

# **Two Rotor Aerodynamical System**

(TRAS)

USB2 version

**Installation Manual**



[www.inteco.com.pl](http://www.inteco.com.pl)



## NOTES

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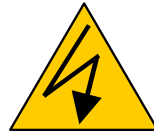
## **SAFETY OF THE EQUIPMENT**

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The equipment, when used in accordance with the supplied instructions, within the parameter set for its mechanical and electrical performance, should not cause any danger to health or safety if normal engineering applications are observed.

If, in specific cases, circumstances exist in which a potential hazard may be brought about by careless or improper use, these will be pointed out and the necessary precautions emphasised.

Some National Directives require to indicate on our equipment certain warnings that require attention by the user. These have been indicated in the specified way by labels. The meaning of any labels that may be fixed to the equipment instrument are explained in this manual.



Risk of electric shock

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## **PRODUCT IMPROVEMENTS**

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The Producer reserves a right to improve design and performance of the product without prior notice.

All major changes are incorporated into up-dated editions of manuals and this manual is believed to be correct at the time of printing. However, some product changes which do not affect the capability of the equipment, may not be included until it is necessary to incorporate other significant changes.



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## **ELECTROMAGNETIC COMPATIBILITY**

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This equipment, when operated in accordance with the supplied documentation, does not cause electromagnetic disturbance outside its immediate electromagnetic environment.

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# 1. INTRODUCTION

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This manual contains a description of the components of the Two Rotor Aerodynamical System (**TRAS**), assembly instructions and test procedures. The procedures described in this manual will ensure correct:

- assembly of the system,
- RT-DAC/USB2 interface board installation,
- cable connections between the mechanical part of the model, Power Interface and PC.

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## 2. COMPONENTS OF THE SYSTEM

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Inteco TRAS set-up consisting of the TRAS Mechanical Unit and TRAS Power Interface Unit,

To use the system the following software and hardware components are required:

- Pentium or AMD based personal computer,
  - Microsoft Windows W7/W10x86 and MATLAB 32 bit with Simulink and RTW (Simulink Coder) toolboxes (not included),
  - MS Visual C++ compiler,
  - or the MS Visual Express compiler (free of charge),
  - or the Open Watcom 1.9 compiler [www.openwatcom.org] free of charge
- or
- Microsoft Windows W7/W10x64 and MATLAB 64 bit with Simulink and RTW (Simulink Coder) toolboxes (not included),
  - Microsoft Software Development Kit (SDK) 7.1 (free of charge compiler)
  - or MS Visual C++ compiler
- and
- RT-DAC/USB2 I/O board,
  - CD-ROM with TRAS software and e-manuals (*User's Manual* and *Installation Manual*):
  - The TCP/IP protocol must be installed in the computer system,



**Details of the required software are available at:**

**[http://www.inteco.com.pl/support/Software\\_requirements.pdf](http://www.inteco.com.pl/support/Software_requirements.pdf)**



**In the case if the Open Watcom compiler is used neither MATLAB nor the compiler can be installed in the Program Files directory (name of the directory cannot includes space).**



**Real-time is supported by the RT-CON toolbox from INTECO (included in TRAS Toolbox and transparent for a user).**

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## **3. UNPACKING AND CHECKING THE ITEMS**

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Carefully unpack the items, and remove all packaging and securing material. You should have the following items (Fig.3.1):

- TRAS beam and leg, with DC motors, rotors, counterbalance, sensors and attached ribbon signal cables and power cables,
- TRAS support,
- couplings bolts (2) and special allen wrench (if required),
- fixing clamp (1) and fixing bar (1),
- TRAS Power Interface,
- Emergency switch,
- Main power cable,
- USB dongle,
- RT-DAC4/USB2 board with 9V DC power supply and ribbon cables,
- CD-ROM (Documentation: TRAS *User's Manual*, this manual, TRAS toolbox),
- Item List.

The exact specification you will find on the *Item List*. If any item is missing or damaged please, contact *Inteco*.



