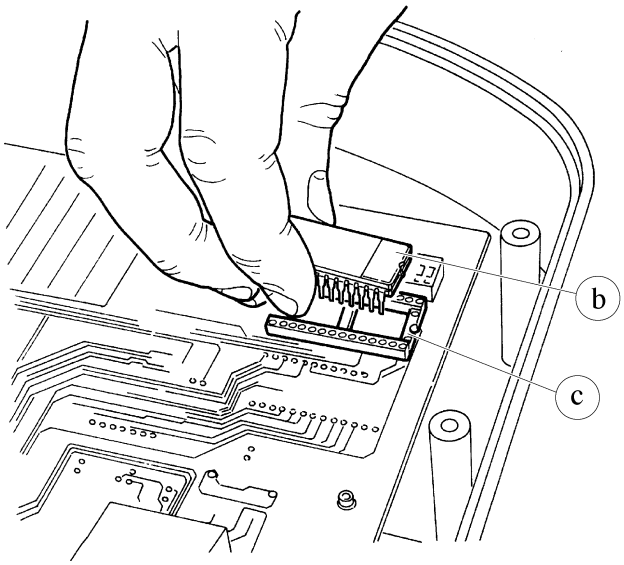

Figure 7.2-2

Carry out the procedure described in paragraph 7.1. “Disassembling the display”.

With the display on a work bench:

1. Remove EPROM **a** from its socket using an integrated-circuit extractor tool.

To reassemble the EPROM:

1. Make sure that reference index **b** on the EPROM coincides with reference notch **c** on the socket.
2. Be careful to center the EPROM pins above their corresponding holes in the socket.
3. Push the pins into the socket.

The EPROM can be irreversibly damaged if the reference index on the EPROM is not correctly matched up with the notch on the socket, or if its pins are bent.

7.3. DISASSEMBLING THE FAN CONTROL BOARD

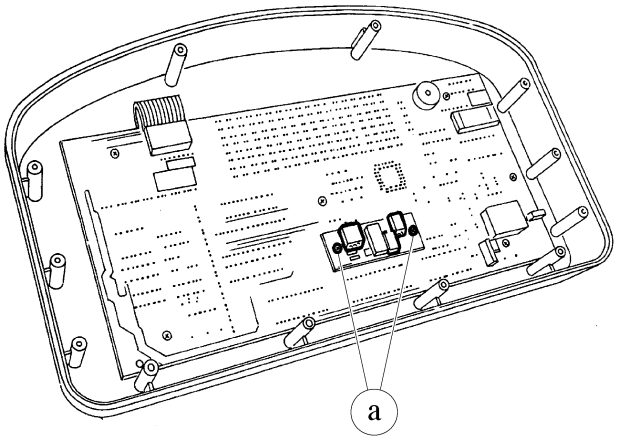

Figure 7.3-1

Carry out the procedure described in paragraph 7.1. “Disassembling the display”.

With the display on a work bench:

1. Remove the two fixing screws **a** of the fan control board using a 5.5-mm socket wrench.
2. Remove the FAN CONTROL BOARD.

To reassemble the FAN CONTROL BOARD, carry out the above steps in reverse order.

7.4. DISASSEMBLING THE CPU BOARD

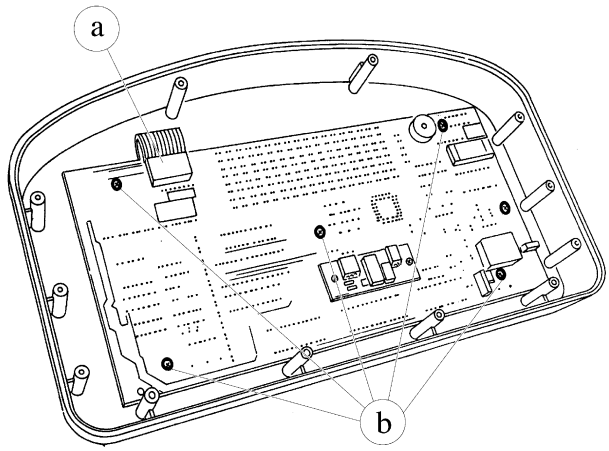

Figure 7.4-1

Carry out the procedures described in paragraph 7.1. “Disassembling the display” and 7.3. “Disassembling the fan control board”.

With the display placed on a work bench:

1. Disconnect keyboard connector **a**.
2. Remove the 5 screws **b**, using a small Phillips screwdriver.
3. Remove the CPU board.

These procedures must be carried out on a work bench.

To reassemble the CPU BOARD, carry out the above steps in reverse order and reassemble the fan control board disassembled previously.

After completing this operation, carry out machine calibration as instructed in paragraph 8.2.

7.5. DISASSEMBLING THE KEYBOARD

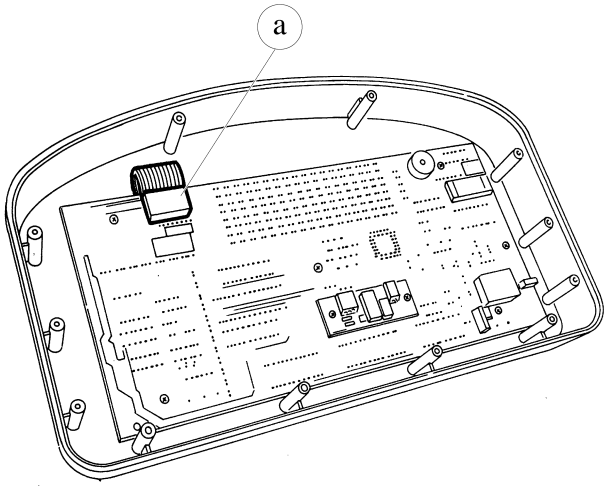

Figure 7.5-1

Carry out the procedure described in paragraph 7.1. “Disassembling the display”.

