



ROHDE & SCHWARZ

Test and Measurement
Division

Operating Manual

Software for the Transmission of I/Q Data of Different Formats to the I/Q- Modulation Generator AMIQ

AMIQ-K2

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1	Overview	5
2	Starting Up.....	6
2.1	Hardware and Software Requirements	6
2.2	Installing / Uninstalling the Software	6
2.3	Linking the Controller and AMIQ	6
3	Operation	7
3.1	General Remarks on the Theory of Operation.....	7
3.2	Setting the Parameters for Remote Control and Transmission	8
3.2.1	Selecting the Interface Options.....	8
3.2.2	Saving, Loading and Automatic Loading of the Program Configuration.....	10
3.3	Transmission of Source Data to the AMIQ	11
3.3.1	Selection of the Source-file Format	11
3.3.2	Selecting the Source File(s).....	12
3.3.3	Setting the Signal Level	13
3.3.4	Transmitting the Source Data to the AMIQ.....	14
3.4	Starting Data Output Manually.....	16
3.5	Clock Presetting	17
3.6	Adding a Guard Period with DAB-Format	18
3.7	Saving Source Files	19
3.8	Appending to Existing Sources	20
3.9	Setting Markers.....	21
3.10	AMIQ Remote Control	23
3.10.1	Selecting the General Remote-Control Functions (AMIQ Remote Control Panel)	23
3.10.2	AMIQ Hardware Settings	25
3.10.3	File Management in the File Management Panel	26
3.10.4	Performing Test and Internal Adjustment in the Test and Adjustment Panel.....	28
4	Appendix	29
4.1	Description of the Source File Formats	29
4.2	Example Files.....	34

1 Overview

The application software AMIQ-K2 is a conversion program for I/Q data. Using this software, data sets with I/Q values which are provided in files of different formats can be loaded either directly into the AMIQ or converted into a file format which can be read and processed by the WinIQSIM software.

E.g., the formats of various math programs, of the software packages DAB-K1 and IQSIM are supported as well as the AWG21 format.

Besides, the software AMIQ-K2 is used for the remote control of various important AMIQ functions for hardware settings and run control. Operation of the remote control is very similar to that via the WinIQSIM software which is supplied with the modulation generator AMIQ

This manual contains detailed operating instructions. Further information on specific functions can be looked up in the corresponding sections of the AMIQ manual and the WinIQSIM software manual.

The user is assumed to have basic knowledge on operating the windows user interface by mouse and keyboard control.

This manual refers to the software version 1.5. From this version, WIN 3.x is no longer supported.

2 Starting Up

2.1 Hardware and Software Requirements

- Computer, CPU: at least 486, Pentium or higher, 100 MHz or higher recommended
- Windows 95 or Windows NT (version 4.0 or higher).
- RAM: at least 32 Mbytes (Windows NT: at least 48 Mbytes)
- GPIB: GPIB-(IEC-)bus card (IEEE 488.2 bus interface PS-B4, SN 1006.6207.04 or National Instruments-compatible card) with GPIB-bus control
GPIB-(IEC-)bus driver for windows by National Instruments with GPIB bus control.
- Monitor: VGA color monitor, min. resolution 800*600 pixels, recommended resolution 1024*768 pixels

2.2 Installing / Uninstalling the Software

- Insert the first disc into drive a: and start the *setup.exe* program by selecting **Start --> RUN** (in the task bar) or by double-click to **a:setup.exe** and follow the instructions.

While installing, you may rename the path for the AMIQ-K2 software. The 'LabWindows/CVI Run Time Engine' required by AMIQ-K2 is not copied if it has already been installed on the controller.

The setup software is generated by the new program group AMIQ-K2. It also provides an icon for uninstalling the program.

2.3 Linking the Controller and AMIQ

AMIQ is controlled via the serial interface or via the GPIB(IEC-)bus.

For control via the **serial interface**:

- Connect the controller and AMIQ via a zero-modem cable.
An illustration of the wiring for this cable is given in Section 5 of the AMIQ manual.

For **GPIB-(IEC-)bus control**:

- Connect the controller and AMIQ via an IEC/IEEE-bus cable.

