How to use the TPM-02

CONTROL, DIAGNOSIS AND CODING TOOL
FOR TPMS SYSTEMS

Operating Instructions
(ENGLISH)

Produced by TECNOMOTOR S.p.A

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Foreword

Dear Customer,

Thanks for choosing our product. This product has been designed to give you years of satisfactory service. To ensure this, please read this User Manual thoroughly before using the product and keep the manual in a safe place for future reference.

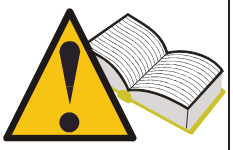
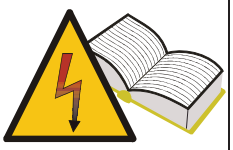
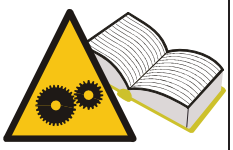
Our exhaustive range of products sets a new standard in TPMS (Tire Pressure Monitoring System) diagnostics while offering an aesthetically pleasing design.

All of our products are designed and manufactured to the highest quality standards.

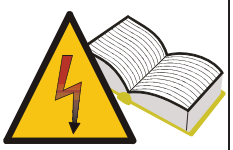
TPM-02 will prove an indispensable tool for:

- Checking sensor operation before servicing the tires (when vehicle is brought in for service or repair).
- Establishing proper operation of the TPMS system when the customer picks up the vehicle.
- Determining why the “Tire Pressure” (TPMS) light turns on.
- Ensuring that sensor provides accurate pressure and temperature readings.
- Measuring the pressure of wireless tires (with no need to unscrew valve cap and connect a compressed air line with pressure gauge).
- Enabling time-saving, safe repair procedures with reference information (such as torque figures or part numbers) always handy to avoid damage due to improper procedures.
- Ensuring that sensors are refitted in their original positions after service (positioning tool)
- Perform a TPMS coding operation after a sensor replacement.

1. Symbols used in the manual

	This symbol calls attention to important information concerning operation and safety.
	This symbol calls attention to important information and tips aimed at ensuring proper operation of the equipment.
	This symbol calls attention to important instructions concerning maintenance of electrical parts.
	This symbol calls attention to important service instructions.

2. Safety rules

	**To recharge the equipment, it is <u>mandatory</u> to use the power supply unit supplied by Tecnomotor S.p.A. Item No. 1800155. Tecnomotor shall not be liable for damage to equipment in the event other power supply units are used.**
	This appliance has been designed and tested to ensure safe operation. The user is required to observe the information and warnings provided in this manual to ensure safe operation and preserve the safety features of the appliance.
	WARNING : For equipment package maintenance and handling after equipment installation, the provisions of Legislative Decrees DDLL 626 of 19/9/94 and 242 of 19/3/96 apply. Use appropriate tools to open package.

CAUTION : USE UTMOST CARE !!!
Do not allow operation of this equipment by unqualified persons. It is the owner's responsibility to keep warning labels and rating plates clean and legible.

This manual is subject to changes and updates.
Be sure to read the update and customization instructions included in this manual.
The manual is divided into sections for ease of reference. Manual instructions - especially those concerning maintenance - are intended for use by specialized technical personnel with good knowledge of mechanics, electromechanics or of the operation of computerized unit-based systems. The system has been designed to facilitate operation and troubleshooting, with a wide range of display messages providing detailed indications to help locate problems.

Please read these instructions carefully before operating the equipment.
Collect this manual and all literature supplied with the equipment in a file folder and keep it with the machine where operators can easily access it.

Make sure installation has been performed in compliance with all applicable regulations and standards.
Read this manual carefully and learn how to use the equipment properly and safely.

Be sure to observe applicable accident prevention rules when operating and servicing the equipment.
In the event of unauthorized changes to the equipment, the manufacturer shall not be liable for any resulting damage or incident. Please note that bypassing or removing safety devices is in violation of workplace safety rules in force in the user's country.