1. Disconnect KEYBOARD connector **a**.

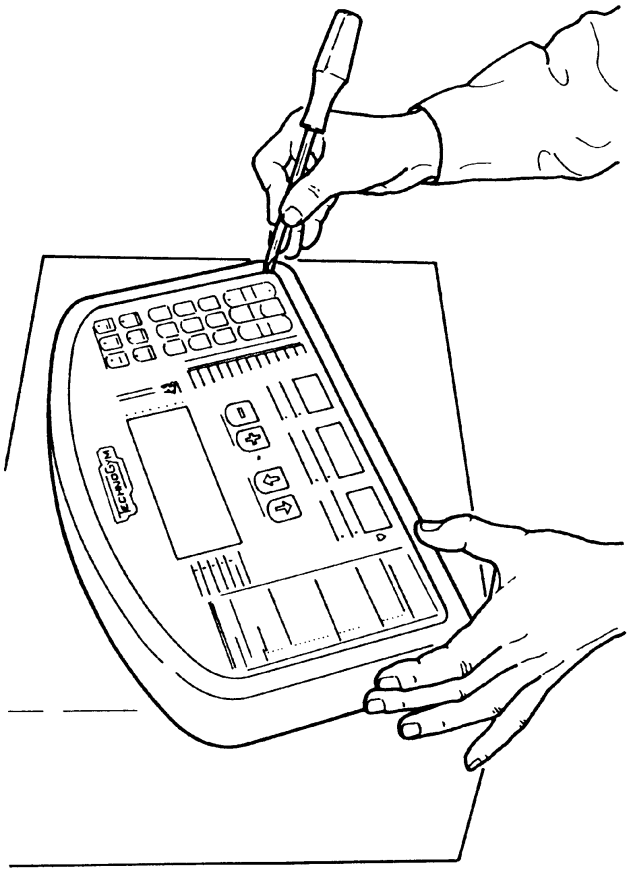

Figure 7.5-2

With the display on a work bench:

1. Use a sharp tool to lift up a corner of the KEYBOARD and detach it.

To assemble the new KEYBOARD, with the display on a work bench:

1. Remove the backing film from the adhesive.
2. Apply the adhesive part, starting from the left and working towards the right, without bending the keyboard.
3. Insert the connector in the special slot on the display and connect it to the CPU board.
4. Remove the protective film.

When reassembling the keyboard, make sure that none of the keys are bent or remain pushed in.

The KEYBOARD assembly procedure can only be carried out once, because disassembly damages the tracks and keys.

7.6. DISASSEMBLING THE CARDIO RECEIVER

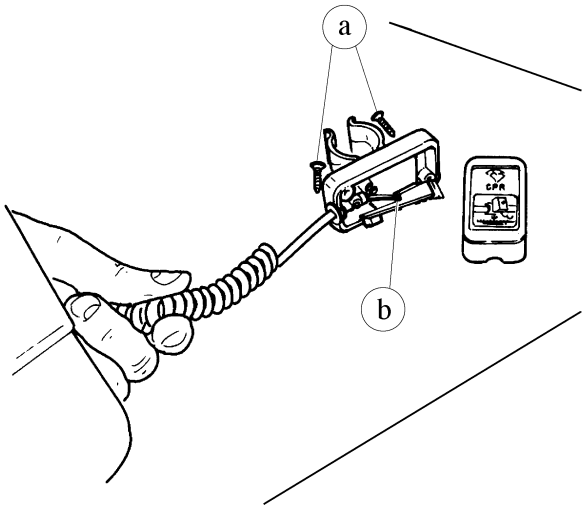

Figure 7.6-1

1. Turn off the machine and unplug the mains lead from the wall outlet.

2. Remove the CARDIO RECEIVER housing from its support on the machine.
3. Unscrew the 2 screws **a** using a small Phillips screwdriver.
4. Open the housing.
5. Disconnect connector **b**.
6. Remove the RECEIVER.

To reassemble the RECEIVER, carry out the above steps in reverse order.

7.7. DISASSEMBLING THE FAN ASSEMBLY

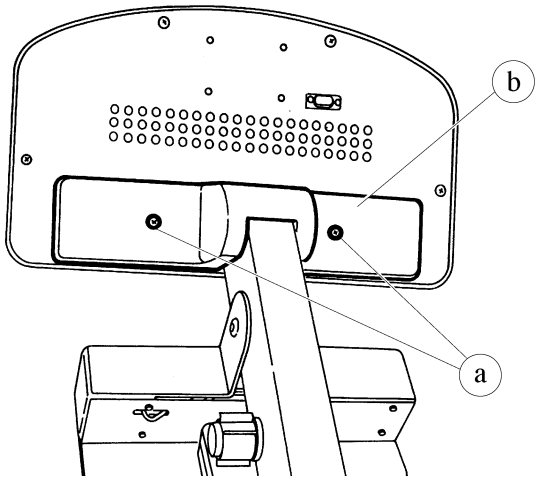

Figure 7.7-1

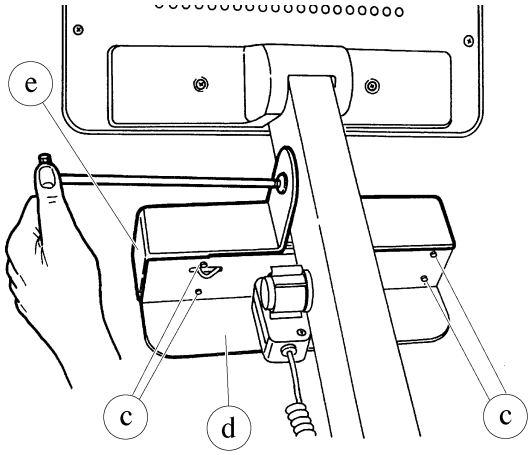

Figure 7.7-2

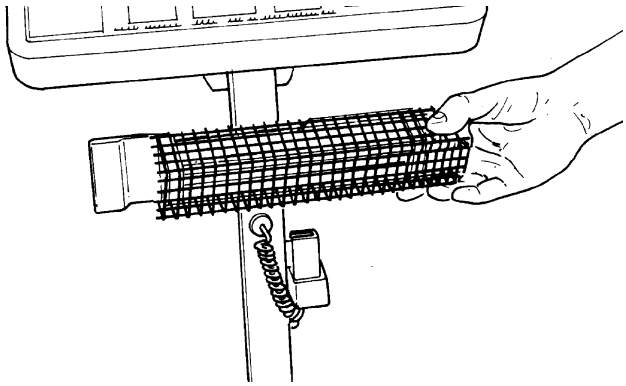

Figure 7.7-3

Carry out the procedure described in paragraph 7.1. “Disassembling the display”.

