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*Config.: Hi-Pave-PRCS-OUT-MN*

# ***Hi-Pave System Assembly***

## **User Manual**

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## ***Hi-Pave – User Manual***

*Pisa, December 2011*

**KEYWORDS:** HI-PAVE, ENCODER, ANTENNA, FRAME

**SUMMARY:** This manual explains the procedure of assembling the Hi-Pave GPR system in all its parts.

<i>Document Evolution</i>		
Revision	Date	Reason of change
Rev. 1.0	18/02/2011	First Edition
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<i>Versions covered by this document</i>

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## SAFETY INFORMATION

The equipment conforms to the following requirements set by EC regulations, including subsequent modifications, and to the legislation set by the member states that implement these regulations:

### *1999/05/EEC Radio Directive*

Warning: this equipment is destined for use in industrial environments (Class A apparatus). In residential, commercial and light industry environments, this apparatus may generate radio interference: in this case, the user may be required to operate while taking appropriate countermeasures.

The apparatus is sensitive to the presence of external electromagnetic fields, which may reduce its performance.



## IMPORTANT NOTE FOR THE US CUSTOMERS

### FCC ID: UFW-HR2000NA

This device complies with part 15 of the FCC Rules:

Operation is subject to the following conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, Including interference that may cause undesired operation

**Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.**

Operation of this device is restricted to law enforcement, fire and rescue officials, scientific research institutes, commercial mining companies, and construction companies. Operation by any other party is a violation of 47 U.S.C. § 301 and could subject the operator to serious legal penalties.

### Coordination Requirements.

(a) UWB imaging systems require coordination through the FCC before the equipment may be used. The operator shall comply with any constraints on equipment usage resulting from this coordination.

(b) The users of UWB imaging devices shall supply detailed operational areas to the FCC Office of Engineering and Technology who shall coordinate this information with the Federal Government through the National Telecommunications and Information Administration. The information provided by the UWB operator shall include the name, address and other pertinent contact information of the user, the desired geographical area of operation, and the FCC ID number and other nomenclature of the UWB device. This material shall be submitted to the following address:

*Frequency Coordination Branch., OET*

*Federal Communications Commission*

*445 12th Street, SW*

*Washington, D.C. 20554*

*ATTN: UWB Coordination*

(d) Users of authorized, coordinated UWB systems may transfer them to other qualified users and to different locations upon coordination of change of ownership or location to the FCC and coordination with existing authorized operations.

(e) The NTIA/FCC coordination report shall include any needed constraints that apply to day-to-day operations. Such constraints could specify prohibited areas of operations or areas located near authorized radio stations for which additional coordination is required before operation of the UWB equipment. If additional local coordination is required, a local coordination contact will be provided.

(f) The coordination of routine UWB operations shall not take longer than 15 business days from the receipt of the coordination request by NTIA. Special temporary operations may be handled with an expedited turn-around time when circumstances warrant. The operation of UWB systems in emergency situations involving the safety of life or property may occur without coordination provided a notification procedure, similar to that contained in CFR47 Section 2.405(a)-(e), is followed by the UWB equipment user.

**Notice: Use of this device as a wall imaging system is prohibited by FCC regulations.**

**IMPORTANT NOTE FOR THE CANADIAN CUSTOMERS**

IC Certification Number: IC:8991A – HR2000NA

This device complies with the requirements of IC Standard RSS-220

This Ground Penetrating Radar Device shall be operated only when in contact with or within 1 m of the ground.

This Ground Penetrating Radar Device shall be operated only by law enforcement agencies, scientific research institutes, commercial mining companies, construction companies, and emergency rescue or firefighting organizations.

**NOTE IMPORTANTE POUR LES UTILISATEURS CANADIENS**

Numéro de certification IC:8991A – HR2000NA

Cet appareil est conforme aux exigences de la norme RSS IC-220

Cet équipement géoradar doit être utilisé que lorsqu'il est en contact ou à moins de 1 mètre du sol.

Cet équipement géoradar doit être utilisé que par des organismes d'application de la loi, des instituts de recherche scientifique, des sociétés minières commerciales, des entreprises de construction et de secours d'urgence ou les organisations de lutte contre les incendies.

