2-CHANNEL
SIGNAL AQUISITION INTERFACE
IDAC-2

INSTRUCTIONS
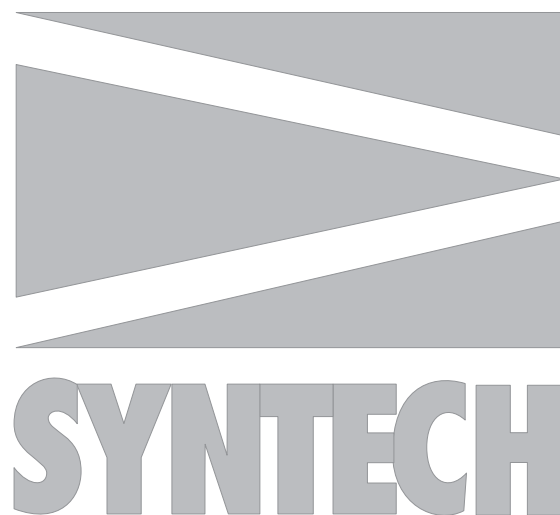
SYNTECH

IDAC-2 with EAG PROBE

IDAC-2 FRONT and REAR PANEL RECEPTACLES

INPUT for PROBES etc.

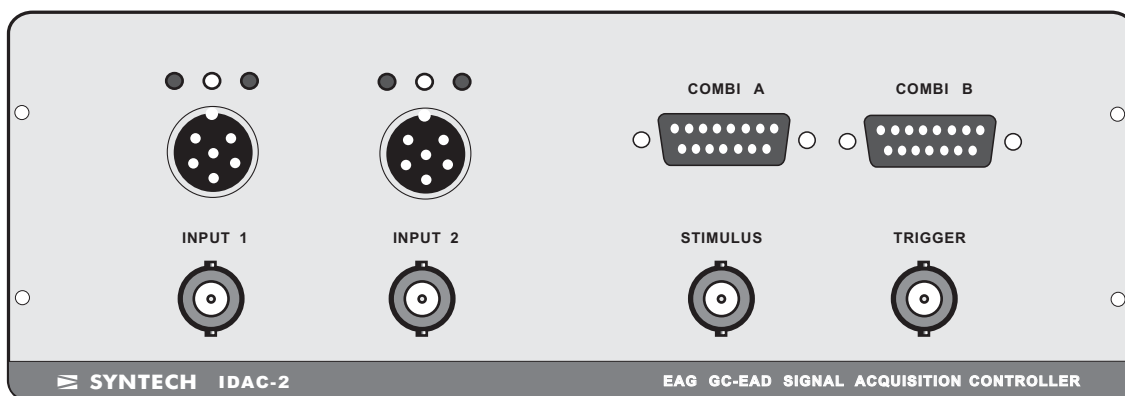- 12 V   + 12 V
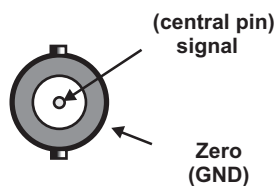
(central pin)
+ signal

- signal   NC

common
GND
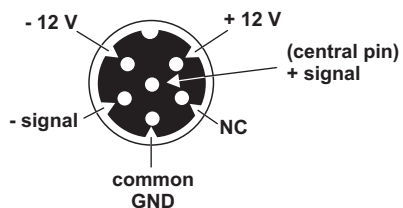
**3-LED INPUT RANGE
INDICATOR**

DIN INPUT RECEPTACLE

**15-Pin D receptacles
for COMBINED 2-signal input devices**

COMBI A   COMBI B

INPUT 1   INPUT 2   STIMULUS   TRIGGER

≥ SYNTECH IDAC-2   EAG GC-EAD SIGNAL ACQUISITION CONTROLLER

BNC INPUT

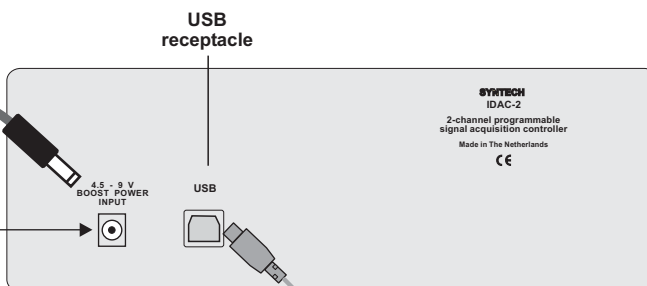**INPUT
for Stimulus Signal**

**INPUT
for Trigger Signal**

(central pin)
signal

Zero
(GND)

**USB
receptacle**

**Boost power supply
only needed if USB
power not sufficient**

SYNTECH
IDAC-2
2-channel programmable
signal acquisition controller
Made in The Netherlands
CE

4.5 - 9 V
BOOST POWER
INPUT

USB

POWER
SUPPLY
9-15
Volt

Central pin
NEGATIVE   Mantle
POSITIVE
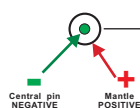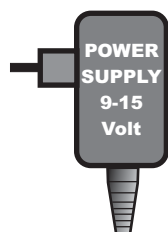
PC
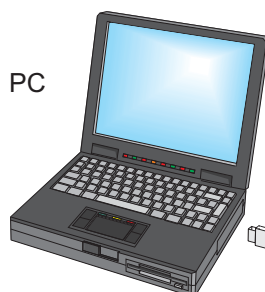
USB
cable
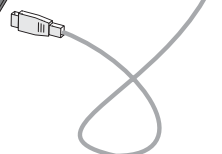
GENERAL

The IDAC-2 is an Intelligent Data acquisition Controller specially developed for the recording of low frequency signals (0-20 Hz) from biological preparations, such as Electroantennograms (EAG), Electroolfactograms (EOG), Retinograms, Electropenetograms (EPG) and signals from analysis instruments like gas chromatographs.

The hardware of the serial IDAC-2 system consists of a signal acquisition interface designed for use with an IBM compatible personal computer (PC). The interface is exclusively produced by Syntech. It contains 16-bit analog to digital converters, software controlled precision amplifiers, filter circuits, and control logic. The interface takes care of signal conditioning, amplification, analog-digital conversion, filtering and data transfer to the PC via the USB port. The system can handle two analog signals simultaneously: 1) Electroantennogram (EAG) signals; and 2) low frequency DC signals like the electrometer output of a gas chromatograph (GC) for coupled GC/EAD. In addition, inputs are provided for a stimulus indication and trigger command signal.

The software provides programs for EAG and GC/EAD recording and analysis. Signals are presented on the screen in real-time mode, which makes use of an oscilloscope superfluous. Acquisition of data can be started from the keyboard or from an external signal (stimulus generator, remote GC start command, etc). Data are stored during recording, and can subsequently be analyzed on any PC containing the software; the IDAC-2 is only necessary for the acquisition. Signals are interactively evaluated and the operator maintains full control over the analysis. Results are graphically and numerically presented, and can be printed, exported in ASCII format, or stored.

Operation of the system is rather straightforward, and the user will easily find out how to operate the various functions and options. However, some basic experience with electrophysiological experiments and preparation handling is necessary. The quality of electrophysiological recordings is for a great part dependent on the quality of the preparation, the condition of the experimental animal, and the skill of the experimenter. However, there are situations in which the signal to noise ratio is poor, or the signal is superimposed on hum, which is sometimes unavoidable. In such cases the Syntech system is still able to extract relevant information out of the noise, but this may take some more time and dedication.