1. Disconnect connector K3 from the fan control board.

2. Unscrew the 2 self-tapping screws **a** using a large Phillips screwdriver.
3. Remove the rear cover **b** of the display.

4. Remove the fan cable.

5. Unscrew the 4 screws **c** fixing the instruction lexan **d** to the FAN ASSEMBLY bracket.

6. Unscrew the left-hand bracket **e** of the FAN ASSEMBLY using a 5-mm hex T-wrench.

7. Cut the strap fixing the FAN cable on the protective grill.

8. Remove the protective grill from the FAN ASSEMBLY.
9. Remove the FAN.

To reassemble the FAN GROUP, carry out the above procedure in reverse order.

7.8. DISASSEMBLING THE GUARD

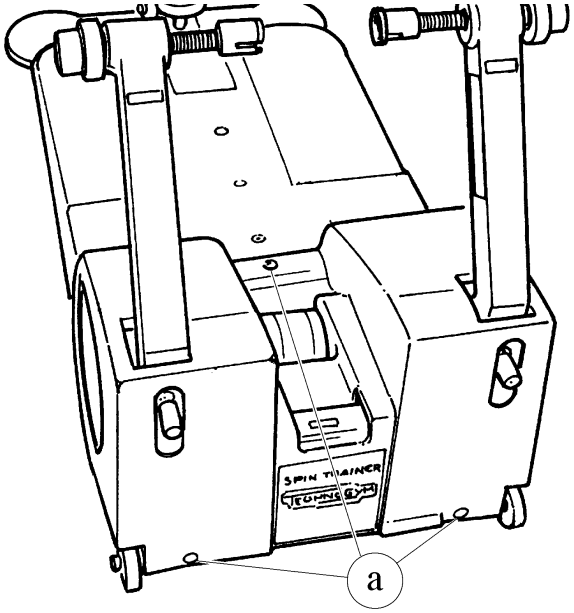

Figure 7.8-1

1. Turn off the machine and unplug the mains lead from the wall outlet.
2. Unscrew the 3 self-tapping screws **a** fixing the GUARD with a large Phillips screwdriver.

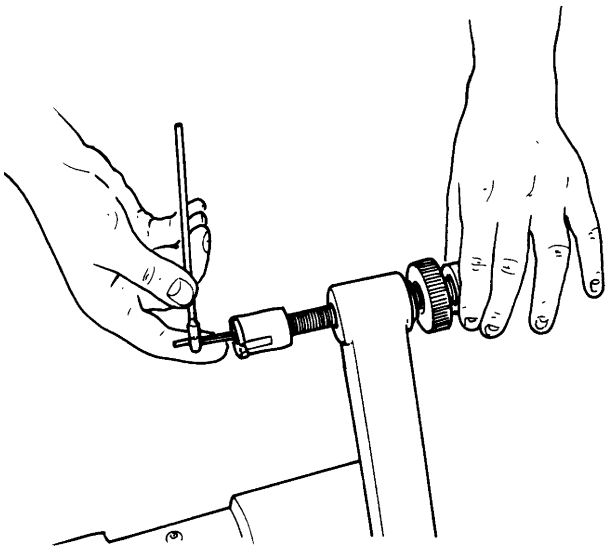

Figure 7.8-2

3. Unscrew the two rear hub supports using a 3-mm hex T-wrench.
4. Remove the 2 rear bicycle hub clamps.
5. Remove the GUARD.

To reassemble the GUARD, carry out the above steps in reverse order.

7.9. DISASSEMBLING THE FOOTBOARD

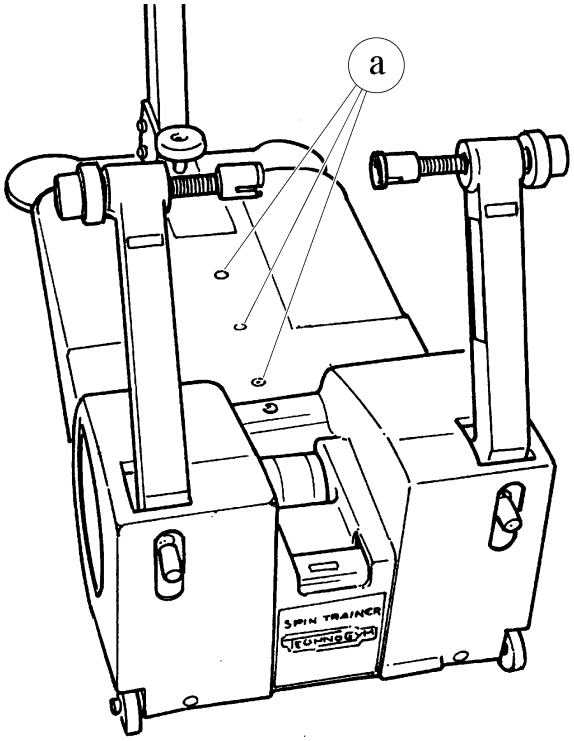

Figure 7.9-1

1. Turn off the machine and unplug the mains lead from the wall outlet.

2. Unscrew the 3 screws **a** which hold the FOOTBOARD in place using a 6-mm Allen wrench.
3. Remove the FOOTBOARD.

To reassemble the FOOTBOARD, carry out the above steps in reverse order.

7.10. DISASSEMBLING THE ELECTRONIC CIRCUIT BOARDS

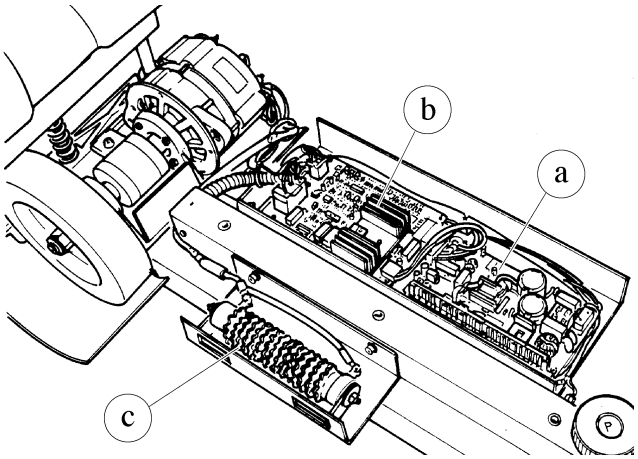

Figure 7.10-1

Carry out the procedures described in paragraph 7.9. “Disassembling the footboard”.