CAUTION
Changes or modifications not expressly approved by the party responsible for compliance with the FCC Rules could avoid the users' authority to operate this equipment.

3. Upon receipt

Upon receipt, check packing and product components for damage in the presence of the carrier. Liability for transport damage attaches to the forwarding agent or carrier. Report any damage, giving details of the nature and severity of the damage, in the shipping document and file a claim against forwarding agent or carrier.

4. Package contents

Package contains:

- 1 TPM-02 sensor tester
- 1 USB connection cable for PC connection
- 1 CD-ROM with product update utility
- 1 externatl Power Supply.

4.1 OBD Option

Through this optional it is possible to connect the tool to the ECU of the vehicle in order to carry out the following procedures:

Flashing the ECU when the sensor is replaced
Flashing the ECU when rotating the tires
Adjust when possible the alarm threshold, set the winter tires etc.
Read and delete the malfunctions

The optional kit includes a SD card and intelligent OBD cable

5. Maintenance and care

Please follow these instructions to avoid malfunction or unexpected failures:

- Do not drop or knock the equipment.
- Avoid spilling fluids on the equipment.
- Do not use batteries other than those specified in this manual.
- Do not service the equipment when it is in operation.
- Do not clean the equipment when it is in operation.
- Keep the package for safe handling

6. How to power on/off the equipment

Touch the key to power on the equipment.

Touch key to power off the equipment. The equipment will power off automatically when no buttons have been pressed for 10 minutes to save battery life.

7. Recharging the equipment (par.7)

The batteries placed inside the equipment are charged. ***The equipment may only be recharged using power supply .*** In the event the equipment should run fully flat, it will take about 3 hours to fully recharge it.

8. Settings

Step	Screen page	Description
1		Select option **SETUP** from the main menu page
2		Selecting LANGUAGE user can choose from: French, Italian, English, Portuguese, Spanish and German
3		Selecting MEASURMENT UNIT user can select it for different parameters. Pressure (bar / psi / KPa) Temperature (C/F) Torque (Nm / FtLbs)
4		Selecting COUNTRY it's possible to setup the Operating Frequency of the tool. USA (315Mhz) EUROPE (433Mhz)

5		Selecting ALARM it's possible to enable or disable SOUND and VIBRATION
6		Selecting RELEASE the tool will show software infos: FW VERSION DB VERSION SERIAL: XXXXXX

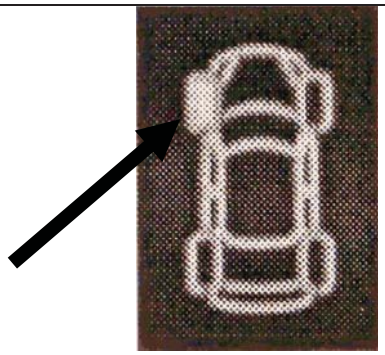
9. What is a TPMS system?

The TPMS or Tire Pressure Monitoring System continually monitors tire pressures and temperatures and sends the information to the body computer to have it displayed on the instrument panel. The system is made up of an ECU placed inside the cab that receives radio frequency pressure and temperature signals from four sensors installed inside the tires.
When the vehicle is running, the sensors transmit their signals every 20-30 seconds approximately. In the event of a significant pressure variation, transmission interval is shortened to 8-10 seconds.
When the vehicle is at standstill, transmission interval may vary between 10 and 40 minutes, depending on the type of sensor installed.

10. TPMS indicator lights

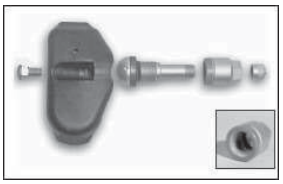
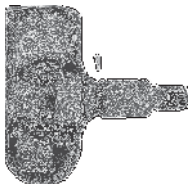
Outlined below are the most significant TPMS indicator lights.

Depending on the type of vehicle, this light may indicate one of the following conditions: • Turns on to indicate that the pressure of one or more tires is above or below the specified rated pressure. • Turns on to indicate a TPMS malfunction (for instance, when one of the sensors is malfunctioning). • Light operation may vary to differentiate indications when tire pressure has crossed the warning or alert thresholds.	

