

AGMaster – Master control program for AG500 data recording.

Contents

AGMaster – Master control program for AG500 data recording1
Contents1
tab sheets for system control2
main window for sweep recording – control2
monitoring sensor signals – amplitudes4
extended functions5
extra button6
DataCenter7
TCP-Connector8
extended control tab9
General procedures10
system startup10
determine the complex offset10
adjust phase angle11
Details for the use of AGMaster12
Data files12
How to record sweeps12
AutoKal run – move sensors with the automatic calibration unit
start the AutoKal run13
adjust the transmitter strength14
installation15
troubleshooting15

tab sheets for system control

The tab sheet control includes three panels representing the control areas for the corresponding programs.

- ➤ control
- > <u>amplitudes</u>
- extended functions

The programs Maggen , SenRec and Mailmd4 (optional) are initialised simultaneously by AGMaster.

- > The Maggen program is running on the Trans-Computer it drives the transmitter
- The SenRec program is running on the PSR-Computer it reads the sensor signals
- The optional Mailmd4 can run on any another Computer it controls the AutoKal over the md4 motor controller.
- The AGMaster program itself may run on the Trans-Computer or any other computer.

main window for sweep recording – control

Starting AGMaster, you will see the tab sheet control which appears as the initial screen of the program.

This window shows the AGMaster for sweep recording.



- 1. set the sweep length in "number of sample"
- 2. shows the adjusted sweep length in seconds

3. start sweep recording

recording comment please wait while recording	comment
Figure 2: A progress bar appears and shows recording progress	Figure 3: The name of the recorded file appears in the filename field

For more detailed information refer to the <u>DataCenter</u> window.

4. synchronise transmitter DTC 6 and Receiver PSR 12

The Maggen program (on Trans-Computer) and the SenRec program (on PSR-Computer) are stopped and synchronously restarted.

5. close session

After all sweeps are recorded, press this button to write all protocol information to ag500.inifile. This also stores the log- and debug-information from "TCP-Connector" window into the files:

- > ag5log.txt
- > ag5debug.txt

The close session clears the fields in <u>TCP-Connector</u> window.

6. shut down AG500

The Trans-Computer and the PSR-Computer shutdown themselves and switch off their power. After a minute the power for the whole system should be switched off.

7. Status panel

This panel is intended for monitoring the functional states of all corresponding programs.



Status information for AutoKal run:

- moves reports how many target points are reached already
- > records reports how many target points are recorded
- > parses reports how many of the records were passed to the files result.txt

SenRec and Maggen status:

green status words indicates a fine running system. On error conditions, there will appear red messages.

8. extra

This button is visible in all tab sheets. It offers extra functions see "extra button"

9. Switch to the "amplitudes" window

The see next chapter.

monitoring sensor signals - amplitudes

This tab sheet shows the actual measured sensor signals for all channels. Additional there is a graphic display for one selectable sensor(channel).