To disassemble the POWER SUPPLY **a**:

1. Disconnect the 2 connectors CN1 and CN2.
2. Unscrew the 4 fixing screws on the support plate using a 7-mm socket wrench.
3. Remove the circuit board.

To disassemble the ALTERNATOR INTERFACE BOARD **b**:

1. Disconnect the 3 connectors CN1, CN2 and CN3.
2. Unscrew the 4 fixing screws on the support plate using a 7-mm socket wrench.
3. Remove the circuit board.

To disassemble the POWER RESISTOR **c**:

1. Unscrew the 2 locknuts of cable SP-5 using a 7-mm wrench.
2. Unscrew the 2 locknuts of the resistor using a 10-mm wrench.
3. Remove the resistor.

To reassemble the ELECTRONIC CIRCUIT BOARDS, carry out the above steps in reverse order.

7.11. DISASSEMBLING THE REAR ASSEMBLY

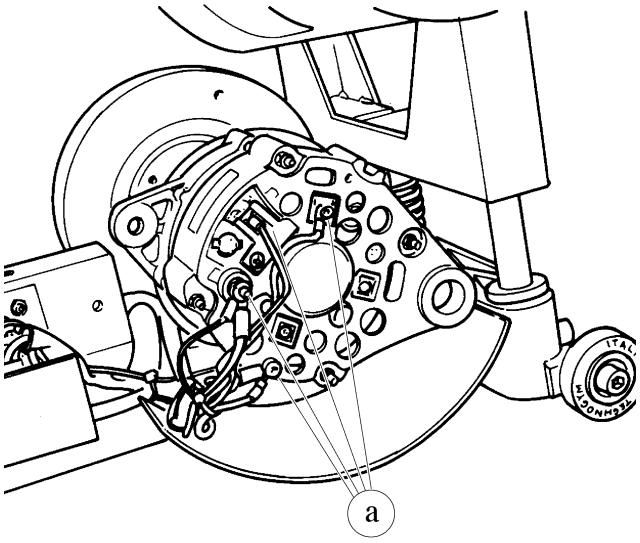

Figure 7.11-1

Carry out the procedure described in paragraph 7.8. “Disassembling the guard”.

1. Disconnect alternator cables **a**.

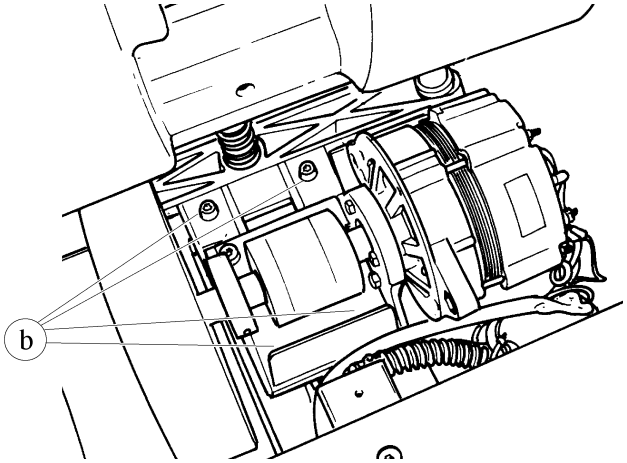

Figure 7.11-2

2. Unscrew the 4 screws **b** which fix the REAR GROUP to the machine frame using a 6-mm hex T-wrench.
3. Remove the REAR ASSEMBLY.

To reassemble the REAR ASSEMBLY, carry out the above procedure in reverse order.

When reassembling the REAR ASSEMBLY, be careful to position the vibration-dampers under the fixing screws.

7.12. DISASSEMBLING THE SECOND ROLLER

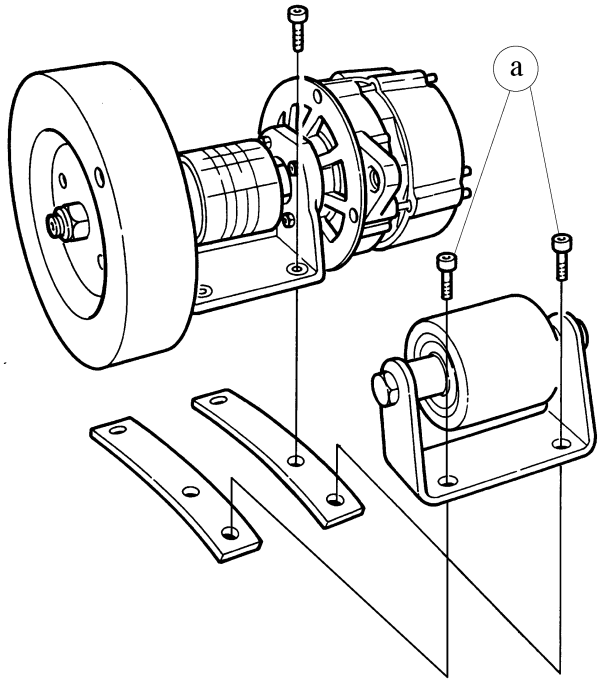

Figure 7.12-1

Carry out the procedure described in paragraph 7.8. “Disassembling the guard”.

1. Remove the 2 screws **a** using a 6-mm hex T-wrench.
2. Remove the SECOND ROLLER.

To reassemble the SECOND ROLLER, carry out the above procedure in reverse order.

When reassembling the SECOND ROLLER, ensure that it doesn't fut against the guard.

After completing the procedure, align the SECOND ROLLER using its fixing slots.

The SECOND ROLLER can be installed on machines which are not equipped with one using UPGRADE KIT 0P185C.

7.13. DISASSEMBLING THE FLYWHEEL AND ALTERNATOR GROUP

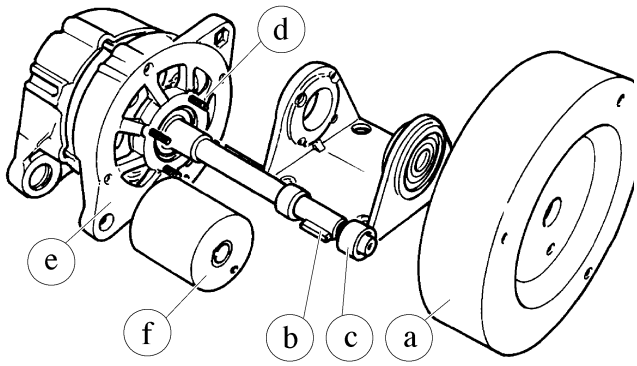

Figure 7.13-1

Carry out the procedure described in 7.11. “Disassembling the rear assembly”.