**Carefully follow the installation steps described below. Only correct installation procedure ensures proper operation of the system.**



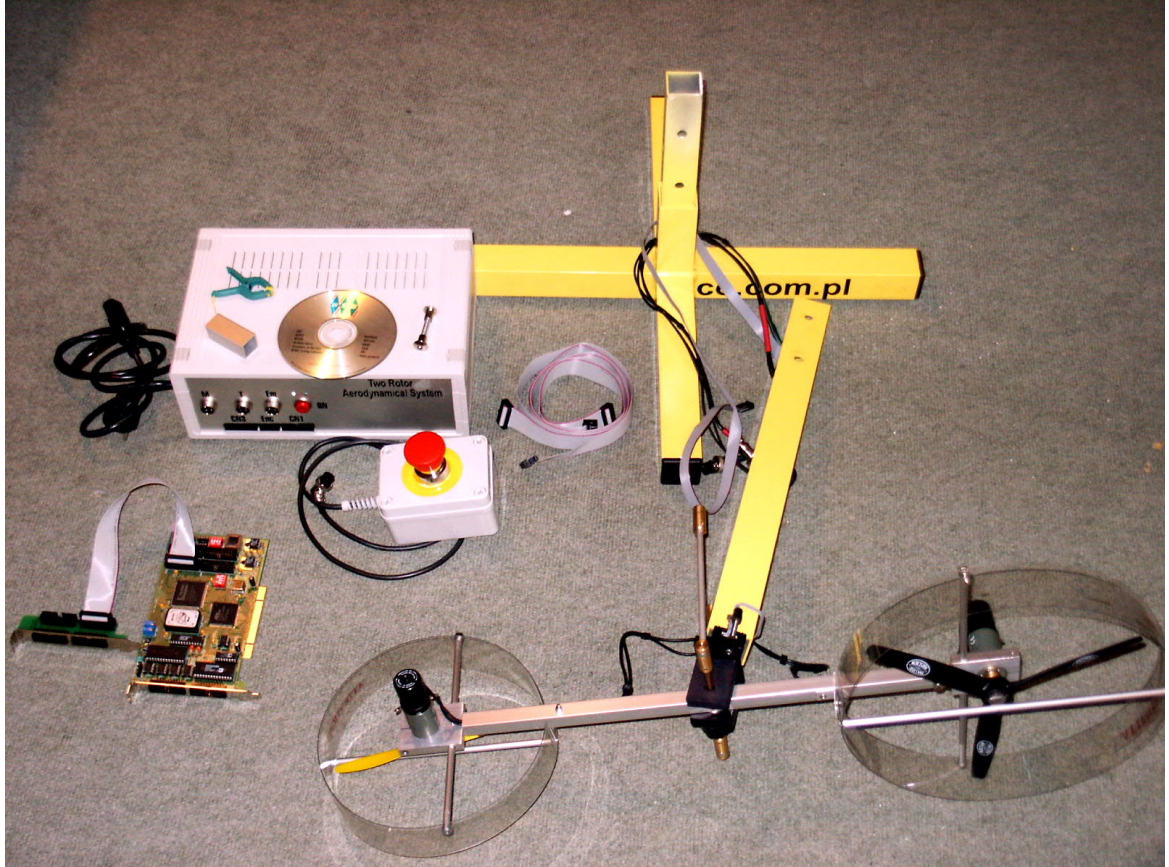


Fig 3.1 The TRAS set-up, not assembled

## 4. ASSEMBLY OF THE MECHANICAL CONSTRUCTION

Sometimes the structure consists of two parts. In this case components of the mechanical construction are given in Fig.4.1