Image: control contrel control control control control control	AGMaster v6.00.12 control the ag500 system control amplitudes extended functions	2 6	5	
KU 11.2.3 90.6.8 99.95° 1077.1 89.84° 2223.7 89.96° 60.4 90.81° NL 2 7.5 564.5 90.07° 553.1 89.83° 279.7 90.14° 62.7 91.77° SL 3 13.5 1957.4 90.09° 2070.0 90.05° 1577.7 90.66° 20.1 86.66° RO 4 11.1 75.7 90.00° 521.7 90.13° 411.8 90.09° 22.5 157.15° SR_5 8.7 1558.7 90.02° 2472.6 89.95° 47.1 89.83° NR 9 3041.7 89.94° 3037.6 89.95° 34.9 90.00° 103.6 89.23° NR 9 9 00° 103.6 89.23° 1 <td< td=""><td>Amplitude chann 1</td><td>chann 2</td><td>chann 3</td><td>chann 4</td></td<>	Amplitude chann 1	chann 2	chann 3	chann 4
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	KU 1 12.3 806.8 89.95°	1077.1 89.84°	2223.7 89.96°	60.4 90.81°
$\overline{L_3}$ 13.5 1957.4 90.09° 2070.0 90.05° 1577.7 90.06° 20.1 86.66° $\overline{K_04}$ 11.1 75.7 90.00° 521.7 90.13° 411.8 90.09° 22.5 157.15° $\overline{SR_5}$ 8.7 1558.7 90.02° 2472.6 89.93° 1058.7 89.95° 47.1 89.83° $NR_{\bullet \circ \circ \circ}$ 3041.7 89.94° 3037.6 89.95° 34.9 90.00° 103.6 89.23° Image: the state of the state	NL 2 7.5 564.5 90.07°	553.1 89.83°	279.7 90.14°	62.7 91.77°
$K_0 = 4$ 11.1 75.7 90.00° 521.7 90.13° 411.8 90.09° 22.5 157.15° SR_5 8.7 1558.7 90.02° 2472.6 89.93° 1058.7 89.95° 47.1 89.83° $NR_{\bullet \circ} \circ$ 3041.7 89.94° 3037.6 89.95° 10.3.6 89.23° $3 \rightarrow$ double click 1 1 $4 = 0$ $6 = 0$ $8 = 0$	SL 3 13.5 1957.4 90.09°	2070.0 90.05°	1577.7 90.06°	20.1 86.66°
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	 K0 4 11.1 75.7 90.00°	521.7 90.13°	411.8 90.09°	22.5 157.15°
$3 \rightarrow \text{double click}$	SR 5 8.7 1558.7 90.02°	2472.6 89.93°	1058.7 89.95°	47.1 89.83°
$3 \rightarrow \text{double click}$ 1 1 8	NR	3037.6 89.95°	394.9 90.00°	103.6 89.23°
	$3 \rightarrow \text{double click}$		8	<u> </u>

1. Table with actual sensor signals.

The six rows represent the corresponding signal from each transmitter. In Figure 2, each column shows the signal and the phase angle. Only four columns fit into the window and the scroll bar is necessary to see the channel 5 to 12.

2. small display

If this check box is checked, all 12 channels are visible only with their amplitude

3. Double clicking onto one field

This will switch between display of actual measured values and angles - and

display of minimal and maximal values of amplitudes as well as deviations.

4. reset statistics

resets the deviation of the phase angle and sets the minimum and maximum amplitude deviations to zero.

5. complex offset

initiates the recording of the sensor's complex offsets

6. angle adjust

Performs a sweep recording and determines the phase offset for all sensor – transmitter combinations. This is necessary to have a "zero phase angle" and find the right sign of all amplitudes.

7. use complex offset

This check box allows the complex offset correction to use or not. It has no effect for the sweep recording. Only the offset value is written to the <u>header file</u>.

The complex offset correction is important for angle adjust, calibration data recording, "make amps" (see <u>DataCenter</u>) and for display.

8. graphic display for one selected sensor

There is a continuous display of measured amplitudes as bar chart.

The six clocks represent the corresponding phase angles. The initial angle is drawn as a red pointer and the actual as a green pointer.

You should see either only the green pointer (because the red one is just exactly below) or both pointers aligned (180° angle between the green pointer and the red one).

If not so, there is a very small amplitude or the computer ran out of synchronisation.

extended functions

This window is mainly for service purpose. Only special educated persons should use all functions.

The user should only use the "AGMaster" field.

AGMaster v6.00.12 control the ag500 sys control amplitudes extended function	stem	_ I X
frequency scan	vitch to master on:	re-synchronize DTC and P
maggen referenced log start stop	AGMaster show extended control tab show tcp connector cube-sensor	start both 2
senrec	dauermessung interval (s) record sweep 300 add log re-synchroniz reset stats each time show log	3 hide extended functions
Figure 7: extended function	ns for service purpose only	

1. show extended control tab

The "main window for sweep recording" is changed to enable the <u>control of the MD4</u> to drive the AutoKal.

2. show tcp connector

The additional <u>TCP-Connector</u> window appears. It shows the actual IP-connections and logand debug information

3. cube-sensor

This switches the display (<u>monitoring sensor signals – amplitudes</u>) to absolute field strength under special conditions. This is a really experimental function and not easy to use. There must be the special cubic calibration sensor installed.

The purpose of this function is to measure the field and adjust the transmitter strength.

extra button

The extra button is visible on all tab sheets. It has 6 functions all the time available.