USB receptacle
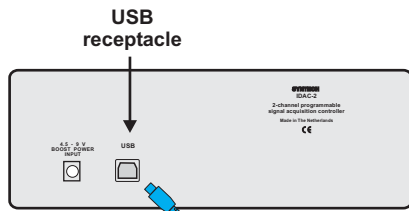
1. Connect the USB cable between IDAC2 and PC

2. Windows finds the new hardware
   Click: No, not this time (No web connection)
   Click: Next

3. Insert the Installation CD ; Click next
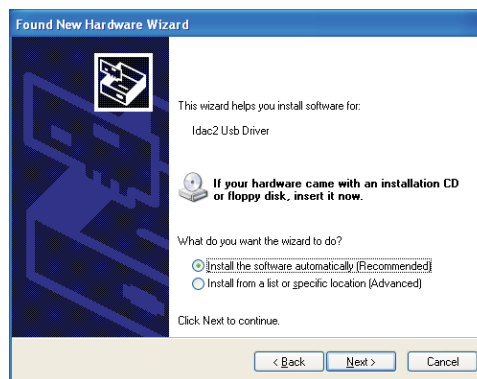
If Windows does not find the driver on the CD, select the second option and browse to the path on the CD: Drivers/Idac2

4. Click Continue Anyway
   (the IDAC is not a Windows device)
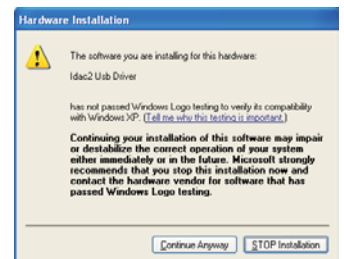
5. Click Next
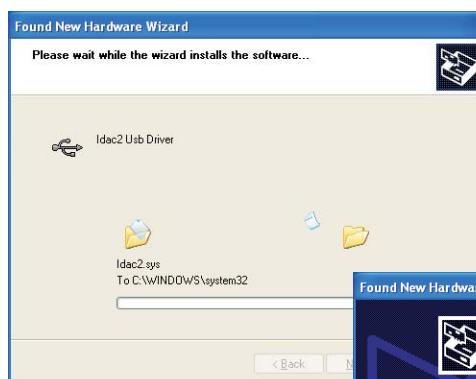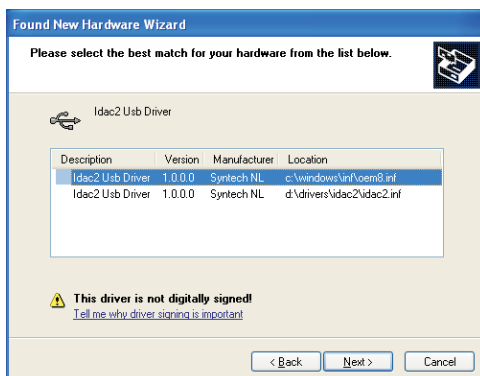
6. Click Finish to leave the installation wizard.

7. Re-insert the CD to install the Device Interfaces and the Program software.

   If the CD does not start automatically, open Windows Explorer and install the Device and the Programs by activating ' setup.exe' in the Divers/Idac2 abd Programs directories.
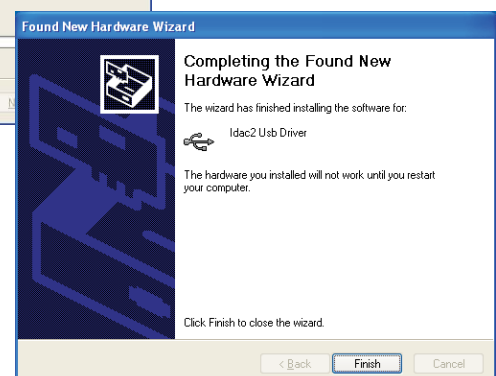
SOFTWARE INSTALLATION

Read this section before connecting the IDAC-2 to the computer

The software for the IDAC-2 consists of 3 modules:

    1) **USB driver** (to handle the USB communication)
    2) **Device Interface** (to control functions and settings of the IDAC2)
    3) **Program** software (EAG, GC-EAD, Autospike)

1. USB DRIVER IINSTALLATION

Operation of the IDAC-2 via the USB port requires the installation of the USB Driver for the IDAC-2. This driver is located on the software CD supplied with the IDAC-2. It is necessary to install the USB driver to operate the IDAC-2.

The USB Drivers is installed as follows:

    1) Start the computer running Windows (version 98 to XP)
    2) Connect the USB cable between IDAC-2 and the USB port on the computer.
    3) Windows responds to the connection of the IDAC-2 with the message:
            " New hardware found"
        If this message does NOT appear : connect a power supply to the
   *' boost power' receptacle at the rear panel of the IDAC-2 box.*
    4) Follow the Windows instructions wizard
    5) Insert the program CD
    6) If Windows does not succeed in locating the driver software, select the Option: ' Install from a list or specific location (Advanced)' and enter the path for the USB driver on the CD (in the drivers/idac2 directory)
    7) Neglect Windows ' warnings' related to compatibility: Continue Anyway. (The IDAC software is not a Windows product)
    8) Click ' Finish' to close the installation wizard.

Note: If the USB driver for the IDAC-2 has not been properly installed it is not possible to operate the IDAC-2. In case the USB driver installation fails, disconnect the IDAC from the USB port, re-boot the computer and repeat the installation procedure.
      Once the USB driver is properly installed it is permanently stored in the Windows system directory and activated automatically after connection of theIDAC-2.

Click on **Device**

STEP 1

Installation menu

Insert installation CD

If CD does not auto-start:

1) open Windows Explorer
2) go to CD directory
3) open directory Drivers
4) run the file " EsRun.exe"

Select " IDAC-2"

Installation menu

STEP 2

Click on Program button
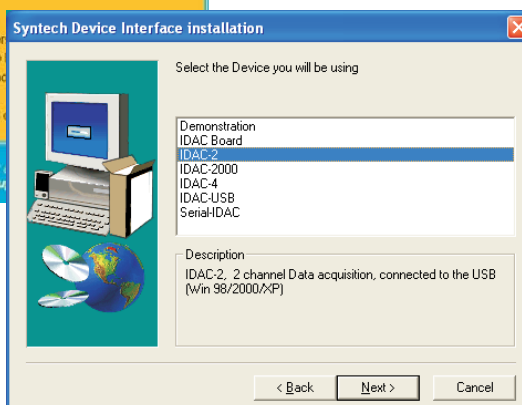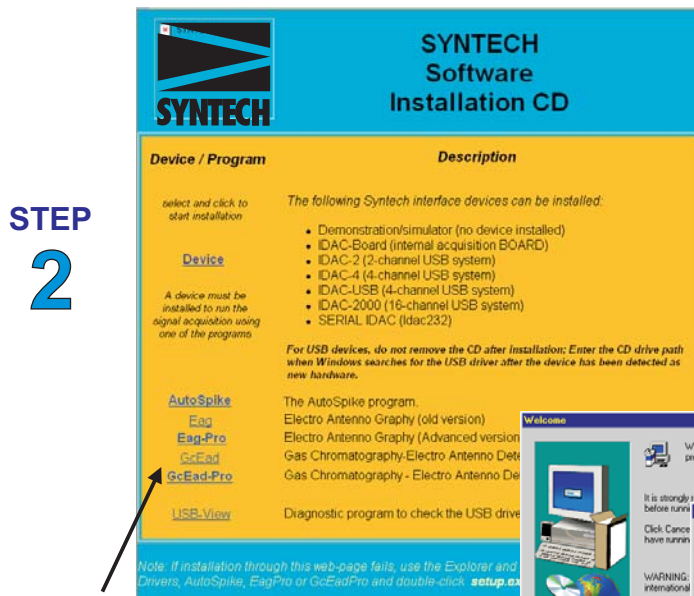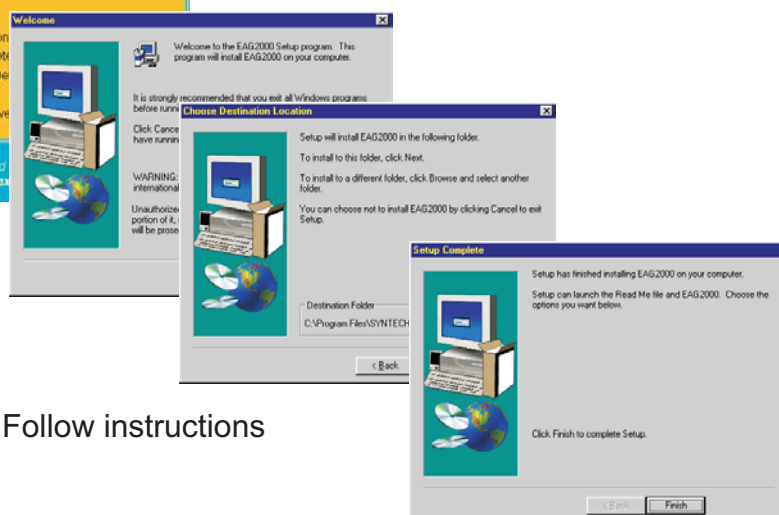
If Installation menu does not appear:

1) open Windows Explorer
2) go to CD directory
3) open Program directory
4) run the file " Setup.exe" in the program directory
5) follow the instructions

Follow instructions

2. DEVICE INTERFACE INSTALLATION

Apart from the USB driver, which handles the communication between PC and IDAC-2, software must be installed to control the functions of the IDAC-2 .
This ' device interface' software is used by the signal recording programs (EAG and GC-EAD, and Autospike) to set the recording parameters and display options.