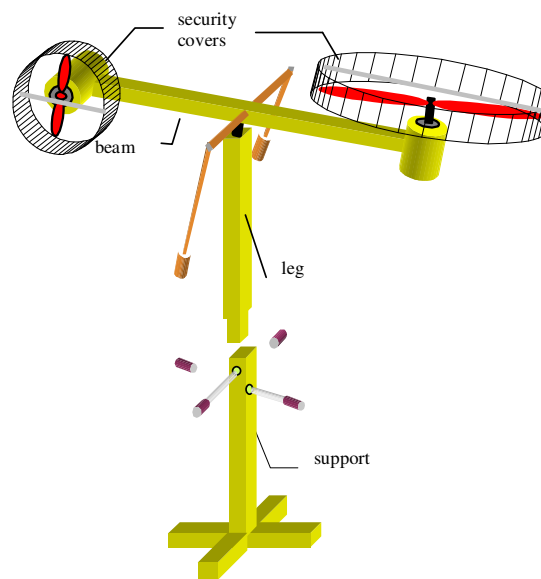


Fig.4.1 TRAS mechanical construction

Select the TRAS support and place it on the table. Join with the leg and TRAS beam. Insert coupling bolts into mounting sockets and loosely screw them with the allen key provided (Fig.4.2).

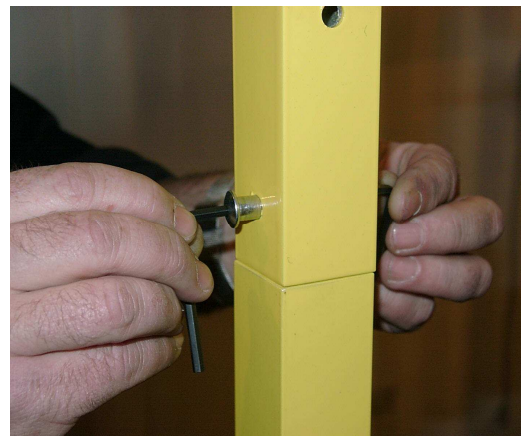


Fig 4.2 Coupling bolts

## 5. RT-DAC/USB CARD INSTALLATION

The RT-DAC/USB setup contains:

- RT-DAC/USB2 board,
- USB A-B cable
- 9V-12V DC / 4W stabilized power supply. The plug dimensions are given in Fig. 5.2.

The layout of the RT-DAC/USB board is presented in Fig. 5.1

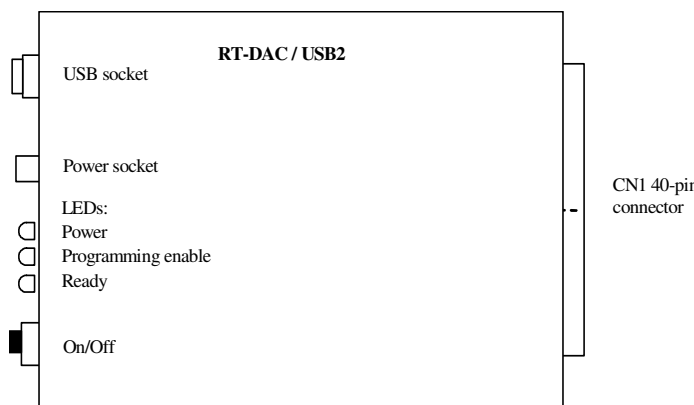


Fig. 5.1. The layout of the RT-DAC/USB board

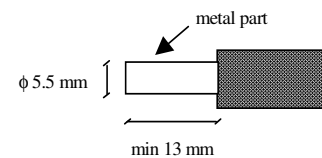


Fig. 5.2. The plug of the DC power supply

The *Power* signalling LED is emitting light when the *On/Off* switch is on, *Ready* LED indicates that communication between RT-DAC/USB board and computer is running and *Programming Enable* LED is emitting light when the board is ready to be programmed.

To install the board:

- connect the board to the computer using the included USB cable,
- install driver for the board (see below or CD:\DRIVER\ readme\_USB2.txt),
- connect the local version of the DC 9V-12V stabilised power supply



## **5.1 DRIVER INSTALLATION**

The driver for RTDAC/USB2 board has to be installed. The user with administrator privileges must install the drivers.

### **Installation:**

1. Start Windows,
2. connect the RTDAC/USB2 device and turn power ON,
3. system detects a new USB device. Do not allow to install driver automatically.
4. Select path CD:\driver\USB2\ driver\directory\_related\_to\_your\_OS\cyusb.inf then OK.