Tire location indicator This light indicates the location of the under- or overinflated tire. The light may be associated with a display message.	
Display messages	"Check tire pressure"
Audio Alarms Audio alarm for wrong tire pressure or TPMS malfunction	

11. Type of sensors

Sensors may be grouped into two broad categories, depending on whether they are incorporated into valve body or not as shown in the table below.

	**Design 1** The valve shown in the figure is made up two elements: - pressure sensor - valve body Valve body is made up of four elements: retaining screw, valve, nut and valve cap.
	**Design 2** The valve shown in the figure is a single component that incorporates both pressure sensor and tire valve. This valve design also features a grommet/O-ring (to keep air from escaping past the hole in the rim), a nut and the valve cap.

In design 1, valve and sensor may be replaced separately when needed; in design 2, valve and sensor are replaced as a set.

12. How to position the equipment

The equipment incorporates a low-frequency antenna to transmit sensor data. An arrow ⇧ on the top panel of the equipment shows where the tip of the antenna is located. In order to properly energize the valve, the equipment must be aligned with valve body as shown in the figure below. Anyway, the equipment must be placed over the tire and tilted towards valve body.

Correct position

This set-up ensures the ideal condition for low-frequency data transmission to the sensor installed inside the tire. Other set-ups, like that shown in the next figure, could lead to noise between equipment and valve. This prevents communication between the two and makes accurate sensor diagnosis impossible.

WRONG position

13. Functions

13.1. Keypad

The equipment is equipped with a 7-button keypad featuring:

1) On/Off button to power on and off the equipment
2) Up, Down, Left e Right arrow buttons for browsing
3) Enter button to confirm selection or acknowledge display messages
4) Esc button to go back to previous menu or cancel an operation in progress.

13.2. Sensor Test

When you select this function, the tester will attempt to actuate the sensor and configure the receivers to verify correct valve data transmission.

Step	Screen page	Description
1		Select option **TPM CHECK** from the main menu page
2		Select vehicle make
3		Select vehicle model

4		Select vehicle's year of manufacture
5		Select **Sensor Check**
6		The tester will attempt to actuate the sensor by sending it a low-frequency signal.
7		If the tester receives the correct data from the valve, it will beep and display pressure, temperature, battery state and ID (identification code). Press Enter to go to the next menu.
8		This menu offers the following options: • **ESC** to go back to tester main menu. • CHECK to repeat the test without going back to main menu in the event the tester was unable to communicate with the sensor. • lets you save the test to tester memory.

Step 7: In some cases, the sensor will transmit data if it senses a pressure variation of a least 0.2 bar in the tire. When the tester shows a message reading **Deflate tire**, it means that you need to induce a pressure variation in order to enable valve data transmission.

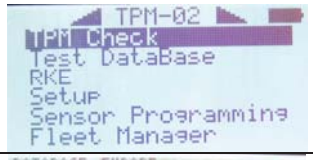
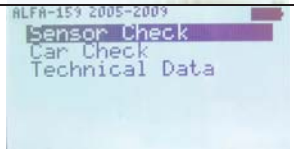
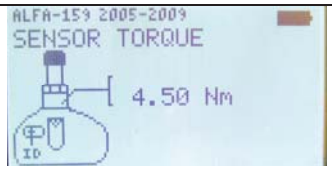
Step 7 : If the tester receives data in the wrong format but signal is the correct frequency, message "**f=433MHz Sensor not recognized**" is displayed. If the tester did not receive the frequency signal either, message "**No signal received**".

Step 8: When ID and pressure data is not displayed, the sensor is likely to be malfunctioning. To determine whether the sensor is actually faulty, test the other vehicle sensors; if ID and pressure values from the other sensors are displayed correctly, the sensor is faulty.