The device interface is installed as follows:

1)   Insert the Syntech program CD.

1. The CD starts automatically and the software installation MENU appears
2. The CD does not start automatically; proceed as follows:
Run Windows Explorer
Select the CD station
Run the file: EsRun.exe (or Install.exe)

2)   In the menu select ' Device'
3)   In the device list select: IDAC-2
4)   Follow the instructions

If the installation menu does not appear:

1)   Open Windows Explorer
2)   Select the CD station
3)   Open the directory: ' Drivers'
4)   In this directory activate the file: ' Setup.exe
5)   In the menu select 'Device'
6)   In the device list select 'Idac2'
7)   Follow the instructions

Note: Each Syntech interface system (IDAC-2, IDAC-4, and IDAC-16) is controlled by a dedicated device interface. If another device is used on the same computer, both the USB driver (see previous section) and the device interface for that particular device must be installed.
Only a single device can be running at the same time on the same computer, and the proper device interface must be selected. The USB driver for the device (once it has been installed previously) is automatically activated by Windows (these drivers are permanently stored in the Windows system directory).

3. PROGRAM SOFTWARE INSTALLATION

1)   Insert the Syntech program CD.

   1. The CD starts automatically and the software installation MENU appears
   2. The CD does not start automatically; proceed as follows:
           Run Windows Explorer
           Select the CD station
           Run the file: EsRun.exe (or Install.exe)

2)   In the menu select any of the programs (EAG, GC-EAD, Autospike)
3)   Follow the instructions

   If the installation menu does not appear:

1)   Open Windows Explorer
2)   Select the CD station
3)   Open the directory with the program name
4)   In this directory activate the file: ' Setup.exe
5)   Follow the instructions

Note: Most of the programs can operate with all the Syntech interface devices:
        IDAC-2, IDAC-4, and IDAC-16. Only the proper device interface must be
        installed to run a certain interface.
        The programs recognize the connected device and adapt the setting
        options to the hardware features offered by the device connected.
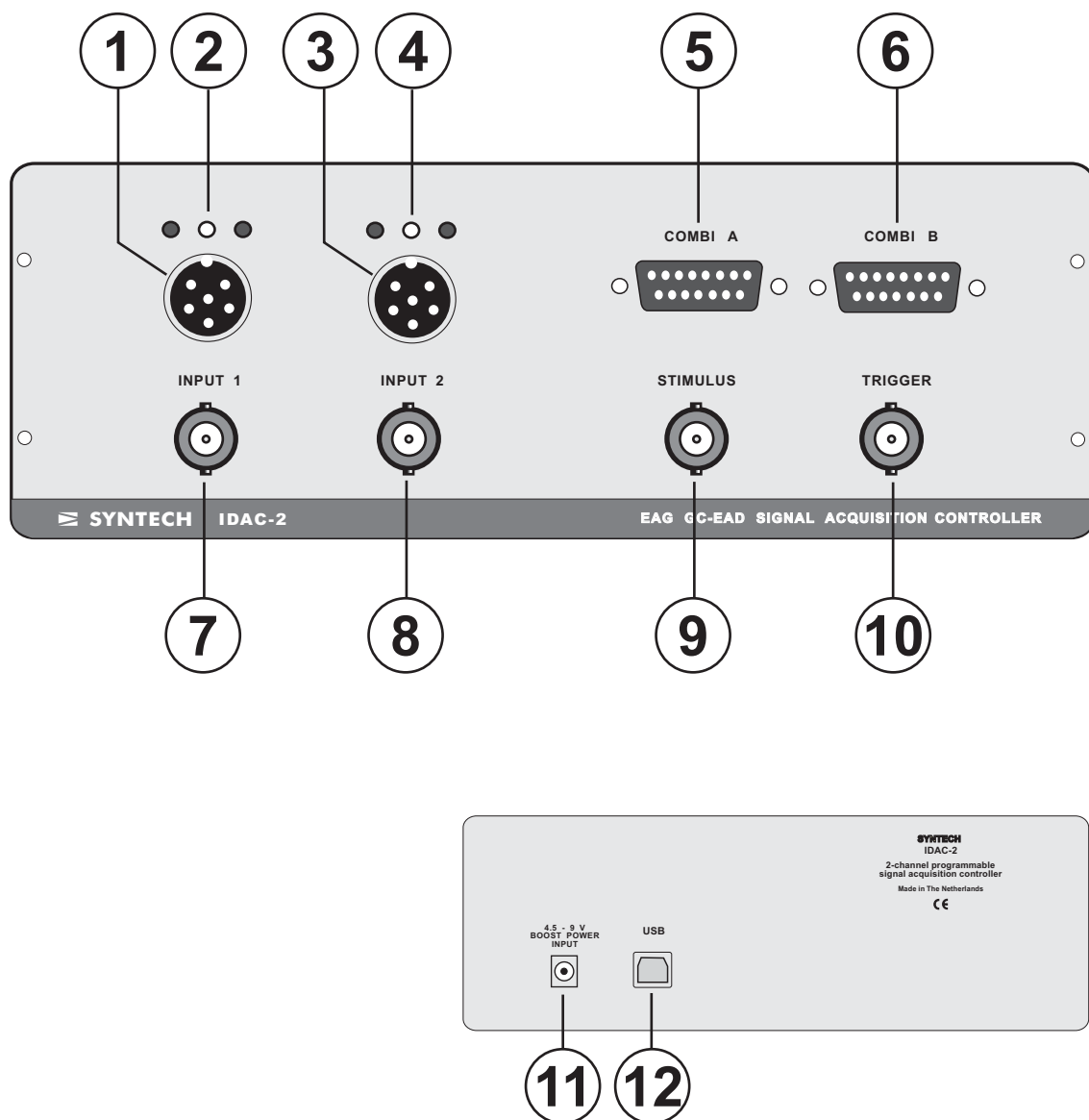
FRONT

1. Channel 1 signal input. For single or differential signals and power supply.
2. Signal indicator for channel 1. (Red LED: signal is out of range)
3. Channel 2 signal input. For single or differential signals and power supply.
4. Signal indicator for channel 2. (Red LED: signal is out of range)
5. Input for devices processing more than 1 signal
6. Same as 5.
7. BNC input for channel1; for single ended signals
8. BNC input for channel 2; for single ended signals
9. Input for 'Stimulus' signal (positive going signal from stimulus controller, etc)

