

**HARDWARE AND SOFTWARE FOR EVENT-RELATED POTENTIALS
ACQUISITION AND PROCESSING**

Mitsar-EEG systems.

**ERP system installation,
configuration and calibration.**

User Guide

**St-Petersburg, Russia
2016**

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Introduction

This document contains step-by-step description of the hardware and software installation, configuration and calibration to prepare ERP recording system.

IMPORTANT! The configuration on new ERP systems differs from previous one. Therefore, installation procedures, configuration and calibration are slightly different from those described in “WinEEG” User Manual and “PSYTASK” User Manual.

ERP recording system components

The system configuration is shown in Fig. 1. This system consists of several components that are listed in Table 1.

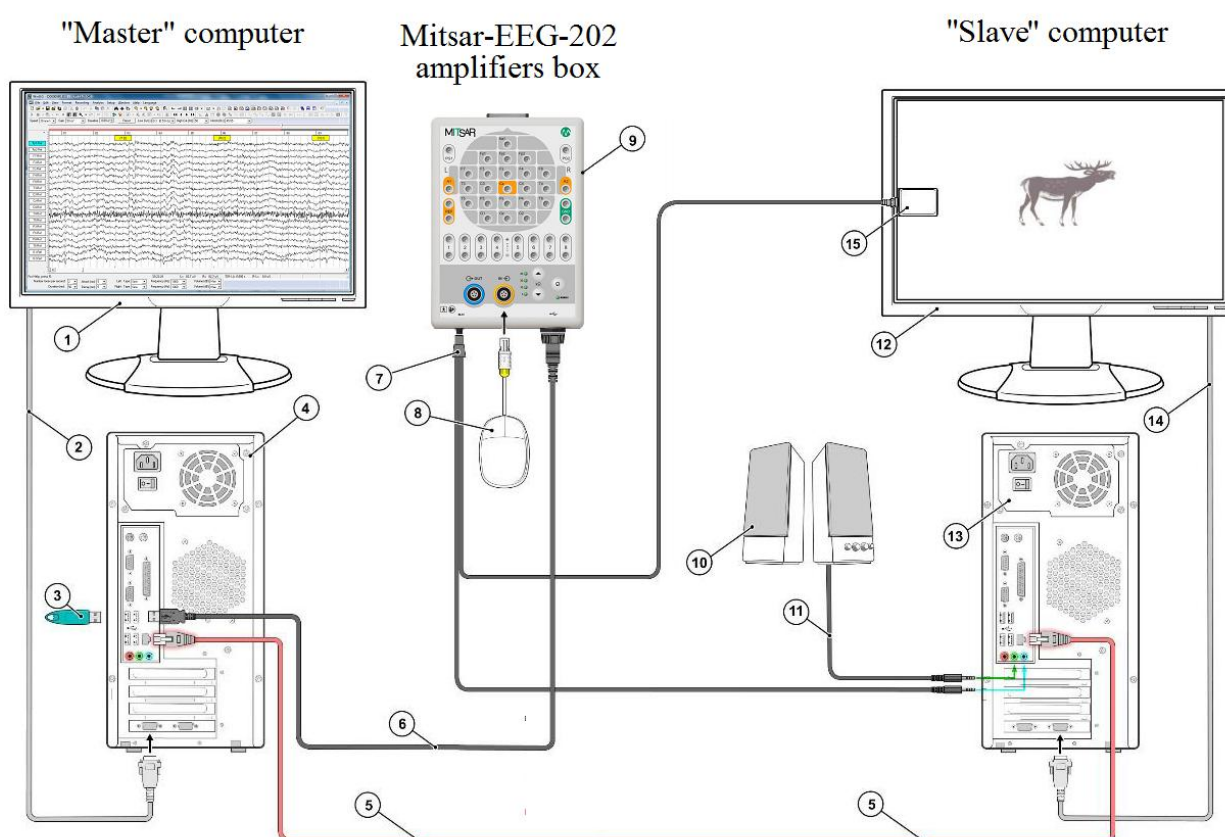


Fig. 1. Configuration of the ERP recording system.

“1” - Monitor of “Master” computer; “2” - Monitor cable of “Master” computer; “3” - Software USB dongle (Guardant dongle); “4” - CPU of “Master” computer; “5” - Ethernet cable (Network cable or Patch cord); “6” - USB A cable– mini USB B; “7” - EP sensors; “8” - Patient button; “9” - Mitsar-EEG Amplifier box; “10” – Loudspeakers; “11” - Cable for speakers; “12” - Monitor of “Slave” computer; “13” - CPU of “Slave” computer; “14” - Monitor cable of “Slave” computer; “15” – Video sensor.

Table 1. List of main components for the ERP recording system

#	Component	Digital mark(s) in Fig. 1	Main functions
1.	Mitsar-EEG amplifiers box: “Mitsar-EEG-201” or “Mitsar-EEG-202”	“9”	1. EEG signal amplification, analog-digital conversion and transmission of data to the computer. 2. Detection of the synchronization signals from the video sensor and audio splitter and transmission them to the computer
2.	“Master” computer* with WinEEG software (IBM PC compatible, Windows Vista, 7, 8, 10).	“1”, “2”, “4”	1. Collection of data from the amplifiers box. 2. Recording external events: stimulus marks, and subject response. 3. Storing the data on a hard disk. 4. Processing and visualization of the data. 5. Control of the "Slave" computers.
3.	“Slave” computer* with PSYTASK software (IBM PC compatible, Windows Vista, 7, 8, 10).	“12”, “13”, “14”	1. Presentation (generation) of visual and auditory stimulus. 2. Generation of the video synchronization signals. Auditory stimulus itself may be used as a synchronization signal. Therefore, an additional synchronization signal is not required to auditory stimuli.
4.	Loudspeakers	“10”	Reproduction of sounds generated by “Slave” computer.
6.	Video sensor	“15”	Detection of video synchronization signals.
7.	Patient button	“8”	Detection of subject response.
8.	Guardant dongle	“3”	This device protects the WinEEG software from unauthorized copying.

* Recommended configuration of computers can be found on the web sites:

<http://www.mitsar-medical.com> or <http://www.mitsar-eeeg.ru>

Hardware installation

Several components of the ERP recording system must be correctly connected during its installation. Safe way to connect the ERP recording system components is as follows.

1. Turn off the “Master” and “Slave” computers.
2. Disconnect the “Master” and “Slave” computers from the Power socket.
3. Turn off the Loudspeakers.
4. Disconnect the Loudspeakers from the Power socket.
5. Connect the Mitsar-EEG amplifiers box to the “Master” computer using USB cable.
6. Connect together the “Master” and “Slave” computers using Network cable (Patch cord). (We strongly recommend to use the direct connection of two computers, instead of connecting them to a computer network. The direct connection will provide the best performance of the ERP recording system.)
7. Connect the Loudspeakers to the first output of sound card of the “Slave” computers.
8. Connect the "EP sensors" to the appropriate input of the Mitsar-EEG amplifiers box.
9. Place and fix the "Video sensor" near the left border of the monitor screen. (The most appropriate vertical position of the "Video sensor" is the center of the screen. Such vertical position of the "Video sensor" is appropriate for most of ERP research. But perhaps another position is required in a number of other cases.)
10. Connect the additional cable of the "EP sensors" to the second output of of sound card of the “Slave” computers.
11. Connect the Patient button to appropriate input of the Mitsar-EEG amplifiers box.
12. Connect the Guardant dongle to USB port of the “Master” computer.
13. Connect the “Master” and “Slave” computers to the Power socket.
14. Connect the Loudspeakers to the Power socket.
15. Turn on the “Master” and “Slave” computers.
16. Turn on the Loudspeakers.

Software installation

You must install the following software components to the ERP recording system.

“Master” computer:

1. WinEEG software. (It can be download from web sites <http://www.mitsar-medical.com> or <http://www.mitsar-eeg.ru>)
2. Mitsar-EEG amplifiers box driver. (It can be download from web sites <http://www.mitsar-medical.com>, or <http://www.mitsar-eeg.ru>, or <http://www.ftdichip.com/>)
3. Guardant dongle driver. (It can be download from web sites <http://www.mitsar-medical.com>, or <http://www.mitsar-eeg.ru>, or <http://www.guardant.com/>)

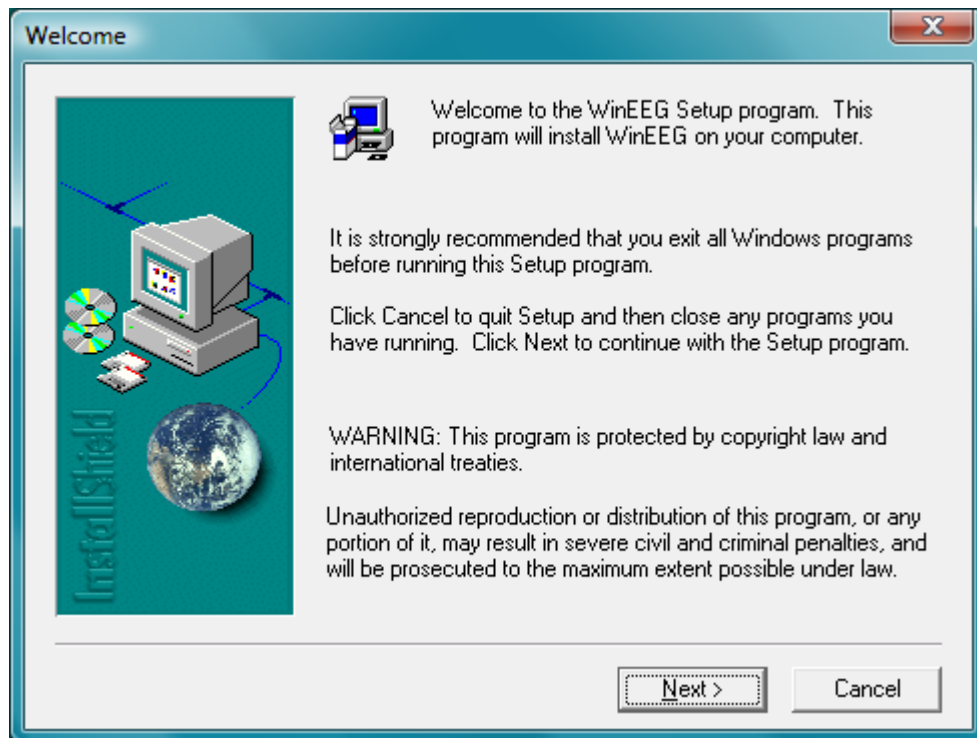
“Slave” computer:

1. PSYTASK software. (It can be download from web sites <http://www.mitsar-medical.com> or <http://www.mitsar-eeg.ru>)
2. DirectX 9 or later if it is not already installed. (It can be downloaded from Microsoft web site).

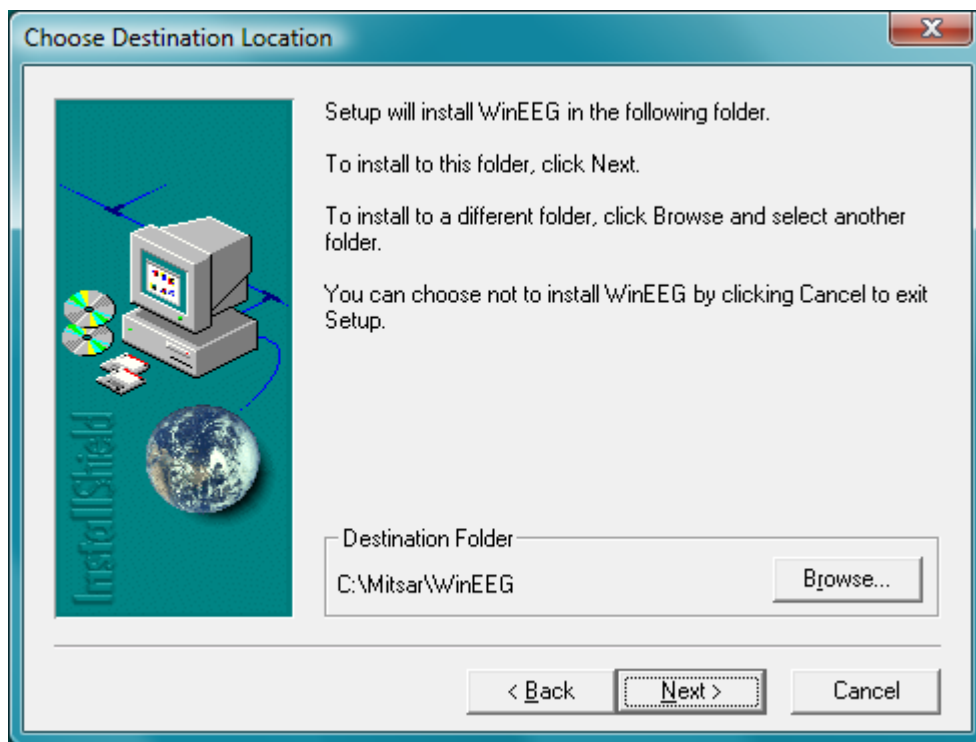
The installation of these software components is described below. We strongly recommend that you reboot (restart) both the “Master” and “Slave” computer after installation the software components.

WinEEG software installation.

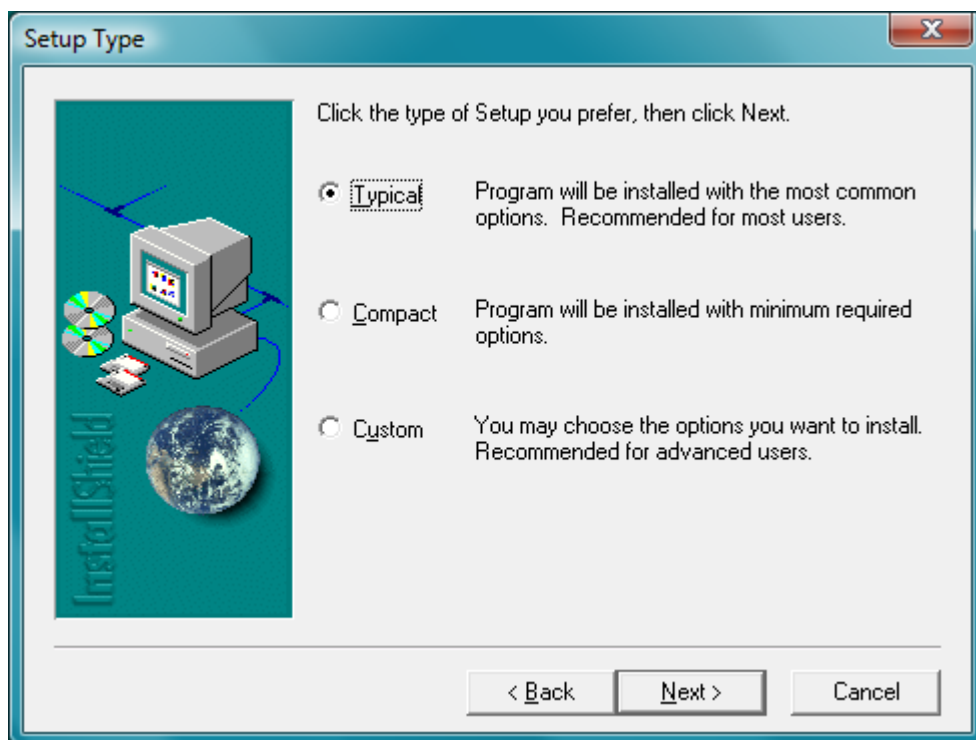
1. Insert the CD or USB memory stick to the corresponding drive of the “Master” computer.
2. Open folder with name **WinEEG**.
3. Run **SETUP.EXE** program.
4. Follow the instruction on the screen.