Step 8: battery state "ko" means that sensor battery is flat and sensor must be replaced. Battery state "vv" means that the battery is not fully charged; when this is the case, you might want to replace the sensor to be on the safe side; definitely replace the sensor if the customer claimed intermittent TPMS light operation. Battery state "ok" means that sensor battery is in good working order.

13.3. Tightening Torques

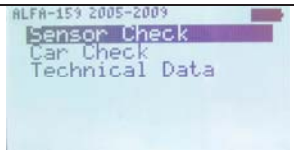
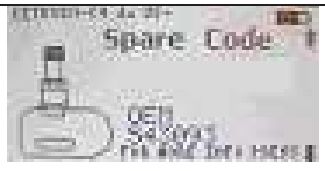
This function provides an overview of sensor and wheel tightening torques; overtightening may cause irreparable damage sensor and wheel rim.

Step	Screen page	Description
1		Select option **Select vehicle** from the main menu page
2		Select vehicle make
3		Select vehicle model
4		Select vehicle's year of manufacture
5		Select **Technical Data**
6		The tester displays: • **Sensor TRQ** Tightening torque for pressure sensor **Sensor SCR**[1] Tightening torque for retaining screw of pressure sensor valve body.

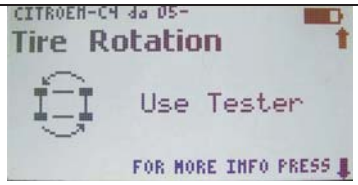
7		Clicking 3 time on the down arrow will show also the **Wheel TRQ**

[1] Sensor screw tightening torque is only provided for design 1, see paragraph 10 in this manual.

13.4. Part Number

Step	Screen page	Description
1		Select option **Select vehicle** from the main menu page
2		Select vehicle make
3		Select vehicle model
4		Select vehicle's year of manufacture
5		Select **Technical Data**
6		Select 4 times More info press ⬇ The tester displays the part number of the appropriate valve for the selected vehicle. OEM part numbers are displayed.

13.5. Tire Rotation and Sensor Replacement

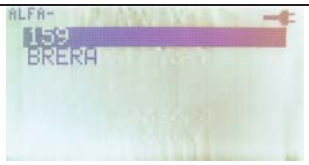
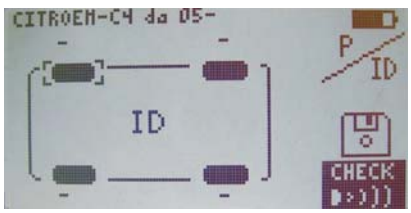
Step	Screen page	Description
1		Select option **TPM CHECK** from the main menu page
2		Select vehicle make
3		Select vehicle model
4		Select vehicle's year of manufacture
5		Select **Technical Data**
6		Select More info press ⬇
7		This calls up a menu with the following options: • "TYRE ROTATION" provides information on what tool or technique should be used when rotating sensors.
8		• "SENSOR REPLACEMENT" provides information on what tool or technique should be used when rotating sensors.

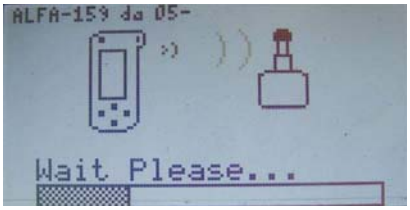
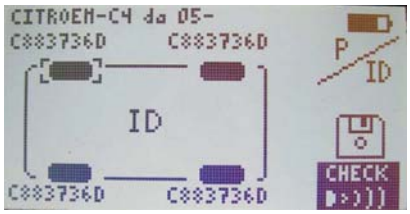
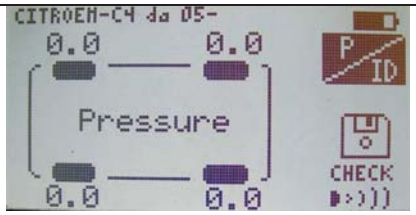
Step 6 and 7 - Possible indications are:

- “Tester”: it indicate that it is necessary to flash the ECU of the vehicle through OBD (p.n. 8-64500013)
- “Manual”: it indicates the a manual procedure exists and then it is necessary to check the vehicle book
- “Drive”: This means you need to drive the vehicle at steady speed for a few minutes (refer to vehicle manual)

13.6. Car Test

To promote transparent customer relationships, this function may be used to establish correct operation of tire sensors when your customer brings in the vehicle for service or picks it up.