REAR

10. Input for 'Trigger' signal (negative going signal, closing swich, etc)
11. Input for ' boost power' supply (9-15V, DC) In case the USB port of the PC does not provide sufficient power to run the IDAC-2. Central pin negative.
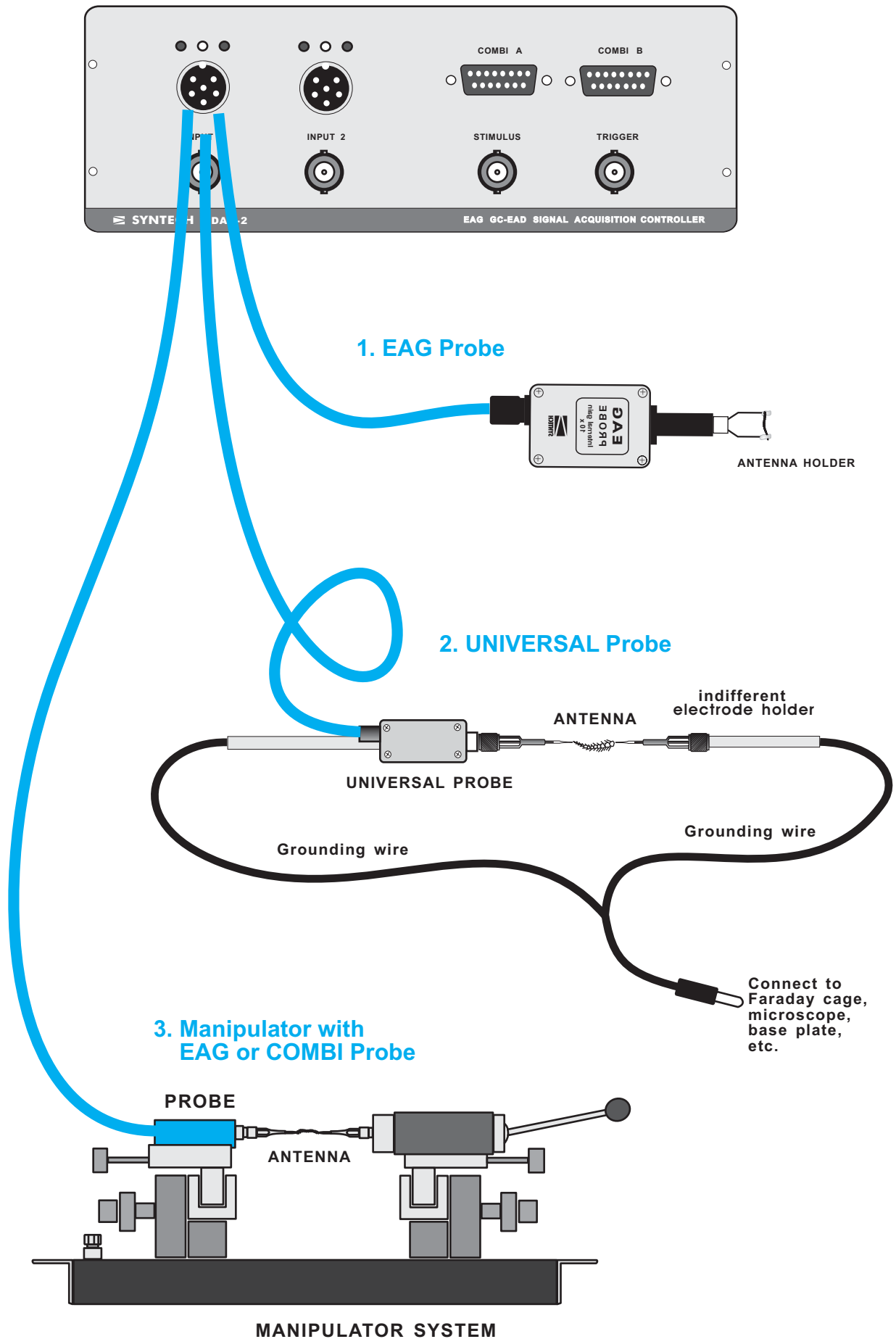
SIGNAL CONNECTIONS

FRONT RECEPTACLES

(bold numbers refer to the figure of the IDAC-2)

1. Channel 1 universal signal input for 6-pin DIN connector. Provides single and differential signal inputs and power (+12 and -12 V) for active probes and transducers. Maximum signal range -5V to +5V.
2. 1Signal indicator for channel 1. Signal is within acceptable range: green LED lights; if the signal is out of range one of the red LEDs lights up.
3. Channel 2 universal signal input for 6-pin DIN connector. Provides single and differential signal inputs and power (+12 and -12 V) for active probes and transducers. Maximum signal range -5V to +5V.
4. Signal indicator for channel 1. Signal is within acceptable range: green LED lights; if the signal is out of range one of the red LEDs lights up.
5. Connector for devices processing two signals and/or trigger and stimulus signals in a single device. Provides also+12 and -12 V power.
6. Same as 5.
7. BNC input receptacle for channel 1. Only for single ended signals.
This receptacle is connected in parallel with the + signal pin of the DIN connector above it.
If a probe (or other input device) is connected to the DIN receptacle the + output signal of that probe is available from the BNC connector.
8. BNC input receptacle for channel 2. Only for single ended signals.
This receptacle is connected in parallel with the + signal pin of the DIN connector above it.
9. Input for a 'Stimulus' signal. This input is normally zero (TTL low) and is activated by a positive (TTL High) voltage.
10. Input for a 'Trigger' signal. This input is normally =5V (TTL high) and is activated by a zero (TTL Low) voltage. This input is suitable to pick-up commands of a closing switch, like a a pedal switch or the remote start command from a gas chromatograph.

REAR RECEPTACLES

11. Input for ' boost power supply' : 9 - 15 V DC. In case the USB port of the PC does not provide sufficient power to run the IDAC-2 an external power suplly (9- 15V DC) must be connected here.
Note that the central pin is the NEGATIVE
12. USB receptacle.

SIGNAL RECORDING DEVICES for EAG

1. EAG Probe

EAG PROBE
internal gain 10 x

ANTENNA HOLDER

2. UNIVERSAL Probe

UNIVERSAL PROBE

ANTENNA

indifferent electrode holder

Grounding wire

Grounding wire

Connect to Faraday cage, microscope, base plate, etc.

3. Manipulator with EAG or COMBI Probe

PROBE

ANTENNA

MANIPULATOR SYSTEM

COMBI A   COMBI B

INPUT 1   INPUT 2   STIMULUS   TRIGGER

SYNTECH IDAC-2   EAG GC-EAD SIGNAL ACQUISITION CONTROLLER

CONNECTING THE EAG INPUT DEVICE

1. EAG PROBE

The EAG probe does not require a special ground connection, as the input circuit is closed by the antenna mounted on the antenna holder between the two electrodes, one of which is the reference (ground) electrode, the other one the ' recording' electrode.
The probe contains a very effective filter against 50/60 Hz noise. The use of a Faraday shielding cage is not needed.

2. UNIVERSAL AC/DC PROBE

Connect the probe cable to the Channel 1 input of the IDAC-2.
The probe must be used with an indifferent electrode, and a connection must be made between the ground of the [robe and the indifferent electrode holder to complete the input circuit.
The mounting shaft of the probe serves as ground. A 2 mm miniature connector fits into the end of this shaft. The probe shaft must be connected to the same ground as the indifferent electrode. Both the probe shaft and the indifferent electrode are to be connected to the common ground of the set-up, usually the ground plane of a Faraday cage or metal shield.
This ground connection is very important, it is necessary for the establishment of a proper input circuit.

3. MICROMANIPULATOR SYSTEM MP-15 with COMBI EAG PROBE

The combi probe is used as the EAG probe.
When using glass pipette electrodes, the antenna is mounted between the electrode on the probe and the indifferent electrode.
The input circuit is completed by the metal construction of the manipulator; no additional ground wiring is needed.
The noise filter in the probe makes a Faraday shield superfluous.
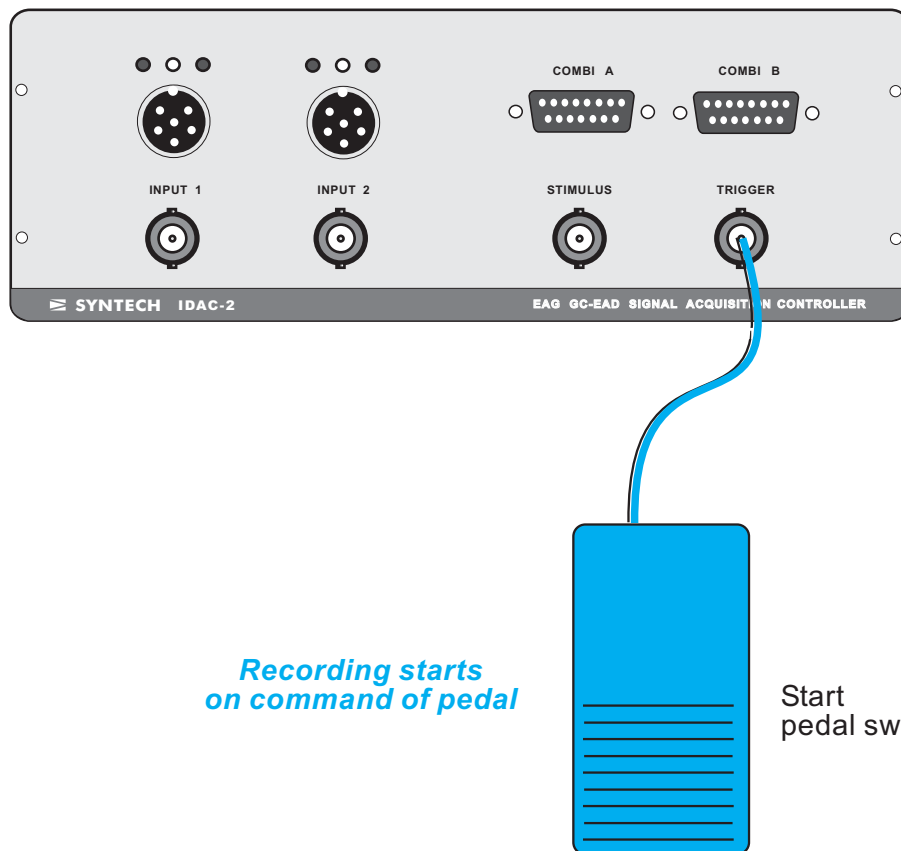
*Recording starts
on command of pedal*