**RADIO-FREQUENCY EXPOSURE COMPLIANCE**

This product operated is usually operated at least 1 m from the operator.

Typical power density levels at a distance of 1 m or greater is below  $1 \mu\text{W}/\text{cm}^2$  ( $0.01 \text{ W}/\text{m}^2$ ) which are far below the levels specified by the current regulations.

Thus, this product pose no health and safety risk when operated in the normal manner of intended use.

**CONFORMITÉ D'EXPOSITION AUX FRÉQUENCES  
RADIO**

Le produit doit être à au moins un mètre de l'utilisateur lorsqu'en opération.

Le niveau de densité de puissance à une distance de 1 mètre et plus est de  $1 \mu\text{W}/\text{cm}^2$  ( $0.01 \text{ W}/\text{m}^2$ ), ce qui est nettement inférieur aux niveaux spécifiés par la réglementation en vigueur.

Ainsi, ce produit ne représente aucun risque pour la santé et la sécurité lorsqu'il est exploité dans les conditions d'utilisation prescrites.



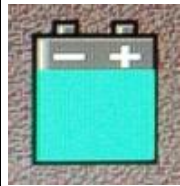
## CLEANING INFORMATION

Before cleaning any external parts of the apparatus, make sure that all cables have been disconnected, including the power supply cable. If a damp cloth is used, make sure it is not too wet, to avoid any damage to the electrical components of the equipment. Wait until the equipment is totally dry before reconnecting the cables.

The Detector Duo should be cleaned periodically using a damp cloth.

Do not use solvents or abrasive detergents.

Do not apply liquid directly to the electrical contacts of the various connectors. If a specific spray is used to clean the PC TFT monitor, make sure it is not flammable; in any case, do not spray it directly on the screen, instead, spray it onto the cleaning cloth.



## BATTERIES REMOVAL INFORMATION

### **Laptop Batteries:**

Manufacturer: PANASONIC

Type: Li-ion Ni

Characteristics: 10.65V 5.7Ah

Removal instructions:

1. turn off the laptop;
2. open the drawer with the symbol of the batteries;
3. extract the battery pack pulling the tab.

### **Radar batteries:**

Manufacturer: FIAMM FG21202 / SAFT MP176065

Type: rechargeable lead acid / rechargeable lithium-ion

Characteristics: 12V & 12Ah / 15V & 6.8Ah

Removal instructions:

1. disconnect the battery from the instrument:
  - a. pull the connector wings;
  - b. separate the connectors;
2. remove the battery from the cover (optional) opening the strap.





The crossed out wheeled bin symbol shown on the equipment indicates that the product must be recycled separately from other waste at the end of its useful life.

Separate waste disposal of this product at the end of its useful life will be organised and managed by IDS. When you decide to dispose of the equipment, contact IDS and follow the system that IDS has set up to permit the separate collection of the apparatus at its life end.

Adequate separate collection for its subsequent recycling, treatment and environmental friendly disposal contribute towards avoiding any unnecessary effects on the environment and to health and favour the reuse or recycling of the materials that make up the equipment. Unauthorised disposal of this product as unsorted waste by its possessor will lead to an administrative penalty foreseen by national regulations.