Step	Screen page	Description
1		Select option **TPM CHECK** from the main menu page
2		Select vehicle make
3		Select vehicle model
4		Select vehicle's year of manufacture
5		Select **Car Check**
6		Through the arrow keys select the tire to be tested. Press Enter to confirm when You are ready.

7		The tester will attempt to actuate the sensor by sending it a low-frequency signal.
8		If the tester receives the correct data from the valve, it will beep and display pressure, temperature, battery state and ID (identification code). Press NEXT TYRE to test the next wheel; press Esc to return to step 6.
….		Steps 6 through 8 are repeated to test the other vehicle wheels.
18		The tester displays a screen page with ID.
19		Is possible to see also the pressures collected ,selecting P ID Once the tester is finish, is possible to save it into the test database selecting
The latter case is likely due to an oversight during the test procedure. Two valves with the same ID installed on the same vehicle are a rare occurrence.		

14. Test database

This function lets you manage, view and repeat any tests performed during past sessions.

14.1. Vehicle Data Log:

This function lets you view Vehicle Test results saved during past sessions. You may also use the "Location Test" function to determine whether the sensors installed on the vehicle are still in the same positions as when the test was saved.

Specifically, you may perform the "vehicle test" when the vehicle is brought in (as outlined in paragraph 12.6) and save the test; upon vehicle delivery, you may call up the vehicle log and check - together with the owner - that sensors are operating properly and are still in the same positions as when the vehicle was brought in. This way, you can establish that any TPMS malfunction has nothing to do with tire repair.

14.2. Sensors Data Log:

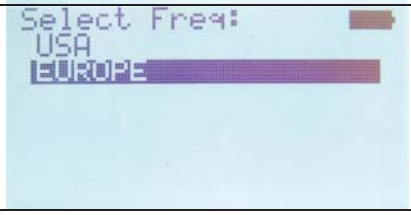
This function lets you view Sensor Test results.

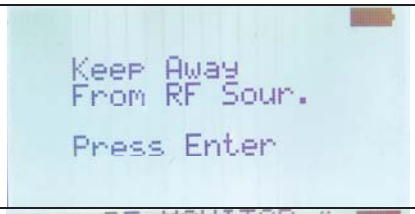
14.3. Upload to PC:

This function lets you upload all data stored in the tester to your PC via the USB port.

15. Vehicle remote control test

The purpose of this function is to check radio frequency data transmission from vehicle remote control devices and battery charge. To ensure accurate test results, perform this test well away from any radio frequency signal sources.

Step	Screen page	Description
1		Select option Remote Test from the main menu page RKE
2		Select frequency

3		A message to move away from other radio-frequency source, such as automatic gates, wireless devices, is displayed. Then press ENTER
4		The diagnostic tester will display RF monitor as well as the number of data received on frequency in use. Press ESC to exit

16. Sensor installation/removal procedure

16.1. Maintenance equipment required for TPMS-equipped tires

TPMS-equipped wheels normally use low-section tires with high speed rating or run flat tires, either self-supporting or auxiliary-supported (PAX System or SR Support Ring tires with insert). Tire installation/removal procedures are similar to those for conventional tires, except for auxiliary-supported run flat tires.

To install and remove TPMS-equipped wheel tires, we recommend using the latest tire changers which are especially suited to install low-section tires or large-size tires on alloy wheels. It is essential that the tire changer be equipped with plastic pressure rollers so as to ensure correct pressure during installation without damage to wheel rim, sensor and tire bead. Shown in the picture is a tire changer suitable for TPMS-equipped wheels.

For auxiliary-supported run flat tires (PAX System or Support Ring) equipped with TPM sensors, you will have to use tire removal/installation equipment approved by the tire manufacturer. These tires require special accessories and the installation/removal procedures are different from those used for standard tires.