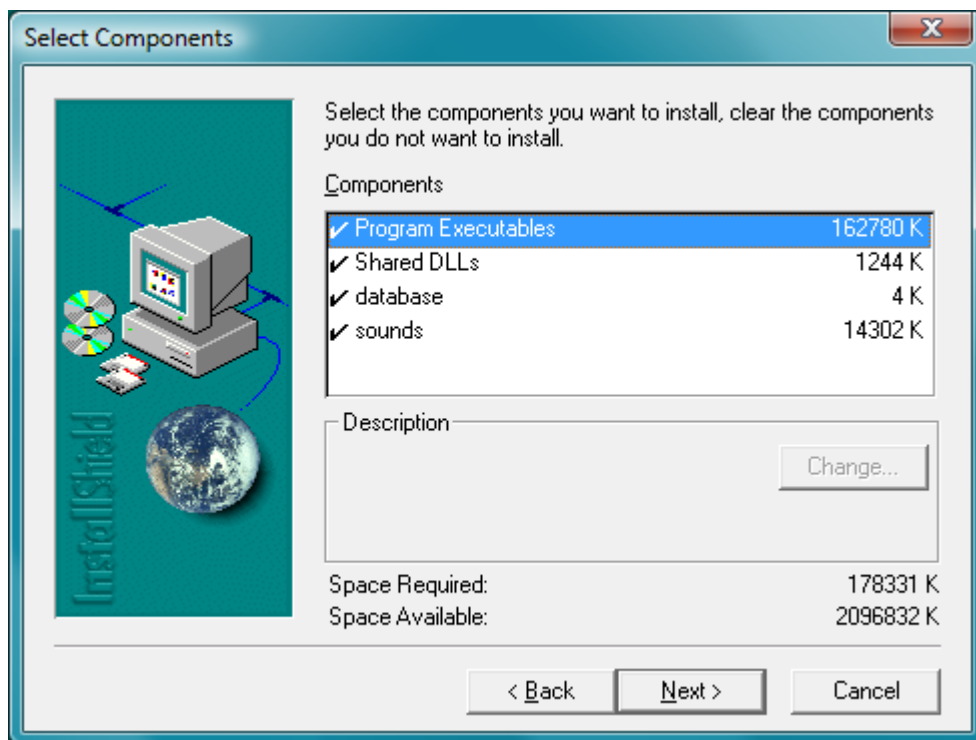
5. Press “Next” button to continue installation.



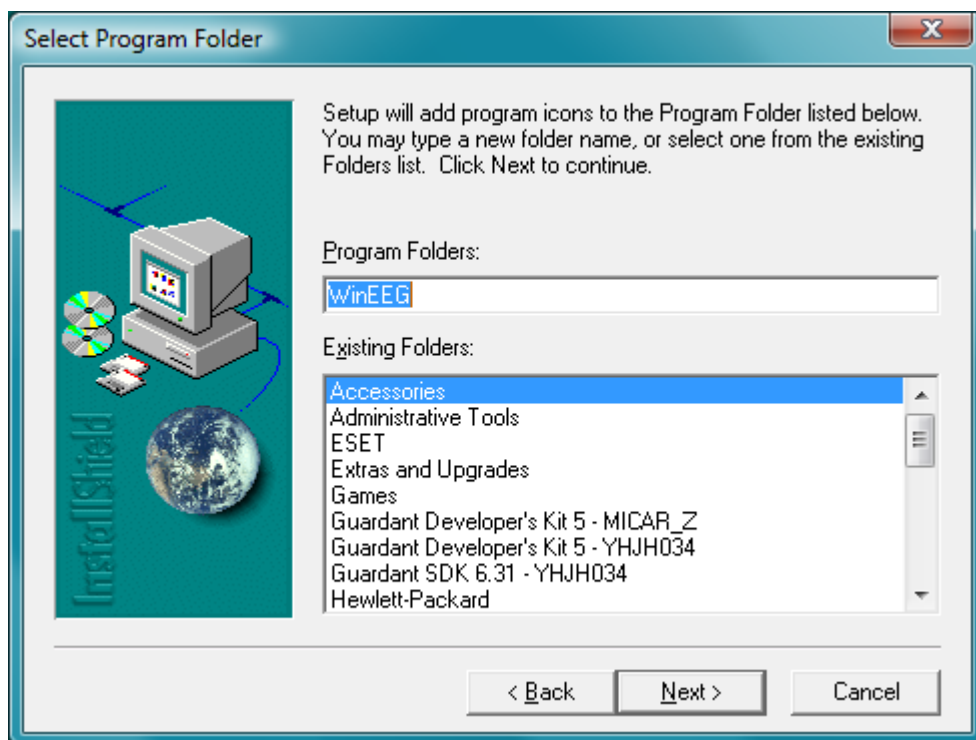
6. Press “Browse...” button if you would like to change location WinEEG program. Press “Next” button to continue installation.



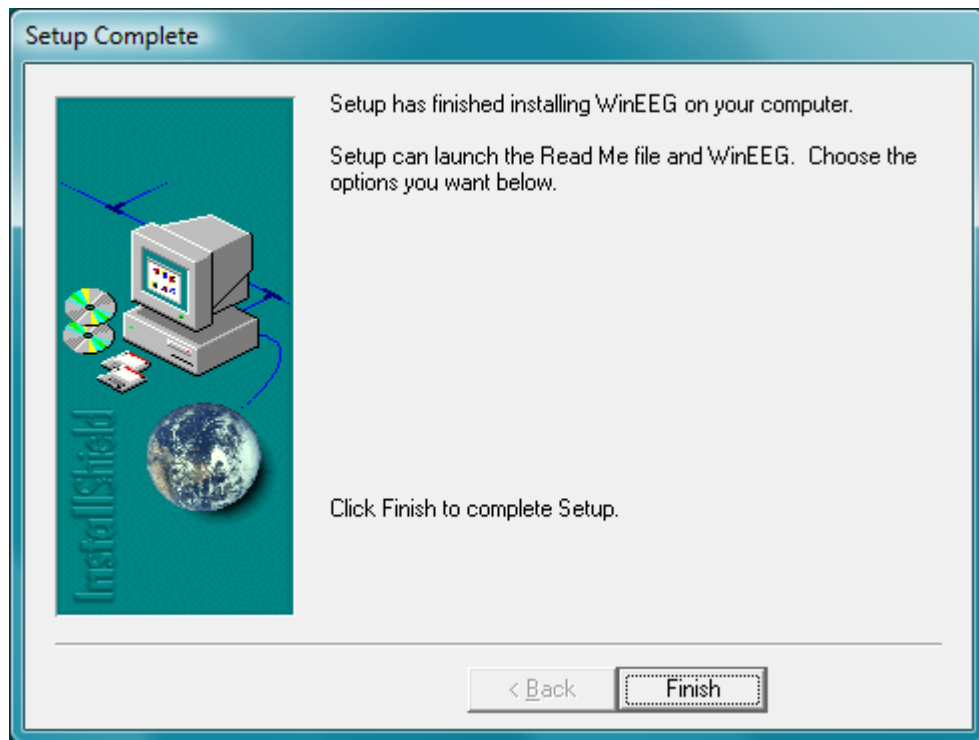
7. Select type of Setup you prefer. Press “Next” button to continue installation. If Custom installation is selected following window will appear on the screen:



8. Select components you want to install. Don't install "Sounds" component if you don't plan to use auditory biofeedback.



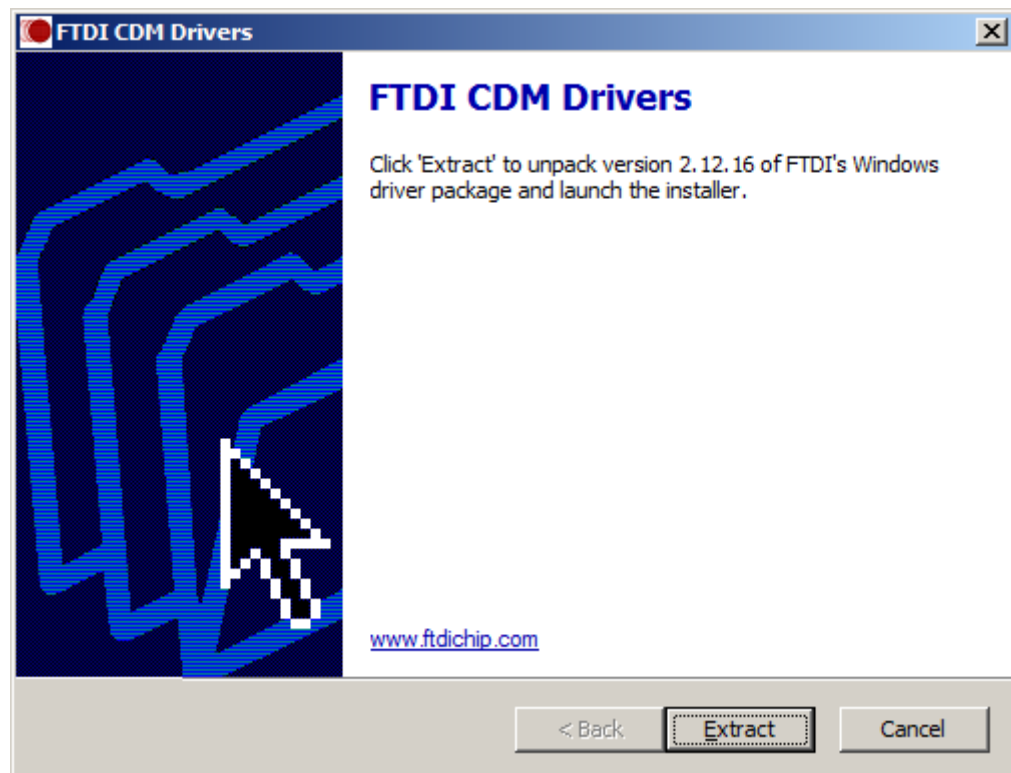
9. Type a new folder name if you want. Press "Next" button to continue installation.



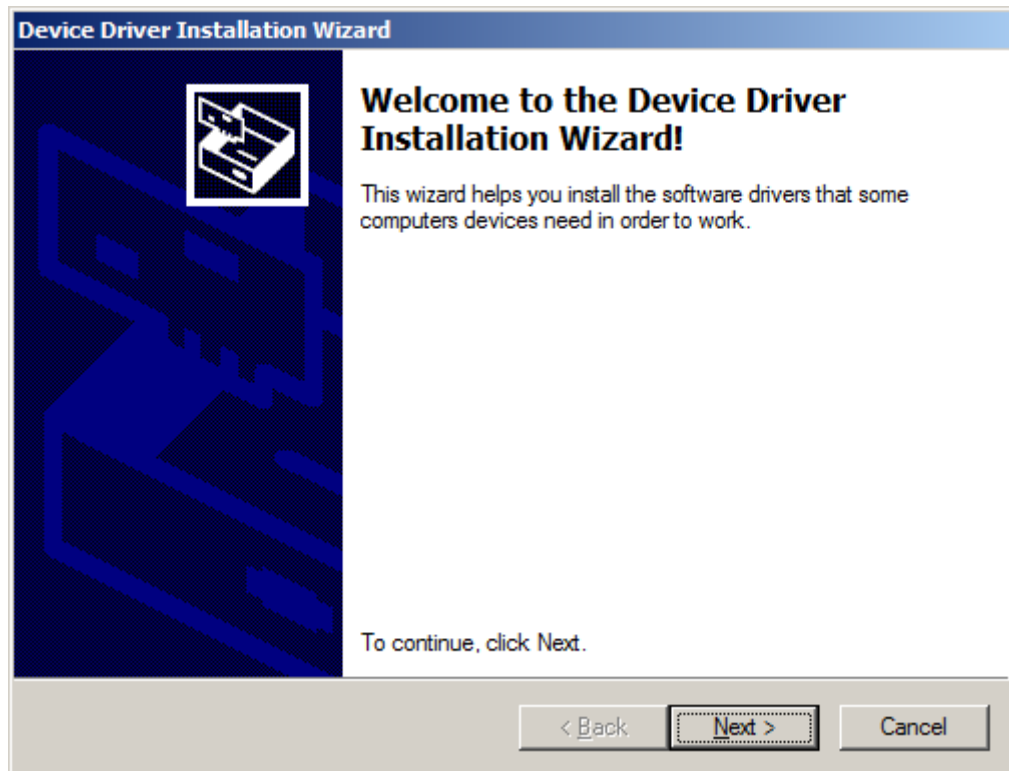
10. Press "Finish" button to complete Setup.

Mitsar-EEG amplifiers box driver.