## WARRANTY CERTIFICATE CONDITIONS

- 1) IDS Ingegneria dei Sistemi S.p.A, hereinafter referred to as IDS, warrants hardware/software products for a period of 12 months from the delivery date to the original customer;
- 2) The delivery date is certified by the “Warranty Registration Form”;
- 3) IDS’s hardware products will be free from defects in materials workmanship under normal use and service;
- 4) IDS’s obligation is limited to repairing or replacing parts or equipment which are returned to IDS, without alteration or further damage, and which in IDS s judgment, were defective or became defective during normal use;
- 5) IDS’ software will have to be installed on a PC according to the requirement of the IDS hardware ( see IDS User’s Guide the Software Data Acquisition);
- 6) IDS’ s software products designed by IDS for use for IDS hardware products are warranted not to fail to execute their programming instructions due to defects during the warranty period, provided they are properly installed on IDS hardware products. IDS does not warrant if the IDS software will be used and operated in hardware and software combinations not selected by IDS;
- 7) IDS does not assumes any liability for any direct, indirect, special, incidental or consequential damages or injuries caused by proper or improper operation of its equipment whether defective or not defective;
- 8) This software may include automated data processing and analysis tools. While every effort is made to ensure the accuracy of the information provided by those tools, they must not be intended as a substitute for intelligent analysis; rather, they have to be intended as an advisor and the user must not completely rely on the results provided by them to give the complete answer. IDS assumes no liability for any direct, indirect special, incidental or consequential damages or injuries caused by such reliance on the accuracy, reliability, or timeliness of the information provided by those tools. Any person or entity who relies on information obtained from the automated data processing/analysis tools only, does so at his or her own risk;
- 9) IDS’s warranty does not extend and shall not apply to:
  - a) Products which have been repaired or altered by other than IDS personnel;
  - b) Products which have been subjected to misuse, neglect, accident or improper installation;
  - c) Products in which have been installed Hardware/Software accessories not supplied by IDS and/or without any approval by IDS;
  - d) Products which have been connected to equipment different from the ones supplied by IDS (except the PC data Logger which must conform to IDS specifications;
  - e) Products which have been damaged by natural disaster or calamities.
- 10) Before returning any equipment to IDS , you have to contact the IDS Customer Care Office that will authorize you to return the material to be repaired;
- 11) Once the parts/equipment to be repaired arrive to IDS, IDS may inspect the defective products to verify they are eligible for repair or replacement. All packing must be saved for inspection purpose in order to assist IDS to understand the cause of the defects. IDS, will not be obliged to repair, or replace for products returned as defective but damaged from abuse, misuse, negligence , accident loss or damage in transit;
- 12) The final clients, is responsible for ensuring the defective products returned to be properly packaged;
- 13) The above warranty are sole and exclusive, and no other warranty, whether written or oral, is expressed or implied.

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## 1. INTRODUCTION

### 1.1 Purpose

This manual explains the procedure of assembling the Hi-Pave GPR system in all its parts.

Ids Hi-Pave system uses HR1000 and/or the HR2000 antennas; the model HR2000NA only is allowed to operate in the US and Canadian markets.

### 1.2 Application Field

This system is dedicated for pavement applications on the asphalt and concrete roads. The most common application is detecting the thickness of asphalt layers, within the first meter of depth.

### 1.3 Reference

The applicable versions of the following documents are the ones officially released at the time of the emission of this present document.

#### 1.3.1 Applicable documents

[AD1] - MN\_2008\_031\_11 – K2 Fast Wave User Manual

### 1.4 Composition of the Hi-pave GPR system

Here below you find the parts of the Hi-pave system:



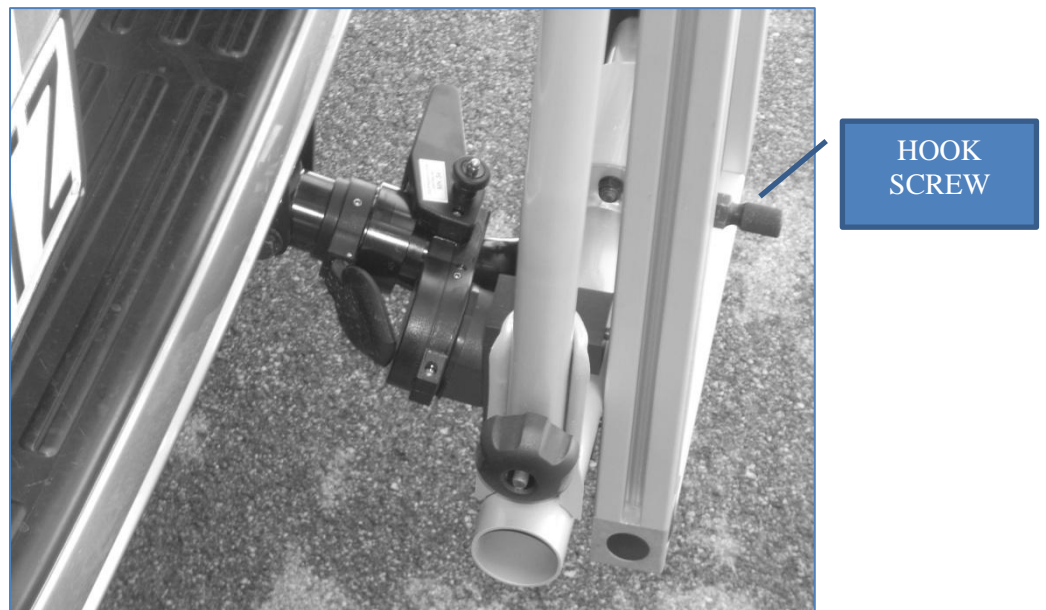
**Fig. 1-1– Composition of the Hi-Pave system**

