HARDWARE AND SOFTWARE FOR EVENT-RELATED POTENTIALS ACQUISITION AND PROCESSING

Mitsar-EEG systems.

# ERP system installation, configuration and calibration.

User Guide

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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.

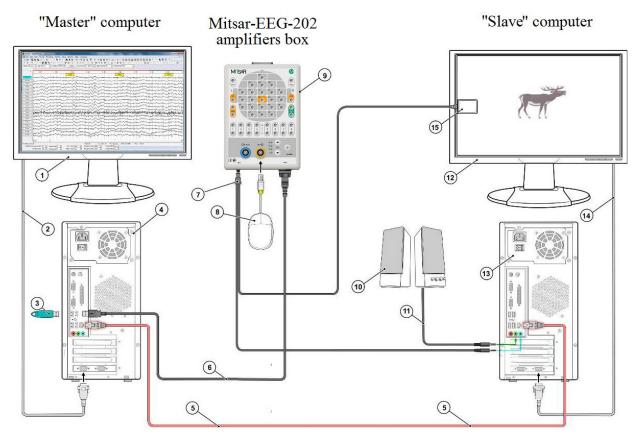


Fig. 1. Configuration of the ERP recording system.

"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

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

\* Recommended configuration of computers can be found on the web sites: http://www.mitsar-medical.com or http://www.mitsar-eeg.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 <u>http://www.mitsar-medical.com</u> or <u>http://www.mitsar-eeg.ru</u>)
- 2. Mitsar-EEG amplifiers box driver. (It can be download from web sites <u>http://www.mitsar-medical.com</u>, or <u>http://www.mitsar-eeg.ru</u>, or <u>http://www.ftdichip.com/</u>)
- 3. Guardant dongle driver. (It can be download from web sites <u>http://www.mitsar-medical.com</u>, or <u>http://www.mitsar-eeg.ru</u>, or <u>http://www.guardant.com/</u>)

"Slave" computer:

- 1. PSYTASK software. (It can be download from web sites <u>http://www.mitsar-medical.com</u> or <u>http://www.mitsar-eeg.ru</u>)
- 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.

Choose Destination Locat	ion 📃 🔀
	Setup will install WinEEG in the following folder. To install to this folder, click Next. To install to a different folder, click Browse and select another folder. You can choose not to install WinEEG by clicking Cancel to exit Setup.
Inste	C:\Mitsar\WinEEG
	< <u>B</u> ack <u>Next</u> Cancel

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

Setup Type		
	Click the type	of Setup you prefer, then click Next.
	• Typical	Program will be installed with the most common options. Recommended for most users.
	C <u>C</u> ompact	Program will be installed with minimum required options.
Instal Shald	C C <u>u</u> stom	You may choose the options you want to install. Recommended for advanced users.
		< <u>B</u> ack <u>N</u> ext > Cancel

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:

Select Components		<b>— X</b>
	Select the components you want to install, cl you do not want to install. <u>C</u> omponents	ear the components
	<ul> <li>✓ Program Executables</li> <li>✓ Shared DLLs</li> <li>✓ database</li> <li>✓ sounds</li> </ul>	162780 К 1244 К 4 К 14302 К
InstallShald	Description	Change
Ins	Space Required: Space Available:	178331 K 2096832 K
	< <u>B</u> ack <u>N</u> ext >	Cancel

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

Select Program Folder	
	Setup will add program icons to the Program Folder listed below. You may type a new folder name, or select one from the existing Folders list. Click Next to continue.
	Program Folders: WinEEG Existing Folders: Accessories
InstallShald	Administrative Tools ESET Extras and Upgrades Games Guardant Developer's Kit 5 - MICAR_Z Guardant Developer's Kit 5 - YHJH034 Guardant SDK 6.31 - YHJH034 Hewlett-Packard
	< <u>B</u> ack <u>N</u> ext > Cancel

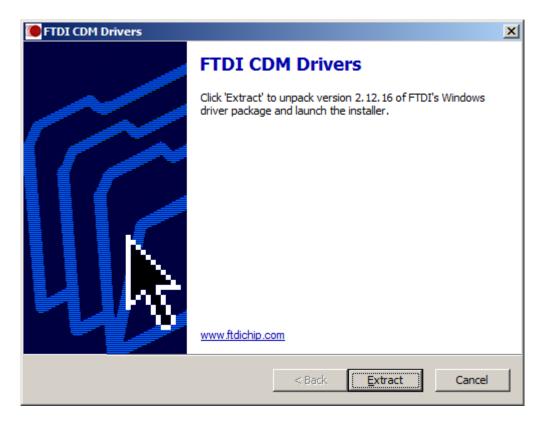
9. Type a new folder name if you want. Press "Next" button to continue installation.