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## 6. CONNECTING THE POWER INTERFACE

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The general diagram of power interface connections is given in Fig. 6.1. In order to connect cables go through the following steps:

- Check the position of the Power Switch located on the side of the back panel – it must be in the „0” (OFF) position.
- Connect the cables:
- plug the 40/20-way ribbon cables as follows:
- the first one (with the red wire) plug in the upper socket in the USB2 board (40-pin) and the other end (20-pin) plug in the CN1 socket of the Power Interface,
- the second one plug in the lower socket in the USB2 board (40-pin) and other end (20-pin) plug in the CN3 socket of the Power Interface,
- plug in 10-way ribbon cable from the encoders into the 10-pin socket (Fig 6.1 ).
- All round sockets in the Power Interface have different number of pins. There is no possible to make a wrong connection.
- Connect three round cables:
- controlling DC motors,
- cables from tachogenerators,
- the emergency switch cable.
- Plug in the mains power cable to the socket located on the back side of the Power Interface box.
- Plug in the 9-DC power supply cable to the socket in USB board.

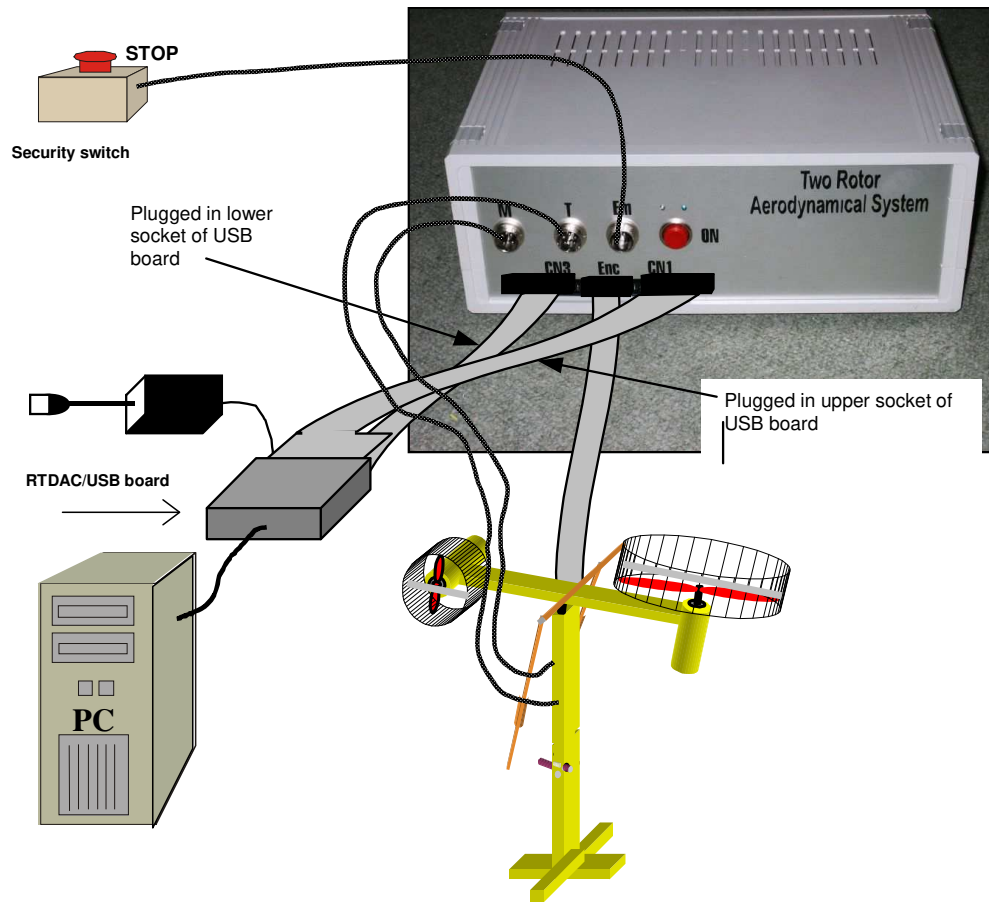


Fig. 6.1 \_Power Interface and connecting cables



## 7. SOFTWARE INSTALLATION



**The installation program has to be started by a system administrator**

To start the installation program insert the CD-ROM into the drive, and open it in the Windows explorer. Next find the in\_tras.exe file located in the Tras directory. Click it with right mouse button and select the “run as administrator” option.