1. N.1 Aluminum Vertical Frame (A), with rectangular shape attached to a frame provided with a hook.
2. N.1 Aluminum Sliding horizontal frame (B)
3. N.1 Embossed white fiberglass frame (C).
4. N.2 Elastic belts
5. N.1 Horn Antenna + N.1 antenna cable
6. N.1 Encoder kit + N.1 wheel encoder cable

## 2. PROCEDURE OF ASSEMBLING

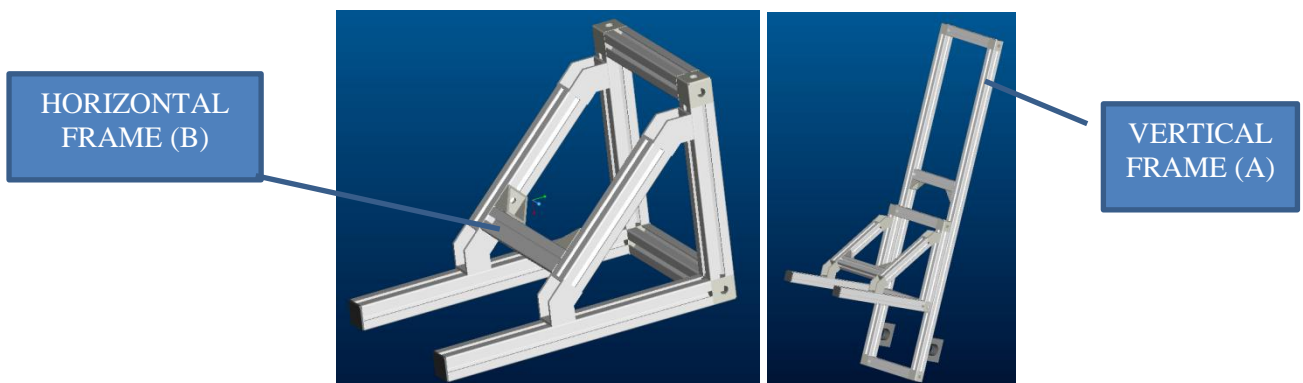
Here below you find the steps to assemble the Hi-Pave GPR system. Of course it's necessary to get a vehicle provided with a hook on the back side and possibly a carrier or similar on the roof/back of the vehicle itself. Please follow the steps in order one by one.

1. Take the metal key (provided with the system) and unscrew the screw on the vertical frame (see **Errore. L'origine riferimento non è stata trovata.**), until the frame fits on to the hook of the vehicle. Then screw it again strongly keeping the frame vertical as much as possible (Fig. 2-1).