Follow the installation and removal instructions and procedures provided by the manufacturers of tire, sensor, vehicle and tire removal/installation equipment. The information provided herein is general information applicable to most sensors found in the market.

In addition to the appropriate tire changer, when you change sensors you will also need suitable sensor replacement kits that include one or more wrenches, O-rings, valve caps in different colours, valve body and valve insert. Kit contents may vary depending on sensor type (see paragraph 10.0) and brand.

16.2. Sensor replacement

Installation and removal procedures vary slightly depending on sensor model.
A standard procedure for the valve-and-sensor assembly configuration (design 1, paragraph 10) may be as follows:

1. loosen the retaining screw so the sensor can move freely.
2. unscrew the nut completely
3. remove valve body from its seat; the sensor must be free to move otherwise the valve will not come off.
4. unscrew the retaining screw and remove valve body.

For incorporated sensors (design 2, paragraph 10), simply perform steps 2 and 3 of the above procedure.

A standard procedure for the valve-and-sensor assembly configuration may be as follows:

1. Obtain a complete replacement kit including TPM sensor and all other parts (valve body, retaining screw, nut, valve cap).
2. Insert valve and O-ring into valve seat. Install the nut to retain valve to wheel rim, but do not tighten yet. The nuts have a small plastic grommet inside that must be sheared upon final tightening. When the nut becomes hard to turn, stop.
3. Install sensor onto valve body and secure it with the retaining screw. These sensors can be installed at varying angles to accommodate different rim configurations. Before final tightening, look up the sensor manufacturer's instructions to make sure that torque is correct, that sensor is in the correct position (i.e. touching the wheel rim or not) and that the external portion of the sensor is below bead seat. If these requirements are not met, the sensor might damage during tire installation.
4. Tighten the valve nut firmly (the grommet inside the nut must break) to the torque specified by the sensor manufacturer.
5. Install the tire.

Standard procedure for incorporated sensor (design 2)

1. Make sure the O-ring is in place on the valve body and insert it into the rim hole.
2. Fit the nut to secure the sensor into place so that is parallel with the rim and tighten to the torque specified by the TPMS manufacturer.
3. Install the tire.

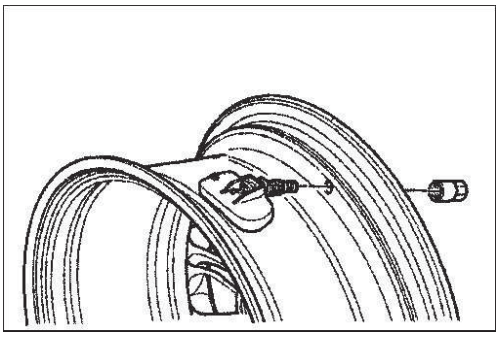


Fig 01

For valve-and-sensor assemblies, replace valve body, screw and nut, O-ring, valve insert and valve cap each time tire is replaced or serviced. For incorporated sensors, replace valve insert, nut, O-ring and valve cap. Appropriate replacement kits are available from TPM sensor manufacturers.

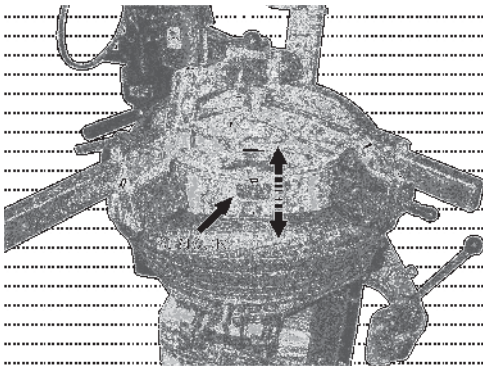
You may retrieve the correct tightening torques for sensor installation and view them on tester display using the function described in paragraph 12.3 "Tightening torques".

Manufacturer (OEM) part numbers for sensors may be viewed on tester display using the function described in paragraph 12. " Part Number".