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.

Device Driver Installation Wizard		
	Welcome to the Device Driver Installation Wizard!           This wizard helps you install the software drivers that some computers devices need in order to work.	
	< <u>B</u> ack. Cancel	

6. Press "Next" button to continue installation.

Device Driver Installation Wizard				
License Ag	preement			
Ŕ	To continue, accept the following license agreement. To read the entire agreement, use the scroll bar or press the Page Down key.			
	IMPORTANT NOTICE: PLEASE READ CAREFULLY BEFORE			
	This licence agreement (Licence) is a legal agreement between you (Licensee or you) and Future Technology Devices International Limited			
	of 2 Seaward Place, Centurion Business Park, Glasgow G41 1HH, Scotland (UK Company Number SC136640) (Licensor or we) for use of driver software provided by the Licensor(Software).			
	BY INSTALLING OR USING THIS SOFTWARE YOU AGREE TO THE			
	<u>accept this agreement</u> <u>Save As</u> <u>Print</u>			
	O I <u>d</u> on't accept this agreement			
	< <u>B</u> ack <u>N</u> ext > Cancel			

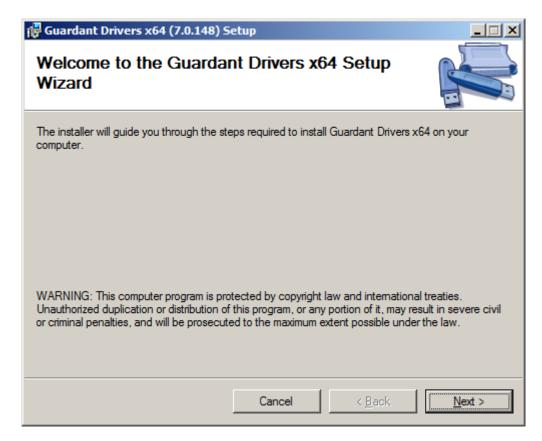
7. Read this agreement, select "I accept this agreement" button and press "Next" button to continue installation.

Device Driver Installation Wizard				
	Completing the Device Driver Installation Wizard			
	The drivers were successfully installed on this computer.			
	You can now connect your device to this computer. If your device came with instructions, please read them first.			
	Driver Name Status			
	✓ FTDI CDM Driver Packa Ready to use			
	FTDI CDM Driver Packa Ready to use			
	K Back Finish Cancel			

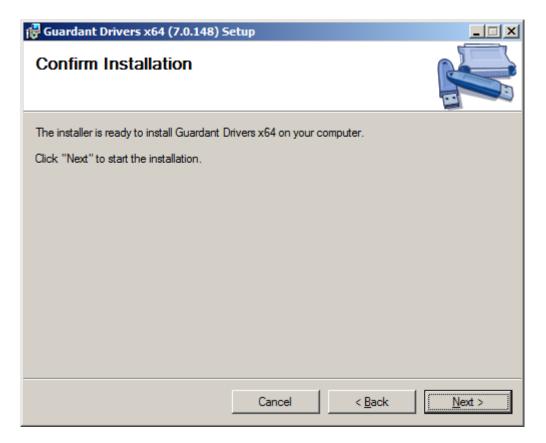
8. Press "Finish" button to complete Setup.

## 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.

🙀 Guardant Drivers x64 (7.0.148) 5	etup		
Installation Complete			
Guardant Drivers x64 has been successf	ully installed.		
Click "Close" to exit.			
	Cancel	< <u>B</u> ack	Gose

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.

Choose Destination Locat	ion 📃
stell Shedd	Setup will install Psytask in the following folder. To install to this folder, click Next. To install to a different folder, click Browse and select another folder. You can choose not to install Psytask by clicking Cancel to exit Setup. Destination Folder
ETT I	C:\Mitsar\Psytask
	< <u>B</u> ack <u>N</u> ext> Cancel

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

Setup Type		
	Click the type	of Setup you prefer, then click Next.
	• Typical	Program will be installed with the most common options. Recommended for most users.
	C <u>C</u> ompact	Program will be installed with minimum required options.
Irstel Bhield	C C <u>u</u> stom	You may choose the options you want to install. Recommended for advanced users.
		< <u>B</u> ack <u>N</u> ext > Cancel

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:

Select Components		×
	Select the components you want to insta you do not want to install. <u>C</u> omponents	II, clear the components
	✓ Program Executables	2224 K
	✓ Shared DLLs	1244 K
	✔ doc	1901 K
	✓ TASKS	18292 K
	✓ DATABASE	4 K
Instel Isheld	Description	Change,
E	Space Required:	23667 K
	Space Available:	2096832 K
	< <u>B</u> ack <u>N</u> ext	> Cancel

8. Select components you want to install.

Select Program Folder	
	Setup will add program icons to the Program Folder listed below. You may type a new folder name, or select one from the existing Folders list. Click Next to continue.
	<u>Program Folders:</u> Psytask E <u>x</u> isting Folders:
InstallShall	Accessories Administrative Tools ESET Extras and Upgrades Games Guardant Developer's Kit 5 - MICAR_Z Guardant Developer's Kit 5 - YHJH034 Guardant SDK 6.31 - YHJH034 Hewlett-Packard
	< <u>B</u> ack <u>N</u> ext > Cancel

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 tree 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.

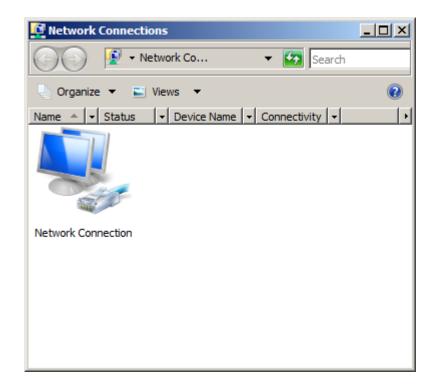
To specify an IP address of the computer, it is necessary to perform the following steps (Windows Vista specific)

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.

Network and Sharing Center			_ <b>_ _</b> ×
Control Panel - Net	work and Sharing Center	🔻 🚺 Search	
Tasks View computers and devices Connect to a network	Network and Sharing Center		View full map
Set up a connection or network Manage network connections Diagnose and repair	VALERY-PC (This computer	Неопознанная сеть	= Internet
	💐 Неопознанная сеть (Pu	blic network)	Customize
	Access	Local only	
	Connection	Подключение по локальной сети	View status
	Sharing and Discovery		
	Network discovery	On On	•
	File sharing	© Off	•
	Public folder sharing	© Off	<ul><li>▼</li></ul>
	Printer sharing	© Off	•
	Password protected sharing	o On	•
	Media sharing	© Off	•
See also Internet Options Windows Firewall	Show me all the files and folders Show me all the shared network	-	

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.

Network Connection Status		×
General		
Connection		
IPv4 Connectivity:	Local	
IPv6 Connectivity:	Limited	
Media State:	Enabled	
Duration:	00:07:31	
Speed:	1.0 Gbps	
Details		
Activity		-
Sent — 駴 —	Received	
Packets: 132	0	
Properties Disable Diagnose	]	
	<u>C</u> lose	

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

Network Connection Properties	×	
Networking		
Connect using:		
Attansic L1 Gigabit Ethernet 10/100/1000Base-T Controlle		
<u>C</u> onfigure		
This connection uses the following items:		
<ul> <li>QoS Packet Scheduler</li> <li>GoS Packet Scheduler</li> <li>File and Printer Sharing for Microsoft Networks</li> <li>Internet Protocol Version 6 (TCP/IPv6)</li> <li>Internet Protocol Version 4 (TCP/IPv4)</li> <li>Internet Protocol Version 4 (TCP/IPv4)</li> <li>Internet Protocol Version 9 (TCP/IPv4)</li> <li>Internet Protocol Versin 9 (TCP/IPv4)</li> <li>Internet Protocol Version 9 (TCP/</li></ul>		
Install Uninstall Properties		
Description Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks.		
OK Cancel		

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.

Internet Protocol Version 4 (TCP/IPv4) Properties			
General			
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.			
O Obtain an IP address automatical	ly		
Use the following IP address:			
IP address:	192.168.0.191		
S <u>u</u> bnet mask:	255.255.255.0		
Default gateway:			
C Obtain DNS server address auton	natically		
□ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □	lresses:		
Preferred DNS server:			
Alternate DNS server:			
Ad <u>v</u> anced			
	OK Cano	cel	

- 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

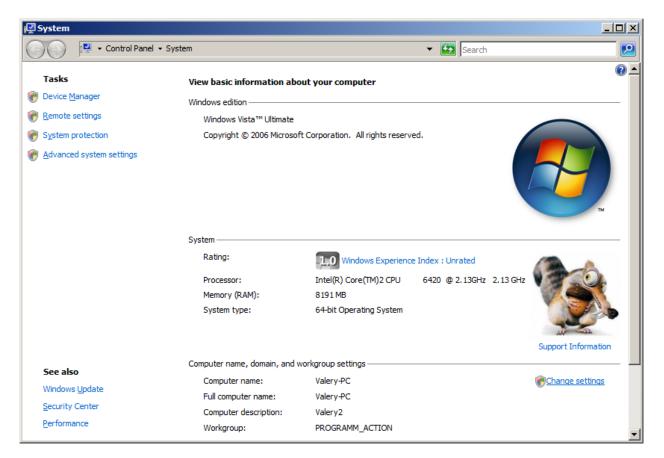
"Slave" computer:

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.

System Properties		×
Computer Name Hardwa	re Advanced System Protection Remote	_,
Windows uses on the network	the following information to identify your computer	
Computer <u>d</u> escription:	Valery2	
	For example: "Kitchen Computer" or "Mary's Computer".	
Full computer name:	Valery-PC	
Workgroup:	PROGRAMM_ACTION	
To use a wizard to join a Network ID.	domain or workgroup, click <u>N</u> etwork ID	
To rename this computer workgroup, click Change		
	OK Cancel Apply	

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

Computer Name/Domain Changes	×
You can change the name and the membership of this computer. Changes might affect access to network resources. More information	
Computer name:	
Valery-PC	
Full computer name: Valery-PC	
<u>M</u> ore	]
Member of	1
C Domain:	
• Workgroup:	
PROGRAMM_ACTION	
0K. Cancel	

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:

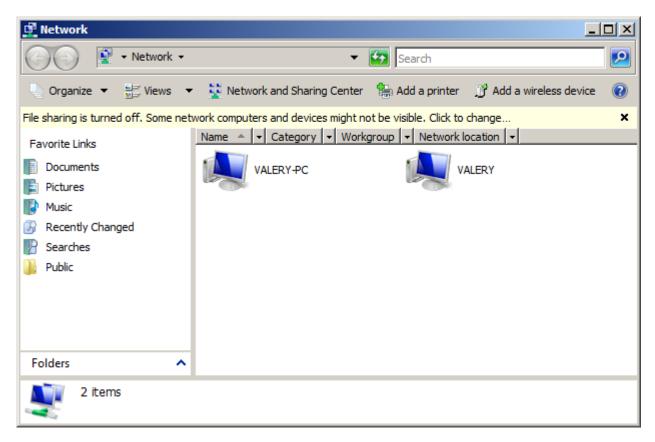
Computer name: Valery Workgroup: PROGRAMM\_ACTION

"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.

Psytask	×
Start New Task	
Display Database	
Display List of Tasks	
Switch to Slave Mode	
Setup Database	
Modify Synchronisation Parameters	
Change IO port for test signal	
Change language	
Quit	

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		
C 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 sy	inchro codes WinEEG control)	
Correction of synchronization for		
Visual stimuli (ms): 0		
Auditory stimuli (ms): 0 Test signal (ms): 0		
Generation of synchronization sygnal for th	e screen	
Position: Left center		
Size: Very large	•	
Type: Black on White		
For the first visual st	imulus 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.

Equipment configuration			x
Amplifiers decsription: Not respond!!!			O port:
Type of amplifiers	Smart-BCI		
	art-BCI connection Bluetooth (default)	C Wi-Fi (optional) IP: 0 . 0 . 0 . 0 Port 0	Electrodes system for Smart-BCI     MCS-CAP     Electro-Cap
Find		Check connection	
Stimuli presentation system      PSYTASK      Another ("EXTERNAL")      Trial duration (ms):      Prestimulus time interval (ms):      SOUNDBOX and LEDs      Graphics acceleration      Method: Turn off	Connection port for synchroniza COM port COM port: COM 1 Baudrate: 57600 Number of bits: 8 Parity: None Stop bits: 1 Syn	Ation and its parameters	Port for external marks COM port: None ▼ Baudrate: 57600 ▼ Number of bits: 8 ▼ Parity: None ▼ Stop bits: 1 ▼
	Access codes Main: Video: Database: OK	Cancel	

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 decsription: Mitsar 202 serial number	er 4720014 (72)	I/O port: USB
Type of amplifiers • Mitsar-EEG-201 or Mitsar-EEG-202	C Smart-BCI	
Mitsar-EEG-201 or Mitsar-EEG-202 I/O port: USB Sampling rate (Hz): 500 Find	Port	nal; 0 . 0 . 0 connection
Stimuli presentation system  PSYTASK  Another ("EXTERNAL")  Trial duration (ms):  Prestimulus time interval (ms):  SOUNDBOX and LEDs  Graphics acceleration  Method: Turn off	Connection port for synchronization and its param COM port CLA COM port COM 1 V Name: Baudrate: 57600 V Number of bits: 8 V IP: Parity: None V Stop bits: 1 V Port: Stop bits: 1 V Port:	AN :
	Access codes Main: Video: Database: OK Cancel	

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

Equipment configuration		<b>X</b>
Amplifiers decsription: Mitsar 202 serial numb	er 4720014 (72)	I/O port: USB
Type of amplifiers Mitsar-EEG-201 or Mitsar-EEG-202	C Smart-BCI	
Mitsar-EEG-201 or Mitsar-EEG-202 I/O port: USB Sampling rate (Hz): 500	Port: 0	C Electro-Cap
Find	Check co	nnection
Stimuli presentation system  PSYTASK  Another ("EXTERNAL")  Trial duration (ms):  Prestimulus time interval (ms):  SOUNDBOX and LEDs  Graphics acceleration  Method: Turn off	Baudrate: 57600	Valery-PC         Saudrate:         57600           Find         Number of bits:         8           192.168.0.191         Parity:         None           Check         Stop bits:         1
	Access codes Main: Video: Database: DKCancel	

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.

Stimuli presentation program list	×
	ОК
	Cancel
	Reread
	Update
Turn on EEG recording	

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.

Stimuli presentation program list	
Tova Tova First Part Tova Second Part VCPT Mathematical EASY Mathematical Middle Mathematical Heavy Reading Auditory Visual P300 Audio P300 Mismatch Negativity GoNogo Audio	Cancel
GoNogo Visual Pattern 5 min (ALR) Pattern 5 min (A) Pattern 5 min (I.P)	Reread

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.

Patient Card for New Investig	gation	×			
-	ar1 [A1<->A2]				
ID:	TEST Date: 20/10/2016 Time: 16:15:58				
Investigation:	EEG observation				
Patient:	TEST PATIENT				
	Patient ID				
Diagnosis:					
Date of birth:	10/10/1990 Sex: M				
Address:					
Note:					
	Disk free space (Mb): 22559				
Maximal lengt	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					
	OK Cancel				

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.

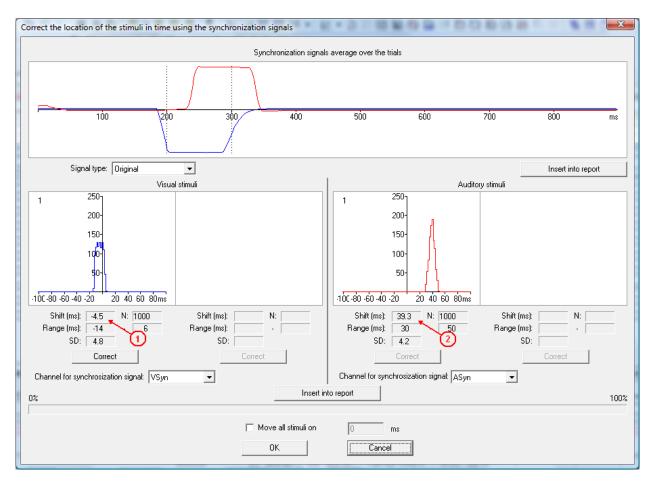
12. Make sure that the video sensor is located above the display area where the synchronization signal appears.