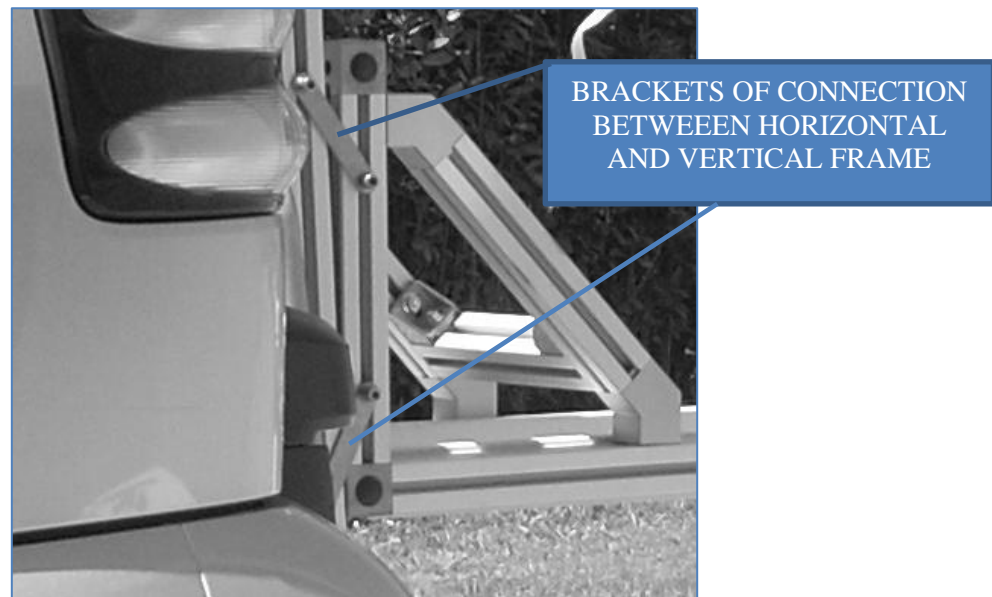


**Fig. 2-1 – Screw on the vertical frame**

2. Make slide the horizontal frame (B) on the vertical frame (A), and fix B to A applying 4 screws M8x20, attaching them to the 4 brackets and verify that the B is horizontal and parallel as much as possible to the ground surface (see Fig. 2-2 and Fig. 2-3).

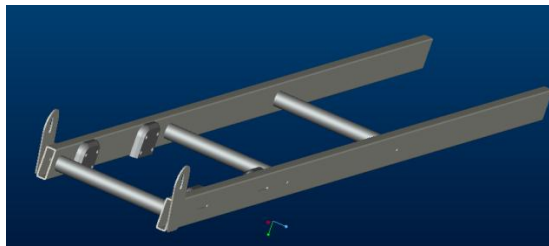


**Fig. 2-2 – Horizontal frame attached to Vertical frame**

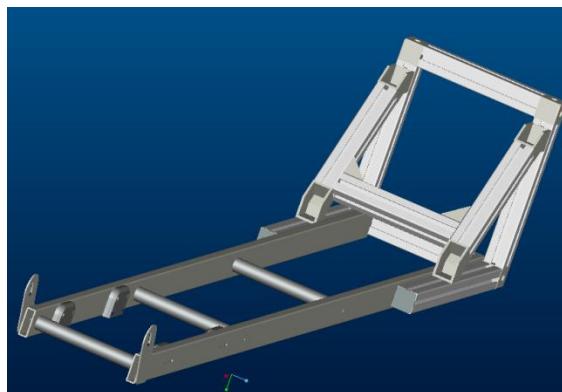


**Fig. 2-3 – Particular of the brackets to fix frame B to frame A**

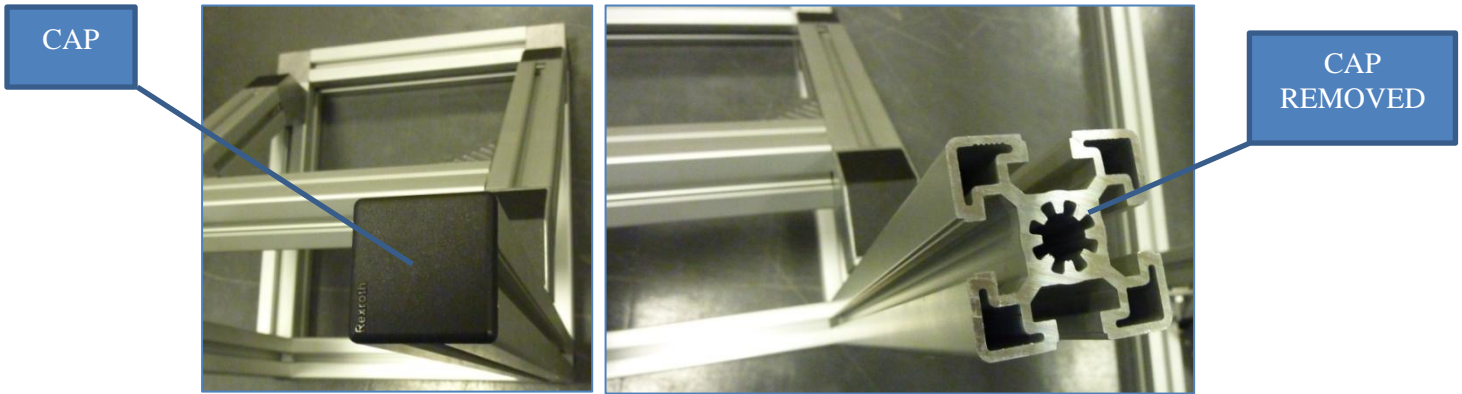
3. Remove the 2 caps from the horizontal frame (B) limbs; then insert embossed fiberglass frame (C) into the internal grooves of B until the end. Finally screw both screws for side of B and insert again the caps (see Fig. 2-4, Fig. 2-5, Fig. 2-6 and Fig. 2-7).