Start
pedal switch

Corresponding Settings for Digital Signals in Software:
(for EAG, EagPro, and GcEadPro)

Invert Stimulus polarity

**EAG
(standard version)**
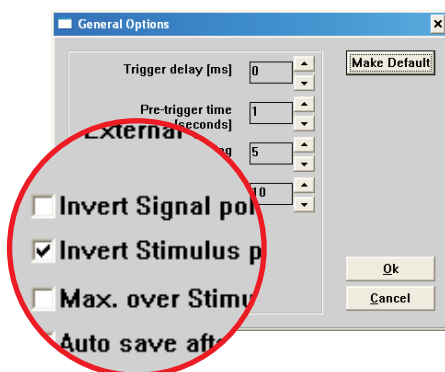
Trigger
1. Enable Invert
2. Enable

EagPro

Trigger
1. Enable Invert
2. Enable

GcEagPro

COMBI A   COMBI B

INPUT 1   INPUT 2   STIMULUS   TRIGGER

≥ SYNTECH IDAC-2   EAG GC EAD SIGNAL ACQUISITION CONTROLLER

**TRIG OUTPUT POL
<<   NORMAL   >>**

Stimulus Output
(at rear)

Stimulus Controller
CS-55

*Recording starts
on command of pedal*

Start
pedal switch

Corresponding Settings for Digital Signals in Software:
(for EAG, EagPro, and GcEadPro)

Invert Stimulus polarity

General Options

Trigger delay [ms] 0

Pre-trigger time
[seconds] 1

External 5

10

☐ Invert Signal pol
☑ Invert Stimulus p
☐ Max. over Stimu
Auto save aft

Make Default

Ok

Cancel

**EAG
(standard version)**

Trigger
1. Enable Invert
2. Enable

Settings

Recording Graphics Filter

Enable Invert

Channel

Recording Channel 1   ☑   ☑   1
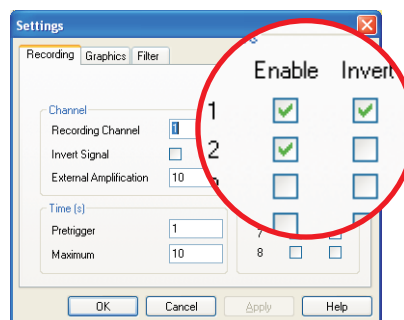
Invert Signal ☐   ☐   2

External Amplification 10   ☐   ☐

Time (s)

Pretrigger 1

Maximum 10   8   ☐   ☐

OK Cancel Apply Help

EagPro

Trigger
1. Enable Invert
2. Enable

Enable Invert

Trigger Signal Graphics Digital I/O Mode Output

tal Input

1   ☑   ☑   gger 1

2   ☑   ☐   Color

3   ☐   ☐

A/B Channel 2

Color

OK Cancel Apply Help

GcEagPro

① ①

COMBI A COMBI B

INPUT 1 INPUT 2 STIMULUS TRIGGER

⊵ SYNTECH IDAC-2 EAG GC-EAD SIGNAL ACQUISITION CONTROLLER

Connect to Analog Signal output (0-1V) of GC

Connect to Remote Start Command output of GC

ACTIVATED CHARCOAL FILTER

Filter Cartridge Syntech Type AFC-1

SYNTECH STIMULUS CONTROLLER 100 - 240 V 50 - 60 Hz Fuse 1 A T

STIMULUS SIGNAL OUT

SYNTECH STIMULUS CONTROLLER CS-5S Made in The Netherlands CE

STIMULUS CONTROLLER CS-5S

A
B
C

DOWN MENU UP

PULSE DURATION PULSE FLOW CONTINUOUS FLOW

START

⊵ SYNTECH STIMULUS CONTROLLER CS-5S

**TRIG OUTPUT POL
<<   NORMAL   >>**

Pedal switch

Pressing pedal marks stimulus delivery on dig. Channel 2

Corresponding Settings for Digital Signals in Software:
(for EAG, EagPro, and GcEadPro)

Invert Stimulus polarity

General Options

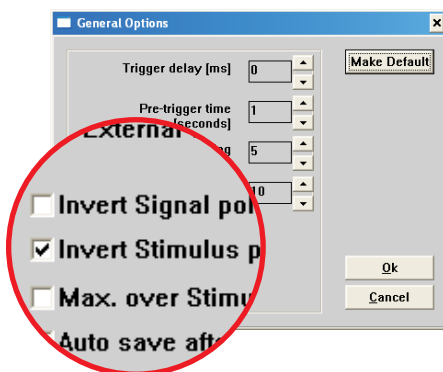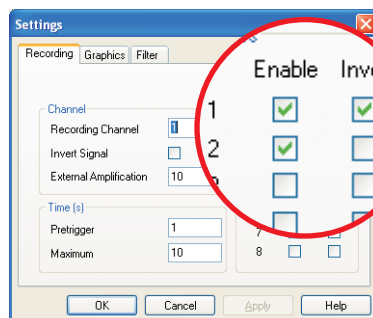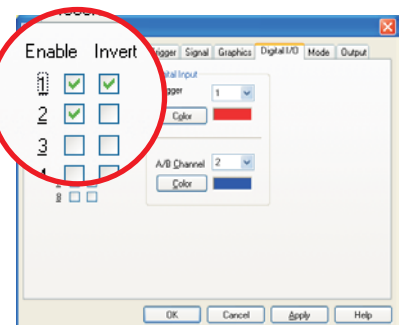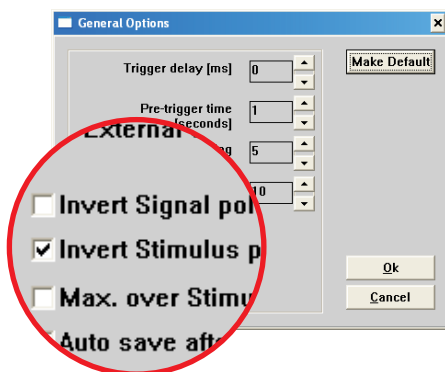Trigger delay [ms] 0   **Make Default**

Pre-trigger time [seconds] 1
External 5

☐ **Invert Signal pol**
☑ **Invert Stimulus p**
☐ **Max. over Stimu**
Auto save aft

Ok

Cancel

**EAG
(standard version)**

Trigger
1. Enable Invert
2. Enable

Settings

Recording | Graphics | Filter

Enable Invert

Channel
Recording Channel 1
Invert Signal
External Amplification 10

1 ☑ ☑
2 ☑ ☐
☐ ☐

Time (s)
Pretrigger 1
Maximum 10

7
8 ☐ ☐

OK Cancel Apply Help

EagPro

Trigger
1. Enable Invert
2. Enable

Enable Invert

Trigger | Signal | Graphics | Digital I/O | Mode | Output

Digital Input
Trigger 1
Color

1 ☑ ☑
2 ☑ ☐
3 ☐ ☐

A/D Channel 2
Color

OK Cancel Apply Help

GcEagPro

EAG RECORDING using the EAG Program

Activate the EAG program by a double click on the EAG icon.
If an ERROR message appears check the following:

* Is the proper device (IDAC-2) interface software installed?
* Is the interface cable connected to the USB port of the computer?
* Is the boost power supply - if necessary - connected?
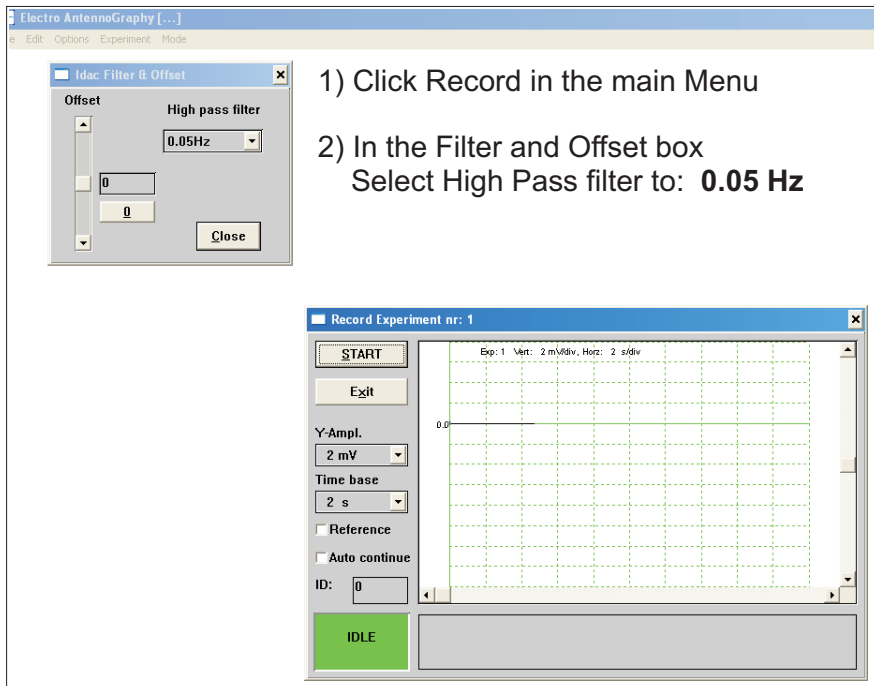

GENERAL OPTIONS

Open the General Options dialog box under the OPTIONS menu.
The following options can be changed:

|	
Pre-trigger time (seconds)	This value determines how much of the signal *before the trigger command* will be recorded. Set to 1.
Max. Recording (seconds)	This is the duration of the *total recording*, including the pre-trigger time. Set to 10
External ampl. factor	The gain of the external amplifier is entered here. *If a **PROBE** is used enter the value **10**.*
Invert input polarity	The polarity of the signal can be inverted; This function has to be used *if the EAG signal is positive going instead of negative*. Only a negative EAG can be properly evaluated by the software.
Max. over Stimulus	If this button is activated the software uses only the section of the EAG during the presentation of the stimulus for calculation of the maximum value. This option only works if the stimulus signal is recorded together with the EAG signal.
Auto save after recording	If selected each EAG is stored on the hard disk immediately after recording; this option prevents loss of data in case of a power failure during a recording session

RECORDING SETTINGS   EAG (standard program)

1) Click Record in the main Menu

2) In the Filter and Offset box
   Select High Pass filter to: **0.05 Hz**

Only select DC if signal levels need to be recorded.

Use the offset slider to adjust the signal trace in the center of the screen.

For normal EAG recording do NOT select DC mode!

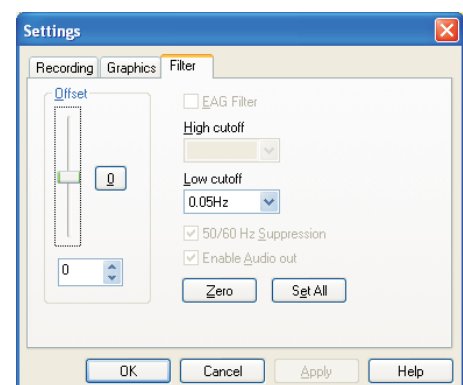# RECORDING SETTINGS   EAG Pro (Advanced EAG program)
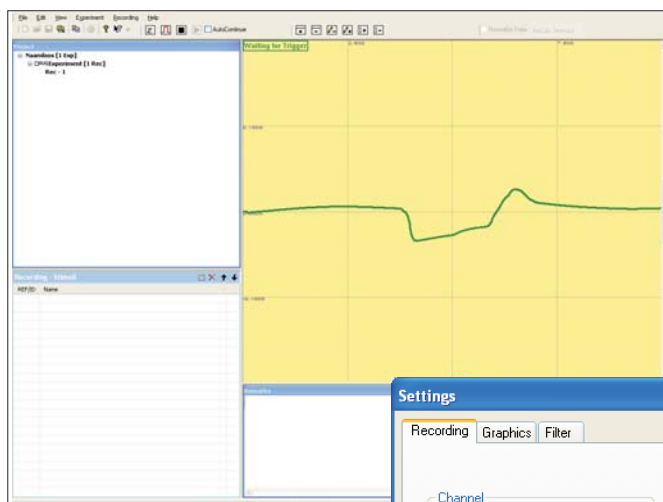
1) Click **Settings..** in the main Menu

2) In the Recording Box
   Set Channel and Trigger
   as indicated.

3) In the Filter and Offset box
   Select High Pass filter to: **0.05 Hz**
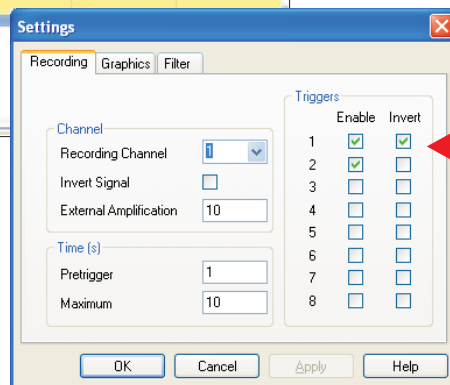
Set Trigger buttons as indicated !

Adjust Maximum Time
if required

RECORDING

Before recording make sure that all electrical connections are properly made and that the stimulus delivery system is functioning. Prepare all test stimulus sources previous to the actual recording session and have a number of reference sources available.
Make fresh pipette electrodes and select an experimental insect. Connect the antenna between the recording electrodes and take care that the electrodes make a stable contact with the antennal tissue.

Connect a Syntech Probe to the probe receptacle

RECORDING PROCEDURE

1) Select **Record** from the Experiment menu:
    The **Record window** appears. There might be a signal trace visible, but this is
    not always the case as it depends on the initial settings.

    Set the **High pass filter** at 0.05 Hz.

2) Adjust the **vertical scale**: start with a high value (10 mV) if no signal trace
    is visible.
    Set the **Time base** on 1 (second)

3) Press the **Z - key** on the key board. Pressing this key bypasses the base line
    control circuit in the interface box and forces the signal to zero.
    Now a trace should be written on the display.

4) Before presenting a stimulus **comments** can be entered in the comments
    area below the signal display screen. Move the cursor using the mouse to
    the right hand side of this area and start typing via the keyboard.
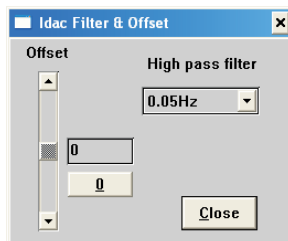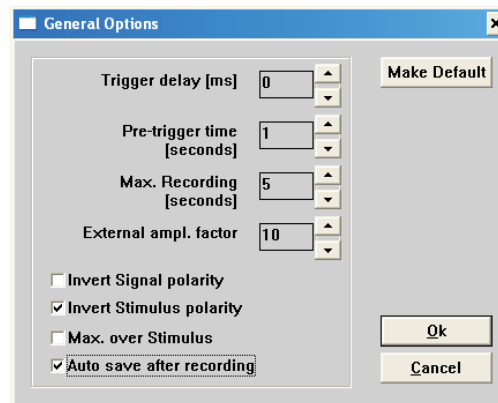   The comments are saved together with the experiment.
    If the stimulus is a reference click the Reference button; also enter an
    Identification number (ID) if applicable. (These parameters can be also be
    entered or edited after the recording session in the **Entry Table**)

5) Select the stimulus source and bring it into position for application.

Electro AntennoGraphy [...]