The same functions are also available at other places.

re-synchronize DTC and PSR

The Trans-Computer and the PSR-Computer shutdown themselves and switch off their power. After a minute the power for the whole system should be switched off.

shut down ag500 •

> After all sweeps are recorded, press this button to write all protocol information to ag500.ini-file. This also stores the log- and debug-information from "TCP-Connector" window into the files "ag5log.txt" and "ag5debug.txt"

complex offset .

determine the complex offset

clear complex offset



The complex offset information is removed. show extended control tab

The main window for sweep recording - control will get additional functions for the use of AutoKal and for recording raw data

show extended functions

The main menu will get the additional Tab extended functions

DataCenter

The DataCenter window offers an alternative method to do sweep recording. It offers additional functions and shows more information on the sweeps.

DataCenter	1960 MB free
	start stop Fixed size 50 clear
Sweep 1 Sweep 2 Sweep 3 Sweep 4 Sweep 5 Sweep 5	Sweep 6 2 400 samples = z.o seconds 1 3 "angle adjust sweep" stored as ~tmp5 in \\TRANS2\rawdata\ requested size : 400 got 400 samples starting with sample 2155188 460800 Bytes in Memory (0.4 MB)
	4 5 6 7 delete make amps save save all
Figure 9: s	special sweep recording with extended functions

1. Set the number of samples as the fix size for the sweep.

If the "fix size" check box is checked, the "start" button has the same function as the "record sweep" button on the "main window for sweep recording – control" tab sheet.

2. Start sweep recording

If the "fix size" check box is unchecked, the "stop" button becomes active and the sweep recording is running until the "stop" button is clicked..

3. clear

Pay attention!! - this button deletes all sweeps without warning

4. delete

deletes the selected sweep

5. make amps

Calculates the amplitudes of the selected sweep. For each sensor, the mean values are calculated out of all the complex amplitudes and stored inside the window.

The minimum, the maximum and the rage for the amplitudes are also shown.

6. save

An open dialog appears and you can select the folder where to store the sweep. You have to enter a name (without extension) for the sweep. The program adds the extension *.KOF and *.hdr to the name and stores both files.

7. save all

The same as "save" but all sweeps are stored. The program adds a four digit number to each sweep name.

TCP-Connector

This window is not necessary for normal use. It is enabled in the <u>extended functions</u> panel or with the <u>extra button</u>.

A TCP-Connector		IX
	Log	
	<17:16:37> MAGGEN: Fibu.resume	
	<17:16:37> MAGGEN: wait for events	
	<17:16:37> MAGGEN: Start Interrupt <17:16:37> MAGGEN: Mailhox -> 2	
Connections	<17:16:38> MAGGEN: Mailbox -> 3	
8010 < 192.168.1.19:1031 Obj: 03275F2C	<17:16:38> MAGGEN: Streamer.Stream_on done	
8020 < 192.168.1.24:1033 Obj: 03276B38 8001 < 192.168.1.19:1035 Obj: 0327B104	<17:16:38> MAGGEN: exit BITBtn_InitClick	
8011 < 192.168.1.19:1033 Obj: 03275814		
8021 < 192.168.1.24:1035 Obj: 03275590		
8001 < 192.168.1.24:1037 Obj: 032410E0 8002 < 192.168.1.24:1038 Obj: 0327BCE8		
	1	
Figure 10: Low level system	information on the TCP connection status	

- 1. Error conditions are reported inside the "debug" window.
- 2. "clear" deletes the Log and Debug information

extended control tab

This window-mode is necessary to use AutoKal or for system check and adjustments. It is enabled in the <u>extended functions</u> panel or with the <u>extra button</u>.

As long as the contact to a program has not been achieved, the representing panel keeps red in background . In consequence, it is not possible to use the respective panel.

Although several functions may work nevertheless, it is recommended not to use a panel which just got grey until all of the other panels also did so. Additionally, make sure that MD4 position pane contains three numerical values for the actual x, y, z position.

exception: you can ignore the panel MD4 GoList if you do not intend to use the Mailmd4 program in the actual session.