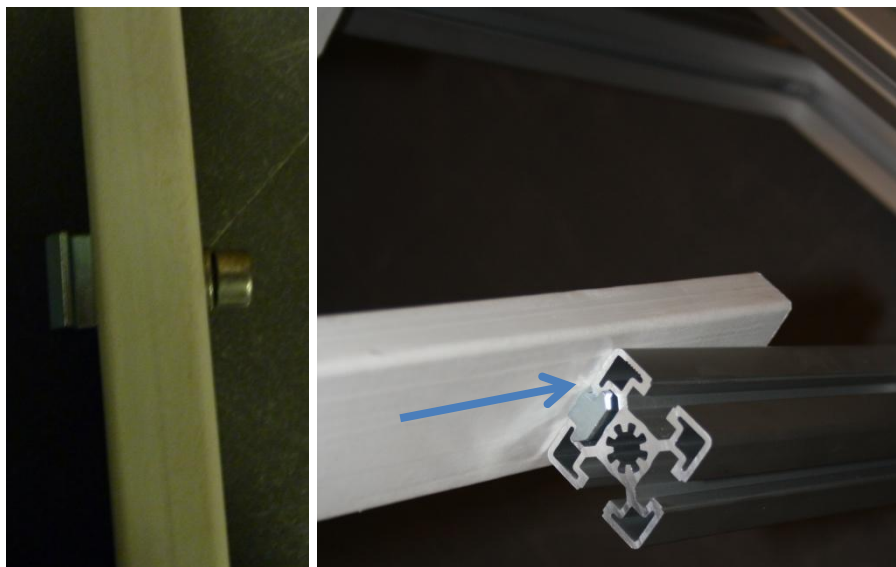
**Fig. 2-4 – Embossed Fiberglass frame (C)**