Check sensor for proper operation before refitting the wheel to avoid removing the wheel again in the event the sensor needs to be replaced.

16.3. Servicing the sensor with the tire installed.

The instructions outlined above require tire removal. Some tire changers equipped with double rollers enable sensor inspection and replacement with no need to remove the tire. If you have this type of equipment, please refer to the manufacturer's instructions.



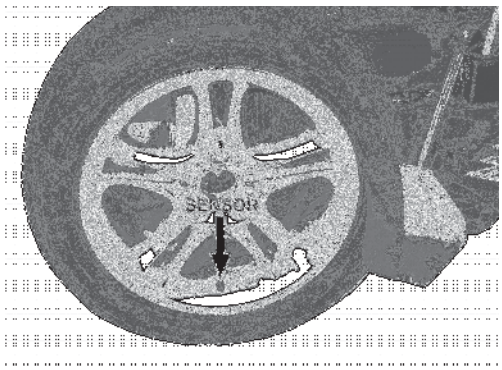
17. Tire removal

TPMS-equipped wheels with internal sensors must be handled with great care during tire removal and installation procedures. A suitable tire changer and proper bead lubrication will greatly facilitate these operations.

Test sensor for proper operation before proceeding.

17.1. Breaking the bead

Remove valve cap and insert and wait until tire deflates before breaking the bead.
Many bead breakers use a blade to break the bead loose from the wheel; with this kind of equipment, position the wheel so the sensor is at 6 o'clock before beginning. If the bead does not break loose at the first attempt, remember to insert the bead breaker blade away from sensor body throughout the procedure. If you are using a bead breaker with rollers, make sure the roller will not push the bead into the wheel well or the bead might hit the sensor during rotation.

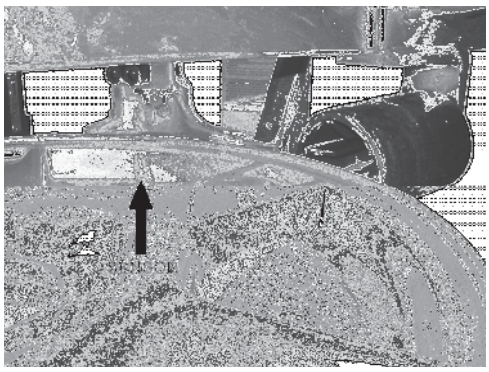


If you are using a blade-type bead breaker, make sure the blade is well away from the sensor. Otherwise, the blade might push the tire bead into the wheel and it might contact and damage the sensor.

If you are using a bead breaker with rollers, make sure the tire bead is not pushed too deep into the wheel well as it is stretched around the wheel rim, or it might damage the sensor.

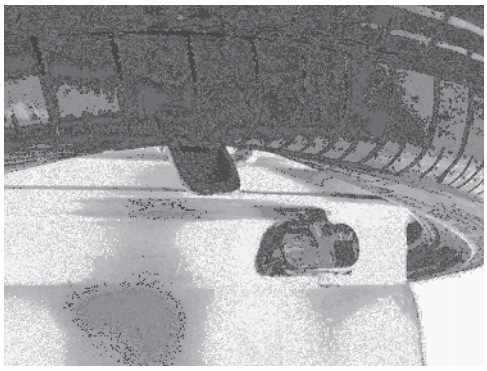
17.2. Breaking the upper bead

Lock the wheel onto the tire changing equipment - fitted with plastic shoes if servicing a light alloy wheel - lubricate the bead and position the head so that the sensor is just behind or under the head. Break the bead using the plastic-guarded lever and place bead over head chisel. Slowly turn the wheel clockwise keeping distance between bead and sensor steady.



17.3. Breaking the lower bead

To break the lower bead, place the head just before the sensor. Pry the tire bead up and over the head chisel, be careful not to hit the sensor. Slowly turn the wheel clockwise until prying out the tire. Check sensor for damage.