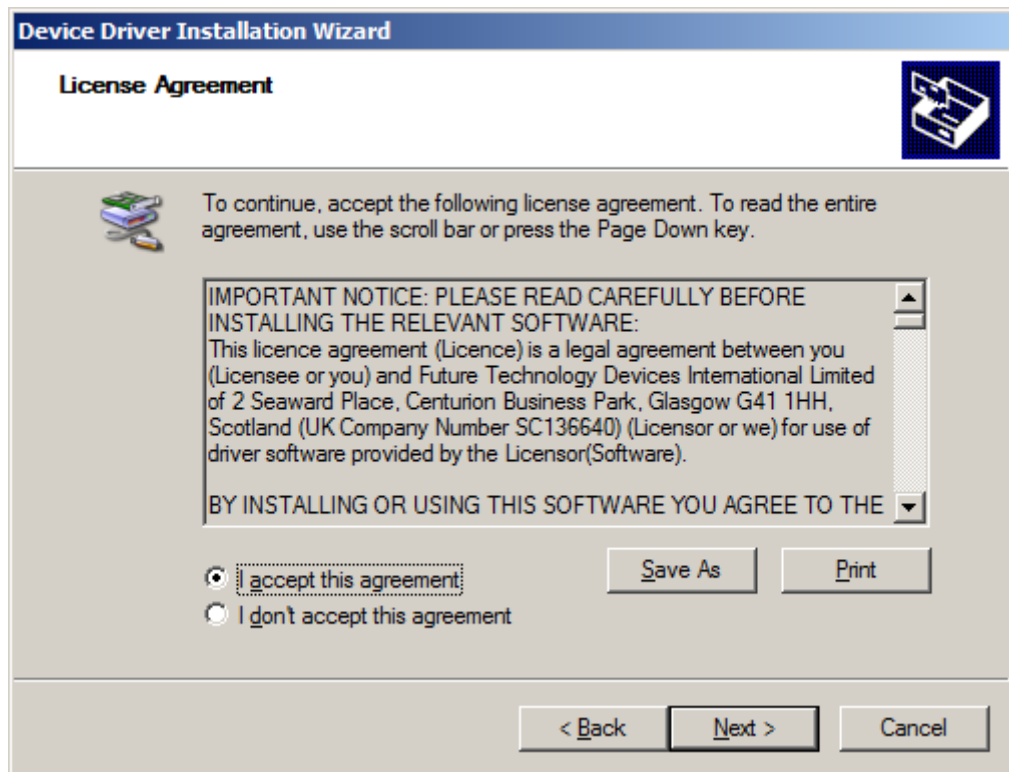
1. Insert the CD or USB memory stick to the corresponding drive of the “Master” computer.
2. Open folder with name **USBDRV**.
3. Run **CDM21216Setup.EXE** program.
4. Follow the instruction on the screen.



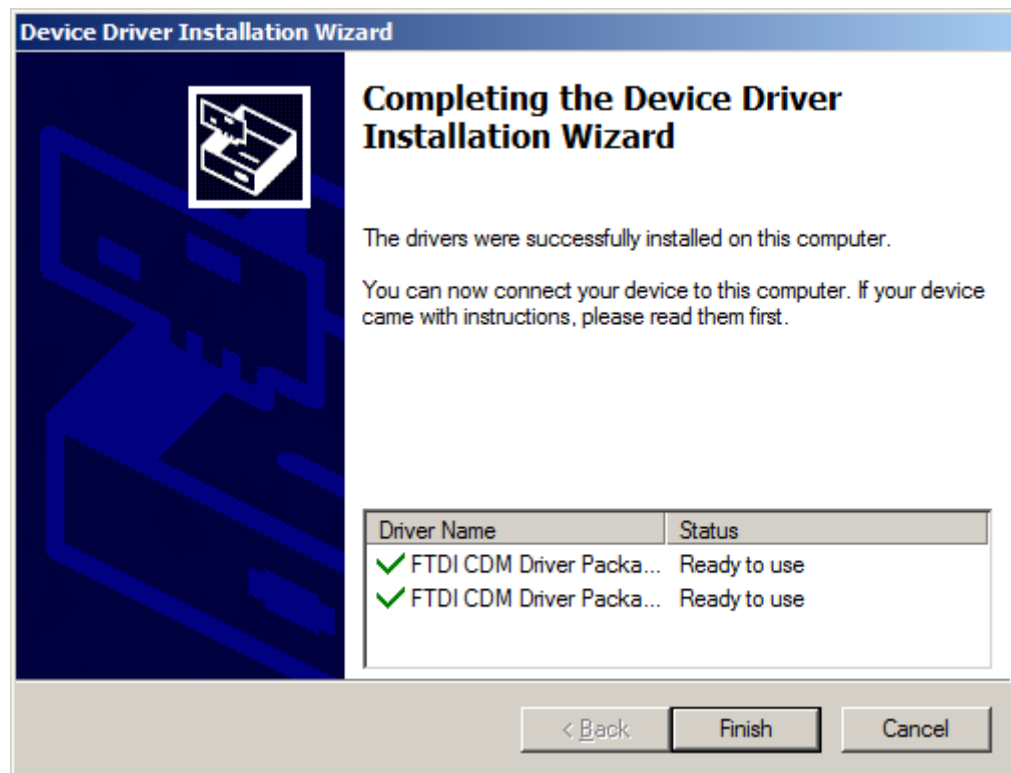
5. Press “Extract” button to continue installation.



6. Press “Next” button to continue installation.



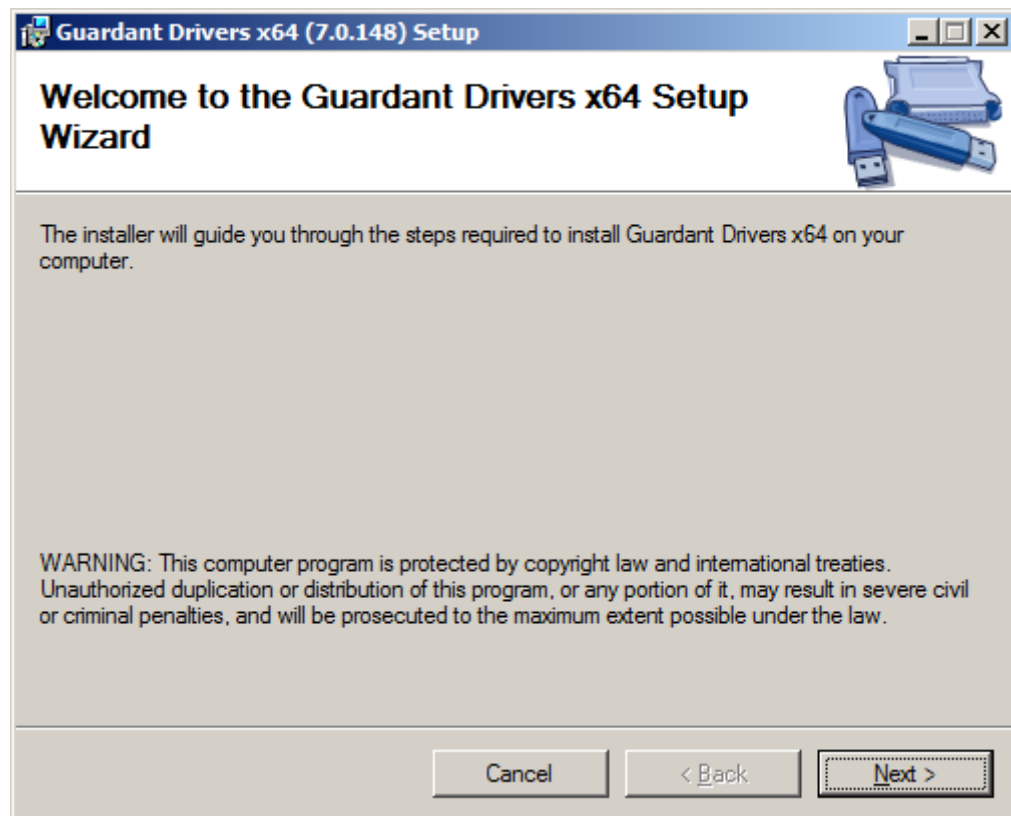
7. Read this agreement, select “I accept this agreement” button and press “Next” button to continue installation.



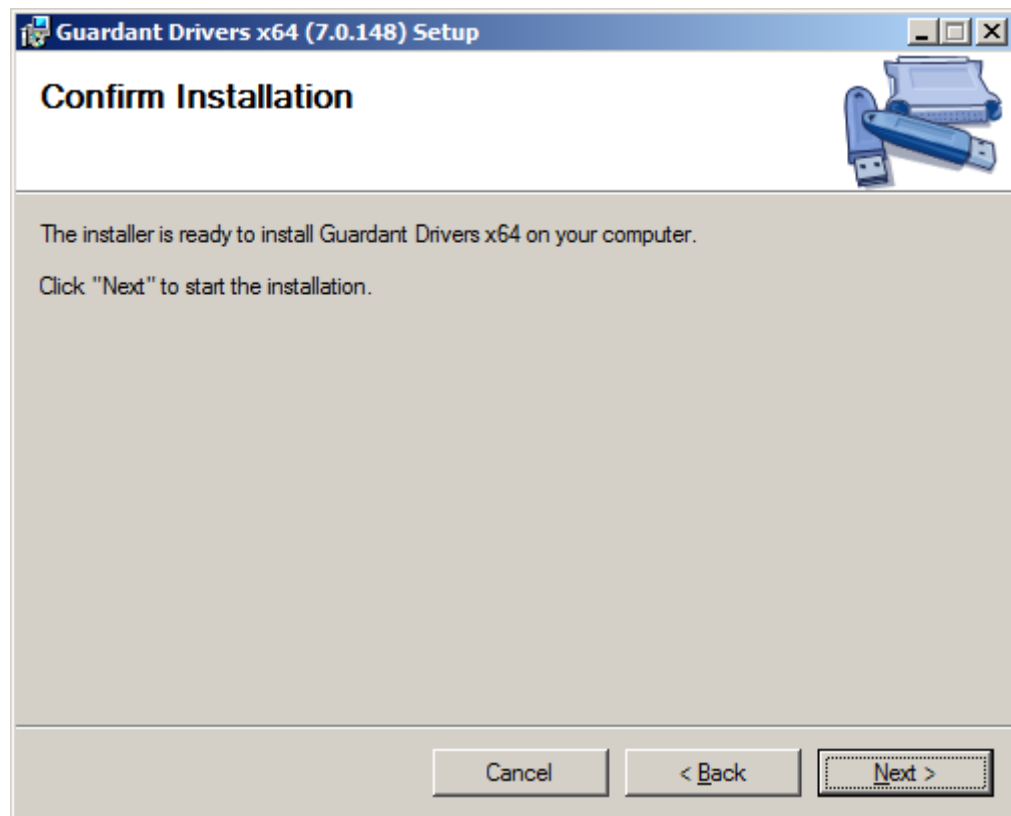
8. Press “Finish” button to complete Setup.

Guardant dongle driver.

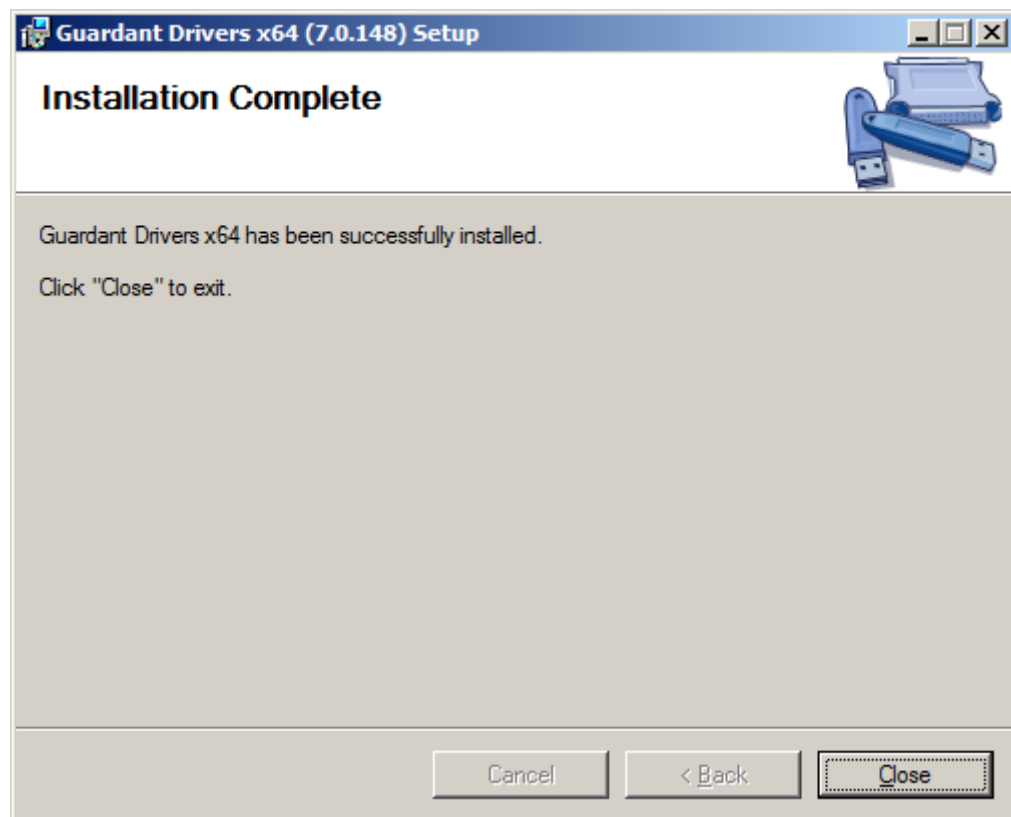
1. Insert the CD or USB memory stick to the corresponding drive of the “Master” computer.
2. Open folder with name **USB Dongle Guardant**.
3. Open folder with name **ENG** (or **RUS**).
4. Run **GrdDriverEX-x86.EXE** program for Windows 32-bits version or **GrdDriverEX-x64.EXE** program for Windows 64-bits version.
5. Follow the instruction on the screen.



6. Press “Next” button to continue installation.



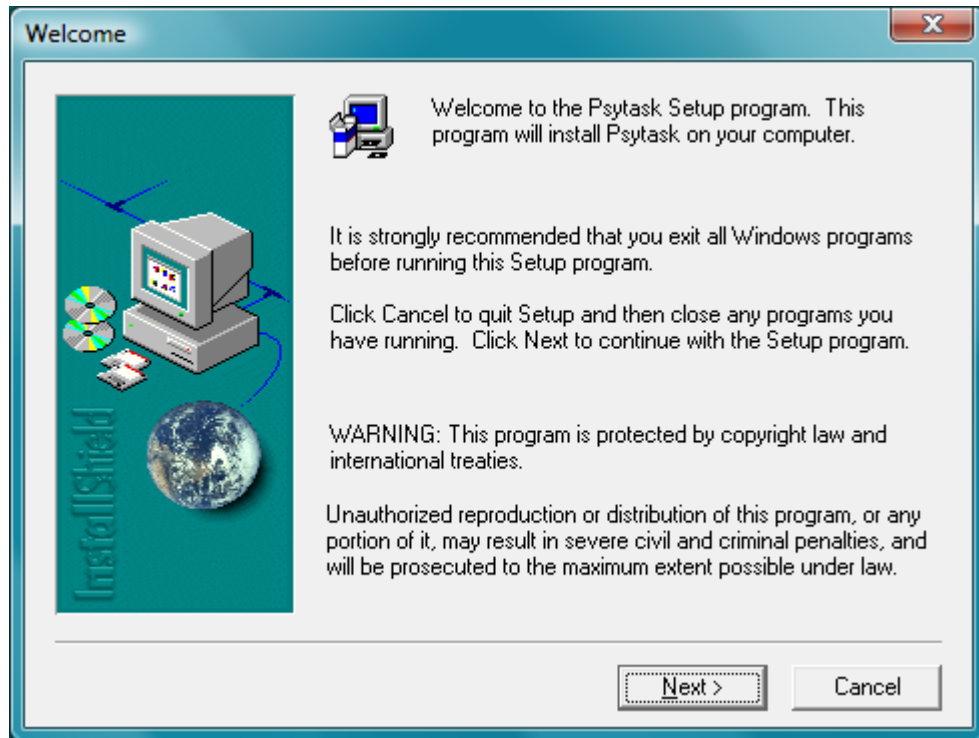
7. Press "Next" button to continue installation.