The software cannot address the AMIQ via the GPIB-(IEC-)bus unless an IEC/IEEE-bus card has been installed in the computer. Refer to the supplied documents for further details.

With delivery of the AMIQ, the GPIB-bus address is set to 6. This is assumed to be the default address by the AMIQ-K2 software. The AMIQ manual provides a description of how to set the device address of the AMIQ in the Section "Changing the IEC/IEEE-bus Address".

This manual also describes how address setting is changed by the AMIQ-K2 under Section 3.2.1 "Selection of the Interface Options".

3 Operation

3.1 General Remarks on the Theory of Operation

The AMIQ-K2 software is operated via so-called panels, which contain buttons, input and display elements. Some panels (such as Marker, Interface Options) can only be opened via the menu bar, others are called from higher-level panels. The control elements of the panels can be called either directly via mouse-click or via the keyboard using the Alt key together with the respective underlined letter or by the tab key.

The main panel is used as operating surface. It contains the **Source** panel, which is always visible and which represents the data input as so-called frontend.

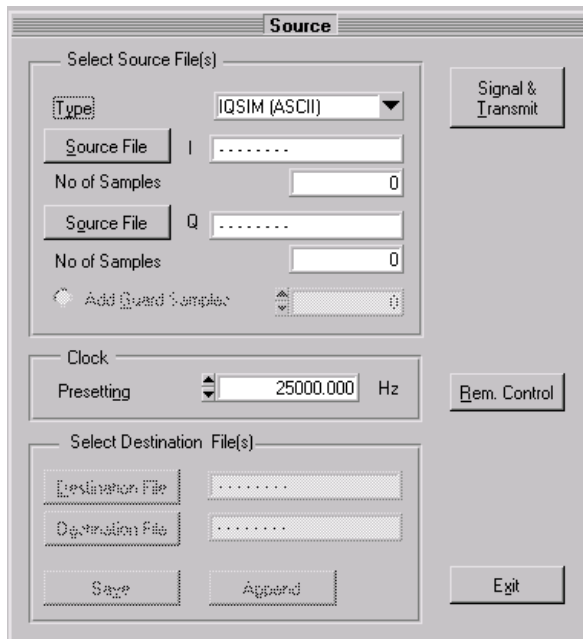


Fig. 3-1 **Source** panel

The **Source File** buttons in the **Source** panel are provided to select the source files. Depending on the type, either two files, one of them containing I and one Q-values, or one file which contains both, I and Q-values are required. The AMIQ output clock may also be selected in this panel. (The remaining fields are accessible only under certain conditions described in the following).

If the source files have been selected, the **Signal & Transmit** button opens the **Signal** panel. The signal level can be set there and data transfer to the AMIQ can be started.

All steps required are described in detail in Section 3.3 of this manual. Further sections on the manual start of data output to the AMIQ, for clock presetting etc. are completing this part.

The **Rem. Control** button is provided to call the **Remote Control** panel and further subpanels for remote control of the AMIQ. They are all described with their individual setting facilities in the corresponding sections of this manual. Since these panels are identical with those in the WinIQSIM-Software and handled in the same manner, reference is made to the WinQSIM manual in the following.

Prior to the first run, the AMIQ-K2 software must be configured for remote control which is why a description of the activities required for configuration precedes the other sections.

3.2 Setting the Parameters for Remote Control and Transmission

3.2.1 Selecting the Interface Options

The AMIQ can be remote-controlled via GPIB-(IEC-)bus or RS232 interface. It can be defined whether or not the signal output to the AMIQ shall be started automatically following a transfer.

The following remote-control parameters are set with delivery:

- connected via GPIB
- AMIQ-GPIB-Address = 6

The following **transmission parameters** are set with delivery:

- **Automatically retry previous Interface**, ie., the remote-control parameters which were last used
- **Automatically load and start waveform after transmission** (by means of the AMIQ-K2 software)

Modify the remote control and transmission parameters if you want to use other settings than those predefined with delivery.

Changing the control parameters

- Connect your computer to the AMIQ and switch on the power supply.
- Wait until the AMIQ has processed its boot sequence (single beep after approx. 30 s)
- Start the AMIQ-K2 software
- Select the panel below in the menu bar via **AMIQ:Interface and Transmission Options**

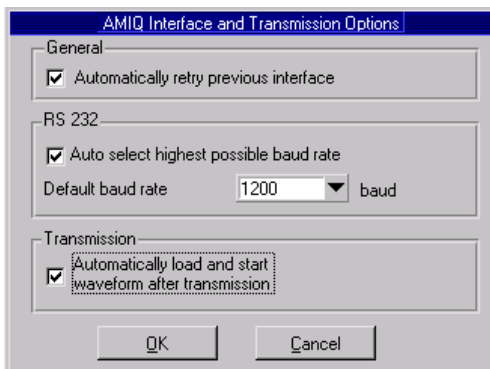


Fig. 3-2 **Interface and Transmission Options** panel

- Disable the field **Automatically retry previous interface** and click to **OK**. Thus, the AMIQ Connection panel with the physical parameters which is normally hidden will be displayed prior to each remote-control access.
- Click to the **Rem. Control** button in the **Source** panel to initiate a remote-control access.

The **AMIQ Connection** panel is displayed, then.

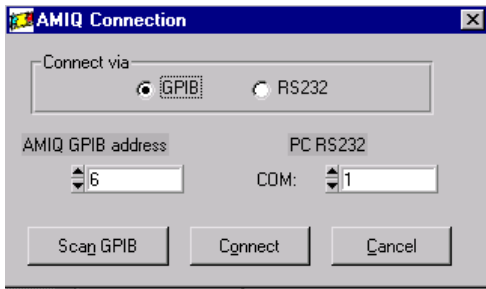


Fig. 3-3 **AMIQ Connection** panel

➤ Enter parameters which are different from the basic setting and click to the **Connect** button.

If the connection is made correctly, you enter the AMIQ **Remote Control** panel.

➤ Terminate the entry by **Close**.

Note: *If the connection cannot be made, please check, whether a ready-to-operate AMIQ has been connected, since the software automatically checks the interface.*

If the connection is set up correctly, reactivate **Automatically retry previous Interface**. Otherwise, you have to quit the **Connection** panel prior to each remote-control access.

Select **AMIQ:Interface and Transmission Options** in the menu bar. The **Interface and Transmission Options** panel is displayed:

➤ Activate the switch **Automatically retry previous Interface**.

➤ Terminate the entry by clicking to **OK**.

Copy the current configuration to the setup.ak2 file in the working directory to make sure that these parameters are automatically loaded with the next program start (cf. Section 3.2.2).

3.2.2 Saving, Loading and Automatic Loading of the Program Configuration

Configuration files for the AMIQ-K2 software have the file extension ak2.

Basic settings of the AMIQ-K2 software are contained in the setup.ak2 file (supplied) in the working directory. This applies also for the parameters for remote control and transmission.

Saving the current settings

- Select **File Save Configuration** in the menu bar
- Enter any destination file with the extension ak2 in the **File Select Popup** menu
- Confirm the selection.

Loading user-specific settings

- Select **File Load Configuration** in the menu bar.
- Enter a source file with the extension ak2 in the **File Select Popup** menu.
- Confirm the selection.

The name of the configuration file which was last loaded is displayed in the title bar of the AMIQ-K2 software. The configuration which has been stored under the name setup.ak2 in the working directory is loaded automatically with starting the program.

The current configuration must be written into the setup.ak2 file to make sure that the current settings are used with the next cold start.

- Select **File:Save Configuration** in the menu bar
- Select the **setup.ak2** file in the working directory in the **File Select Popup** menu.
- Confirm the selection.

You may also save the current configuration when leaving the AMIQ-K2 software

- Click to the **Exit** button in the **Source** panel.
- Select the **Save and Quit** option.
- Enter the desired destination file with the extension ak2 in the **File Select Popup** menu.
- Confirm/Acknowledge the selection.

Note: *The names of the data files used in the latest setting and the number of guard samples do not belong to the settings contained in the setup.*

3.3 Transmission of Source Data to the AMIQ

After the (one-time) definition of the remote control interface, loading the transmission of source-file data requires a few steps, only:

- selection of the source-file format
- selection of the source-file(s)
- setting of the signal level
- transmission of the source data to the AMIQ

3.3.1 Selection of the Source-file Format

➤ Select the **Type** (format of the source file) in the **Source** panel.

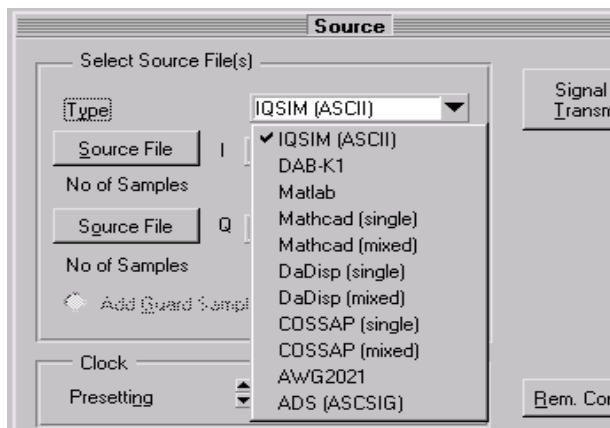


Fig. 3-4 **Source n**

Brief description of the types of source file (**Type**):

IQSIM (ASCII) and DAB-K1 are output formats of the R&S software packages.
 Matlab, Mathcad and Dadisp are output formats of arithmetic programs.
 COSSAP, AWG2021 and ADS are special file formats of various manufacturers.

Some of these formats contain both, I and Q values in one common file. The I and Q values may also be distributed on two files. Both possibilities (one mixed file / two single files) are provided for Mathcad, Dadisp and COSSAP.

Subsequently, either one or two source files must be loaded depending on the type of format

Section 4.1 of the Appendix contains an exact specification of the provided formats.

The **type** of **source-file** belongs to the parameters which are contained in the setup.ak2 and is thus loaded automatically with program start after saving the configuration.

3.3.2 Selecting the Source File(s)

- Open the **Open File Menu** panel via the **Source-File** button(s) or via the menu bar and the corresponding submenus.

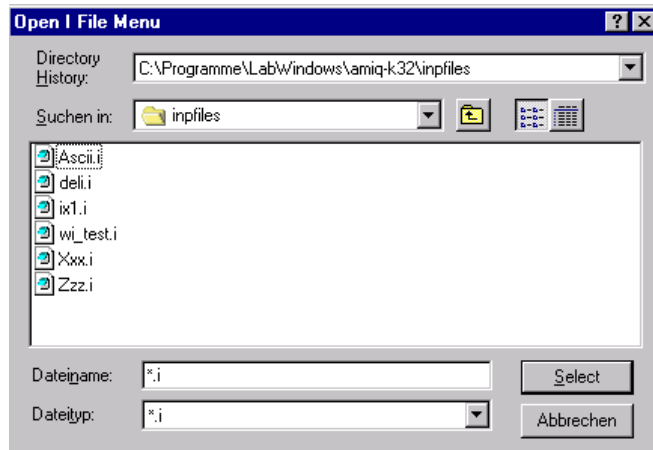


Fig. 3-5 **Open File Menu**

- Select the desired file name by means of double-click or using the **Select** button.

Depending on the type of (file) format, there are special file extensions which are preset to make the selection easier. They are, however, a proposal only, they are not obligatory.

Among others, the program determines the size of the source file, now, and displays it in the **Source** panel. This may last a few seconds with large files. The number of samples is displayed with sources which contain only I or only Q values. With files, which contain both, I and Q values (e.g., in the DAB-K1 format) the number of I/Q pairs is indicated.

Note: *The data of the selected files are not yet loaded at this time. The AMIQ-K2 software analyzes the files as to their forms. Therefore, with long files, the sand-glass is first displayed. Subsequently, the files are closed again. It cannot be found out, whether or not e.g., the types of file and format do coincide!*

If I and Q values are provided in separate files, you can either load the I-values or the Q-values, only. The software for transmitting the data into the AMIQ sets the unknown values zero.

The source-file names are not saved in the setup.ak2 file.

3.3.3 Setting the Signal Level

The **Signal** panel (fig. 4-1) is displayed upon double-click to the **Signal & Transmit** button. This panel allows for setting the dynamic range of the AMIQ and start the transmission of the converted source data to the AMIQ.

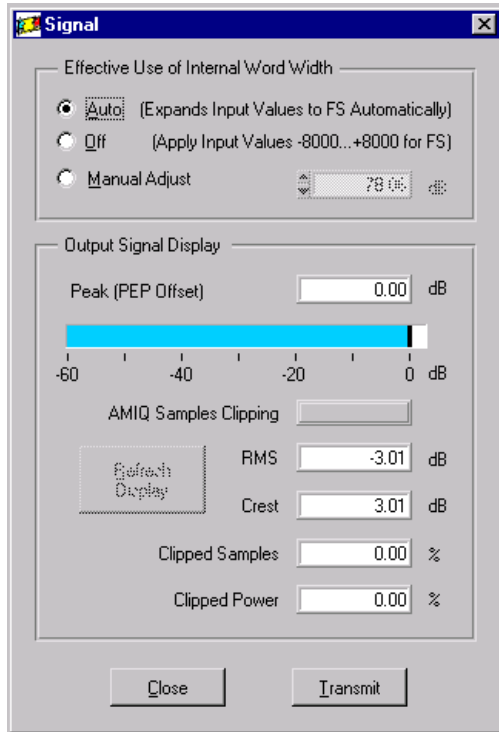


Fig. 3-6 **Signal** panel

The **Signal** panel contains a selection field in the upper window for the output mode, i.e., for the way the input data are assigned to the range of AMIQ words.

- Select **Auto**, if you want to use the maximum word width of the AMIQ with the peak value of the input signal. The gain set for this automatic full output is indicated in dB. **Auto** is the default setting.
- Select **Off**, if you do not want to modify the input data to use them as AMIQ data words. The gain is 0 dB, then. The full output of the AMIQ is achieved using input values from -8000 to +8000.
- Select **Manual Adjust**, if you want to set the gain, individually.

The lower window (**Output Signal Display**) is a mere display field. It shows the characteristics of the AMIQ output signal resulting from the gain setting.

The peak-vector length is indicated as numeric value and displayed as a blue lighted bar. 0 dB corresponds to a vector length of the radius of the unit circle. This means full output for an SMIQ which is controlled by the AMIQ output signal.

If the peak value is below 0 dB, you may enter it as **PEP Offset** in the SMIQ to reach the full level again. The AMIQ has separate I- and Q-channels which are independent of each other. If the I value and the Q-value do not reach the maximum., no clipping occurs. Thus, pairs of value may exist which are outside the unit circle.

A red-lighted field is displayed with gains, which lead to clipping. The values displayed in the **Output Signal Display** field are not updated but the last valid values are retained. These values are shaded to show that they have not been updated.

- Press/Click to **Refresh Display** to update the display.

3.3.4 Transmitting the Source Data to the AMIQ

Data transmission is initiated by mouse-click to the **Transmit** button. Correct functioning of the remote control connection between controller and AMIQ is required (cf. Section 3.2).

After selecting the format and source files (and modifying the level, if required) take two steps to transmit the data to the AMIQ:

1. Select the **Transmit** button in the **Signal** panel.

The source-file data are thus read in, converted into an internal temporary format and stored in the controller.

This first step is supported by the **Processing Source Data** display. If no errors occur, the **Store Converted Data** panel opens (cf. Fig. 3-7).

2. Click **OK**, if you agree with the source and destination settings displayed.

You are thus starting the second step for data transmission. Again, the current state is illustrated in a progress display. If you activated the automatic start after transmission (**Automatically load and start waveform after transmission**) in the **Interface and Transmission Options** panel, the AMIQ immediately starts signal output. Otherwise, start the output manually (cf. Section. 3.4).

The level at the I/Q outputs of the AMIQ depends on the selected signal level and the values which are set in the **AMIQ Hardware Settings** panel. It is opened via the **Rem. Control** button in the **Source** panel and the **Hardware Settings** button in the **AMIQ Remote Control** panel.

Note: *If the output level of the AMIQ is programmed to be **OFF** or an external trigger mode was selected without a trigger signal being provided, the AMIQ does not supply any output signal. Both settings can be changed in **AMIQ Hardware Settings** panel (cf. Section. 3.10.2) which is opened via the **Rem. Control** button in the **Source** panel and the **Hardware Settings** button in the **AMIQ Remote Control** panel.*

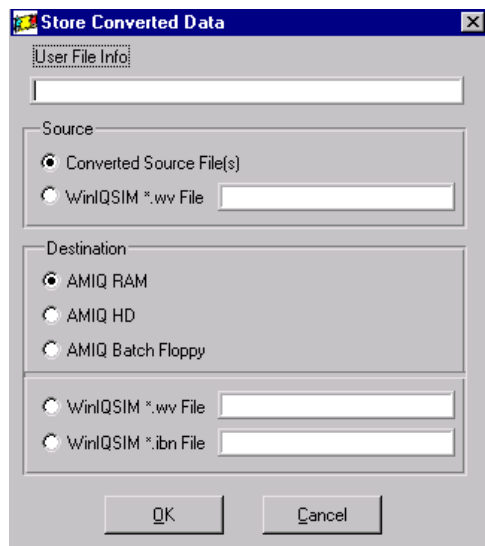


Fig. 3-7 **Store Converted Data** panel

Meaning of the fields in the **Store Converted Data** panel:

The entry of a **User-File-Info** is optional and is useful only, if the data are stored on the hard disk of the AMIQ (**AMIQ HD**).

You generally select the **Selected Source Files** (specified in the **Source** panel) in the **Source** field. This field also allows for loading precompiled wv-files created by WinIQSIM.

The following selections can be made in the **Destination** field:

- **AMIQ RAM** Loading of data into the AMIQ output memory.
- **AMIQ HD** Storing of data on the hard disk of the AMIQ.
- **AMIQ Batch Floppy** generates the winiqsim.iec file in the controller drive. This format is provided for simply loading a waveform into the AMIQ via the floppy-disk (cf. Section 5.27.1.1 in the WinIQSIM manual). Apart from the signal data winiqsim.iec also contains the information about the path on the AMIQ hard disk where the signal data are to be stored on. Enter the required data in the subpanel.

Besides, you may also store the source data on the controller in the wv-format (**wv-File**) or as **ibn-Files** which may be added to other signals in WinIQSIM.

Note: *Since wv-formatted files can be loaded from the **Store Converted Data** panel, this panel can be opened (after a warning) even, if no source files have been entered in the **Source** panel.*

The entries in the **Store Converted Data** panel are parameters which are contained in setup.ak2 and are thus automatically loaded with program start after saving the configuration.

The clock presetting of the Source panel is transmitted to the AMIQ together with the data (cf. Section 3.3.4).

3.4 Starting Data Output Manually

If you activated **Automatically load and start waveform after transmission** in the **Interface and Transmission Options** panel, the AMIQ immediately starts signal output. If it does not, proceed as follows:

- Start the signal output via the **Rem. Control** (**Source** panel) and **Start** (**AMIQ Remote Control**, panel, cf. Section 3.8) buttons.

Note: *If the output level of the AMIQ is programmed to be **OFF** or an external trigger mode was selected without a trigger signal being provided, the AMIQ does not supply any output signal. Both settings can be changed in the **AMIQ Hardware Settings** panel (cf. Section. 3.10.2) which is opened via the **Rem. Control** button in the **Source** panel and the **Hardware Settings** button in the **AMIQ Remote Control** panel.*

3.5 Clock Presetting

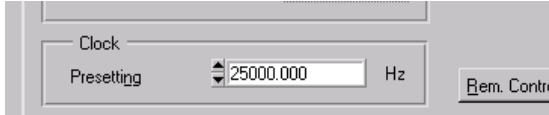


Fig. 3-8 **Clock Presetting**

- Select the presetting of the AMIQ output clock, here.
The permitted range of values is between 100 Hz and 100 MHz.

The number of I/Q pairs must be a multiple of 4 with a clock rate of 4 MHz or higher to ensure that the output is correct!

Note: *The clock rate is an additional information to the information data and is, e.g., also saved on the AMIQ hard disk with data transmission.*

Direct clock programming via the AMIQ remote control is possible in the **AMIQ Hardware Settings** panel (cf. Section 3.10.2). A setting made in that panel is executed immediately and the new clock rate is entered in the **Clock Presetting** window in the **Source** panel.

The **Clock Presetting** is a parameter which is contained in setup.ak2 and is thus automatically loaded with program start after saving the configuration.

3.6 Adding a Guard Period with DAB-Format

You may add a specified number of samples from the end of the data record to the beginning with DAB source files.



Fig. 3-10 Specifying the guard samples

- Enter the desired number of samples.
- Click to the *Add Guard Samples* switch.

Adding of a guard period may be enabled or disabled independent of the number of samples entered. The number of guard samples must not exceed the number of information data.

Note: *Settings made here are only effective for the internal data of the controller. The source file is not modified. Consequently, the settings are effective only after transmission to the AMIQ. However, you may save the extended data records as new source files or append them to existing source files (cf. Sections 3.5 and 3.6).*

The guard information is not entered in the setup.ak2.

3.7 Saving Source Files

WinIQSIM- (ASCII) and DAB-K1 sources can be copied by the AMIQ-K2 software to other files on the controller. Since sources can also be appended to existing files (cf. 3.8), new data records can be combined from single sequences.

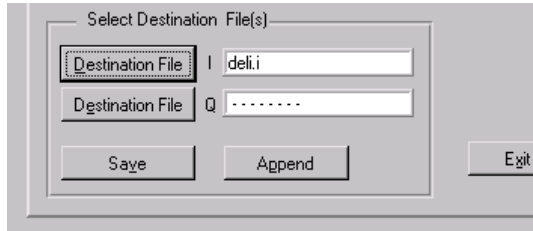


Fig. 3-12 Saving source files

- Click to the Destination File button(s) or select **File:Destination...** in the menu bar. A panel for file selection is then displayed.
- Select a known or new file name and
- save the file by mouse-click to the **Save** button in the **Source** panel.

If you entered a number of guard samples with DAB-K1 files and selected Append, the destination file exceeds the source file, correspondingly.

Note: *If a data record, which has thus been extended, is saved on the originally selected source file(s), ie., the source file is overwritten by a larger file with like name, the file size information in the **Source** panel, which has been calculated with the latest loading of the source file(s), is no longer correct!*

The names of the destination files are not entered in setup.ak2.

3.8 Appending to Existing Sources

IQSIM (ASCII) and DAB-K1 sources may be appended to existing files on the controller by AMIQ-K2 sources. Since sources may also be appended to existing files (cf. Section 3.5), new data records can thus be combined from single sequences.

- Click to the **Destination File** button(s) or select **File:Destination..** in the menu bar.

Another panel for file selection is displayed.

- Select a (existing) name,
- start appending by means of a mouse-click to the **Append** switch in the **Source** panel.

If you entered a number of guard samples with DAB-K1 files and selected the Append switch, the destination file will grow by this amount.

Note: *If a data record is appended to the originally selected source file(s), the file size information in the **Source** panel, which has been calculated with the latest loading of the source file(s), is no longer correct!*

The names of the destination files are not entered into setup.ak2.

3.9 Setting Markers

Markers generate TTL signals which are output to the BNC connectors of the AMIQ at programmable times during the I/Q data output. 4 bits per data word are reserved for the 4 markers in the AMIQ output buffer.

The marker bits are defined in the **Marker Settings** panel which is selected in the menu bar.

- Select **AMIQ:Marker Settings...**

The **Marker Settings** panel is displayed.

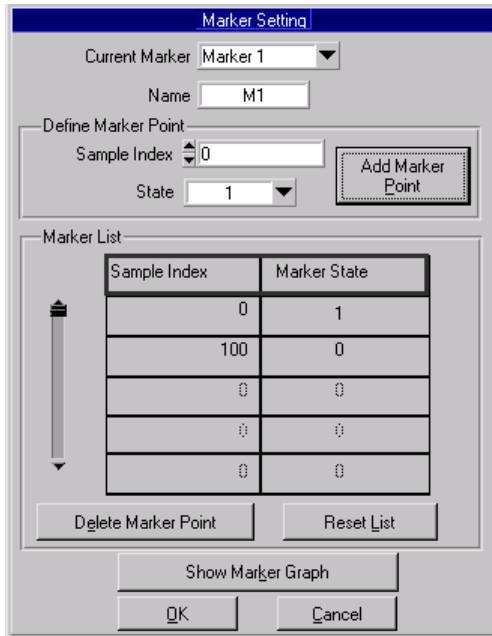


Fig. 3-14 **Marker Setting** panel

- Define which of the four markers you want to set using the **Current Marker** button
- If required, assign the marker an individual name consisting of up to five characters.