AGMaster v6.00.12 control the ag500 system control amplitudes extended functions	1	2	extra
MD4 GoList 🕞 🖉 - none - rec amps by list go by list	max target deviation 0.2 MD4 position <u>home</u> no contact to md4	Maggen Status KO KU SL SR NL NR SenRed AMCO transfe	moves: 0 of 0 records: 0 parses: 0 c status is good r unning
SenRec Rec amplitudes Rec raw data Bloc Number of amps: 50 record sweep 3	ksize in kS/C demodulati	on procedure Magger AMCC transfer siver	good n status is good running good close session INI-file updated.
			SUCCESS
Figure 11: the control panel with the add	itional functions and	a panel to run th	e AutoKal (md4)

1. The panel for the automatic calibration unit AutoKal.

When a computer with the "mailMD4" program is connected, the background changes from red to grey. For details please refer: "start the AutoKal run"

2. Maggen

switch on/off transmitter

This panel contains six buttons which are designated to switch off the single transmitter coils. Switching off means that the respective amplitude is set onto zero. If the mouse cursor is over a button, alternative names are shown.

If a transmitter is off, the according row in the <u>monitoring sensor signals – amplitudes</u> panel is marked red.

After switching off one transmitter, please wait for 5 seconds with your next action. Switching on one transmitter will switch on all transmitters.

3. Rec raw data

According to the selected "Number of blocks" and "Blocksize in kS/C" (kSample/Channel), the data will be stored in the "rawdata" folder in the file "raw0000.bin" (the next in "raw0001.bin").

The raw data file is a sequence of 16 Bit Integer Values - starting with sensor 1.

After recording raw data, it is necessary to perform re-synchronisation before using other program functions.

4. demodulation procedure

There are two demodulation procedures available. The "Filter" method should be used. The alternate "Gradienten" method is only for experimental usage.

General procedures

system startup

- > After system start, wait until AGMaster reports Maggen and SenRec are connected.
- delete "d:\rawdata*.*" except "ag500.ini" on trans-computer. \geq

determine the complex offset

click "complex offset (<u>see control (5)</u>)

🥬 complex offset	
start offset recording offset	actaul offset values: Channel 1 Cos-Ofs S1 = 0.000 0.000 \$2 = 0.000 0.000 \$3 = 0.000 0.000 \$5 = 0.000 0.000 \$5 = 0.000 0.000 \$5 = 0.000 0.000 \$5 = 0.000 0.000 \$5 = 0.000 0.000 \$5 = 0.000 0.000 \$5 = 0.000 0.000 \$5 = 0.000 0.000 \$5 = 0.000 0.000
2	Complex offset
I Show graphic	CK1 use this new values as complex offset
Figure 12: window for determining complex of	offset

- (1) click "start offset recording offset" button
- (2) reverse the sensor plug for all sensors
- (3) click "OK"
- (4) wait for the next window "Thanks..." and reverse the sensor plug for all sensors again
- (5) click "OK"



- > check the result in the graphic offset display and close this window
- (6) click "OK! use this values as complex offset " button

adjust phase angle

AGMaster v5.01.12 co control amplitudes	ntrol the ag50 extended fun	00 system ctions								[extra	×
res	et statistics		small disp	ise complex lay	offset	angle (adjust				_	
Diff / Mirchann 1	chann 2	chann 3	chann 4	chann 5	chann 6	chann 7	chang 8	chann 9	chann 10	chann 11	chann 1	.2
KU 12.3 20.5	17.90	25.38	16.64	0.00	0.00							
NL_1 18.9	5 17.30	23.18	14.86	0.00	0.00			1	·			
SL_3 22.8	5 18.81	28.45	17.02	0.00	0.00							
KO_4 22.4	7 16.95	26.99	15.33	0.00	0.00							
			16.08	0.00	0.00							
3 double cl	ick togg	gles	18.25	0.00	0.00							
Differences	Amplit	udes										Ŀ
0.017460 ms for dataco	ру.	show lo	9	AT I		2						

Figure 14: all clocks point to the right after angle adjust

- (1) click the angle adjust button
- (2) check the angle display shows "synchronic" after angle adjust
- (3) check the amplitudes and differences

Details for the use of AGMaster

Data files

The AGMaster program stores all data in the folder d:\rawdata on the computer where the AGMaster program is running.

The only exception is for raw data recording: raw data are stored in the folder d:\rawdata on the PSR-Computer where the SenRrec program is running.

For details of the data format, please refer to the Articulograph AG500 User Manual.

In general, there are detailed information on the Articulograph AG500 on the web site:

http://www.phonetik.uni-muenchen.de/~andi/EMAPage/

This web site is updated by Andreas Zierdt, IPSK Munich

How to record sweeps

- a) follow the instructions for system startup
- b) Make sure you have the "normal" control tab, if not, deactivate the checkbox "extended control tab" on "extended function" tab sheet.
- c) On "control" tab enter number of samples to be recorded
- d) Press "record sweep"
- e) Wait until AGMaster beeps
 - Check, if status lines stays green
- f) Repeat from point c) or, when finished continue with:
- g) "close session"
 - > copy the sweep data in the "rawdata" folder to your desired folder.
- h) that's it
 - select the tab sheet amplitudes
 - Check if all amplitude values seem to be normal.
 - > If so, you can change back to the tab sheet control
 - Choose number of amps
 - > click the "Record sweep" button to record the first sweep
 - wait until the sweep recording stops with a sound
 - record more sweeps
 - click the "close session" button

AutoKal run – move sensors with the automatic calibration unit

In an AutoKal run, data are recorded at several positions inside the measuring area. According to a "Go-List", the AutoKal moves to the desired positions.

As the result, there is a folder "ausgewertet" with protocol information and a subfolder for each channel (kanal1 ..kanal12).

start the AutoKal run

i) follow the instructions for system start-up



(1) wait for all computers are connected (green status)

- (2) select the number of samples to be taken for average at each location
- (3) load the Go-list
- (4) enter your comment (optional)
- (5) Autokal must be centred (Sensor 3 in the magazine must be just in the middle of the)
- (6) click "rec amps by list" to start the AutoKal run
- (7) wait until the run is completed
- (8) check the "no error" condition, indicated by a green message
- (9) copy the folder "ausgewerted" to your data folder and rename it
- (10) delete all files in the "Rawdata" folder except the "ag500.ini" file.
- (11) continue at (2) if you want to run another Go-List.

adjust the transmitter strength

To do the transmitter adjustment, it is necessary to have the special cubic calibration sensor installed and calibrated. The "RAWDATA\ausgewertet" folder must contain the ag500.ini file with the calibration results.

Please refer to the "Articulograph AG500 User Manual"

- In this special display mode, the columns chann 1 chann 3 show the amplitudes from the three coils of the special cubic calibration sensor.
- > In chann 4 the calculated value of the field is displayed.
- > chann 5 shows the transmitter strength adjustment in the Maggen program
- chann 6 chann 8 show the calibration factors for sensor 1 sensor 3

control amplitudes extendee 2 reset statistics r small display angle adjust complex offset <u>Amplitude chann 1 chann 2 chann 3 chann 4 chann 5 chann 6 chann 7 chann 8 chann 4 chann 5 chann 6 chann 7 chann 8 chann 7 chann 8 chann 1 12.3 1944.1 1511.8 2427.3 3608.553 24139.00 3321.2 3661.9 3478.7 NL_2 7.5 2151.5 1808.3 1013.9 13174.447 23236.00 1808.0 2068.6 1926.8 SL_3 13.5 2061.4 1728.4 2736.7 14043.254 24470.00 3643.7 4136.1 3824.1 KO_4 11.1 3620.5 2832.3 1626.8 1 5132.525 23023.00 2934.9 3318.2 3114.3 SR_5 8.7 1356.7 103.4 19.3 2710.408 24966.00 2321.5 2589.6 2424.4 NR_6 9.9 057.0 339.7 2732.8 4966.090 23.9.00 2561.4 2916.0 2754.5 4 5 mples = 200.0 Hz nach 821.9 sek. 1 4 4 4 <!--</u--></u>	AmpStepSiz	e 10 —								
reset statistics Implitude chann 1 chann 2 chann 3 chann 4 chann 5 chann 6 chann 7 chann 8 chann 8 chann 7 chann 8 chann 8 chann 7 chann 8 chann 8 chann 7 chann 8 chan 7 chann 8 chan 7 chann 8 chan 7 chann 8 chan 7 chan 8 chan 7 chan 8 chan 7 chan 7 chan 8 chan 7 cha 7 chan 7 chan 7	control arr	nplitudes	extended	2						
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NL_2 7.5 2151.5 1808.3 1013.9 3174.447 23236.00 1808.0 2068.6 1926.8 SL_3 13.5 2061.4 1728.4 2736.7 4043.254 24470.00 3643.7 4136.1 3824.1 K0_4 11.1 3620.5 2832.3 1626.8 5132.525 23023.00 2934.9 3318.2 3114.3 SR_5 8.7 1356.7 103.4 19.3 2710.408 24966.00 2321.5 2589.6 2424.4 NR_6 9.9 057.0 339.7 2732.8 4966.090 2379.00 2561.4 2916.0 2754.5 1 6 5 mples = 200.0 Hz nach 821.9 sek. 4 4 4	KU_1 12.3	1944.1	1511.8	2427.3	3608.553	24139.00	3321.2	3661.9	3478.7	
SL_3 13.5 2061.4 1728.4 2736.7 4043.254 24470.00 3643.7 4136.1 3824.1 R0_4 11.1 3620.5 2832.3 1626.8 5132.525 23023.00 2934.9 3318.2 3114.3 SR_5 8.7 1356.7 103.4 19.3 2710.408 24966.00 2321.5 2589.6 2424.4 NR_6 9.9 057.0 339.7 2732.8 4966.090 23.29.00 2561.4 2916.0 2754.5 4 6 5 mples = 200.0 Hz nach 821.9 sek. 4 4 4	NL_2 7.5	2151.5	1808.3	1013.9	3174.447	23236.00	1808.0	2068.6	1926.8	
K0_4 11.1 3620.5 2832.3 1626.8 5132.525 23023.00 2934.9 3318.2 3114.3 SR_5 8.7 1356.7 \$103.4 19.3 2710.408 24966.00 2321.5 2589.6 2424.4 NR_6 9.9 057.0 339 2 2732.8 4966.090 2329.00 2561.4 2916.0 2754.5 I </td <td>SL_3 13.5</td> <td>2061.4</td> <td>1728.4</td> <td>2736.7</td> <td> 4043.254 </td> <td>24470.00</td> <td>3643.7</td> <td>4136.1</td> <td>3824.1</td> <td></td>	SL_3 13.5	2061.4	1728.4	2736.7	4043.254	24470.00	3643.7	4136.1	3824.1	
SR_5 8.7 1356.7 103.4 19.3 2710.408 24966.00 2321.5 2589.6 2424.4 NR_6 9.9 057.0 33917 2732.8 4966.090 2329.00 2561.4 2916.0 2754.5 I </td <td>KO_4 11.1</td> <td>3620.5</td> <td>2832.3</td> <td>1626.8</td> <td> 5132.525 </td> <td>23023.00</td> <td>2934.9</td> <td>3318.2</td> <td>3114.3</td> <td></td>	KO_4 11.1	3620.5	2832.3	1626.8	5132.525	23023.00	2934.9	3318.2	3114.3	
NR_6 9.9 057.0 339 2 2732.8 4966.090 23 29.00 2561.4 2916.0 2754.5	SR_5 8.7	1356.7	\$103.4	19.3	2710.408	24966.00	2321.5	2589.6	2424.4	
1 65 mples = 200.0 Hz nach 821.9 sex.	NR_6 9.9	057.0	3391 7	2732.8	4966.090	23,29.00	2561.4	2916.0	2754.5	

- 1. click the row with the desired transmitter (Ko_4 in Figure 16)
- 2. enter the step size for changing the transmitter strength

Enter the number (here 10) by typing 1 and 0. The Esc key will set the step size to zero.

- 3. type '+' to increase (or '-' to decrease) the transmitter strength by the value of step size
- wait for 10 seconds and watch the values in the selected row (here Ko_4) repeat the steps 3 and 4 (and 2 if necessary) until the field strength in chann 4) has the desired value.
- 5. select the row from the next transmitter to adjust and do the adjustment
- 6. save the adjustments in the Maggen program running on the Trans-Computer.

installation

In the factory set up, there is a running AGMaster version on the Trans-Computer. You can install and run additional AGMaster versions on several other computer in the network.

With the MC500 program you can switch from one AGMaster to another but only one can have the hosts at the same time.

To install the AGMaster do the following steps:

- > create a new folder on your computer
- > copy the file AGMaster.exe into this folder
- copy the file md4filter.txt into this folder
- create a link to your desktop (optional)
- create a folder on your drive d and name it "rawdata" (d:\rawdata)
- > publish this folder as "rawdata"

troubleshooting

In case of trouble, try to open the TCPConnector window and look at the debug messages. Then click the "close session" button and send the "ag5debug.txt", "ag5log.txt" and the "ag500.ini" to Carstens@articulograph.de