Accept the license terms mark the checkbox and click the *Next* button.

The window that follows asks you for your name and the name of your company (Fig.7.2).



Fig.7.2

If you click the *Next* you will see an important dialogue window containing your current MATLAB settings (Fig. 7.3). You must select the appropriate version of the MATLAB software installed.



Fig. 7.3

Browse your system directories and select the appropriate directory. The selected location will be displayed in the *Matlab location* window (Fig.7.4).

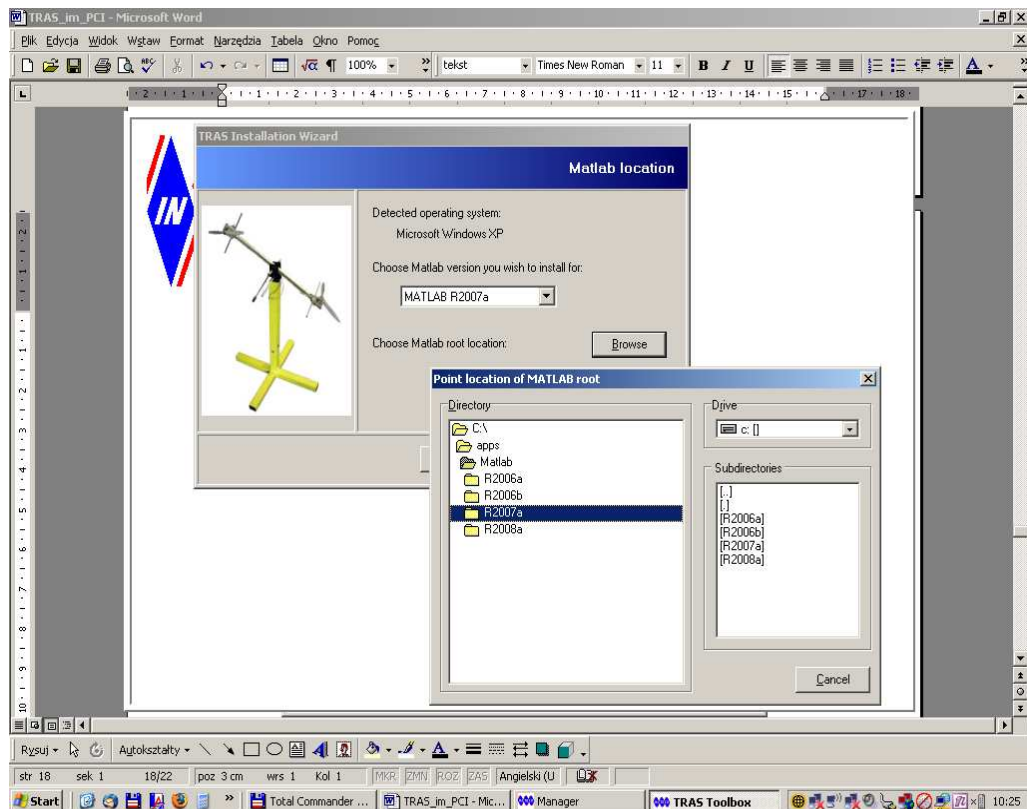


Fig. 7.4



If you have completed installation settings click the *Next* button to start the installation procedure. The end of installation process will be confirmed by the appropriate window (Fig.7.5).