1. Unscrew the nut on the flywheel side using a 24-mm socket wrench.
2. Back off the dowel on the inner side of the flywheel using a 2.5-mm hex T-wrench.
3. Remove flywheel **a**.
4. Remove tab **b**.
5. Remove the flywheel-side spacer **c**.
6. Unscrew the four nuts of the pins which fix the support on alternator **d** using a 10-mm wrench.
7. Remove alternator **e**.
8. Remove roller **f** .

To reassemble the ALTERNATOR and FLYWHEEL group, carry out the above steps in reverse order.

To avoid bending the alternator shaft during reassembly, back off the 4 alternator fixing screws from its connector side, and tighten them again after completing the procedure.

7.14. DISASSEMBLING THE REAR HUB SUPPORTING FRAME

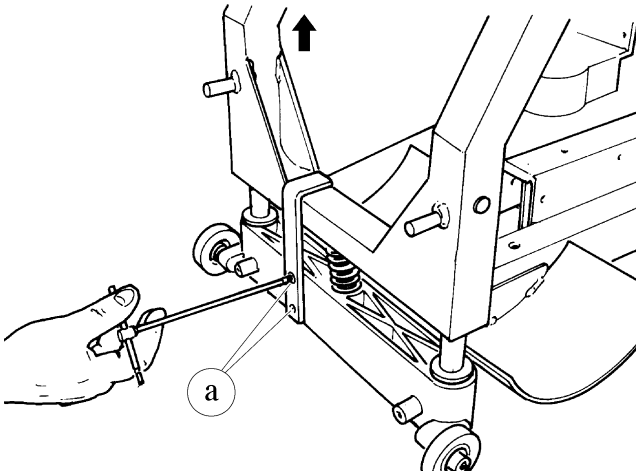

Figure 7.14-1

Carry out the procedure described in paragraph 7.8. "Disassembling the guard".

1. Unscrew the two screws **a** fixing the limit stop bracket to the machine frame using 4-mm hex T-wrench.
2. Remove the bracket.
3. Pull the REAR HUB SUPPORTING FRAME upward to remove.

To reassemble the REAR HUB SUPPORTING FRAME, carry out the above steps in reverse order.

7.15. DISASSEMBLING THE BUSHINGS

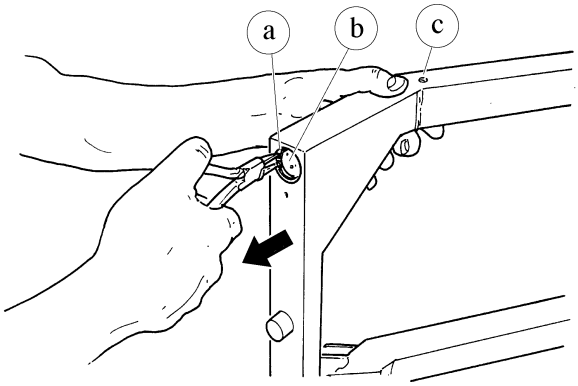

Figure 7.15-1

Carry out the procedure described in paragraph 7.14. "Disassembling the rear hub supporting frame ".

With the rear hub frame placed on a bench, and working from both sides:

1. Remove the snap ring **a** securing the BUSHINGS with the special pliers.
2. Remove the first BUSHING **b** and its spacer using a hooked tool.
3. Push through hole **c** until the second BUSHING comes out.

To reassemble the BUSHINGS, carry out the above steps in reverse order.

7.16. DISASSEMBLING THE RUNNER BARS

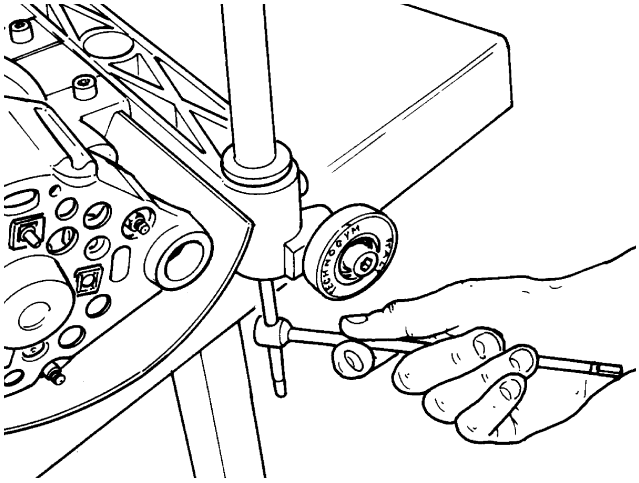

Figure 7.16-1

Carry out the procedure described in paragraph 7.14. “Disassembling the rear hub supporting frame ”.

For both RUNNER BARS:

1. Remove the screws which clamp the RUNNER BARS to the machine frame using an 8-mm T-wrench.

To reassemble the RUNNER BARS, carry out the above steps in reverse order.

7.17. DISASSEMBLING THE FRONT HUB SHOCK ABSORBERS

VersionA:

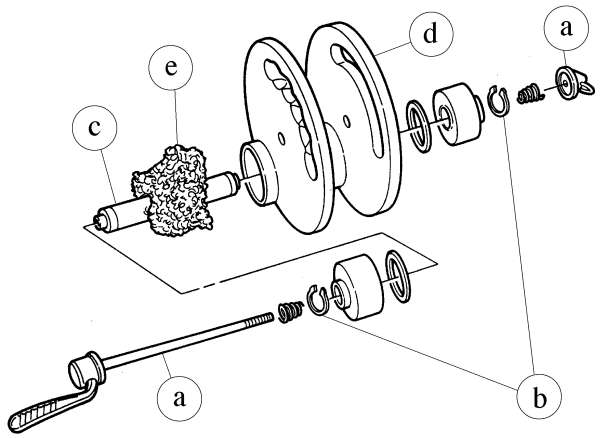

Figure 7.17-1

1. Turn off the machine and unplug the mains lead from the wall outlet.

2. Disassemble bicycle fork clamp **a**.
3. Remove snap ring **b** using the special pliers.
4. Remove pin **c**.

5. Working through the slot in support **d**, use a pointed tool to push out the 2 SHOCK ABSORBERS, knocking against the edges.