17.4. Tire installation

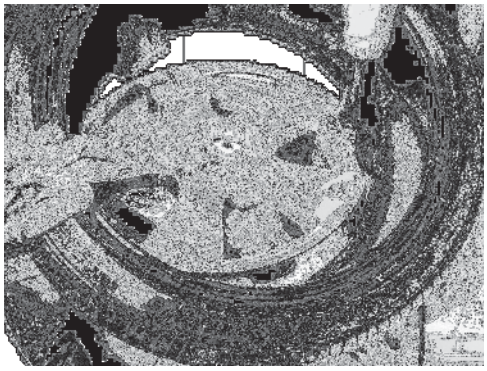
Before installing the tires, check for the following:

- Wheel rim must be in good condition, sensor and air valve must be in the correct position.
- Always replace valve insert, valve nut and O-ring.
- Make sure wheel and tire match before mounting.
- Clean the bead contact area on the wheel rim.
- Lubricate the bead seat and both tire beads using suitable lubricant for touring cars.

Strictly follow the tire manufacturer's recommendations to ensure the rims you select are correct for the rim.

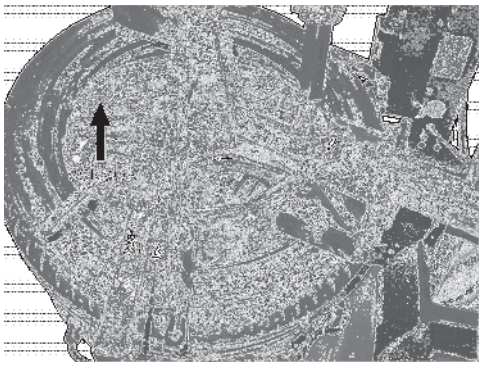
17.5. Seating the lower bead

Place the wheel rim on the tire changer, position it with the sensor at 9 o'clock and lock the rim. Position the tire on the rim and move the head to its working position. Place the bead over the rear end of the head and pry the tire into the wheel well. The sensor should be safely positioned halfway between the seating area on the head and the wheel rim. Slowly rotate the wheel until seating the bead.



17.6. Seating the external bead

Place the sensor nearly at 9 o'clock with respect to head. These tires normally have stiff sidewalls and it might be convenient to use pressure rollers (positioned as shown in the picture) to pry the bead under the wheel well edge.
Slowly rotate the wheel until seating the bead.



Follow the instructions provided by the manufacturers of tyre changer, tire and sensor. Inflating the tire involves potential risks to operator safety; follow the instructions of tire and sensor manufacturers.

Check sensor for proper operation before refitting the wheel to avoid removing the wheel again in the event the sensor needs to be replaced.

When you have installed all four wheels, check that sensors are in the correct positions using the "Location Test" function (see paragraph 12.5 of this manual.)

18. Hardware and software requirements for update/data upload PC.

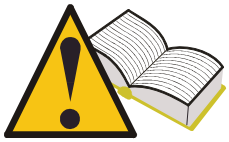
- Processor: > Pentium II.
- Hard Disk: > 2 GB (500MB necessary)
- Operating system: Windows 98SE or higher
- 128 MB RAM
- USB ports 1.1 or higher
- Internet access to download Sw up-dates

19. UP DATING THE TOOL (PRENDERE PARTE AGGIO TPM1)

The tester needs to be updated at regular intervals in order to diagnose and display the data of new vehicles and sensors introduced in the market.

- Connect the USB cable from the PC port to the suitable connector located at the top of the tester.
- Power on the tester after connecting the USB cable.
- Launch the update utility you will have installed on the PC, select **UPDATE** and follow the on-screen instructions.
- When finished, return the tester to its original condition and close the battery holder.

In order to update the tester, you will need a PC with the software supplied on the CD-ROM installed, Internet access and a password. Obtain the password from your supplier.



The password is associated with the serial number of your tester and the database release you want enabled.

If after updating the tester you select a vehicle and get "Vehicle not available - Contact Service", it means you have used a password for an older release than that of the current database on the tester. Contact your supplier to obtain the latest release password

NOTES: