

K&A Laborgeraete GbR

Owner's guide

Synthesizer H-8

Ver.02.11

Important !!!

Please read first!!

- I. General
- II. The instrument
- III. Software
- IV. Operation
- V. Care and maintenance
- VI. Troubleshooting
- VII. Technical data

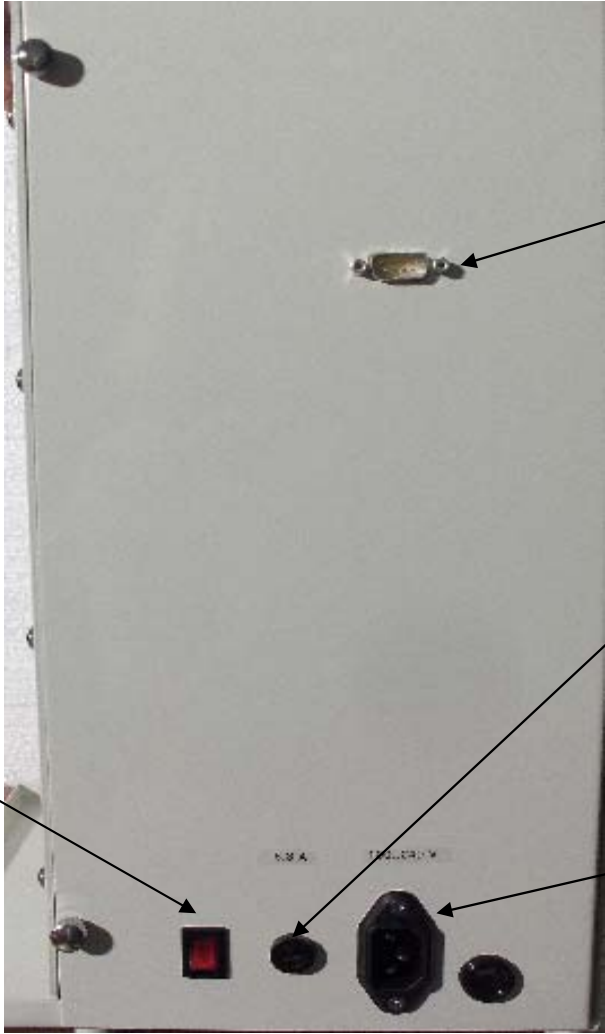
I. General

1. Unpacking

- Please contact your dealer immediately if any damages caused by transportation have been discovered and compensation has to be asserted to claim.
- Make a small report and, if possible, take some pictures.
- Recycle properly the packing materials.

2. Connections

- See technical data of connected values.
- Electric power: check whether the voltage shown on the rating plate corresponds to that of power source.
- Connect the plug to the power source.
- High pressure: check the switch for high (HIGH) pressure at on the instrument; it must be in closed position!
- Connect the tube with pressed air (min. 70 Psi) to the switch for high pressure.
- Low pressure: check the switch for low (LOW) pressure on the instrument; it must be in closed position!
- Connect the tube with nitrogen or argon (min. 10 Psi) to the switch for low pressure.
- Waste tubes: put the ends of the waste tubes into the waste container.
- Computer:
 - Install the software (see Chapter III. Software - Installation)
 - Connect the serial cable between the computer and the instrument.
 - Switch on the instrument.

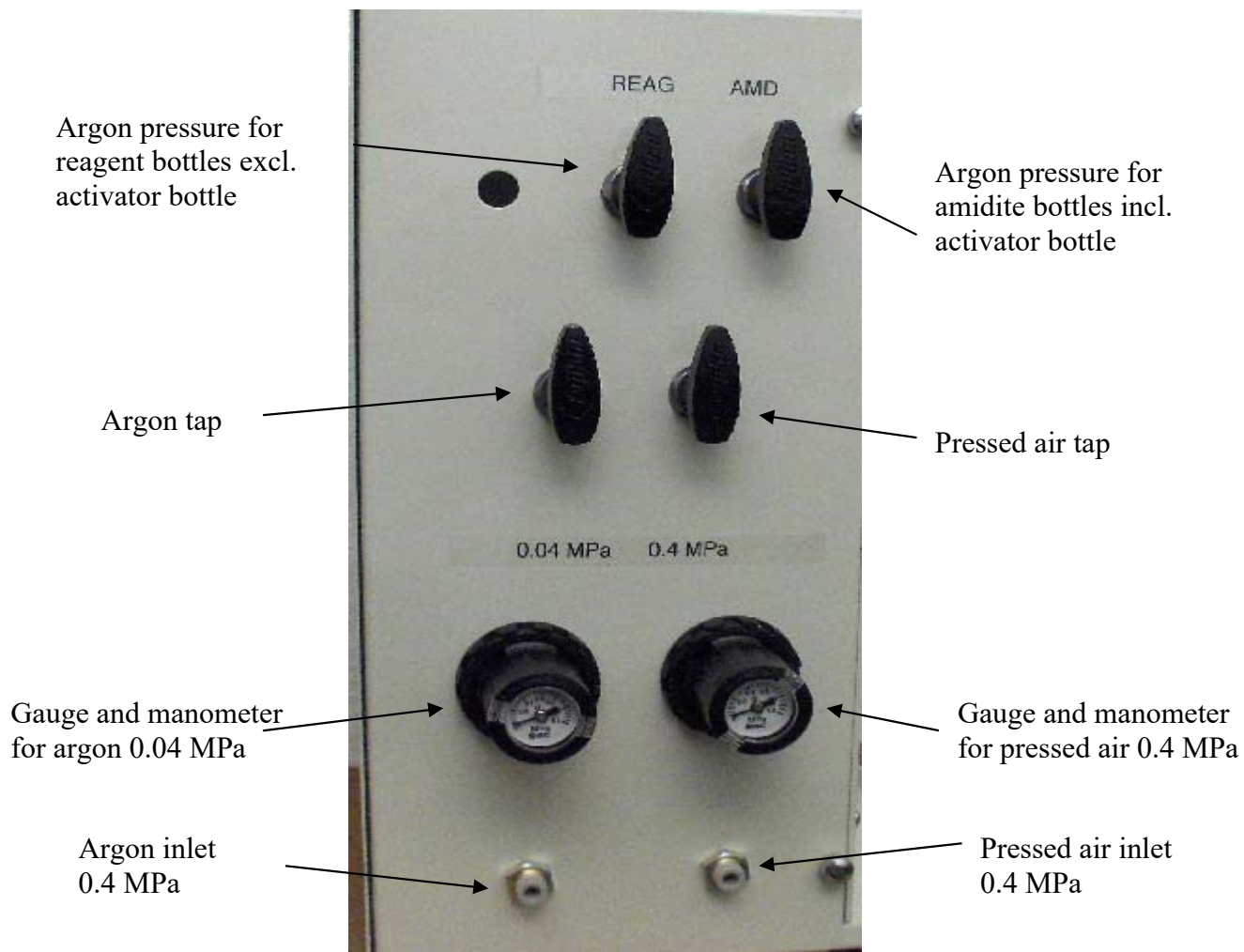


Connect cable to computer

Fuse 3.15 A

Main power switch

Power cord

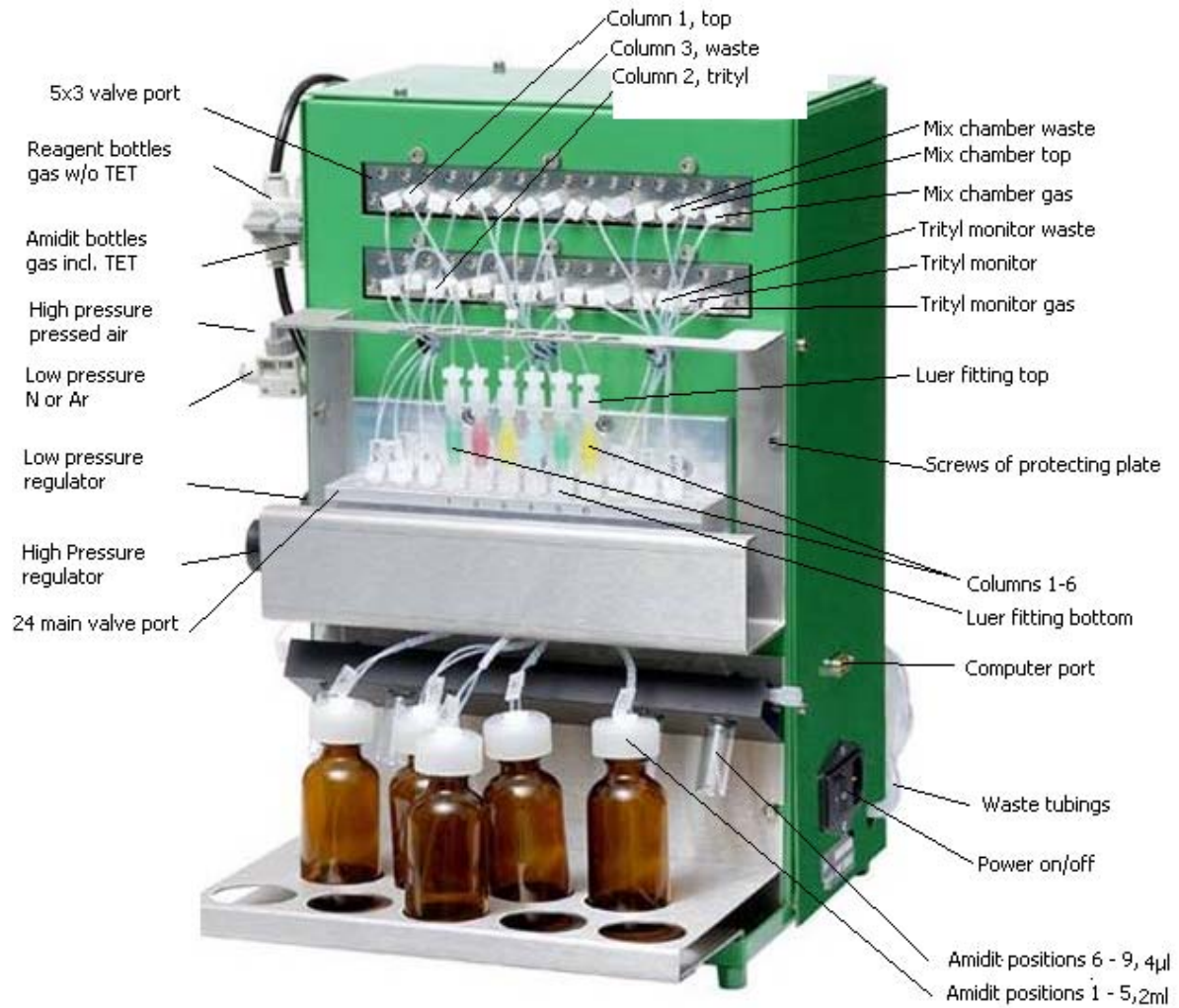


3. Side parts

- Reagent bottles, amidite bottles and columns will be loaded on the instrument, (see Chapter IV – Operation).

II. The instrument

H-6 / H-8 DNA/RNA/LNA synthesizer





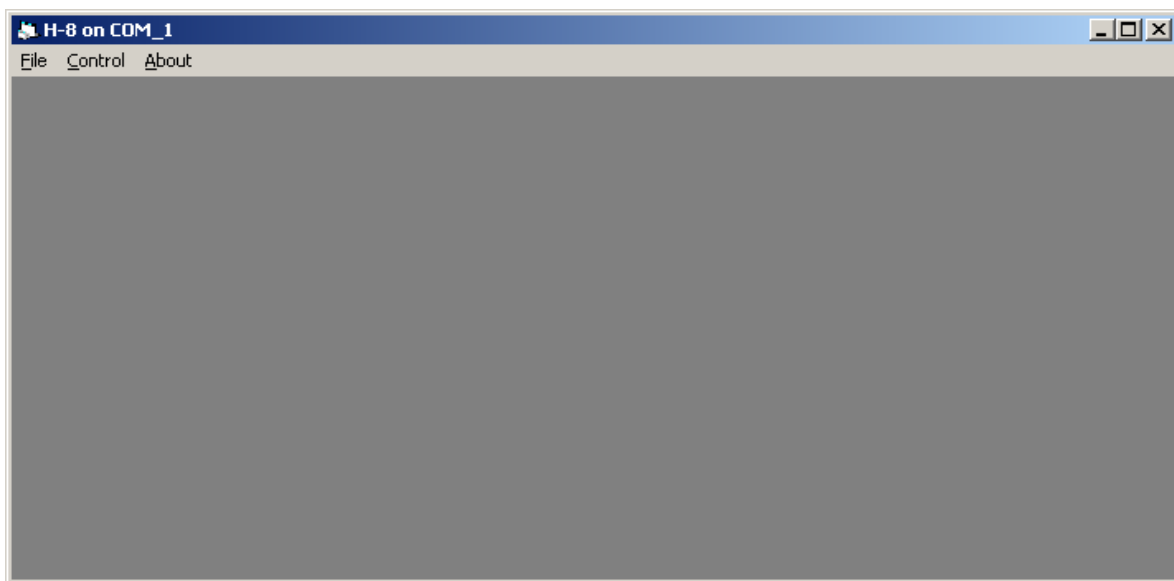
Amidit bottles H-8 standard

III. Software

Installation

- Insert CD with the software in CD driver.
- Double Click on 'Setup' file – Installation starts
- Installation program creates H-8 folder and copies the data into it.
- After finishing, copy all files from CD-folder 'Cycles H-8' into the H-8 folder.
- Create a shortcut to exe program H-8-0206.exe and place it on the desktop.
- Change COM number in the file comk8.txt (comk6.txt for H-6) in the H-8 folder according to COM number in the PC. Enter 1 for COM1, 2 for COM2, etc. and close the file. The COM number can be checked under Windows-Settings Control Panel-System-Device Manager.
 - Start the program through double click on shortcut to H8-0206.exe (H6-0102.exe)
 - Main Menu appears

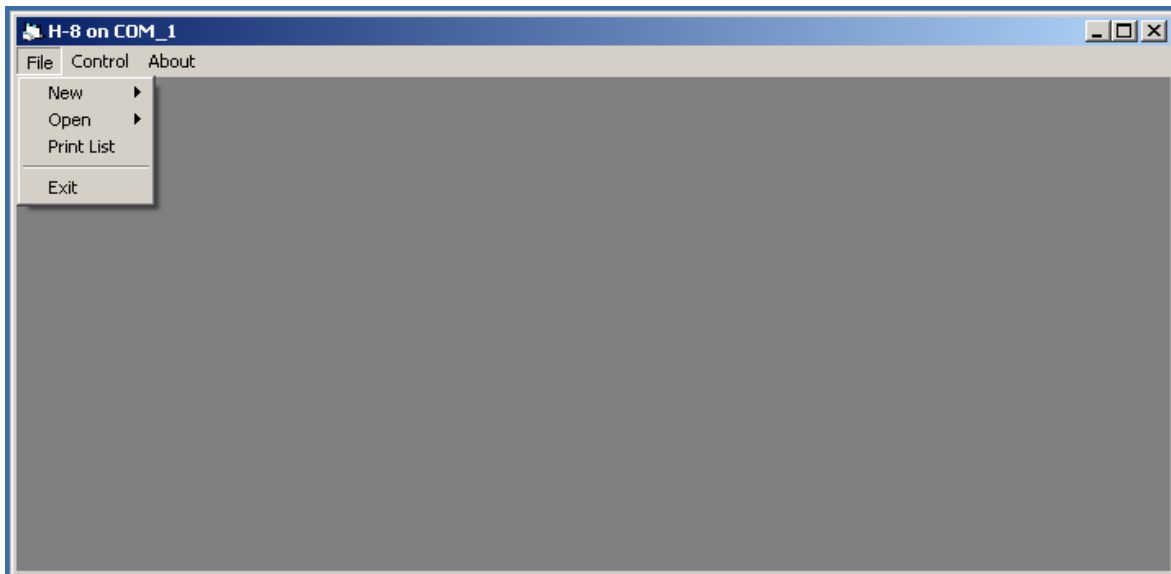
1. Main menu



Main Menu contains submenus :

- File
- Control
- About

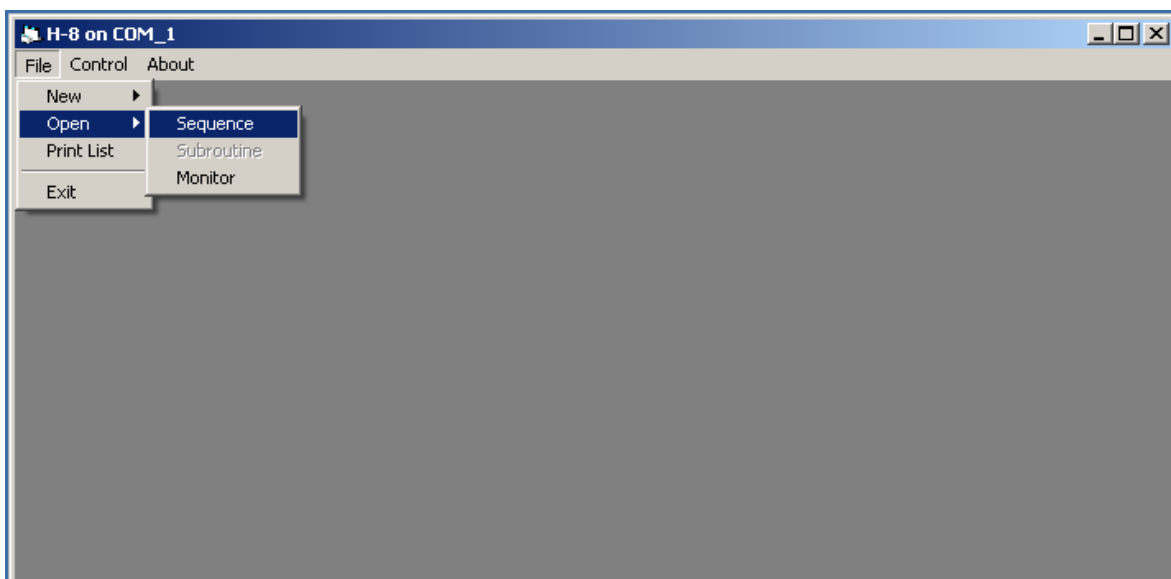
2. Submenu File



Submenu File allows:

- Editing the sequence
- Opening and evaluation of trityl monitors
- Printing of sequences

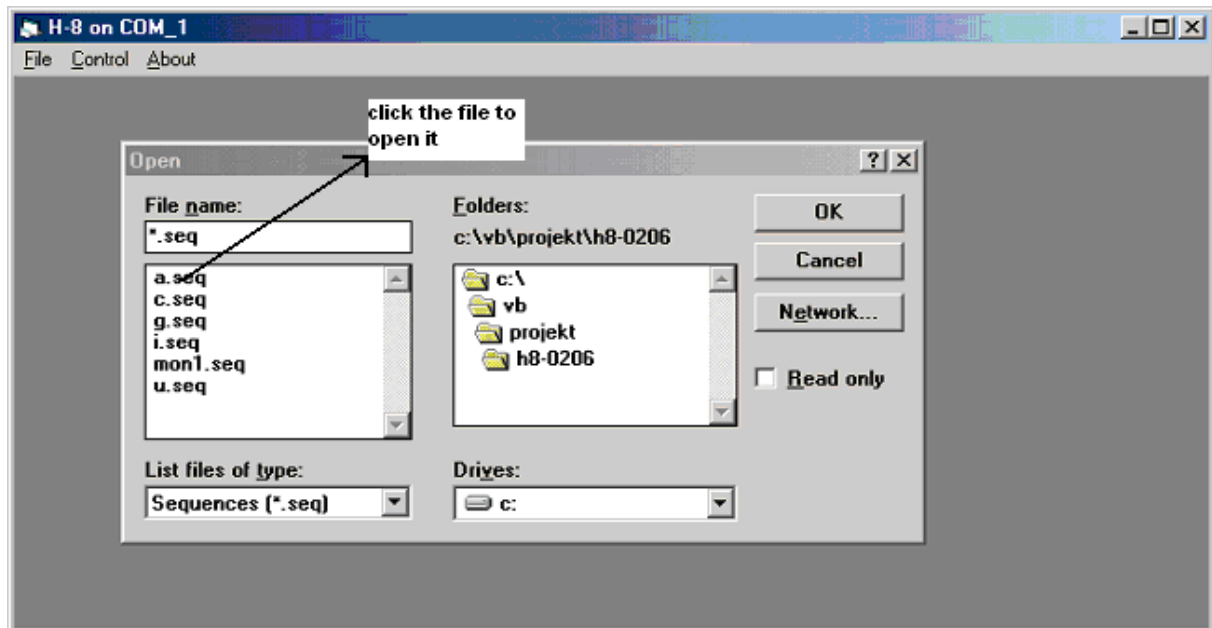
2.1. Submenu File – New – Sequence



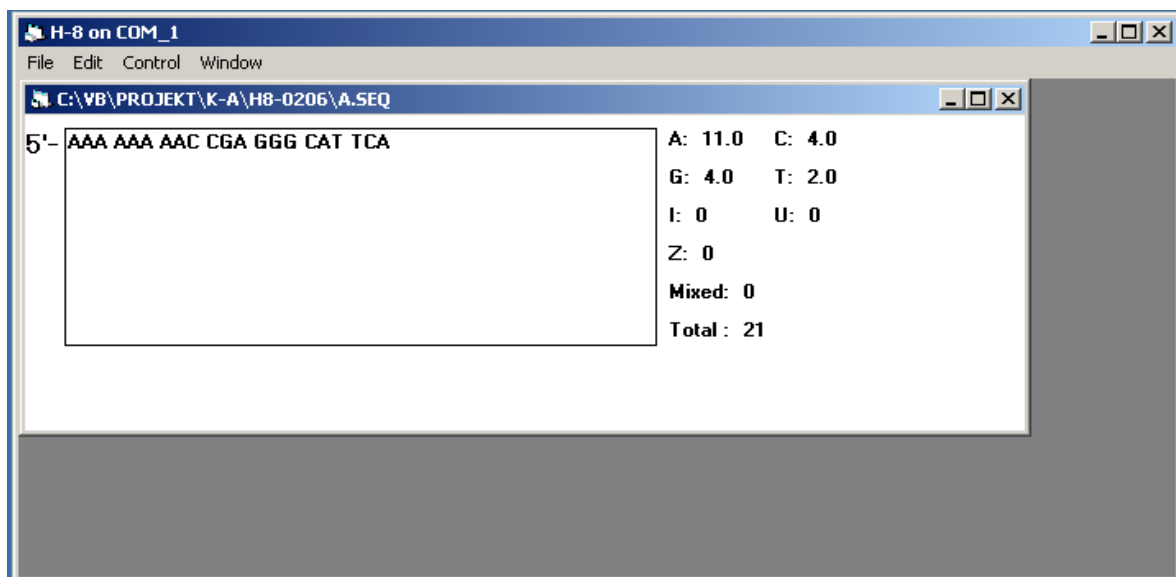
Submenu File – New –Sequence allows creating of the sequence.

2.1.1. Submenu File – Open – Sequence

This menu allows changing or evaluation of existent sequences.



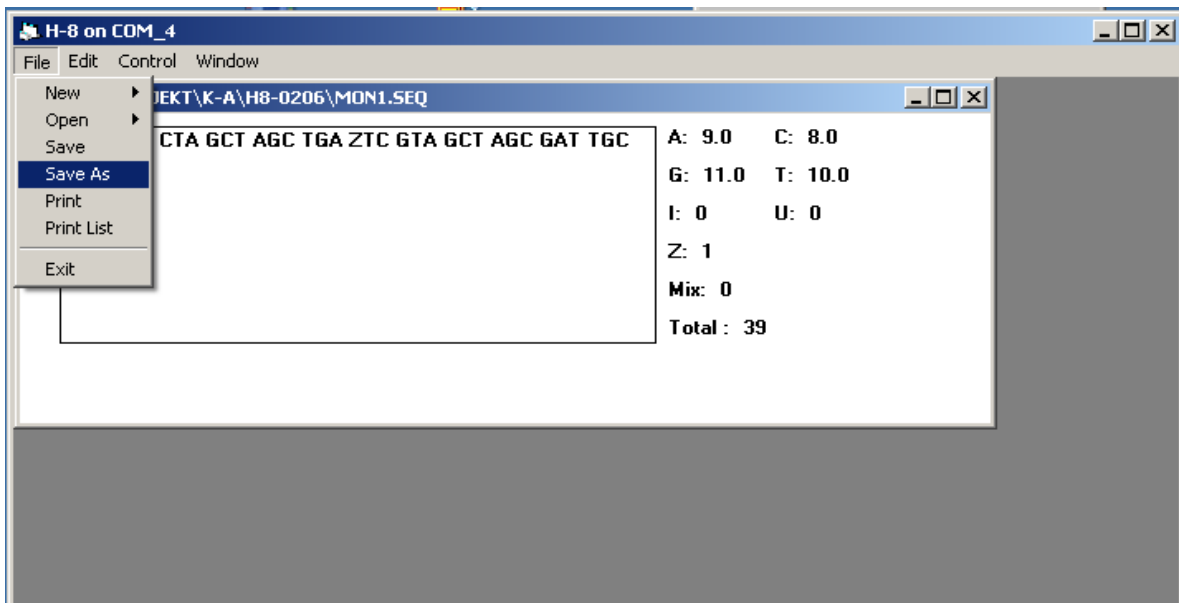
Click on one of the listed files to open them:



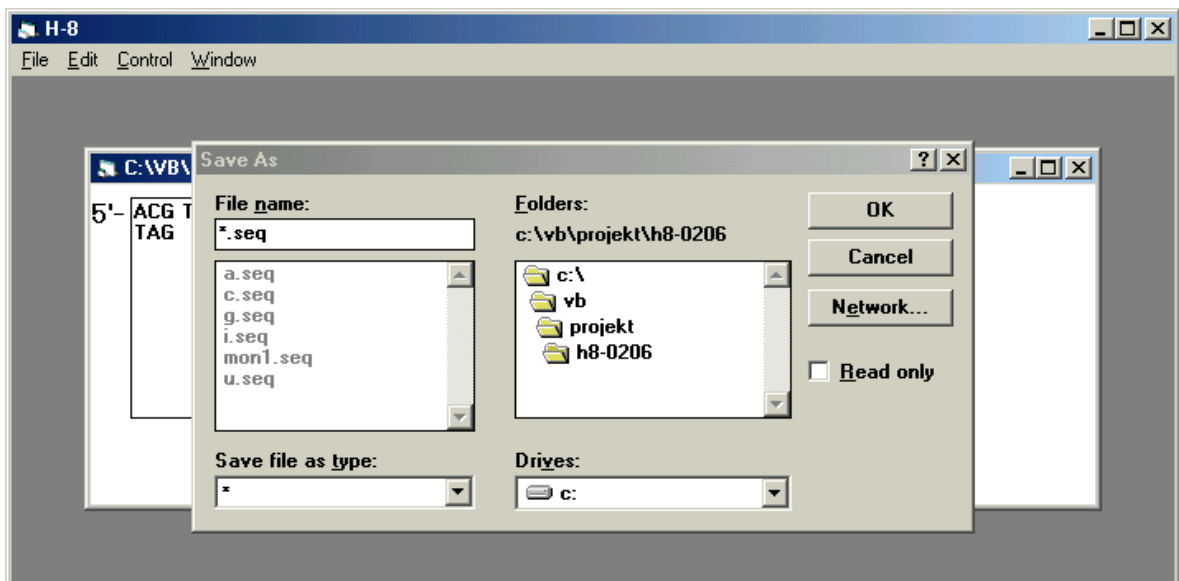
- After opening the file, the sequence can be changed.
- The Cut and Paste functions are available.
- Low case letter will be automatically converted to upper case.
- Right side shows the amounts of the single bases, mixed bases and the total length
- of the sequence.
- Following codes are valid for the wobbles: M (AC), R (AG), W (AT), S (CG), Y (CT), K (GT), V (ACG), H (ACT), D (AGT), B (CGT), N (ACGT)

Caution: code P can be entered, and cause the execution break on this position

When changed, the file can be saved by using the Save As function.



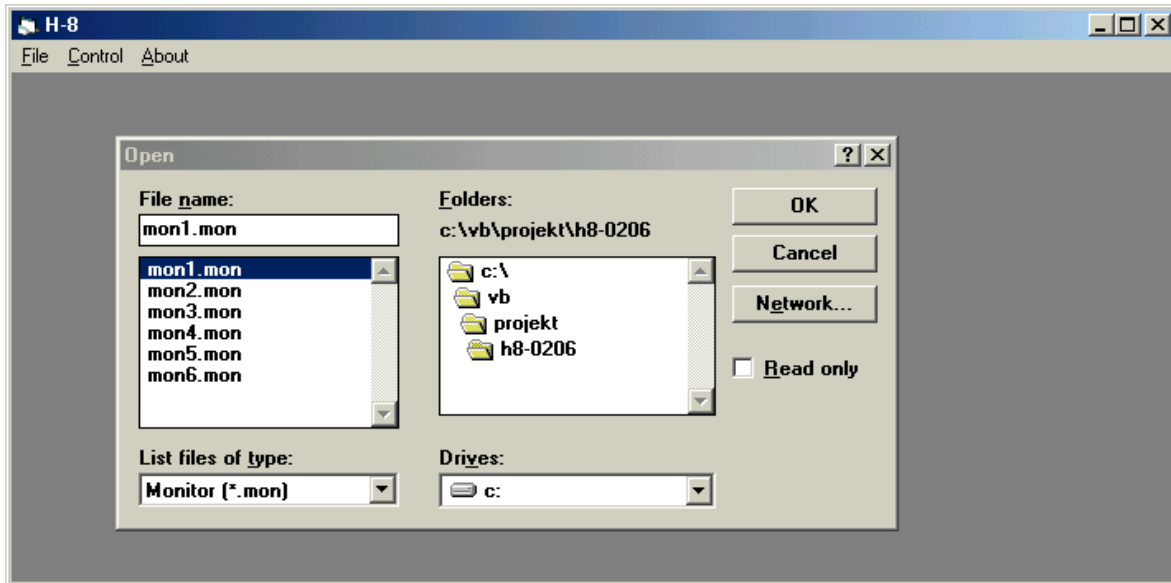
Now the new name of the sequence can be entered and saved by clicking on OK.



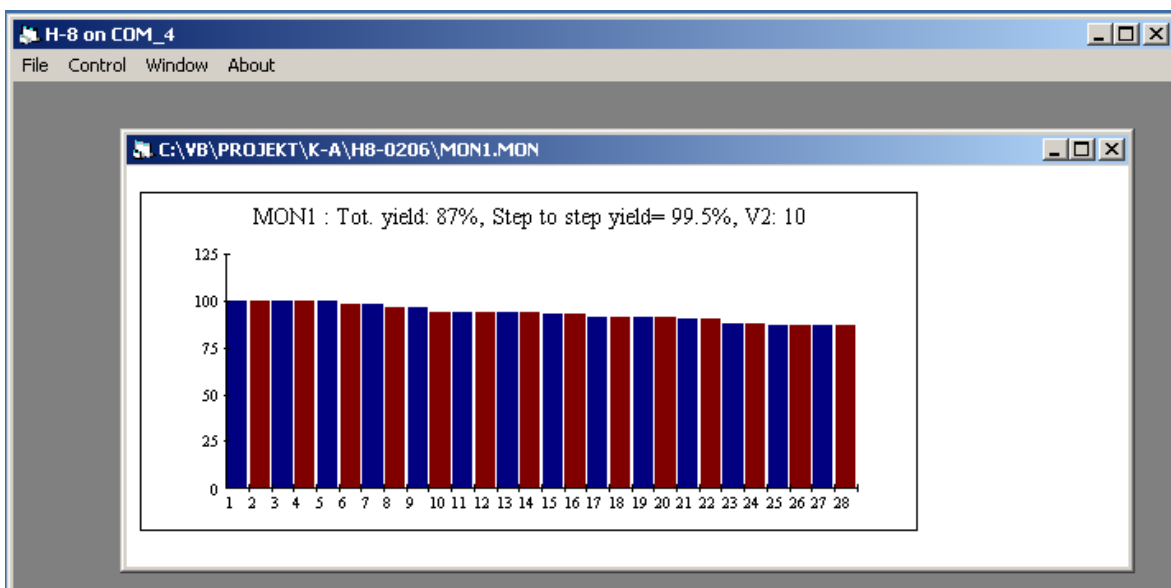
Caution: The sequence name must have extension .seq .

2.2 Submenu File – Open – Monitor

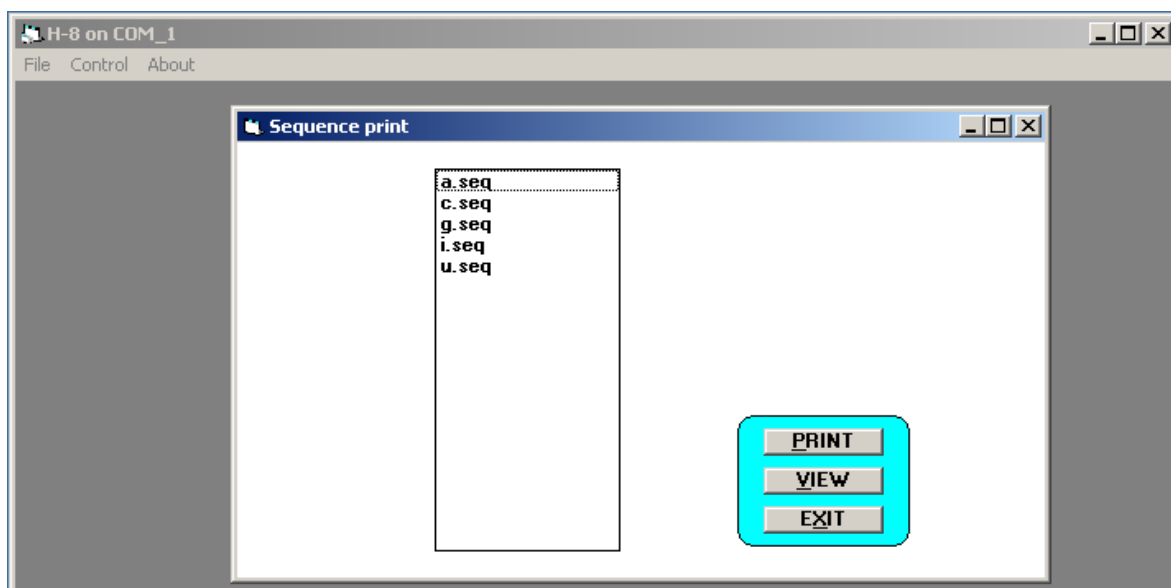
This menu allows evaluation of saved trityl monitors.



Double click or OK on the file to open it.

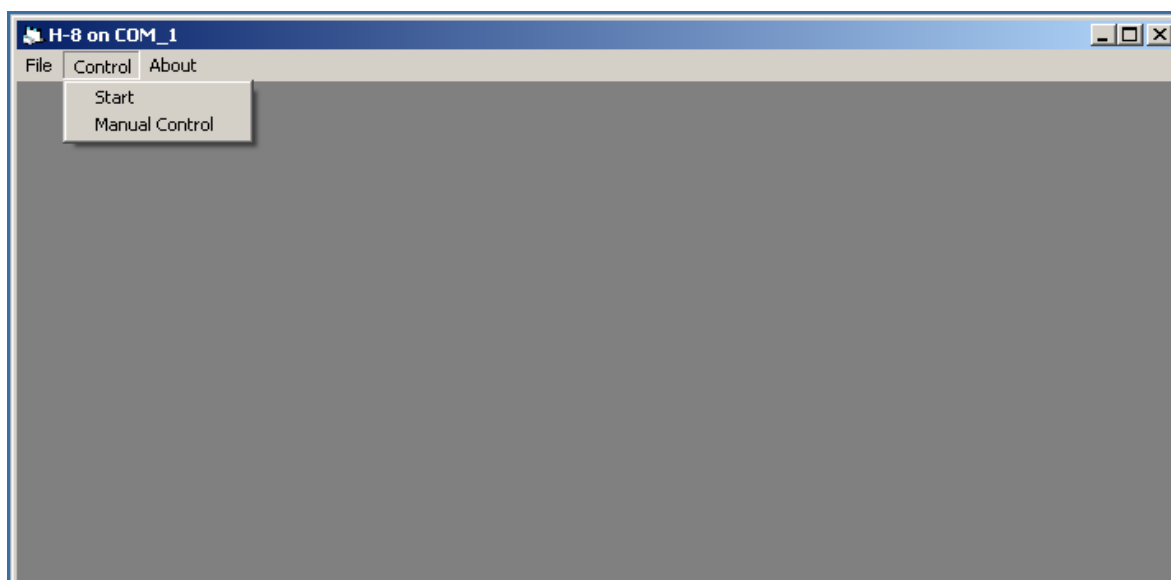


2.3 Submenu File – Print List



This menu allows printing or viewing of all opened sequences.

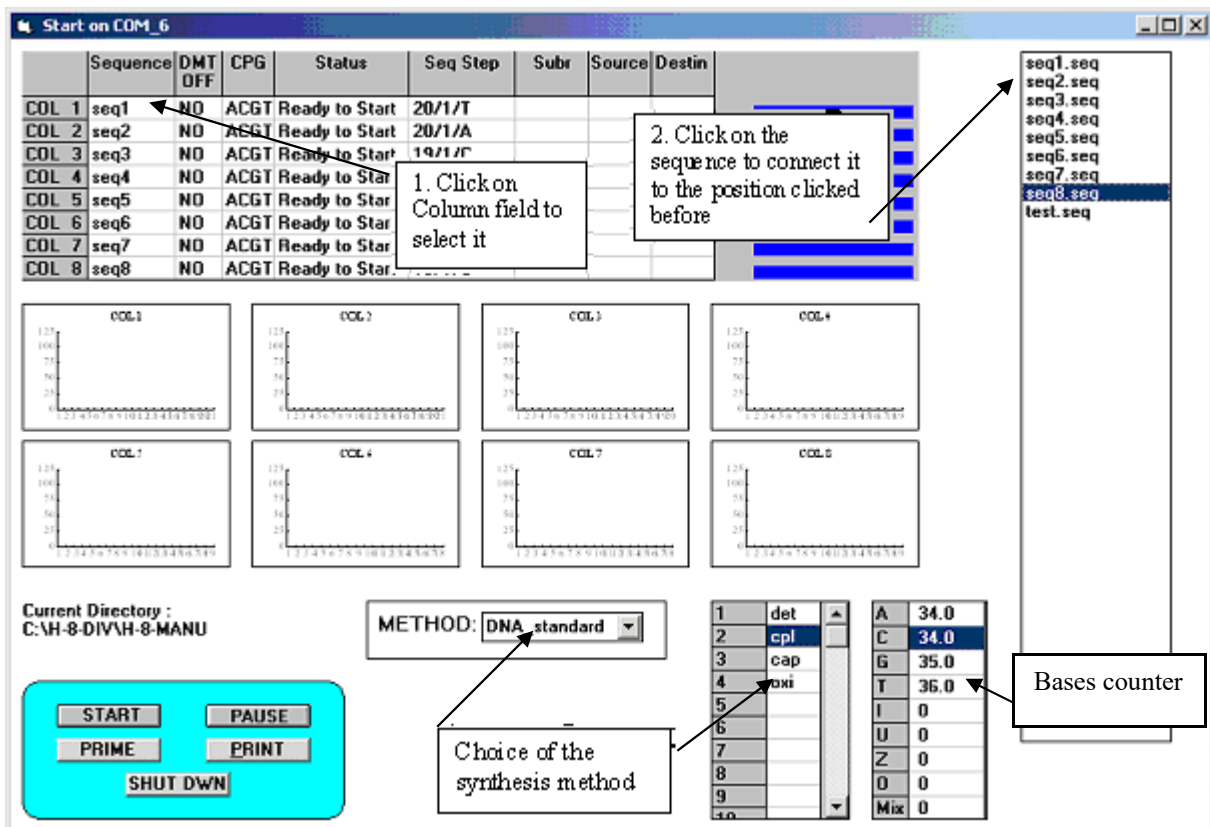
3. Submenu Control



Submenu Control allows:

- Starting of the synthesis.
- Manual control of all valves in the instrument.

3.1 Submenu Control – Start



This menu starts the synthesis:

- **Select the column for the synthesis** by clicking on it (1) and then **click the sequence name** on the right side to concatenate it to column 1 (2). The name of the sequence appears in the column 'Sequence', and status 'Ready to Start' in the column 'Status'.
- Make a choice of the **method** for the synthesis. The method stays valid until the next choice. The method appears in the grid
- Click on the field 'DMT OFF' for switching NO to YES when 5'-DMT should be OFF at the end of the synthesis.
- Accordingly, if universal CPG is used, switch CPG from ACGT to UNIV by clicking on the field CPG.
- Click the field 'Status' on the column position and press the key 'Backspace' when synthesis should be removed on this column position. The name of the sequence disappears and all fields in the row for the selected synthesis column are empty.
- Repeat the double click to shrink the graph to normal size.
- Bases counter for all bases which have to be coupled will be displayed in the grid on the right side of bottom of the screen.
- Click the button PRIME to prime the reagents and wait until the instrument finishes the synthesis.
- **Click START** button when all bases are connected to the column positions and the instrument is prepared to the synthesis.

Start on COM_6

	Sequence	DMT OFF	CPG	Status	Seq Step	Subr	Source	Destin
COL 1	seq1	NO	ACGT	Running	20/ 4/A	cpl		
COL 2	seq2	NO	ACGT	Running	20/ 4/C	cpl		
COL 3	seq3	NO	ACGT	Running	19/ 4/C	cpl		
COL 4	seq4	NO	ACGT	Running	18/ 4/C	cpl		
COL 5	seq5	NO	ACGT	Running	18/ 4/C	cpl		
COL 6	seq6	NO	ACGT	Running	17/ 4/C	cpl		
COL 7	seq7	NO	ACGT	Running	17/ 4/C	cpl		
COL 8	seq8	NO	ACGT	Running	18/ 4/G	cpl		

```
seq1.seq
seq2.seq
seq3.seq
seq4.seq
seq5.seq
seq6.seq
seq7.seq
seq8.seq
test.seq
```

COL1

COL2

COL3

COL4

COL5

COL6

COL7

COL8

Current Directory :
C:\H-8-DIV\H-8-MANU

METHOD: DNA_standard

STOP PAUSE

PRIME PRINT

SHUT DWN

1	det	
2	cpl	
3	cap	
4	oxi	
5		
6		
7		
8		
9		
10		

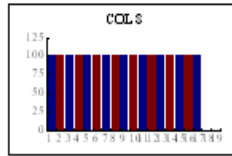
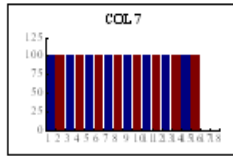
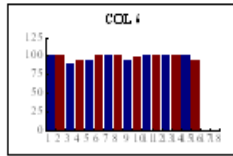
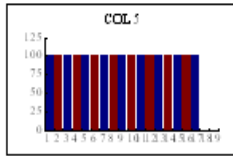
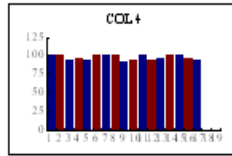
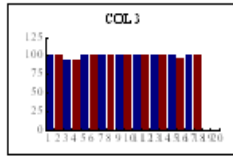
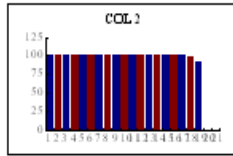
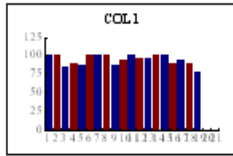
A	33.0
C	33.0
G	28.0
T	29.0
I	0
U	0
Z	0
O	0
Mix	0

- The Status field switch to 'Running' and the synthesis starts running.
- The button START switches to STOP; clicking it will stop these synthesis now.
- Trityl monitor graph bars appear during the progress of the synthesis and the base numbers decrease.
- Double click on trityl monitor graph to enlarge the graph.
- Repeat the double click to shrink the graph to normal size.
- The bases counter will be updated during the synthesis, and all should go to zero when synthesis on all column positions are finished.
- When synthesis is finished, the text 'Finished' appears at the position which is done.

Start on COM_6

	Sequence	DMT OFF	CPG	Status	Seq Step	Subr	Source	Destin
COL 1	seq1	NO	ACGT	Finished				
COL 2	seq2	NO	ACGT	Finished				
COL 3	seq3	NO	ACGT	Finished				
COL 4	seq4	NO	ACGT	Finished				
COL 5	seq5	NO	ACGT	Finished				
COL 6	seq6	NO	ACGT	Finished				
COL 7	seq7	NO	ACGT	Finished				
COL 8	seq8	NO	ACGT	Finished				

seq1.seq
seq2.seq
seq3.seq
seq4.seq
seq5.seq
seq6.seq
seq7.seq
seq8.seq
test.seq



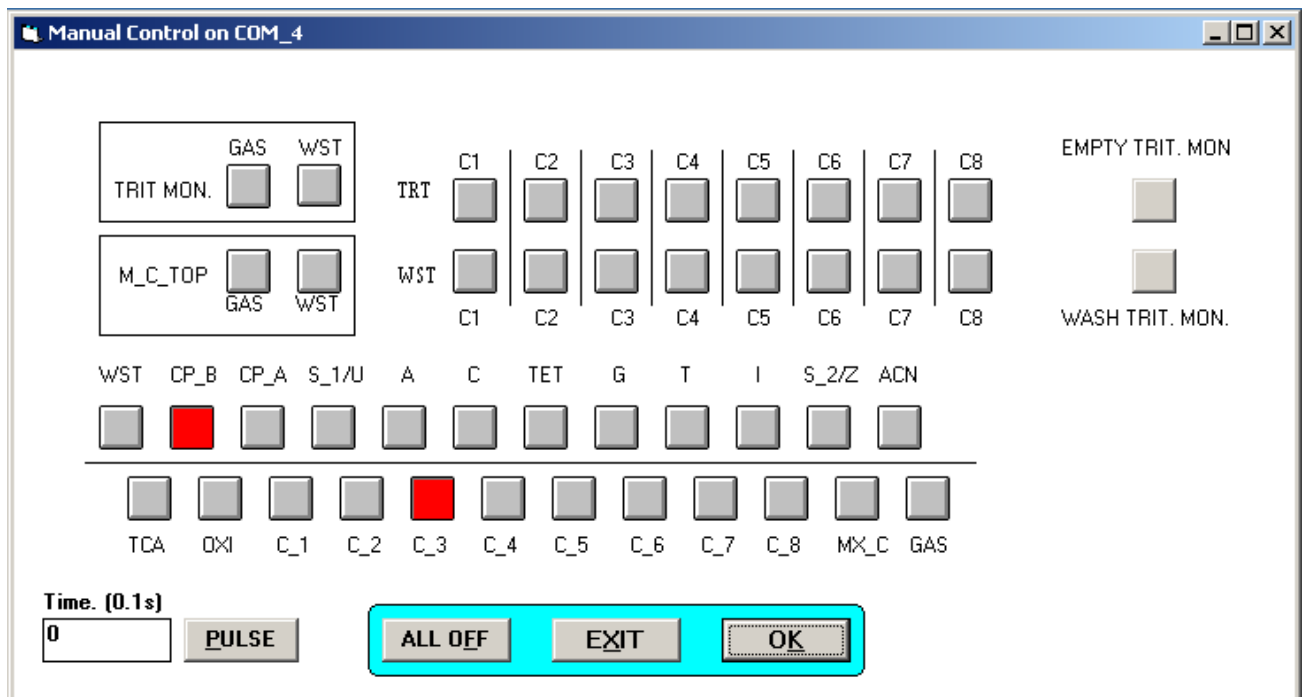
Current Directory :
C:\H-8-DIV\H-8-MANU

METHOD: DNA_standard

STOP PAUSE
PRIME PRINT
SHUT DWN

1	det	A	0.0
2	cpl	C	0.0
3	cap	G	0.0
4	oxi	T	0.0
5		I	0
6		U	0
7		Z	0
8		O	0
9		Mix	0
10			

3.2 Submenu Control - Manual Control



The Manual Control menu allows switching every valve in the instrument. It has also complex functions like 'Empty Trit. Mon.', 'Wash Trit. Mon.' and 'Pulse'.

- Switching the valves on:
 - Click the valve to open; the valve is prepared to open.
 - Click OK; the valve opens on OK click.
- Switching the valves off:
 - Click opened valve which must be closed; the valve is prepared to close
 - Click OK; the valve closes on OK click.
 - By clicking the 'ALL OFF'-button, all valves will be closed at once.

Multiple valves can be prepared to switch by clicking and opened or closed at once by clicking OK.

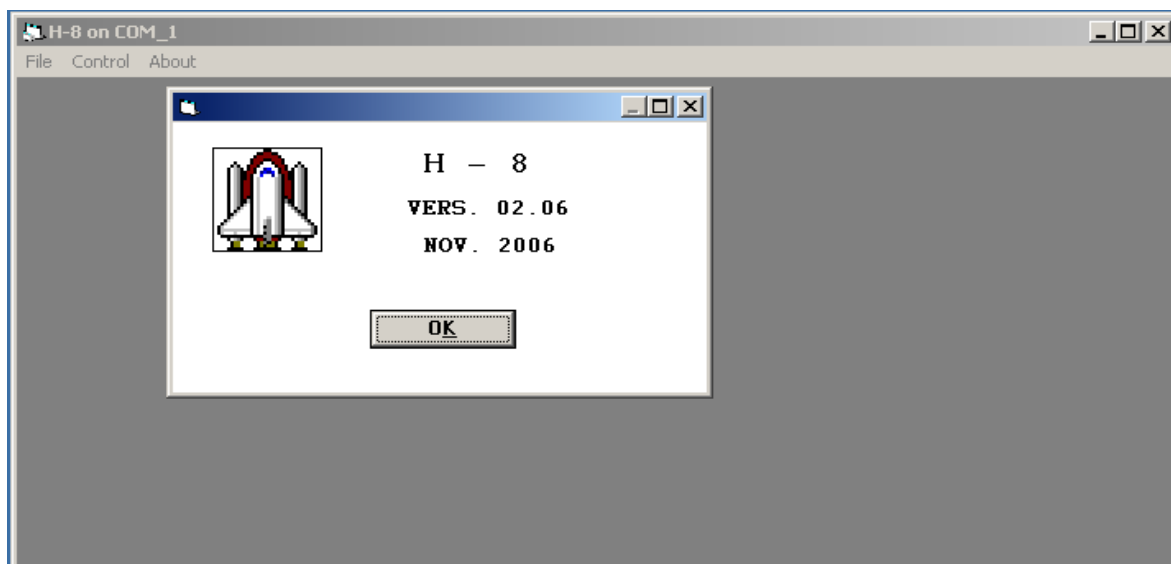
- Pulse function:
 - The function opens the valves for duration time listed in the field 'Time'.
 - Click the valves to open.
 - Enter the time (1 unit equals 0.1 sec).
 - Click 'PULSE' button; the valves open and close after programmed time; next Click on 'PULSE' repeats the function.

Empty Trit. Mon. and Wash Trit. Mon. functions:

Caution: all synthesis columns must be connected to the instrument while using!!!

The functions 'Wash Trit. Mon.' wash the trityl monitor by ACN
The functions 'Empty Trit. Mon.' empty the trityl monitor by Argon

4. Submenu About



Submenu 'About' shows the current software version.

IV. Operation

1. Loading the instrument

Important : high pressure **must be provided** on the instrument, before any reagent bottle will be filled.

Supply fresh amidites and reagents on the instrument
Connect waste tubes to the waste container
Open the gas switch for high pressure (HIGH): 4.0 bar (60 Psi)
Open the gas switch for low pressure (LOW): 0.4 bar (6 Psi)
Open the gas switch for amidites (A) and TET.
Open the gas switch for reagents (R).

2. Start the instrument

Attach the columns to the instrument.

Attention:

If some of the column positions are not used, connect used columns on these positions. It prevents for running out of reagents when mistakes in connecting the sequence to column position are made.

Change START Menu on computer.
Connect sequences to the columns you want to use (See: Software: 3.1.
Control Start)

Click PRIME for priming the reagent and wait until priming is finished.
Click START to start the synthesis.

3. Finish synthesis

When the synthesis finishes on some positions, the completed columns can be removed from the instrument. The synthesis does not have to be stopped, it will continue on positions that are not finished yet.

4. Add columns while synthesis running

When one or more synthesis finish, the new synthesis can be started on free positions while other positions are still running.

For that purpose:

- Click the PAUSE button and wait until the signal (“beep”) can be heard and the text ‘Pause’ occurs in the status field of the synthesis.
- Click the button STOP and stop the synthesis.
- Attach the column for the new synthesis.
- Connect the sequence with the column position by clicking on the status field of the position to restart and then click on the name of the sequence to run it (See also Software - 3.1 Submenu Control – Start).

- Click the Button START to restart the freshly attached position and continue the synthesis on the other positions.

Click MONITOR on start menu to see the step-by-step trityl monitor of the synthesis. If the monitor shows a break, see troubleshooting VI.

5. Refill bottles while running

- When one bottle of reagent or amidite is nearly empty, click the button PAUSE and wait until the signal (“beep”) is heard and the text ‘Pause’ occurs in the status field of the synthesis.
- Refill the required bottle.
- For amidite bottles check o-ring before the bottle will be closed again.
- Press PRIME if necessary and wait for finish.
- Now click the PAUSE again button to continue the synthesis.

V. Care and Maintenance

Important : SHUT DOWN and opening of all bottles (amidites and reagents) **must be done** before closing the high pressure.

1. Changing the membrane in the main block (24-port): every 3 months or earlier:

- click SHUT DOWN and follow the instructions on screen.
- open the bottles and close the switches for low (LOW) and high (HIGH) pressure.
- unlock the 2 screws of protecting plate and remove it
- demount the fittings of reagents and amidite tubes and columns luer lock adapters.
- unlock all M3 screws
- clean all the parts of the valve block and apply the new membrane
- remount all parts (the layout of the fittings can be found in chapter 3.2 Submenu Control - Manual Control).
- close the bottles and open the pressure switches (HIGH pressure first!!).
- open the pressure switches for amidites (A) and reagents (R).
- check if all reagent tubes fittings are tight.
- prime the reagents and amidites.

2. Cleaning the bottle caps: weekly

3. Cleaning the columns luer lock adapters: monthly

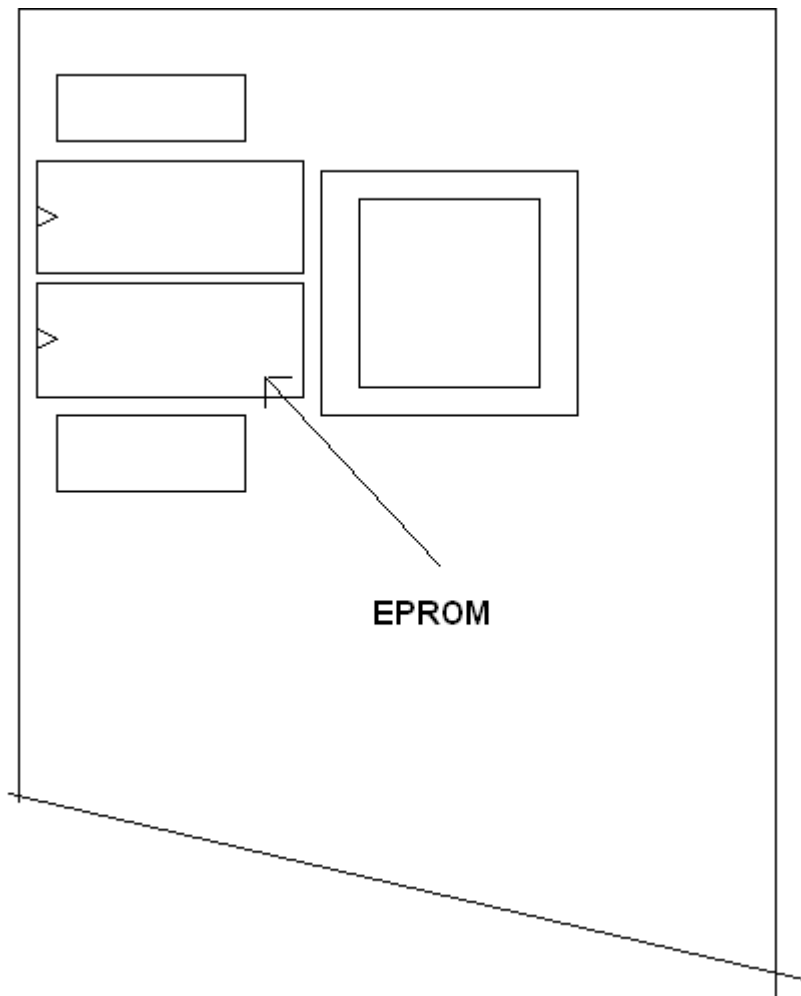
4. Changing membranes of upper valve blocks 5x3, only when problems occur; for example when no fluency through column occurs and one position is blocked. The way of membrane changing is the same as for the main block

5. Changing of pneumatic valves, when problems only

- change to 'Start'
- click SHUT DOWN button and follow the instructions on the screen.
- open the bottles and close the valves for high and low pressure.
- unlock the 2 screws of protecting plate and remove it (only main block)*.
- remove the electronic board.
- change the valve (two screws M1,7) check seal of new valve before mounting.
- mount the electronic board and all other parts.
- close the bottles and open the pressure valves (first high pressure!!) prime the reagents and amidites.
- for 5x3 block: for valve changing open top instrument plate.
- or open one of the both side doors.

6. Changing the EPROM

- turn off the power.
- open the right door of the instrument.
- find the EPROM on the main electronic board place on the right door.



- remove the EPROM from IC-socket.
- insert the new EPROM into IC-socket – important – consider the small marker on the EPROM and insert the chip in proper direction.
- close the right door.
- turn on the power.

VI . Troubleshooting

1. Leaks
2. Breaks on Trityl Monitor
3. Appliance does not work
4. Electrical boards

(see Service Manual, it will be handed over to the employee during personal training)

VII. Technical data

Power connection	
Voltage	100...230 V
Frequency response	50/60 Hz
Connected load	100 W
Main fuse (slow)	3,15 A
High pressure	
Pressed air, free of oil and water	
Pressure	4.0 bar (60 Psi)
Tube size	AD = 6mm, ID = 4mm
Low pressure	
Nitrogen, Argon (99,99%)	
Pressure	0.4 bar (6 Psi)
Tube size	AD = 6mm, ID = 4mm

1. Guarantee

The terms of guarantee issued by our competent distribution company are valid in every country – but usually for 1 year, beginning with the day of the installation. If the instrument malfunctions in any way, we shall warranty the fault free of charge within the period of guarantee, provided the cause can be attributed to faulty material or a manufacturing error.

In the event of a claim on the guarantee, please consult your dealer with accessories and receipt of purchase or contact your customer service centre.

2. Spare parts: H-6/H-8

Membrane, 24-port	# 745-23
Membrane, 5x3 port	# 745-26
Valve, micro 10	# 745-32

Gas switch	# 632-11
Fitting, incl. washer	# 632-13
Plug, Fitting	# 632-17
Screw, M3x18, DIN 912-A2	# 632-19
Luer adapter, top	# 745-45
Luer adapter, buttom	# 745-47
Trityl glass	# 834-21
Trityl seal	# 834-24
Mixing chamber	# 912-04
Electronic board, 24-port	# 745-58
Electronic board, 5x3-port	# 745-51
Bottle cap amidite, seal	# 322-12
Bottle cap amidite, 1 ml/2 ml	# 322-16
Bottle cap reagent, ABI/Proligo 2,5 ltr.	# 322-19
Bottle screw amidite, 1 ml/2 ml	# 322-08
Bottle screw reagent, GL 45	# 322-03

For notice:

Address:

K&A Laborgeraete GbR
Germany

www.ka-lab.de

Geneworld Ltd.
Japan

www.geneworld.co.jp