File Edit Options Experiment Mode

- General
- View
- Timer alarm
- Lists
- Metafile to Clipboard

GENERAL OPTIONS

General Options

Trigger delay [ms] 0

Pre-trigger time [seconds] 1

Max. Recording [seconds] 5

External ampl. factor 10

☐ Invert Signal polarity
☑ Invert Stimulus polarity
☐ Max. over Stimulus
☑ Auto save after recording

Make Default

Ok

Cancel

For IDAC-2:
Invert Stimulus Polarity

Idac Filter & Offset

Offset   High pass filter

                0.05Hz

0

0   Close

Set High pass filter at 0.05 Hz

Record Experiment nr: 1

START

Exit

Y-Ampl.
10 mV

Time base
2 s

☐ Reference

☐ Auto continue

ID: 0

Exp: 1 Vert: 10 mV/div, Horz: 2 s/div

0.0

IDLE
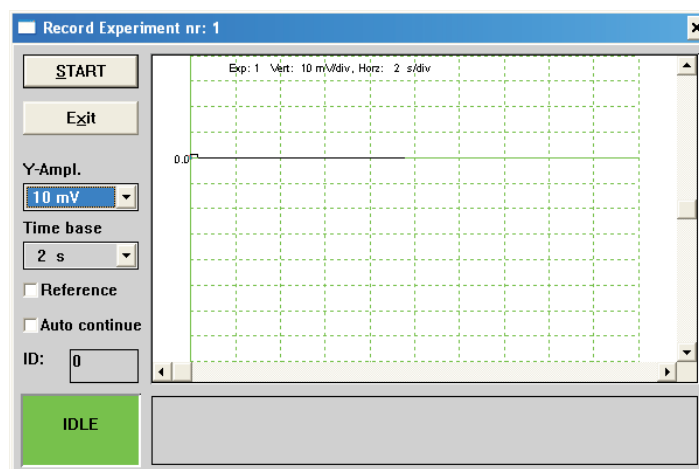
6) Apply the stimulus.

This is done by activation of the **stimulus delivery system**, which produces a **trigger** signal or **stimulus signal** (depending on the type of system used). The Syntech Stimulus Air Controller, CS-55, is started by pressing a **pedal switch** to present the stimulus puff, and at the same time triggers the recording via the **stimulus signal** (if connected properly to the interface box) *Note that due to the trigger signal the trace is automatically reset to the left side of the screen and also to the zero base line.* Recording can also be initiated by clicking the **Start** button; however, the trace is only adjusted to zero properly if the Start button is pressed at exactly the same time as the stimulus is presented. Therefore, a delivery system provided with a trigger or stimulus output signal is highly recommended.
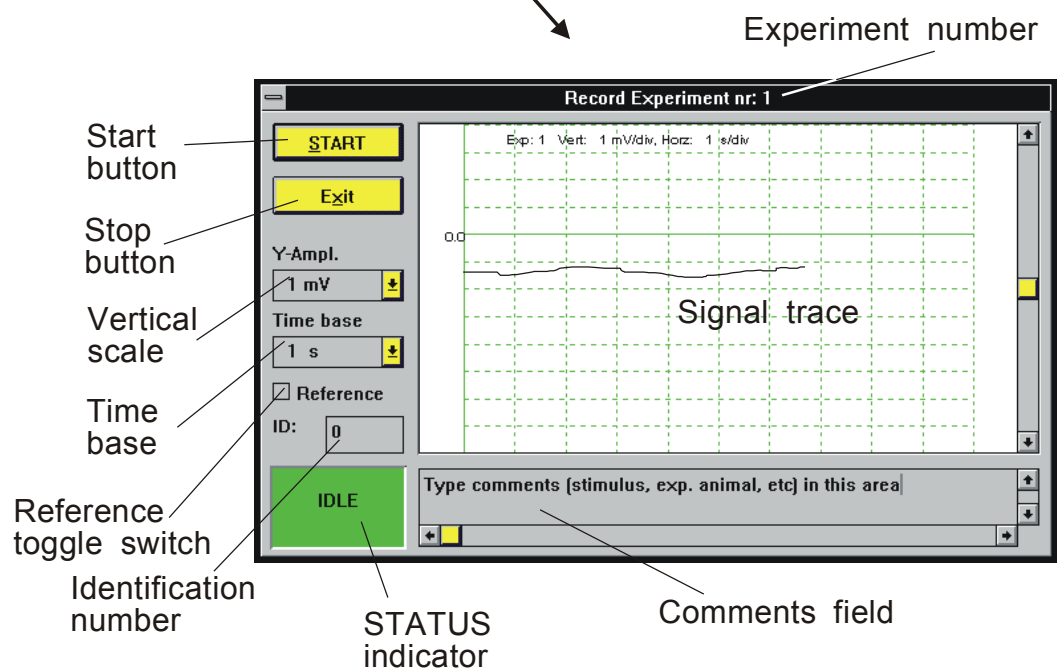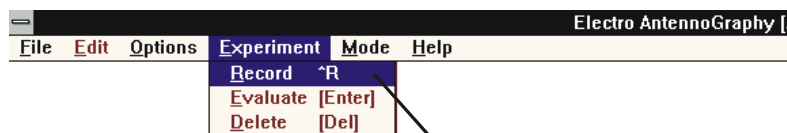
Recording **stops** after the time entered in the **General Options.** It can be terminated also using the STOP button.

7) After recording the trace can be **saved** or the recording can be **repeated** by clicking on **Redo**.
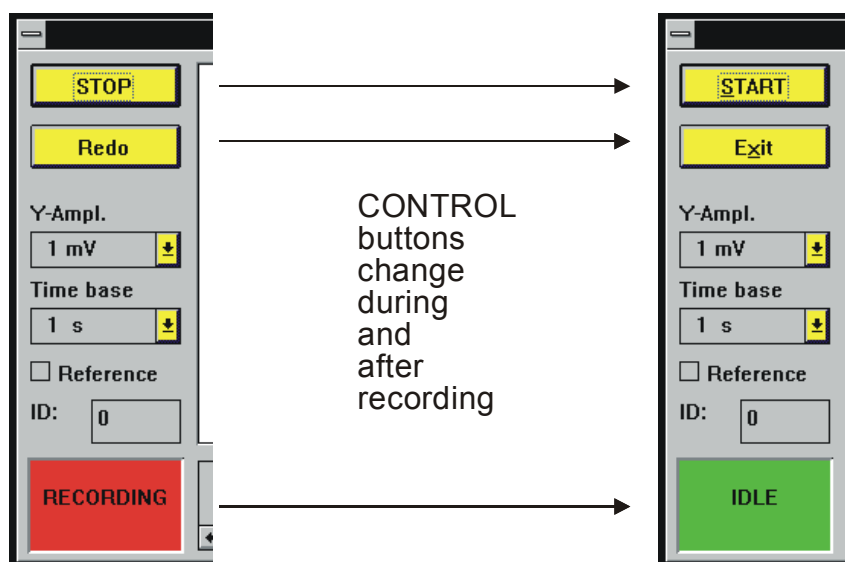
Note 1) *The space-bar of the key board can be used to prepare the system for the next recording. Press the space- bar after each recording to accept the EAG trace and to prepare the screen for the next stimulus. This only functions properly if the last command of the mouse was performed on the Start button; If comments have been entered, or mV values and time base changed, the mouse cursor should be re-set to the start button first in order to enable the space-bar function again. For large series of routine recordings this option is advantageous, because only the space-bar has to be operated to save the previous recording and to prepare for the next.*
Note 2) *The recording session can be interrupted any time by clicking the* ***Exit*** *button. An overview of the previous recordings is presented by activating the* ***Graph*** *entry of the Mode menu. Maxima and* ***Normalized*** *graphs can be displayed also. The session is continued by activating Record (in the Experiment menu) again, and the session numbering is continued from the last recording.*

8) The recording session is terminated by activating the **Save** or **Save as** command in the File menu.

Electro AntennoGraphy [

File   Edit   Options   **Experiment**   Mode   Help

Record   ^R
Evaluate   [Enter]
Delete   [Del]