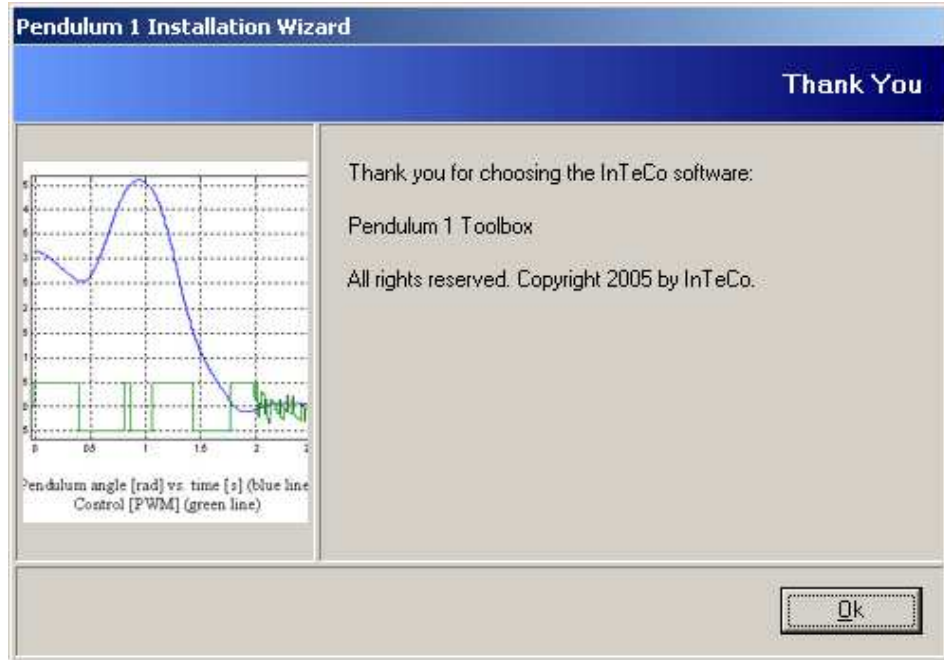


Fig.7.5

The computer has to be restarted after the installation process.

To uninstall the software run as administrator un\_tras.exe file. Uninstalling process will be performed automatically.

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## 8. STARTING AND TESTING

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**For safety reasons it is not allowed to start the system if the plastic security cover is removed. Never touch the moving parts !!!**

To test the system perform the following steps:

- Install the *TRAS* software. For this purpose refer to Section 7.
- According to you selection (1-degree or 2-degrees of freedom experiment) fix one of axis using the included clamp or fixing bar (Fig.8.1, Fig.8.2)

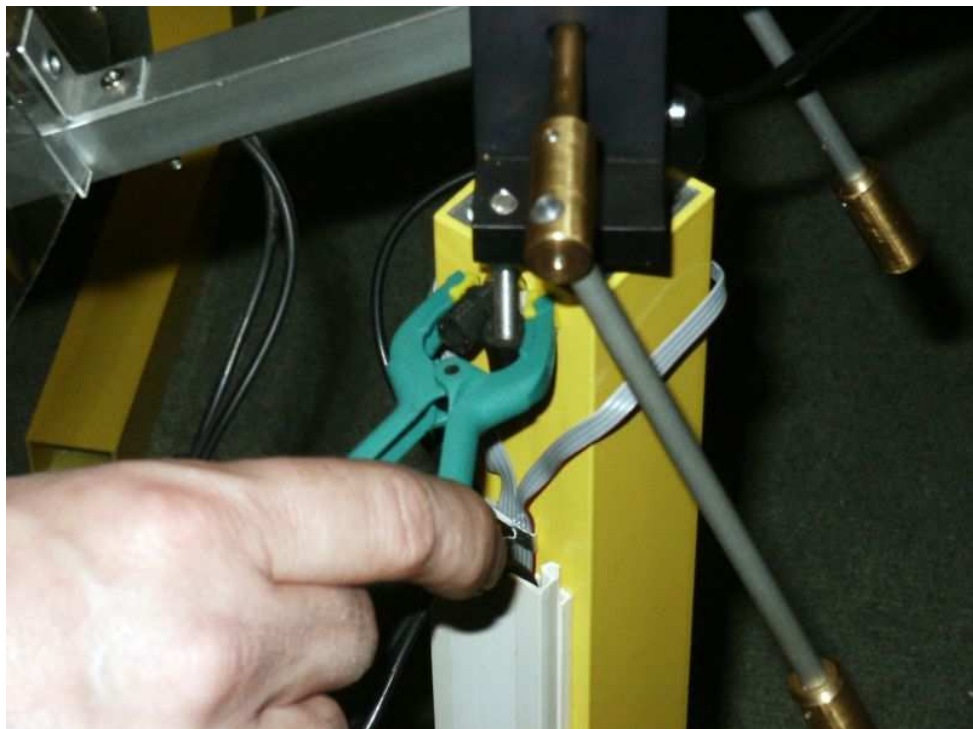


Fig. 8.1 Fixing one degree of freedom

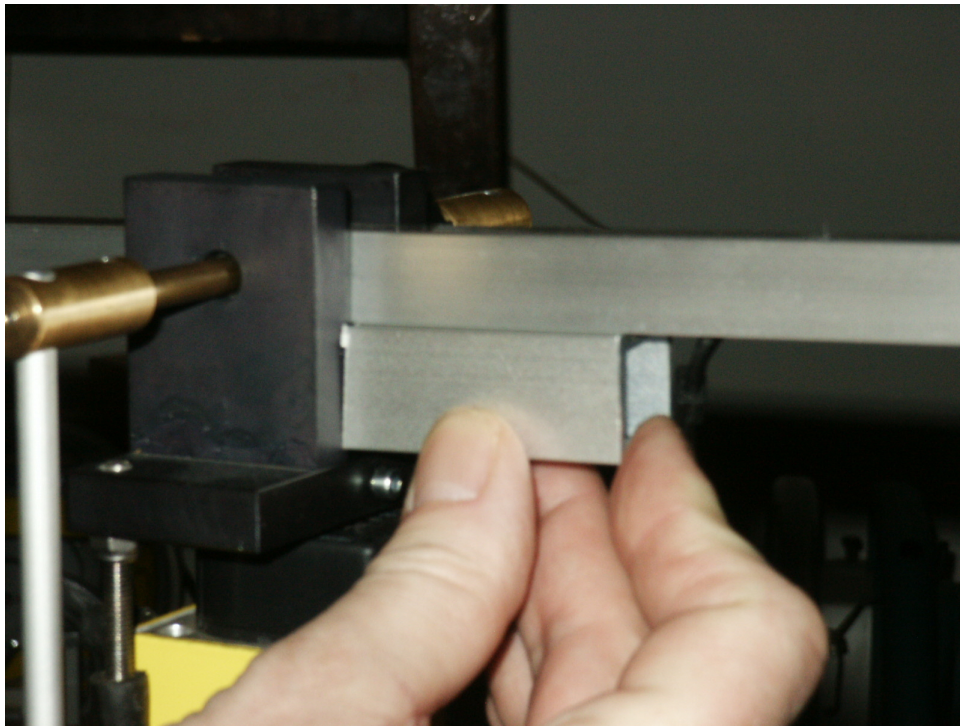


Fig.8.2 Fixing one degree of freedom

- If the RT-DAC/USB2 card has been properly installed and ribbon cables connected turn on your PC,
- Switch on the mains of the TRAS Power Interface,
- Blue LED on the front panel will alight,
- Switch the power on (**ON**),
- Red LED on the front panel will alight,
- Switch the power in USB2 board using On/Off switch.
- Using windows explorer go to *matlabroot/Toolbox/Tras/ManualSetup* directory and run *ManualSetup* application to perform the test, described in the section *Starting, testing and stopping procedures* in *TRAS User's Manual*, to check connections of the sensors to the Power Interface.
- In the case of any unexpected behaviour of the system use the EMERGENCY SWITCH. After using the emergency switch, you have to turn and press switch and next press the **ON** button in order to start the system again.
- Now, start MATLAB and you can perform your own experiments
- If your experiments are finished, stop the MATLAB application. Switch off the mains.



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## 9. OPERATION AND SECURITY NOTES

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- It is not allowed to start the system if the plastic security covers are removed. **Never touch the moving parts.**
- Allow good air circulation around the power interface box for correct cooling of radiators, do not cover the fan.