**Fig. 2-5 – Attaching frame C to frame B**

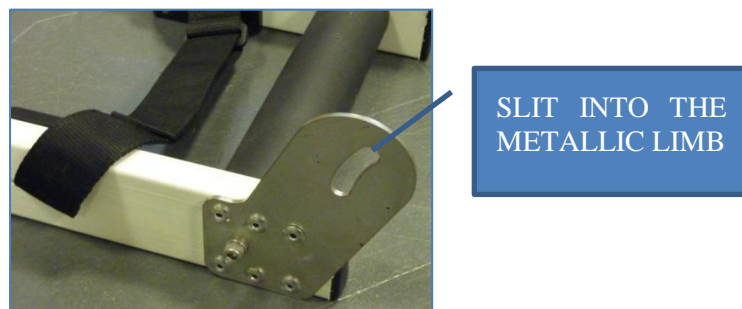


**Fig. 2-6 – Particular of the horizontal frame (B) limbs**



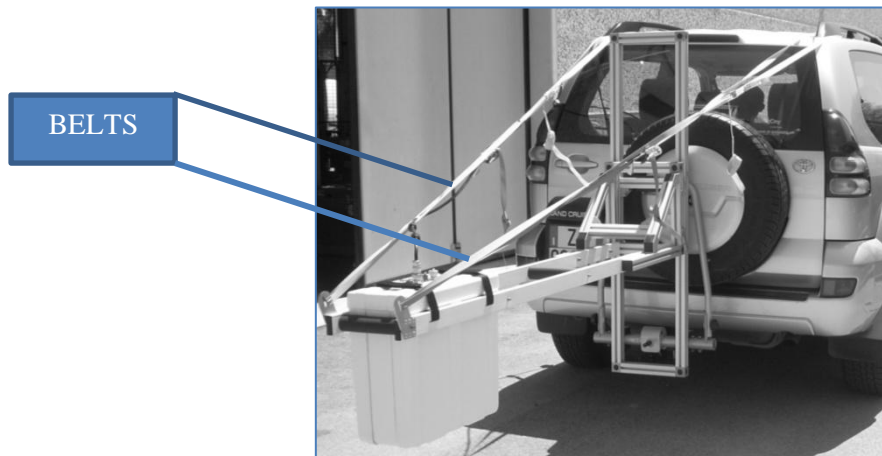
**Fig. 2-7 – Particular of the white fiberglass frame (C) inserted into the internal grooves of the horizontal frame (B), with direction of insertion.**

4. Arrange the 2 elastic belts and adapt them to the vehicle making them pass through the metallic slits located to the limbs of the fiberglass horizontal frame (C); then fix them on the other extremity to the vehicle (i.e. to the carrier or similar stable supports) using its pulling mechanism (see Fig. 2-8 and Fig. 2-9).



**Fig. 2-8 – Particular of the metallic limb and its slit on the frame C**





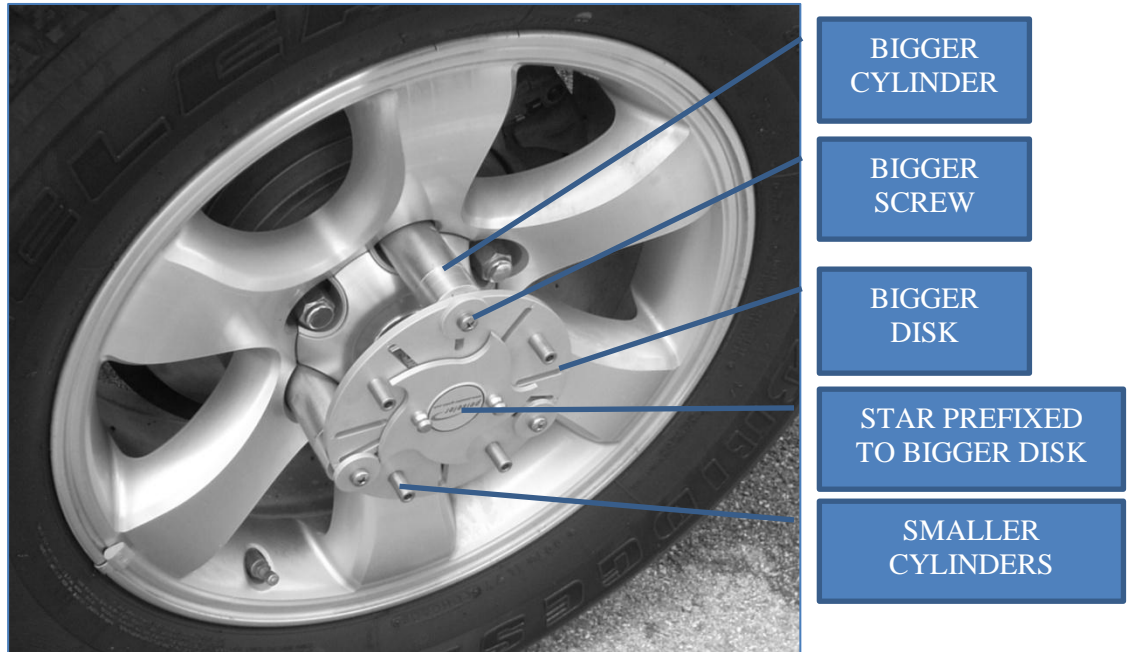
**Fig. 2-9 – Particular of the belts**

5. Insert the horn antenna onto the fiberglass frame in its proper place, located at the extremity of the frame C, between 2 black cross rubber bars; then fix the top of the antenna with the 2 straps already assembled properly.
6. The encoder kit (see Fig. 2-10) is composed by:
  - a. 4 metallic cylinders ( $\text{Ø}17$ , or  $\text{Ø}19$  or  $\text{Ø}21$ )
  - b. 1 bigger metallic disk + 1 metallic star + 4 bigger screws
  - c. 1 smaller metallic disk + 1 encoder + encoder cable + 4 smaller screws + magnet.