Experiment number

Record Experiment nr: 1

Exp: 1 Vert: 1 mV/div, Horz: 1 s/div

Start button — **START**

Stop button — **Exit**

Vertical scale — **Y-Ampl.** 1 mV

Time base — **Time base** 1 s

0.0

Signal trace

Reference toggle switch — ☑ Reference

Identification number — ID: 0

STATUS indicator — **IDLE**

Type comments (stimulus, exp. animal, etc) in this area

Comments field

RECORD WINDOW

STOP

Redo

Y-Ampl.
1 mV

Time base
1 s

☐ Reference

ID: 0

RECORDING

CONTROL buttons change during and after recording

START

Exit

Y-Ampl.
1 mV

Time base
1 s

☐ Reference

ID: 0

IDLE

CONTROL BUTTONS

REPLAY and EVALUATION

Recording sessions can be evaluated immediately after, or even during, recording, and after they have been saved on disk. Evaluation can also be done on a computer not containing the IDAC signal acquisition board, but with the EAG program installed.
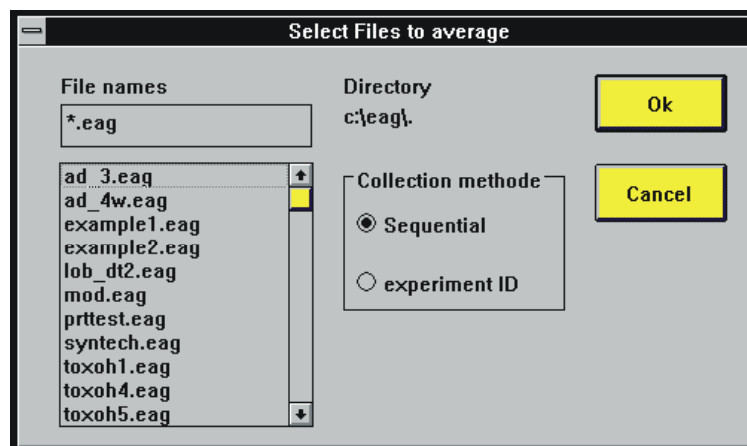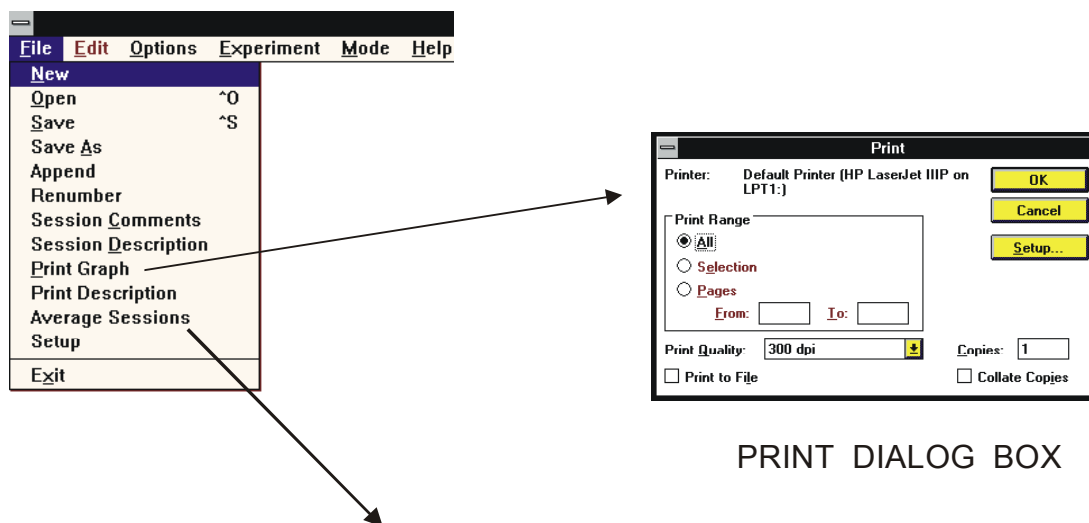
Activate **Open** in the File menu to select a session for evaluation.
The experiments can be presented in various ways as selected in the **Mode** menu:

1) As **graphs**. This mode displays an *overview* of all recordings in a session. The size, and consequently the number, of graphs on the screen is selected in the **View Option** dialog box (see figure) by entering the number of columns in which the individual EAG traces are to be displayed on a single screen.
Each **individual EAG** recording can be selected for **full screen display** by a double mouse click on the selected graph, which is marked by a frame if selected. Comments, mV and Time base can be changed in this mode without affecting the stored numerical data.

2) **Maxima**. Shows a bar graph of the maximum (negative) EAG deflections in mV. The "colour" (only black and white colours and hatchings are used) is determined by the Identification Number (ID) , which is entered in the Record window or in the Entry Table. Recordings marked as **References** (either in the Record window or in the Entry Table) are **black**.

3) **Normalized.** Shows a bar graph of the normalized values in **%** of the reference, which is by definition set at 100%. References are shown as black bars. Normalized values can only be calculated if at least two references are measured (if not an Error message is presented).

4) **Entry Table**. This table presents the recordings in numerical order with the Identification number **(Id** number) and the quality (**Ref , yes or no**) together first characters of the **Comments** text. All parameters are editable by selecting the row with the mouse and using standard Windows editing operations. Modifications are effective on all other applicable windows.

5) As a **List**. The values for Maximum and Normalized EAG traces are available as a numerical list. This list can be transferred to the Windows **clipboard** for use in other programs, or it can be printed directly. The List is presented on command of the **List** selection in the **Option** menu.

drag DOT to move
red line up or down
to adjust position
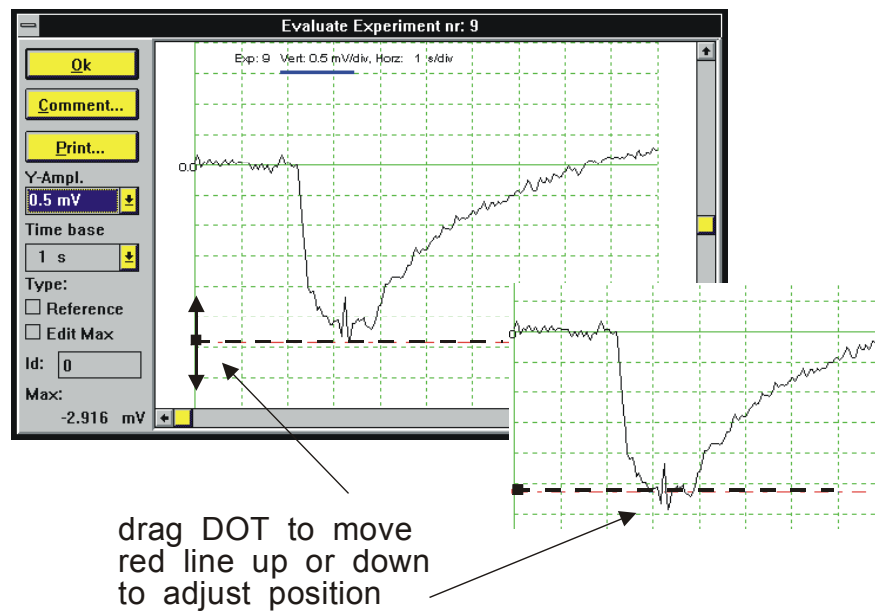
EDITING of MAXIMUM VALUE

PRINT DIALOG BOX

AVERAGE SESSION SELECTION BOX

6) In **ASCII** format. Data of a session can be exported in ASCII format using the **Save as..** command in the File menu, followed by selecting **ASCII data.**

(***.asc)** in the **Save File Type :..** selection box. This operation saves all recordings as digital data resulting in a rather long data file. The **Reduced data (*.dat)** format does not save the original EAG traces but only the data belonging to the Maxima and Normalized graphs resulting in a considerably shorter file.

EDITING MAXIMUM

The maximum (negative) EAG deflection is automatically measured from the stored EAG trace. The lowest value in an EAG trace is determined and presented as Maximum EAG value. However, this is not always correct, especially if the EAG signal is distorted by **noise** and the software selects to lower noise peak. The maximum value as determined by the program can be manually edited in the **Evaluation screen** by dragging the maximum indication line (dotted red line with a black dot at the left side) using the mouse. This action is immediately followed by a change in the numerical mV display box and all other tables and data are updated.
To **"undo" the editing** operation click on the **Edit Max** button to restore the original value.

PRINTING

Graphs presented in any **active window** can be printed immediately.
Activate the desired display by selecting the appropriate window and select **Print Graph** from the File menu. The standard Windows print dialog appears, in which printers can be selected and options adapted.
The **List** can be printed directly using the Print button in the List window.
Session Comments are printed below each print-out.
Session Description text can be stored and printed separately.

APPEND

This command allows sessions to be combined. It is useful if a session has to be interrupted , but continued later. In order to retain consistency of the data the same reference should be used in files that are appended.

RENUMBER

Deleting a selected **experiment** using the **Delete** command in the Experiment menu does not affect the **sequential numbering** of the remaining recordings. The session can be renumbered in continuous order using the **Renumber** command. Do **not** renumber files that are to be averaged on numerical order.

AVERAGING SESSIONS

Maxima and Normalized data of stored sessions can be **averaged** and **mean** values with **standard error** calculated and displayed.
The files for averaging are selected by clicking on the appropriate file names in the file list.
Averaging can be done on **sequential number**, or by collecting values from recordings with the same **Identification Number** (if applicable). The latter method enables presentation of stimuli in random order if each stimulus is characterized by an explicit identification number.
Averaging requires some degree of standardization of recording sessions.