To reassemble the SHOCK ABSORBERS, carry out the above steps in reverse order.

Always reassemble the steel wool to ensure grounding of the bicycle frame.

Version B:

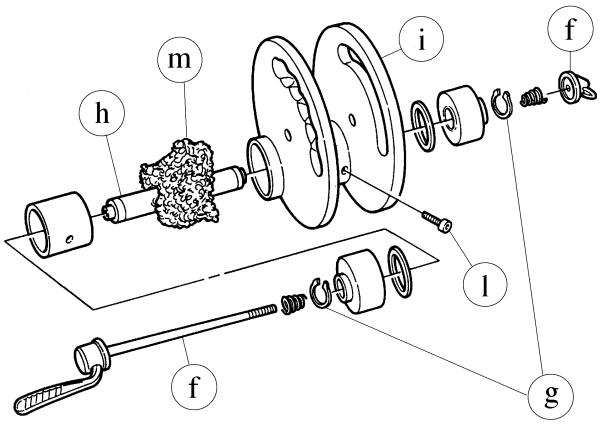

Figure 7.17-2

1. Turn off the machine and unplug the mains lead from the wall outlet.

2. Disassemble the bicycle fork clamp **f**.
3. Remove circlip **g** using the circlip pliers.
4. Pull out pin **h**.

5. Unscrew screw **l** using a 5-mm hex T-wrench.

6. Working through the slot in support **i**, use a pointed tool to push out the 2 SHOCK ABSORBERS, knocking against the edges.

To reassemble the SHOCK ABSORBERS, carry out the above steps in reverse order.

Always reassemble the steel wool to ensure grounding of the bicycle frame.

7.18. DISASSEMBLING THE ALTERNATOR BRUSHES

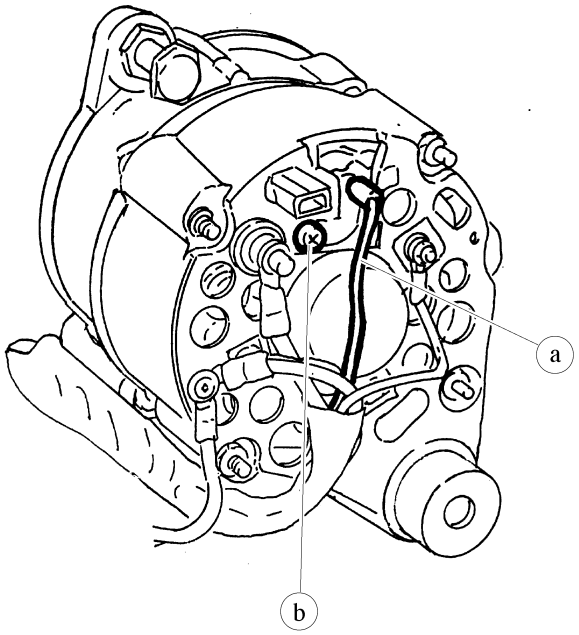

Figure 7.18-1

Carry out the procedure described in paragraph 7.8. “Disassembling the guard ”.

1. Disconnect alternator cable **a**.
2. Unscrew BRUSH group fixing screw **b**.
3. Remove the BRUSHES.

To reassemble the BRUSHES, carry out the above steps in reverse order.

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8. ADJUSTMENTS

8.1. WEAR OF BRUSHES

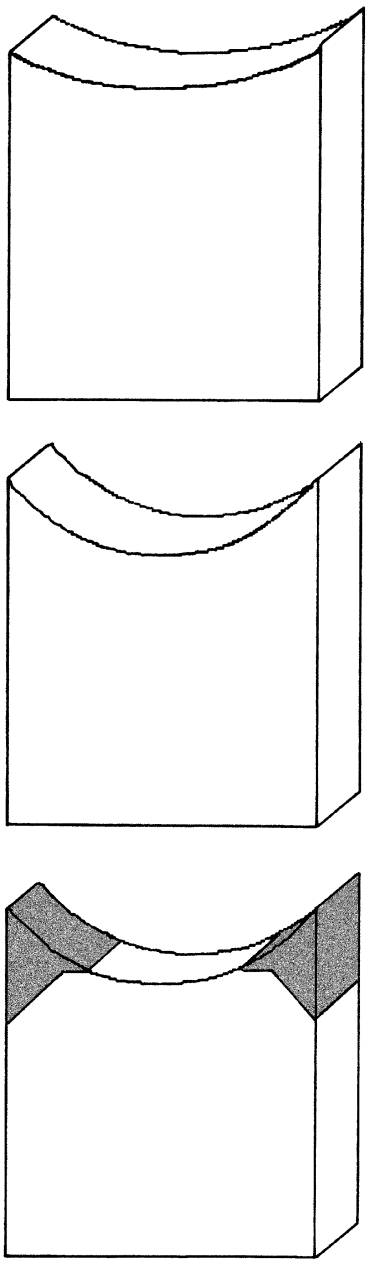


Figure 8.1-1

Carry out the procedure described in paragraph 7.18. Disassembling the alternator brushes".

- The brush shown in (A) is correctly worn.
- The brush shown in (B) is irregularly worn and may result in noise and wear of the alternator collector.

Using abrasive paper, eliminate the pointed edges as shown in figure (C).

8.2. CALIBRATION

The machine incorporates a power CALIBRATION function to ensure that the value shown on the display corresponds to the actual power produced by the machine.

The various methods for carrying out the CALIBRATION procedure are described in the "Operating and service instructions" of the machine. In the event of having to performing power CALIBRATION, it is recommended to follow the procedure below:

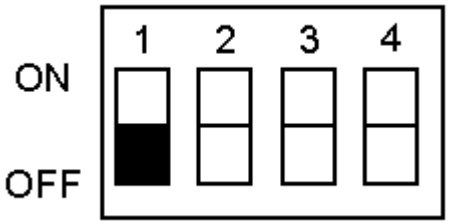
1. Turn on the machine and wait for it to enter standby mode.
2. Simultaneously press the **314** keys.
3. The machine will display the message "PSI?" or "ATM?" as a reminder to check the pressure of the rear tire. After checking the tire pressure, press "Enter".
4. The machine will light the LED corresponding to entry of the user's weight, and "0" will appear on the display: enter the value 75 Kg, or 165 lbs for US versions.
5. The entered value will appear on the display.
6. Press the "Enter" key to confirm or "Clear" to quit the procedure.
7. If the "Enter" key is pressed, a 5-second beep will indicate that the procedure has been successfully completed.
8. The machine is now calibrated.