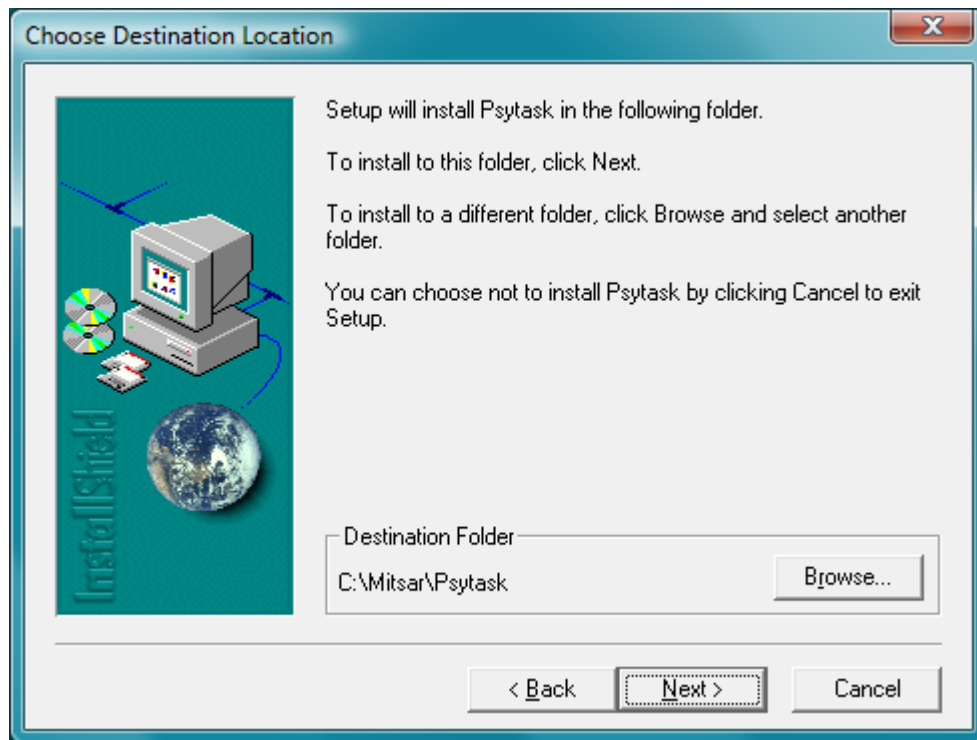
8. Press "Close" button to complete Setup.

PSYTASK software.

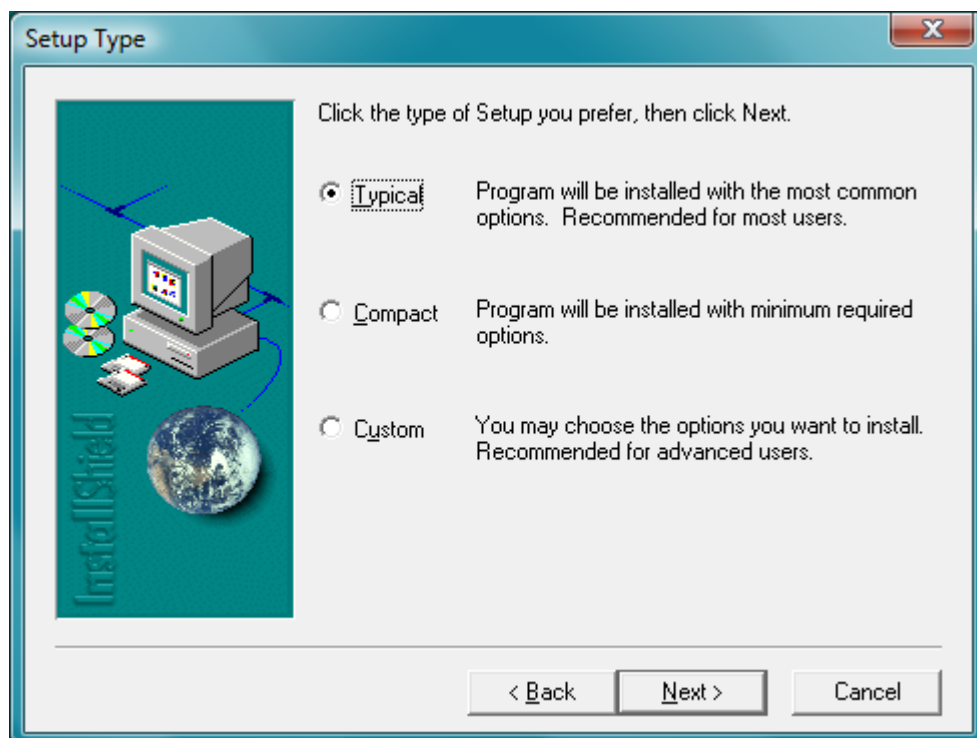
1. Insert the CD or USB memory stick to the corresponding drive of the “Slave” computer.
2. Open folder with name **PSYTASK**.
3. Run **SETUP.EXE** program.
4. Follow the instruction on the screen.



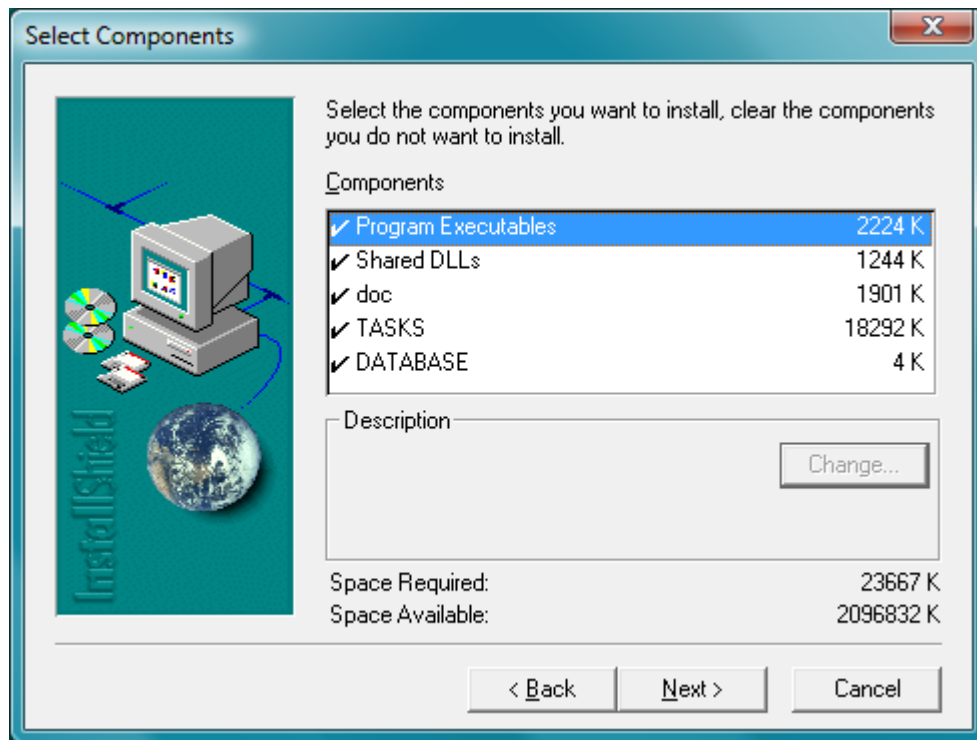
5. Press “Next” button to continue installation.



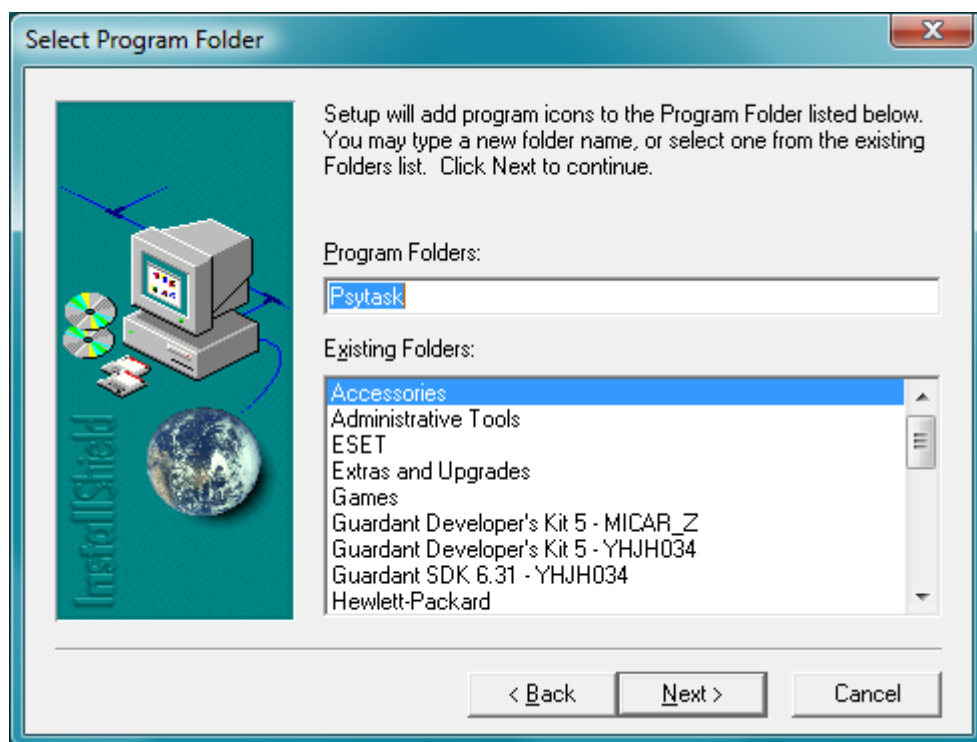
6. Press “Browse...” button if you would like to change location of PSYTASK program. Press “Next” button to continue installation.



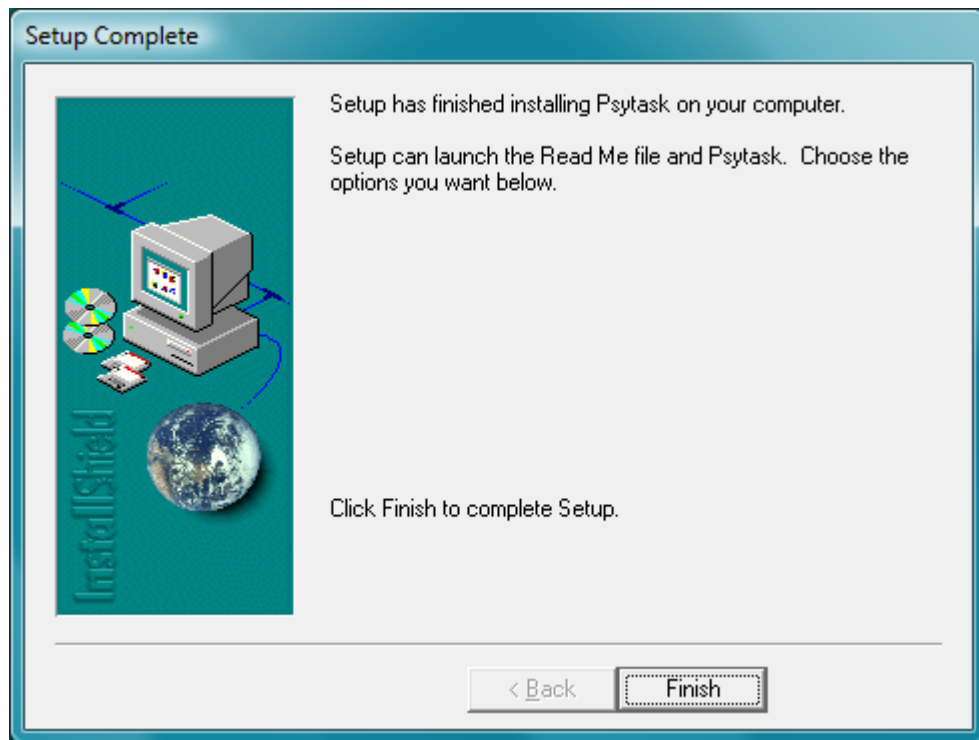
7. Select the type of Setup you prefer and press “Next” button to continue installation. If Custom installation is selected following window will appear on the screen:



8. Select components you want to install.



9. Type a new folder name if you want. Press "Next" button to continue installation.



10. Press “Next” button to complete Setup.

ERP recording system software configuration

You must perform the configuration of the system after the hardware and software installation. The software configuration includes two steps:

1. Computer network configuration
2. WinEEG and PSYTASK software configuration.

Network configuration

Network configuration is performed about the same on both “Master” and “Slave” computers and includes following three steps.

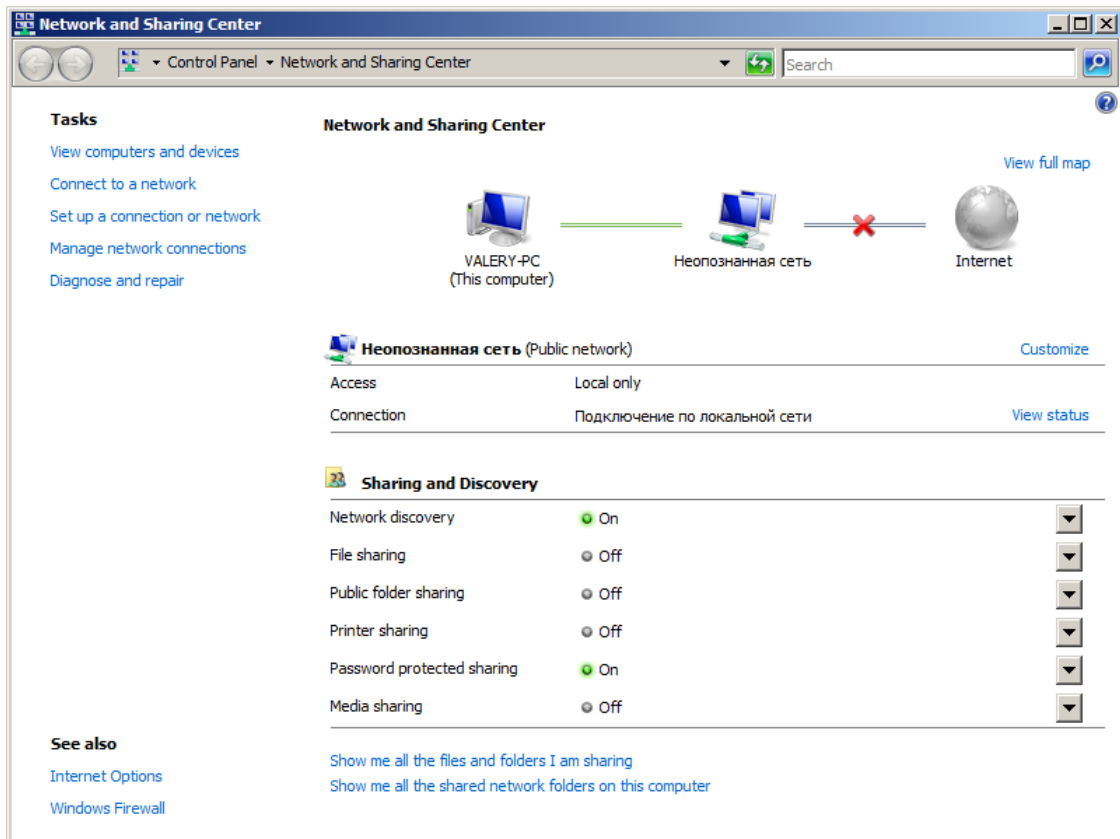
1. Specifying the IP address of the computer.
2. Definition of the working group for both computers.
3. Verifying Network Settings

In fact, the last two steps are not strictly necessary. But we strongly recommend that you perform these steps to make sure that the network is configured correctly and to simplify WinEEG and PSYTASK software configuration.

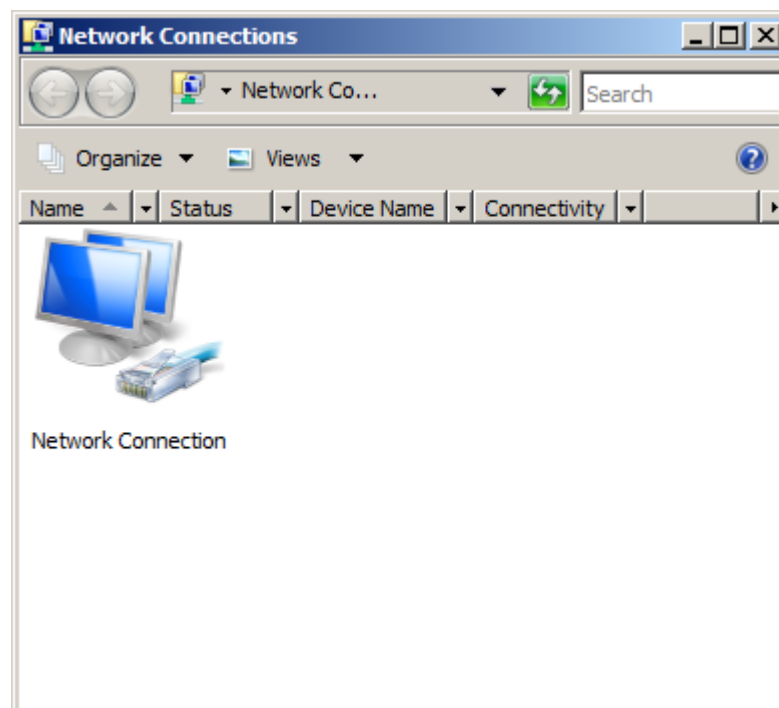
1. Specifying the IP address of the computer.

To specify an IP address of the computer, it is necessary to perform the following steps (Windows Vista specific)

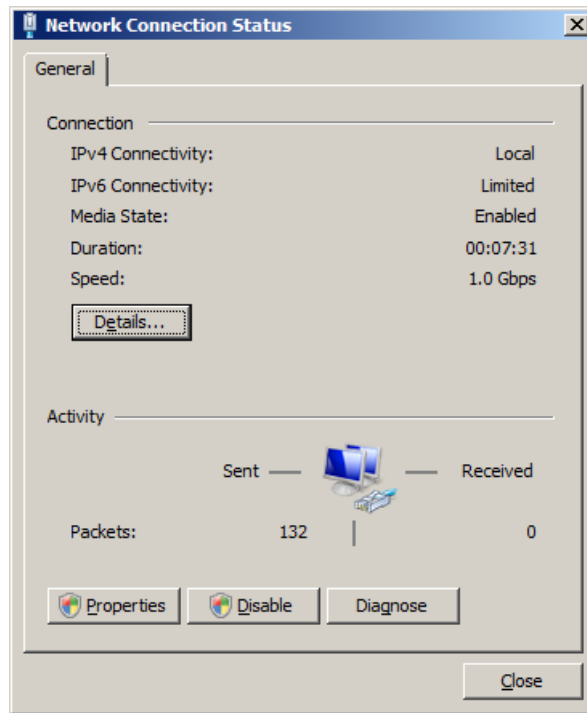
1. Move mouse pointer to the "Network" icon on desktop and click right button. The pop-up menu will appear on the screen.
2. Select "Property" item. The "Network and Sharing Center" window will appear on the screen.



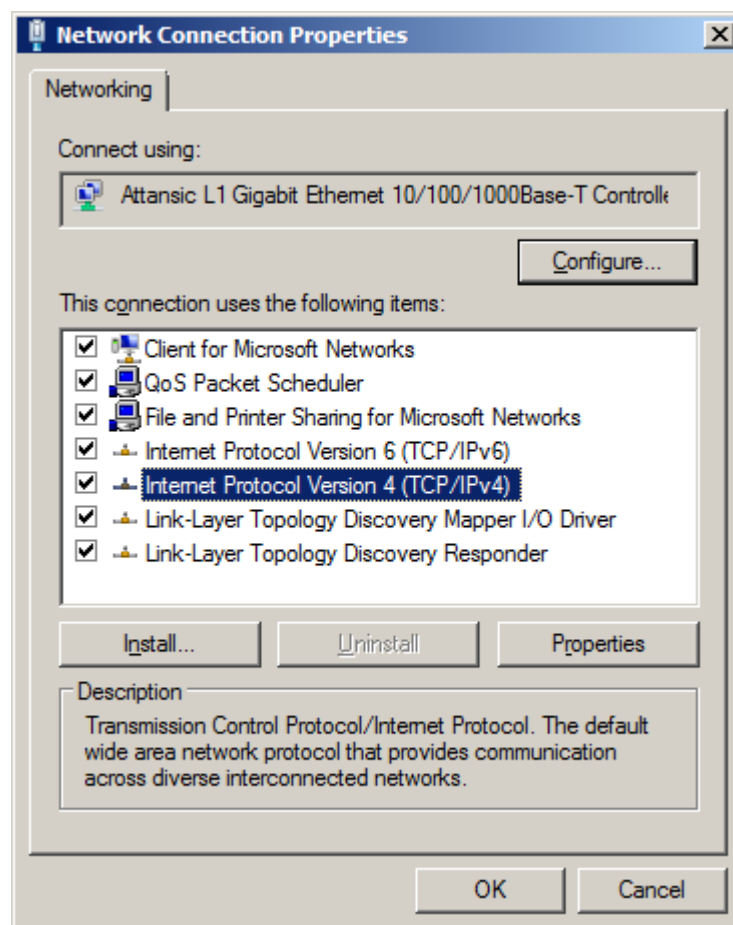
3. Select "Manage network connection" item. The "Network Connection" window will appear on the screen.



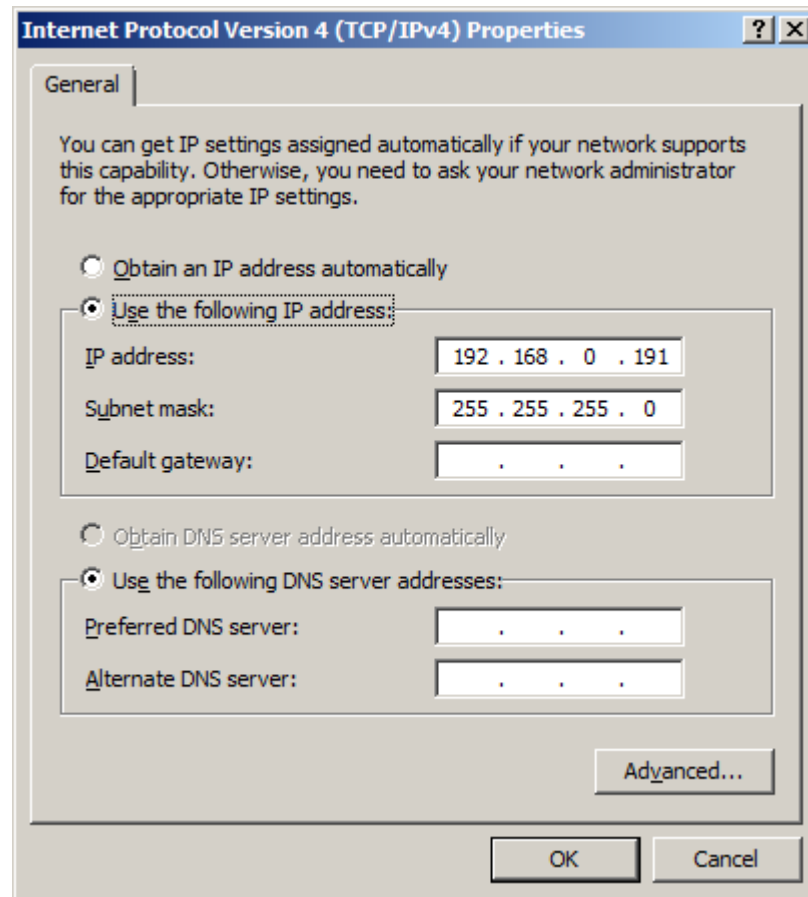
4. Move mouse pointer to the "Network Connection" icon and double click left button. The "Network Connection Status" window will appear on the screen.



5. Press "Properties" button. The "Network Connection Properties" window will appear on the screen.



6. Select "Internet Protocol Version 4 (TCP/IPv4)" option as it is shown above and press "Properties" button. The "Internet Protocol Version 4 (TCP/IPv4) Properties" window will appear on the screen.



7. Select "Use the following IP address:" option.
8. Enter "IP address" into corresponding field.
9. Enter "Subnet Mask" into corresponding field.
10. Press "OK" button in the "Internet Protocol Version 4 (TCP/IPv4) Properties" window
11. Press "Close" button in the "Network Connection Properties" window.
12. Press "Close" button in the "Network Connection Status" window.
13. Close the "Network Connection" window.
14. Close the "Network and Sharing Center" window.

IMPORTANT!!! The IP address and Subnet mask should be specified on both “Master” and “Slave” computers separately. Subnet mask should be identical on both computers. The subfields of IP addresses that correspond to non-zero subfields of Subnet mask should also be identical. But the subfields of IP addresses that correspond to the zero subfields of Subnet mask should not be identical. The following example illustrates these rules.

Example:

Appropriate network settings may be the following:

“Master” computer:

IP address: 192.168.0.1
Subnet mask: 255.255.255.0

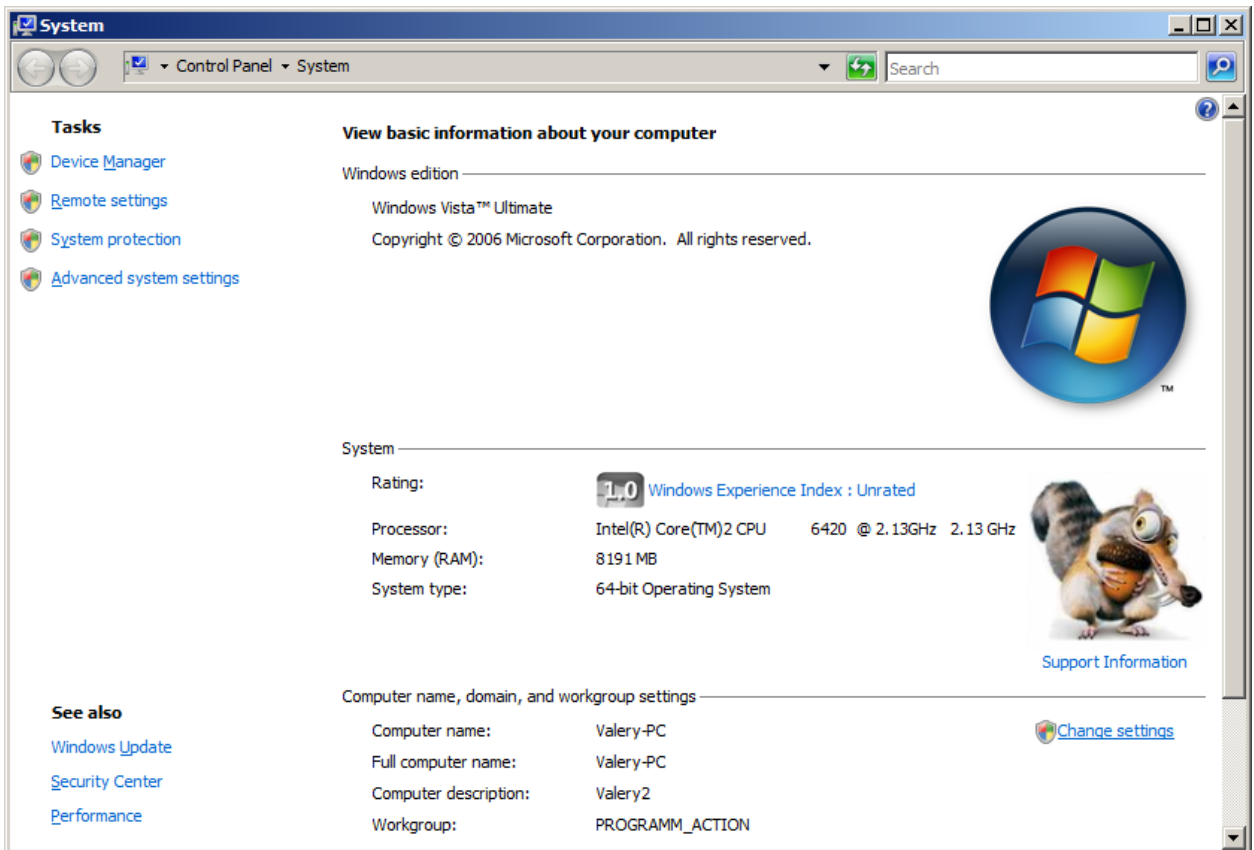
“Slave” computer:

IP address: 192.168.0.2
Subnet mask: 255.255.255.0

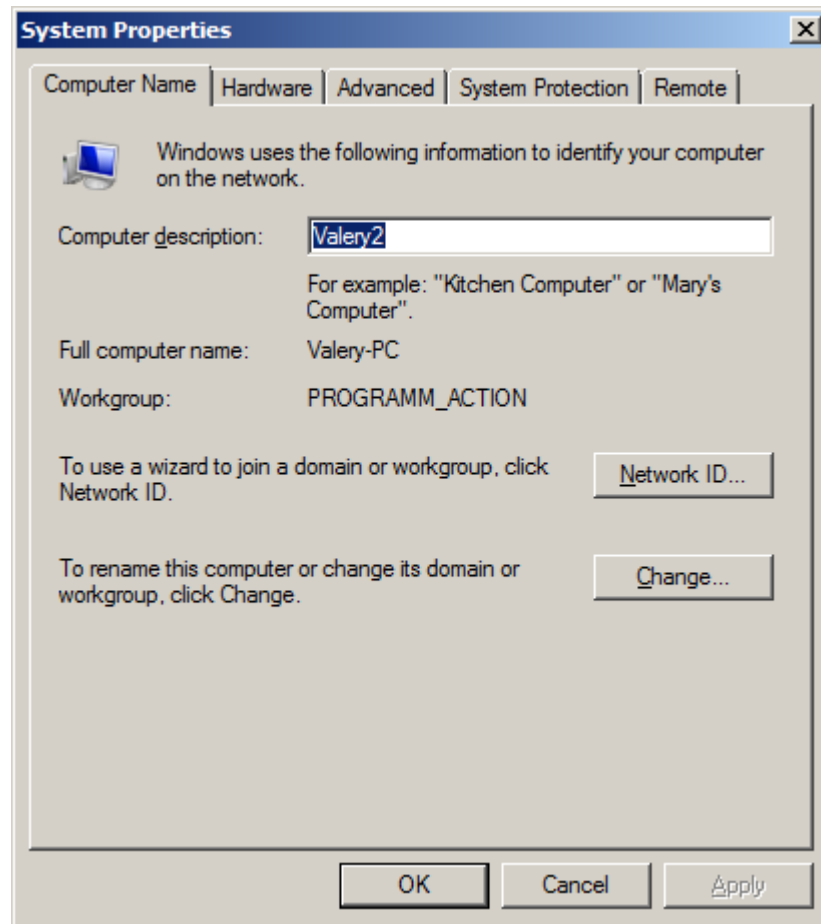
2. Definition of the working group for both computers.

1. Move mouse pointer to the "Computer" icon on desktop and click right button. The pop-up menu will appear on the screen.

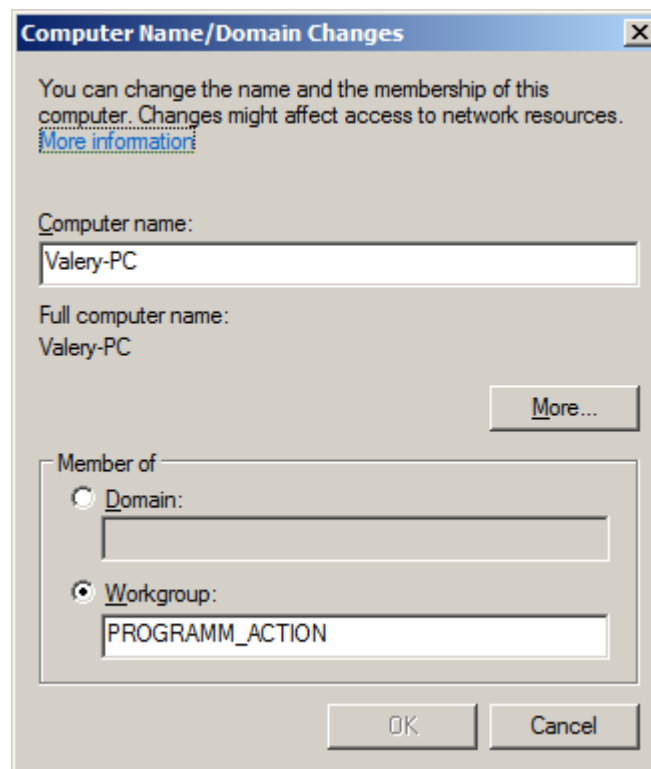
2. Select "Property" item. The "System" window will appear on the screen.



3. Select "Change setting" item for the "Computer name, domain, and workgroup setting" . The "System Properties" window will appear on the screen.



4. Press "Change..." button. The "Computer Name/Domain Changes" window will appear on the screen.



4. Enter "Computer name:" into corresponding field

5. Enter "Workgroup" into corresponding field
6. Press "OK"
7. Restart the computer.

IMPORTANT!!! The "Computer name:" and "Workgroup" should be specified on both "Master" and "Slave" computers separately. The "Workgroup" should be the same on both "Master" and "Slave" computers. The Computer names should be different.

Example:

"Master" computer:

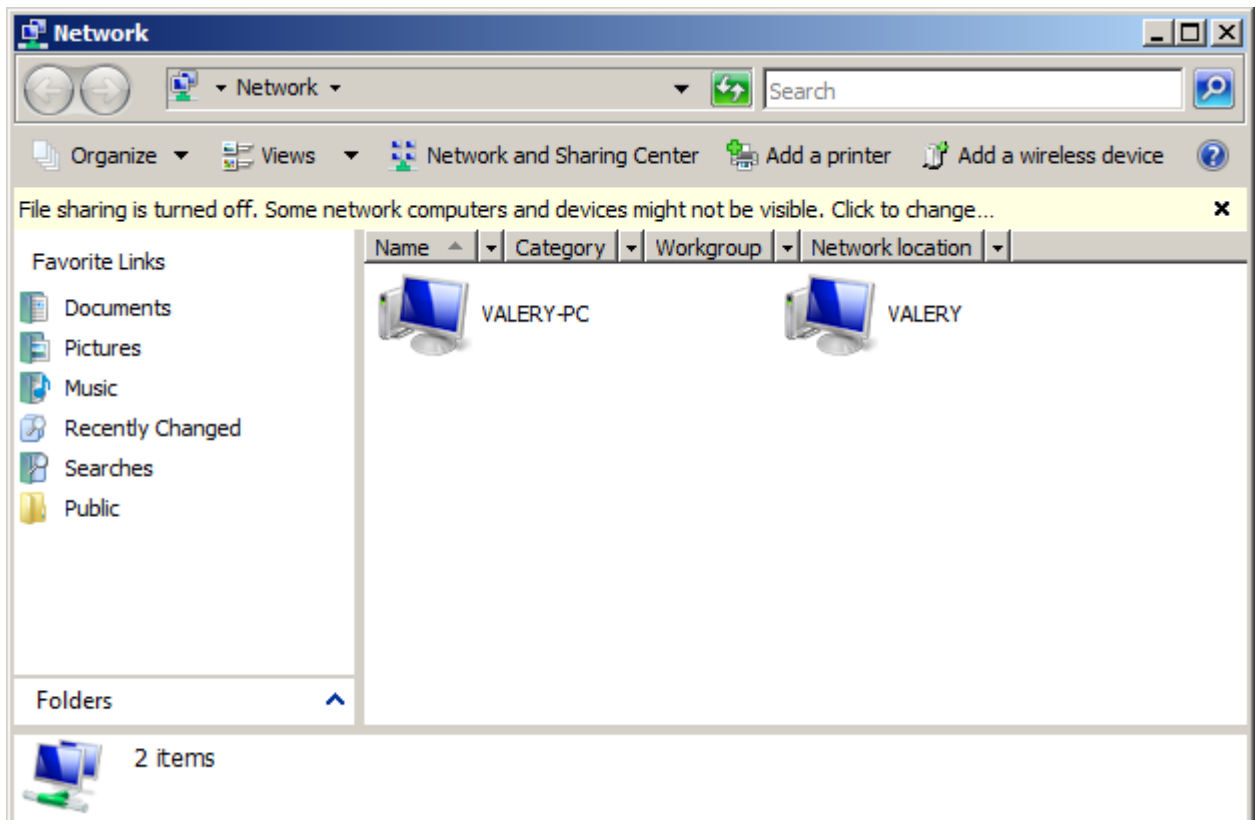
Computer name: Valery
Workgroup: PROGRAMM_ACTION

"Slave" computer:

Computer name: Valery-PC
Workgroup: PROGRAMM_ACTION

3. Verifying Network Settings

1. Move mouse pointer to the "Network" icon on desktop and double click left button. The "Network" window will appear on the screen.



2. Wait until the search for computers on the network is over

3. Make sure that both computers are found in the network, as it is shown above
4. Close "Network" window".

WinEEG and PSYTASK software configuration

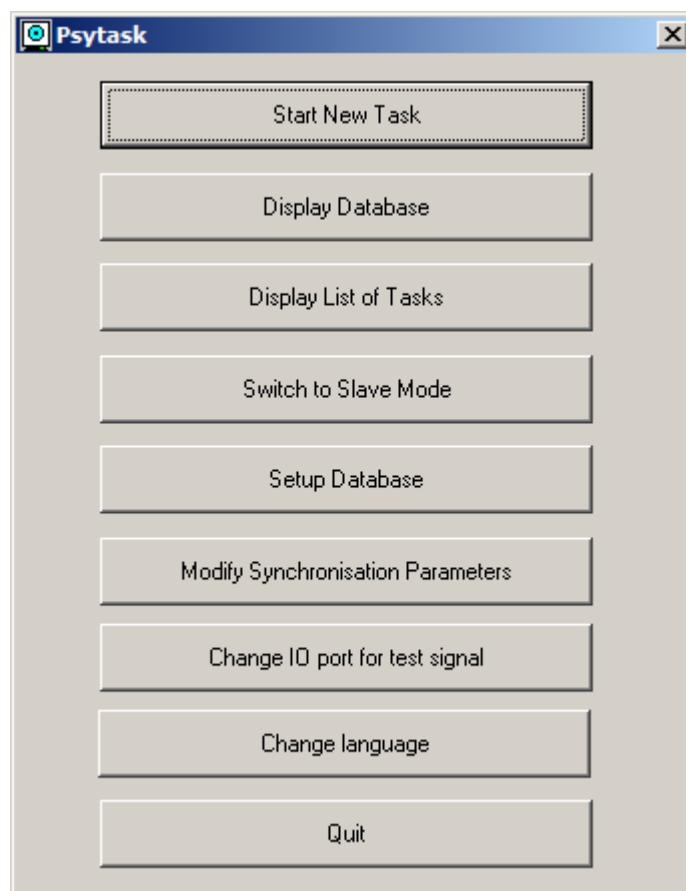
Important!!! Before you start to configure the WinEEG and PSYTASK software, make sure that the hardware software of ERP recording system is properly installed and the network settings are specified correctly.

WinEEG and PSYTASK software configuration includes three steps:

1. Specifying synchronization settings for PSYTASK software.
2. Specifying equipment parameters and synchronization settings for WinEEG software.
3. Testing the synchronization parameters for WinEEG and PSYTASK software.

1. Specifying synchronization settings for PSYTASK software

1. Start PSYTASK using shortcut on Desktop of “Slave” computer. The main window of PSYTASK will appear on the screen.



2. Press “Modify Synchronization Parameters” button. The “Parameters of Synchronization” window will appear on the screen.

Parameters of synchronisation

Connection port for synchronization and its parameters

COM port LAN

COM port: COM 7 Name: Valery-PC

Baudrate: 57600 IP: 192.168. 0 .191

Parity: None Port: 60779

Number of bits: 8

Stop bits: 1

Synchronisation mode: Don't send synchro codes (WinEEG control)

Correction of synchronization for

Visual stimuli (ms): 0

Auditory stimuli (ms): 0

Test signal (ms): 0

Generation of synchronization signal for the screen

Position: Left center

Size: Very large

Type: Black on White

For the first visual stimulus only

OK Cancel

3. Select “LAN” option in “Connection port for synchronization and its parameters” group as it is shown above.
4. Make sure that “Synchronization mode” is selected as “Don’t send synchro codes (WinEEG control)” as it is shown above..
5. Make sure that all fields in “Correction of synchronization for” group are zeroed as it is shown above.
6. Select appropriate parameters in the “Generation of synchronization signal for the screen” group. The recommended parameters are following (see Figure above):
 Position: “Left center”
 Size: “Very large”
 Type: Black on White.
 “For the first visual stimulus only” button is unchecked.
7. Press “OK” button.

2. Specifying equipment parameters and synchronization settings for WinEEG software.

1. Start WinEEG using shortcut on Desktop of “Master” computer. The main window of WinEEG will appear on the screen.

2. Perform command “Setup->Equipment Parameters...” from main menu of WinEEG. The “Equipment configuration” window will appear on the screen.

3. Select “Type of amplifies” as “Mitsar-EEG-201 or Mitsar-EEG-202”.

4. Press “Find” button. If WinEEG have successfully found connected amplifiers box, their description will appear in the field with name “Amplifiers description” as it shown below.

Equipment configuration

Amplifiers description: Mitsar 202 serial number 4720014 (72) I/O port: USB

Type of amplifiers

Mitsar-EEG-201 or Mitsar-EEG-202 Smart-BCI

Mitsar-EEG-201 or Mitsar-EEG-202

I/O port: USB Sampling rate (Hz): 500

Find

Smart-BCI connection

Bluetooth (default) Wi-Fi (optional)

IP: 0 . 0 . 0 . 0 Port: 0

Check connection

Electrodes system for Smart-BCI

MCS-CAP Electro-Cap

Stimuli presentation system

PSYTASK Another ("EXTERNAL")

Trial duration (ms): 0 Prestimulus time interval (ms): 0

SOUNDBOX and LEDs

Connection port for synchronization and its parameters

COM port LAN

COM port: COM 1 Baudrate: 57600 Number of bits: 8 Parity: None Stop bits: 1

Name: IP: 0 . 0 . 0 . 0 Port: 60779

Find Check

Port for external marks

COM port: None Baudrate: 57600 Number of bits: 8 Parity: None Stop bits: 1

Graphics acceleration

Method: Turn off Synchronization with Vertical Retrace

Access codes

Main: Video: Database:

OK Cancel

5. Select "Sampling rate" as "500" (See above)

Equipment configuration

Amplifiers description: Mitsar 202 serial number 4720014 (72) I/O port: USB

Type of amplifiers

Mitsar-EEG-201 or Mitsar-EEG-202 Smart-BCI

Mitsar-EEG-201 or Mitsar-EEG-202

I/O port: USB Sampling rate (Hz): 500

Find

Smart-BCI connection

Bluetooth (default) Wi-Fi (optional)

IP: 0 . 0 . 0 . 0 Port: 0

Check connection

Electrodes system for Smart-BCI

MCS-CAP Electro-Cap

Stimuli presentation system

PSYTASK Another ("EXTERNAL")

Trial duration (ms): 0 Prestimulus time interval (ms): 0

SOUNDBOX and LEDs

Connection port for synchronization and its parameters

COM port LAN

COM port: COM 1 Baudrate: 57600 Number of bits: 8 Parity: None Stop bits: 1

Name: Valery-PC IP: 192.168. 0 . 191 Port: 60779

Find Check

Port for external marks

COM port: None Baudrate: 57600 Number of bits: 8 Parity: None Stop bits: 1

Graphics acceleration

Method: Turn off Synchronization with Vertical Retrace

Access codes

Main: Video: Database:

OK Cancel

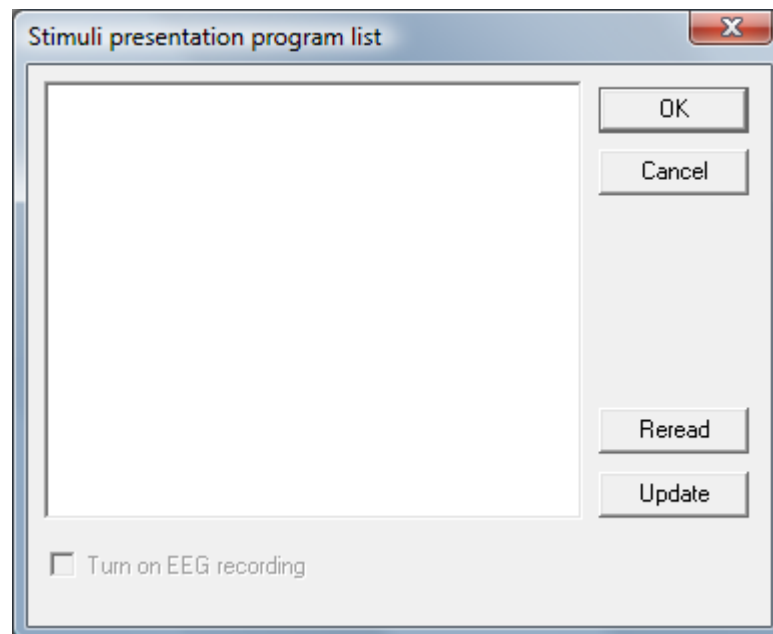
6. Make sure that Stimuli presentation system is selected as “PSYTASK”.
7. Select “LAN” ” option in “Connection port for synchronization and its parameters as it is shown above.
8. Enter into the “Name:” field the Network name of “Slave” computer.
9. Press “Find” button from this group of fields and make sure that corrected IP address if “Slave” computer is displayed.
10. Press “OK” button.

3. *Testing the synchronization parameters for WinEEG and PSYTASK software.*

1. Start PSYTASK using shortcut on Desktop of “Slave” computer if it is not already running.
2. Press “Switch to Slave Mode” button in PSYTASK main window.

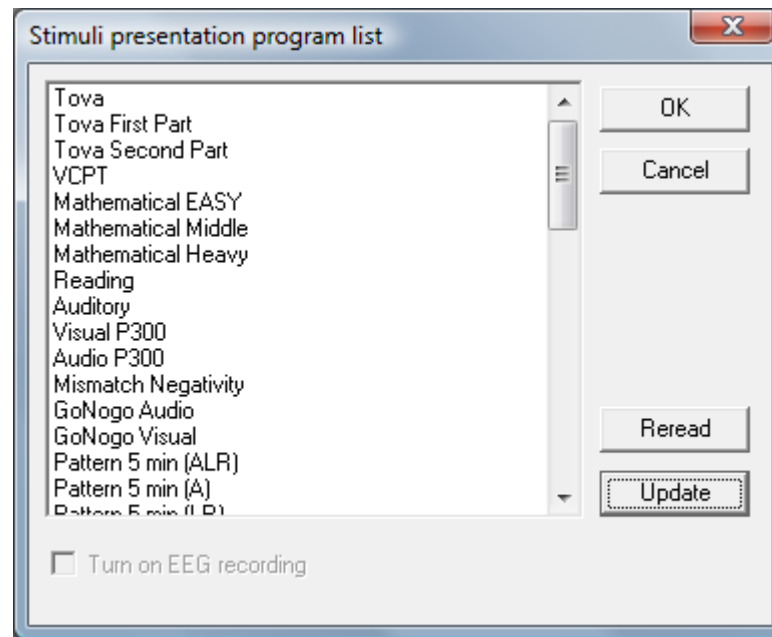
Now, the PSYTASK is ready to work together with WinEEG.

3. Start WinEEG using shortcut on Desktop of “Master” computer if it is not already running.
4. Perform command “Setup->Stimuli Presentation Programs” from main menu of WinEEG. The “Stimuli presentation program list” window will appear on the screen.



5. Press “Update” button. If the Network cable is connected and Network settings are correct the progress bar will display a process of transferring of task protocols from PSYTASK program to WinEEG program. Otherwise WinEEG program will report that the slave computer does not respond. You need to check the network connection and the network settings again and repeat the steps 1-5.

6. Make sure that the list of stimuli presentation programs is correctly updated as it is shown below.



7. Press "OK" button.

Now, the WinEEG is ready to work together with PSYTASK. But the ERP recording system is not yet ready for ERP recording. This system should be calibrated (see below).

Important!!! It is necessary to perform steps 1-6 described in this section every time when the list of tasks or their parameters is changed in PSYTASK software. We recommend that you carry out this procedure each time before the ERP recording, if you are not sure that nobody has changed the list of tasks or their parameters.

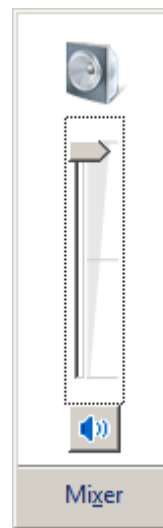
Important!!! PSYTASK software is able to send correct task protocols (presentation program). Please be attentive and check newly added task protocols before updating list of presentation program for WinEEG software. Incorrect task protocols should be deleted from the list using PSYTASK software before updating.

ERP recording system calibration

System calibration is performed to compensate for possible constant delays of visual and auditory stimuli in relation to EEG recording. The nature of these delays may be different, for example, dynamic characteristics of the monitor connected to the “Slave” computer, peculiar properties of a particular implementation of any component of the Windows operating system and etc. It is difficult to predict the magnitude of these delays in advance, because they depend on the specific system configuration. However, these delays can be measured and compensated.

Several steps need to perform to carry out the calibration procedure.

Before start the calibration procedure, make sure that audio playback on "Slave" computer was already turned on, and set the maximum volume.



1. Start PSYTASK using shortcut on Desktop of “Slave” computer if it is not already running.
2. Press “Switch to Slave Mode” button in PSYTASK main window.
3. Start WinEEG using shortcut on Desktop of “Master” computer if it is not already running. Here we assume that all the settings described above have already been made.

Important!!! Several additional steps should be performed for old modifications of the amplifiers box. This is due to the fact that these amplifiers have no special inputs for Video sensor. In this case video and audio synchronization signals are recorded using Bio1, Bio2,... channels. To record these signals, you need to prepare an appropriate montage in advance. This montage should include corresponding Bio channels. To prepare montage please use the command “Setup->Montage List...” from main menu of WinEEG.

If you are new versions of the amplifiers, the preparation of the montage is not required. Special channels "VSyn" and "ASyn" will be automatically added to currently used montage.

4. Perform command “File->New” from main menu of WinEEG. The “Patient Card for New Investigation” window will appear on the screen.

The screenshot shows a dialog box titled "Patient Card for New Investigation". It contains the following fields and values:

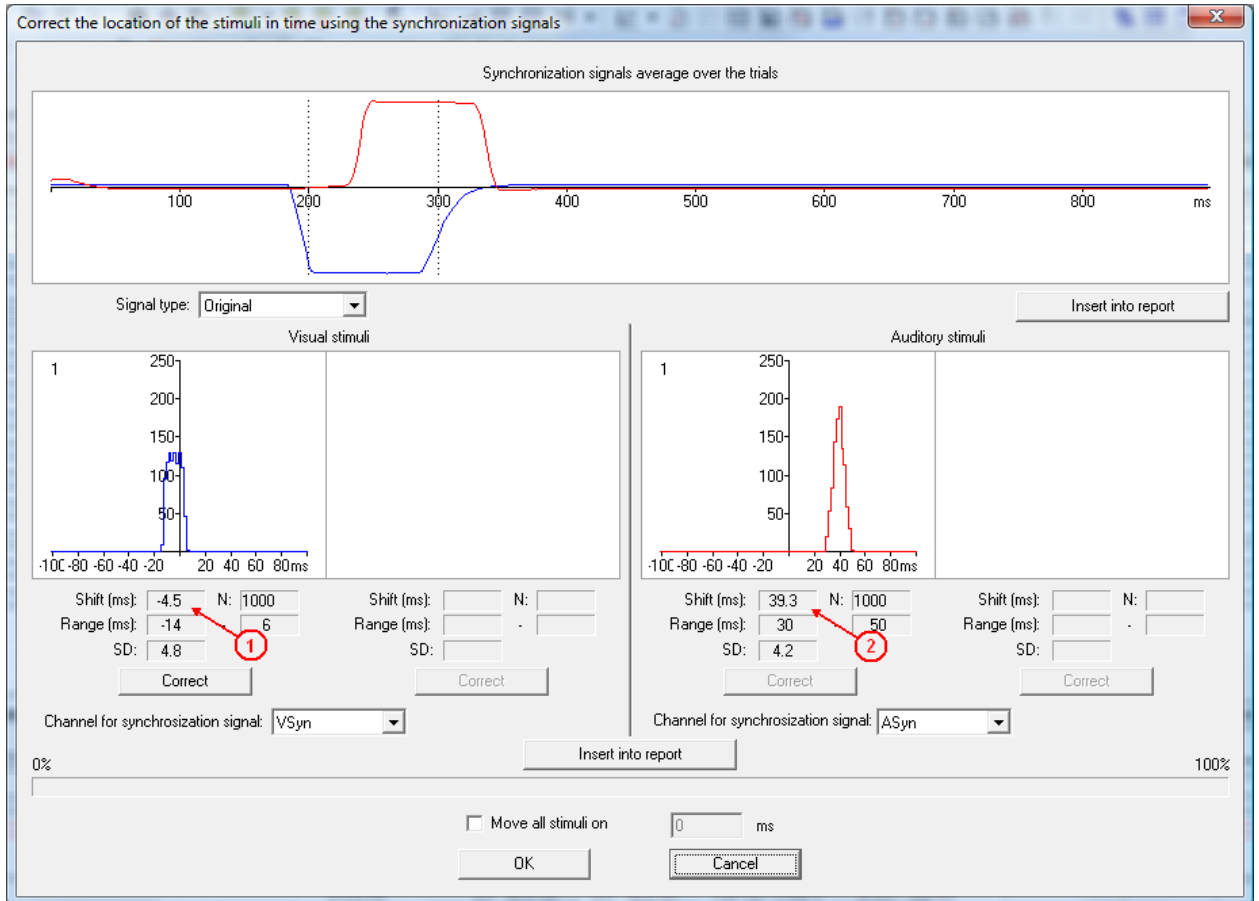
- Montage Name: Monopolar1 [A1<->A2]
- Amplifiers: Mitsar 202 serial number 4720014 (72)
- ID: TEST
- Date: 20/10/2016
- Time: 16:15:58
- Investigation: EEG observation
- Patient: TEST PATIENT
- Patient ID: (empty)
- Diagnosis: (empty)
- Date of birth: 10/10/1990
- Sex: M
- Address: (empty)
- Note: (empty)
- Disk free space (Mb): 22559
- Maximal length of 20-channels EEG recording (minute): 39425
- Video recording parameters:
 - Resolution (Pixels): 320 x 240
 - Frames per second: 25
 - Maximal length of recording (minute): 136

At the bottom of the dialog are "OK" and "Cancel" buttons.

5. Select appropriate montage if necessary. Skip this step for new versions of the amplifiers.
6. Press "OK" button. A new EEG window will be displayed on the screen.
7. Run command "Recording->EEG Recording" from main menu of WinEEG.
8. Run command "Recording-> Stimuli Presentation Program" from main menu of WinEEG. The "Stimuli presentation program list" window (see above) will appear on the screen.
9. Select stimuli presentation protocol with name "AudioVideo 2" and press "OK" button.
10. Make sure that "Slave" computer start the procedure of stimuli presentation. Monitor screens should rhythmically change the luminosity with a period of 1 second.
11. Make sure that "Video synchronization signal" (small square) periodically appear (or disappear) on the screen.
12. Make sure that the video sensor is located above the display area where the synchronization signal appears.
13. Wait until the end of the work of stimuli presentation procedures (approximately 34 minutes).
14. Stop recording using command "Recording->Stop" from main menu of WinEEG.

15. Save the newly recorded data using command “File->Save As...” from main menu of WinEEG.

16. Run command “Edit->Adjust trial synchronization” from main menu of WinEEG. The “Correct the location of the stimuli in time using the synchronization signals” window will appear on the screen.



17. Pay attention on the shift of visual and auditory stimuli that is which are marked by arrows 1 and 2 correspondingly.

18. Return to “Slave computer” and press “Esc”. PSYTASK will return to main window.

19. Press “Modify Synchronization Parameters” button. The “Parameters of Synchronization” window will appear on the screen.

20. Enter corresponding correction of synchronization for visual and auditory stimuli similarly, as shown below.

Parameters of synchronization

Connection port for synchronization and its parameters

COM port LAN

COM port: COM 7 Name: Valery-PC
 Baudrate: 57600 IP: 127.0.0.1
 Parity: None Port: 60779
 Number of bits: 8
 Stop bits: 1

Synchronisation mode: Don't send synchro codes (WinEEG control)

Correction of synchronization for

Visual stimuli (ms): -4
 Auditory stimuli (ms): 39
 Test signal (ms): 0

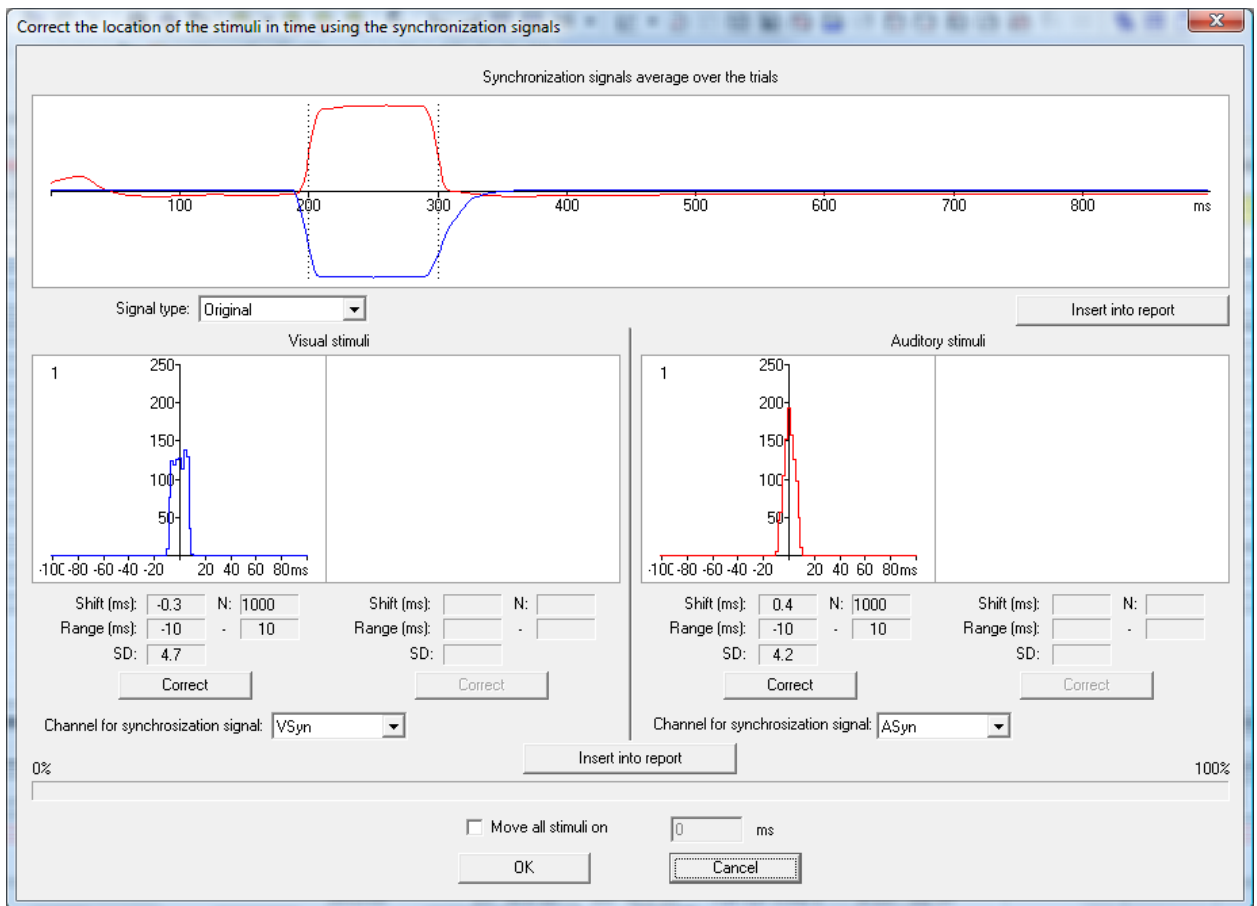
Generation of synchronization signal for the screen

Position: Left center
 Size: Very large
 Type: Black on White
 For the first visual stimulus only

OK Cancel

21. Press “OK”

22. Repeat the steps 1-16 to check the accuracy of the calibration. The results should be approximately the same, as shown below.



Now, the ERP recording system is not yet ready for ERP recording.

The calibration of the ERP recording system can be performed for visual and auditory stimuli separately. The procedure of calibration is very the same excepting that you will use stimuli presentation protocols with name “Video 1” and “Audio 1” correspondingly. Each will take approximately 17 minutes.

How to perform ERP recording

The procedures the ERP recording and the calibration of ERP recording system are similar. But they differ in a few steps. This steps will be shown in *italics*.

1. Place the electrodes on the patient's head. For a normal investigation 19 electrodes are placed using the International 10-20 system. Also a "common point" electrode, "N" electrode and reference electrodes must be placed.

Attention!!! Common point and reference electrodes are to be placed in any case, whether bipolar or monopolar montage is used. If EEG is assumed to be recorded in reference to ears two reference electrodes are placed on the ears. A reference electrode can be placed on the forehead and connected to A1 or A2 input (the appropriate electrode is provided in the set) and a corresponding montage is set in the program. EEG signal quality depends on paying special attention to the placement of common point and reference electrodes.

2. Connect the electrodes to their respective inputs on the front panel of the amplifier block.

3. Start PSYTASK using shortcut on Desktop of "Slave" computer if it is not already running.

4. Press "Switch to Slave Mode" button in PSYTASK main window.

5. Start WinEEG using shortcut on Desktop of "Master" computer if it is not already running. Here we assume that all the settings described above have already been made.

Important!!! Several additional steps should be performed for old modifications of the amplifiers box. This is due to the fact that these amplifiers have no special inputs for Video sensor. In this case video and audio synchronization signals are recorded using Bio1, Bio2,... channels. To record these signals, you need to prepare an appropriate montage in advance. This montage should include corresponding Bio channels. To prepare montage please use the command "Setup->Montage List..." from main menu of WinEEG.

If you are new versions of the amplifiers, the preparation of the montage is not required. Special channels "VSyn" and "ASyn" will be automatically added to currently used montage.

6. Run the electrode impedance checking mode using command "Recording->Impedance" from main menu of WinEEG. If the impedance value is satisfactory (less than 5 kOhm), close the Control of Electrode Impedance window. Otherwise re-install those electrode(s) showing excessive impedance.

7. Perform command "File->New" from main menu of WinEEG. The "Patient Card for New Investigation" window will appear on the screen.

Patient Card for New Investigation

Montage Name:

Amplifiers:

ID: Date: Time:

Investigation:

Patient:

Patient ID:

Diagnosis:

Date of birth: Sex:

Address:

Note:

Disk free space (Mb):

Maximal length of 20-channels EEG recording (minute):

Video recording parameters

Resolution (Pixels): Frames per second:

Maximal length of recording (minute):

8. Select appropriate montage if necessary. Skip this step for new versions of the amplifiers.

9. Fill patient card to identify the EEG recording.

10. Press “OK” button. A new EEG window will be displayed on the screen.

11. Run command “Recording->EEG Monitoring” from main menu of WinEEG. Visually check the quality of the live EEG displayed in the new window. If any channel is acquiring EEG poorly, re-install the corresponding electrode(s). Check EEG acquisition quality using a monopolar montage, without averaging.

12. Run command “Recording->EEG Recording” from main menu of WinEEG.

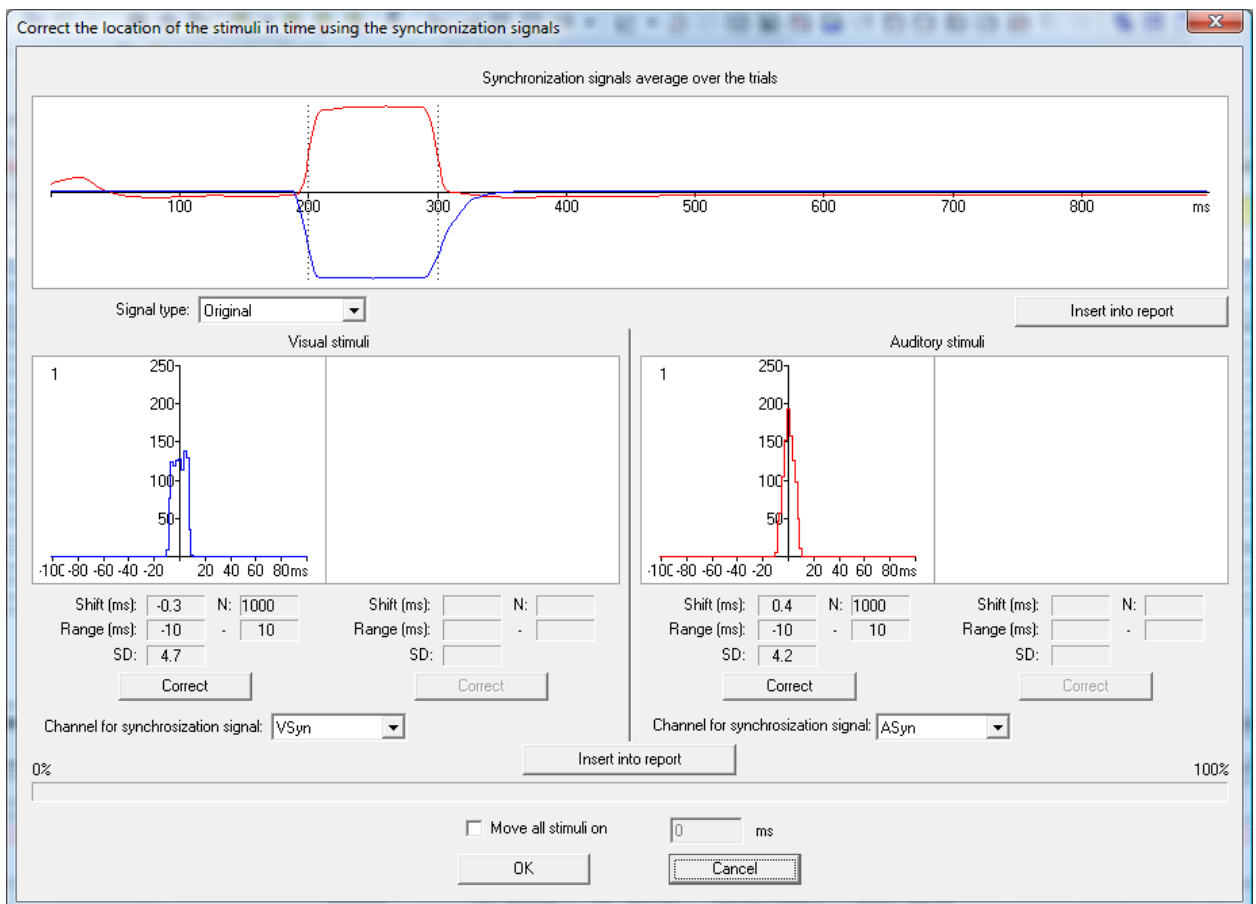
13. Run command “Recording-> Stimuli Presentation Program” from main menu of WinEEG. The “Stimuli presentation program list” window (see above) will appear on the screen.

14. Select appropriate stimuli presentation protocol and press “OK” button.

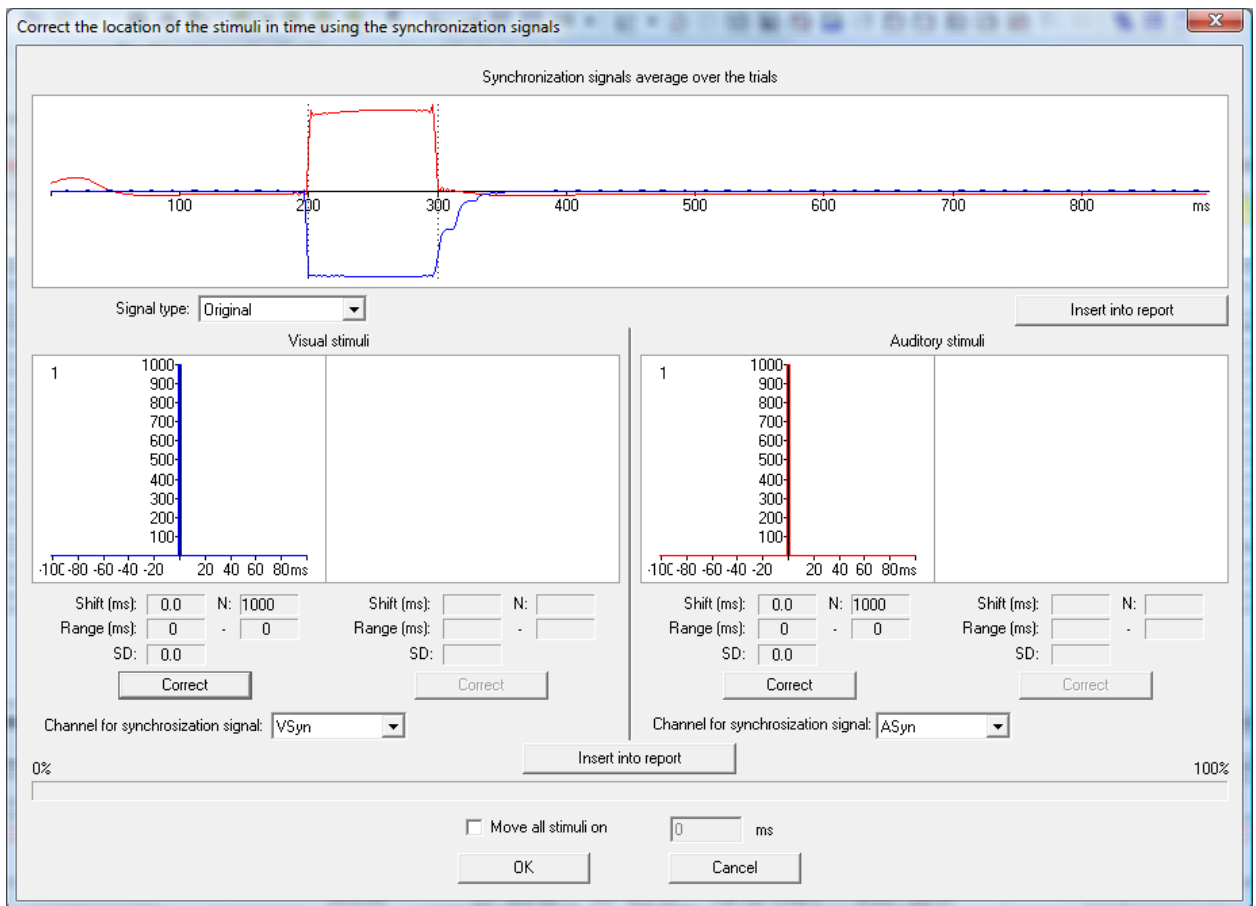
15. Make sure that “Slave” computer start the procedure of stimuli presentation.

16. Make sure that “Video synchronization signal” (small square) periodically appear (or disappear) on the screen.

17. Make sure that the video sensor is located above the display area where the synchronization signal appears.
18. Wait until the end of the work of stimuli presentation procedures.
19. Stop recording using command “Recording->Stop” from main menu of WinEEG.
20. Save the newly created EEG file into the database using command “File->Save” from main menu of WinEEG.
21. Run command “Edit->Adjust trial synchronization” from main menu of WinEEG. The “Correct the location of the stimuli in time using the synchronization signals” window will appear on the screen.



22. Press corresponding “Correct” button, if you need to compensate for the random synchronization error. The result can be similar as it shown below.



23. Press "OK" button.

24. Run command "File->Save" from main menu of WinEEG to save modification.

25. Follow the instructions described in "WinEEG user manual" to compute ERPs and perform their analysis.