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.

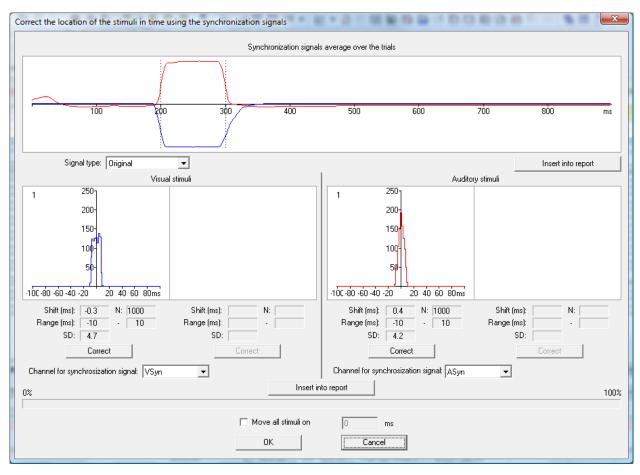
19. Press "Modify Synchronization Parameters" button. The "Parameters of Synchronization" window will appear on the screen.

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

Pa	arameters of synchroniza	tion		×	
	Connection port for synchronization and its parameters				
	C 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 sy	nchro codes (WinEEG control)	•	
Г	Correction of synchronization for				
	Visual stimuli (ms): -4				
	Auditory stimuli (ms): 39				
	Test signal (ms):				
[	Generation of synchronization signal for the screen				
	Position: Left cente	er	•		
	Size: Very large	;	•		
	Type: Black on	White	•		
	For the first visual stimulus only				
		эк	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: 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				
Diagnosis:				
Date of birth: 10/10/1990 Sex: M				
Address:				
Note:				
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				
OK Cancel				

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.

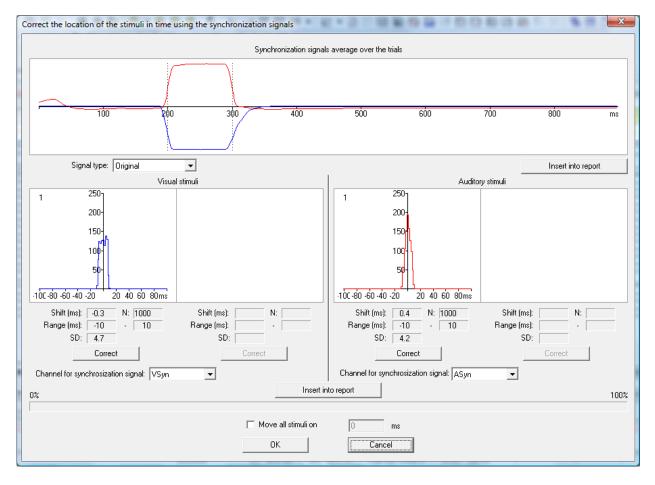
17. Make sure that the video sensor is located above the display area where the synchronization signal appears.

18. Wait until the end of the work of stimuli presentation procedures.

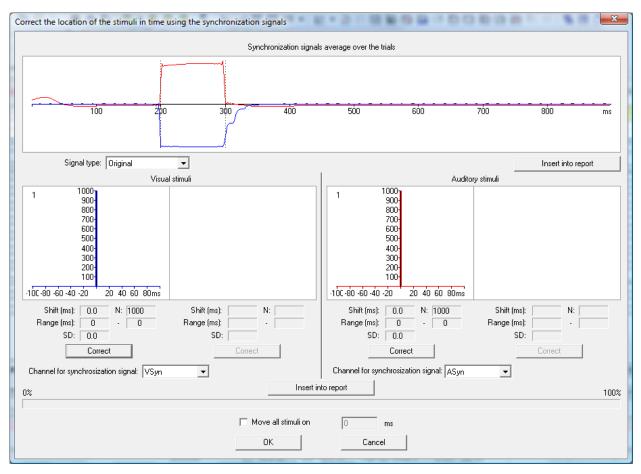
19. Stop recording using command "Recording->Stop" from main menu of WinEEG.

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.