9. CONFIGURING THE MACHINE

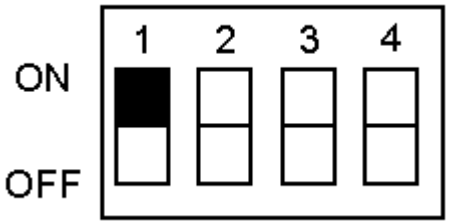
Carry out the procedure described in paragraph 7.1. "Disassembling the display" to access the dip-switches on the CPU board. Dip-switch configuration 1 enables the printout function.

9.1. ENABLE PRINTING

On the SW release not TGS, it is possible to enable the printing using dip-switch #1:



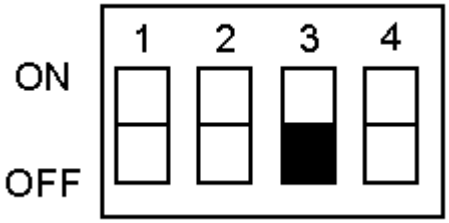
Printing **enabled**



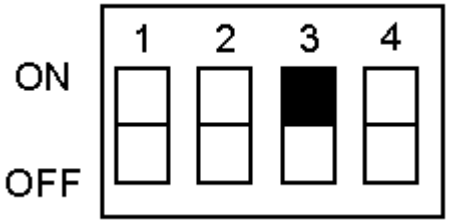
Printing **disabled**

9.2. UNIT OF MEASURE

Starting from release 2.2 TGS it is possible to set the unit of measure:



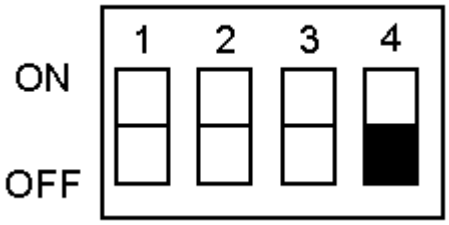
Weight in **Kg** and speed in **Km/h**



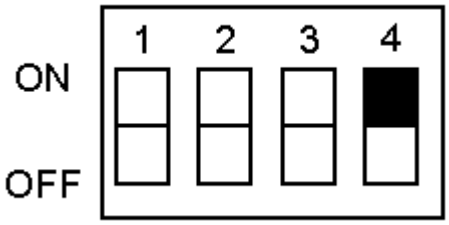
Weight in **lbs** and speed in **mph**

9.3. MESSAGES ON LED MATRIX

Starting from release 2.2 TGS it is possible to select how some messages will be shown on the LED matrix: IP or PI stands for Performance index and PSI or ATM is a reminder to check the pressure of the rear tire.



The matrix will show **PI** and **PSI**



The matrix will show **IP** and **ATM**

10. SCHEDULED MAINTENANCE

To keep the machine in perfect working order, carry out the scheduled maintenance operations specified in the table below:

	CLEANING	LUBRICATION
MACHINE EXTERIOR	weekly **(A)**	
MACHINE INTERIOR	monthly **(B)**	
REAR RUNNER BARS		yearly **(C)**
REAR ROLLERS	monthly **(D)**	

These operations must be carried out with the machine turned off and the mains lead unplugged from the wall outlet.

The scheduled maintenance operations are described below:

(A) EXTERNAL CLEANING

Carry out every week. For this operation, use only a mild detergent. Be careful never to spray the product directly onto the machine: use it to moisten a cloth.

(B) INTERNAL CLEANING

Carry out every month. Open the chain guards (see paragraph 7.8.), remove the footboard (see paragraph 7.9. and use a vacuum cleaner or compressed air to thoroughly clean the interior, taking special care with the alternator and the electronic circuit boards.

(C) LUBRICATION OF REAR RUNNER BARS

Carry out once a year. Open the rear guard (see paragraph 7.8.), remove the rear hub supporting frame (see paragraph 7.14.) and clean the two vertical runner bars and the bushings inside the disassembled support frame using a cloth moistened with alcohol. Finally, lubricate using generic grease (lithium grease recommended).

(D) CLEANING THE REAR ROLLERS

Carry out every month. Open the rear guard (see paragraph 7.8.) and clean the rear roller(s) to remove the rubber residue left by the tire, rubbing with a cloth moistened with alcohol and non-abrasive chemical products. Carry out more frequently if the wear on the tire leaves a quantity of residue which can impair pedaling.

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11. APPENDIX

11.1. TECHNICAL NOTES ON CARDIO RECEIVERS

The receiver shown in the figure below is equipped with:

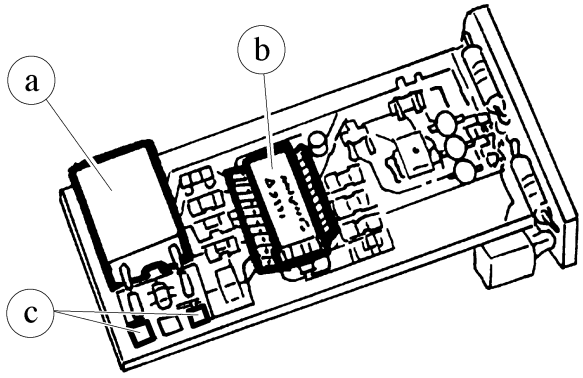


Figure 11.1-1

- an antenna **a**, designated the "coil", which receives the signal from the transmitter strap worn by the user.
- an integrated circuit **b**, designated the ASIC, which has the function of filtering the analog signal and generating a pulse train corresponding to the received heart rate.
- two contacts **c** parallel to the coil, on which a 15 KOhm resistor is sometimes mounted.

The following paragraphs contain various suggestions regarding the cardio receivers, which may be useful for improving the reception of the cardio signal.