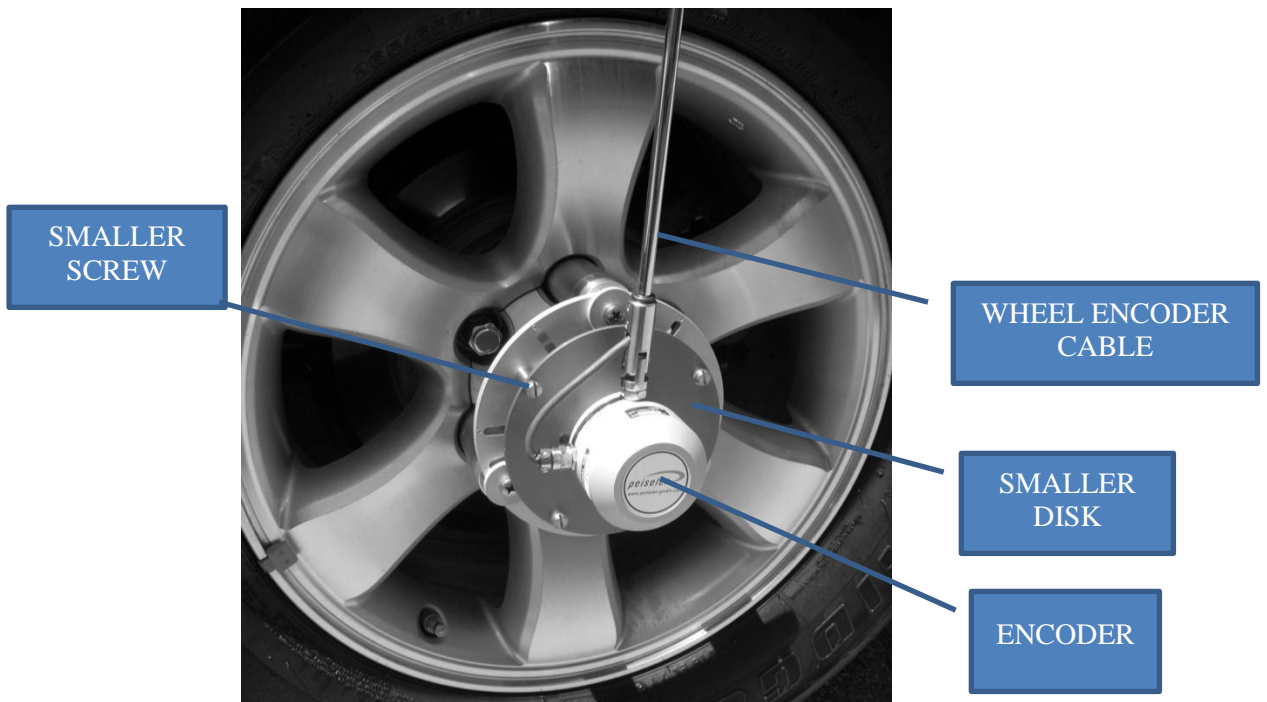


**Fig. 2-10 – Encoder wheel kit view**

Insert the 4 cylinders within the 4 nuts of the vehicle wheel and then apply on them the bigger disk, screwing it to them by fixing 4 bigger screws; then apply the smaller disk to the bigger disk by fixing the 4 smaller screws to the prefixed smaller cylinders. Keep vertical the encoder cable and apply the magnet located on its limb to the vehicle metallic side (see Fig. 2-11 and Fig. 2-12).



**Fig. 2-11 – Particular of the wheel mechanical kit**



**Fig. 2-12 – Particular of the wheel encoder kit**

7. Connect the wheel cable to the wheel port of the DAD control Unit and connect the antenna cable to antenna port of the DAD control unit.



**Fig. 2-13 – Final assembling of the Hi-Pave system**