11.1.1. TYPE OF ASIC

The cardio receivers can be equipped with 3 different ASIC models, identifiable by the code marked on the component: MAS, FTC or HRRE. These ASICs are characterized by different reception ranges and different levels of immunity to noise. Tests have determined that the maximum reception distances are as follows:

ASIC	DISTANCE (cm)
MAS	90
FTC	100
HRRE	85

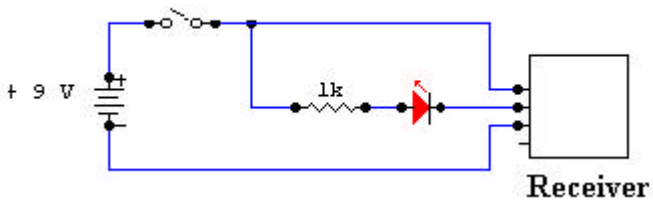
As regards sensitivity to noise, the best ASIC is the HRRE model. This ASIC is also the one recommended by the manufacturer.

11.1.2. PRESENCE OF ELECTROMAGNETIC FIELDS

The receiver is sensitive to electromagnetic fields produced by the switching of LEDs, motor brushes, the commutation of power devices, monitors, neon lights, stereo equipment, etc., which can impair its operation. It has been found that such electromagnetic fields directly affect the analog part of the receiver (detected by the coil) whereas they have no effect on digital components such as the CPU receiver connecting cable.

Electromagnetic interference can take two different forms: on the one hand, the receiver may detect and hence generate spurious transients, or on the other hand the receiver may become saturated. The presence of transients is generally accompanied by irregular blinking of the heart rate LED on the display, but does not affect the value shown which is processed by special SW filters. Saturation of the receiver, on the other hand, is a phenomenon which, depending on its intensity, can reduce the maximum reception distance until it becomes completely impossible to receive a signal.

In the presence of electromagnetic interference, use the frequency signal monitor shown in the schematic below to determine the presence, intensity and effect of the fields.



This circuit causes the LED to light for every heart beat and/or transient detected: in this way it is possible to determine whether there is electromagnetic noise, and identify its source.

The only effective solution in the presence of electromagnetic interference is to reduce the power of the noise source, using a trial and error method based principally on:

- Shielding the noise source.
- Increasing the distance between the noise source and the receiver, if necessary by changing the position of the machines.

It is also possible to reduce the receiver's ability to detect interference by:

- Changing the position of the receiver;
- Reducing the sensitivity of the receiver (see paragraph 11.1.3.)
- In some cases, it was found to be effective to screen the receiver inside a tagger box having a thickness of 0.15 mm.

Please note that these are merely some possible suggestions, and that the effectiveness of the chosen solution must be verified in practice.

11.1.3. REDUCING RECEIVER SENSITIVITY

It is possible to diminish the receiver's sensitivity in order to reduce its range of reception. This solution is recommended in the following cases:

- presence of electromagnetic fields which interfere with reception or saturate the receiver;
- problems due to interaction between the receiver on one machine and the signal transmitted by a user training on another machine that is too close and cannot be moved farther away.

Sensitivity is reduced by soldering a resistor in parallel with the coil. Normally, the receiver already has a 15 KOhm resistor mounted in series with the coil, however it is advisable to check for its presence.

The following table shows the nominal values of reception distance based on the value of the resistor soldered on the coil:

RESISTANCE (Ohm)	DISTANCE (cm)
15K	89
13K	88
11K	87
9K1	85
6K8	84
5K1	81
3K	74
2K	69
1K	57

Please note that these are only nominal values. The actual reduction in sensitivity must be verified experimentally, taking great care not to excessively reduce the reception distance.

WARNING: if there is already a 15 KOhm resistor mounted in parallel with the coil, note that adding another resistor in parallel will produce a total resistance value equivalent to the parallel combination of the added resistor and the existing 15 KOhm resistor.

11.1.4. MECHANICAL VIBRATIONS

Mechanical vibrations may cause slight shifting of the coil, giving rise to transient pulses. If these transients occur only occasionally they can be easily filtered by SW. However, if the mechanical vibrations are periodic, they can produce periodic pulses which may be interpreted as correct heart rate values.

To eliminate or reduce the effects of vibration, house the receiver between the foam pads in such a way that any vibrations are correctly damped.

WARNING: in the case of foam pads and receiver secured by a strap, do not tighten the strap excessively as this may reduce the damping capacity of the foam pad.

11.1.5. POSITION OF THE RECEIVER

Carefully position the receiver according to the specifications below:

- the coil must be directed toward the user;
- the coil must be positioned well away (even a few centimeters) from the LEDs;
- the cable must be folded immediately after the connection on the receiver, so that it does not pass near the coil;
- the receiver must be directed in such a way that its axis of reception, shown in the figure below, is parallel to that of the transmitter, shown in the figure below too:

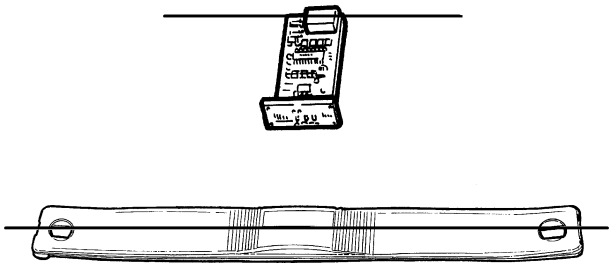


Figure 11.1-2

Please note that even a slight departure from the above specifications may considerably impair the accuracy of reception.

The optimal configuration is therefore that shown in the figure below:

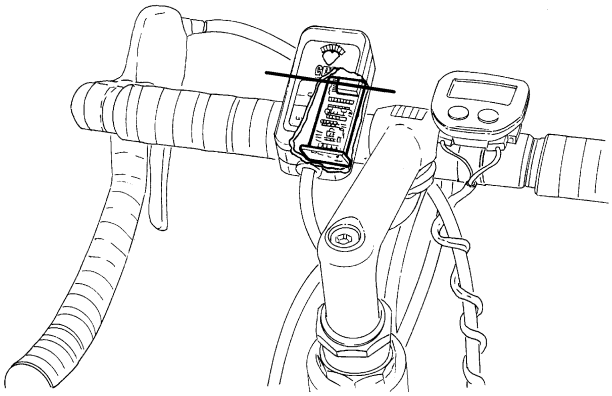


Figure 11.1-3

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