In the **Define Marker Point** field:

- Enter the position where the marker signal is to change and the new logical state.
- Copy the current entry into the **Marker List** via the **Add Marker Point** button.

The level at the marker output is retained until an entry of another logical state is made in the marker list.

The **Marker List** then contains the status information for each marker.

- Delete individual entries using the **Delete Marker Point** button, if required.
- Delete all Entries using the **Reset List** button, if required.
- Check the time-related function of the marker sequence by selecting the **Show Marker Graph** button.

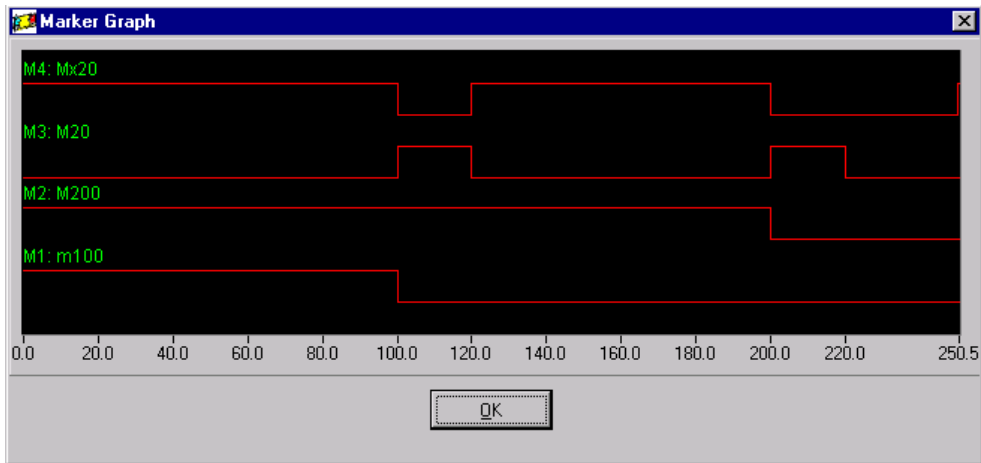


Fig. 3-15 **Marker Graph** panel

The **AMIQ Rem. Control** panel allows for enabling, disabling and shifting the (cf. Section 3.10.1).

Note: *The markers can be edited in the **Marker** panel and checked in the **Marker Graph** panel. However, they are displayed after a transmission of source data by the AMIQ-K2 software! Moreover, they must be enabled in the **AMIQ Rem. Control** panel (cf. Section 3.10.1*

Refer to the WinIQSIM manual, Section 5.27.8, for further information on the **Marker** panel,.

3.10 AMIQ Remote Control

3.10.1 Selecting the General Remote-Control Functions (AMIQ Remote Control Panel)

Open the **AMIQ Remote Control** panel using the **Rem. Control** button in the **Source** panel or via the menu bar via **AMIQ:Remote Control**.

Note: Prior to opening the panel, the AMIQ-K2 software checks whether a remote-control connection to the AMIQ can be set up. Therefore, the AMIQ must be connected and ready for operation.

If the option **Automatically retry previous interface** has been selected in the **Interface and Transmission** panel, the connection is set up with the last selected parameters, if this is possible (cf. Section 3.2.1). If it is not possible or if this option has not been selected in **Interface and Transmission** panel, the **AMIQ Connection** panel (cf. Section 3.2.1) is first selected instead of the **AMIQ Remote Control** panel. In this panel, you define the type of interface and the correct address. Selecting the **Connect** button first initiates the software for setting up the remote-control connection and, then, opens the **AMIQ Remote Control** panel.

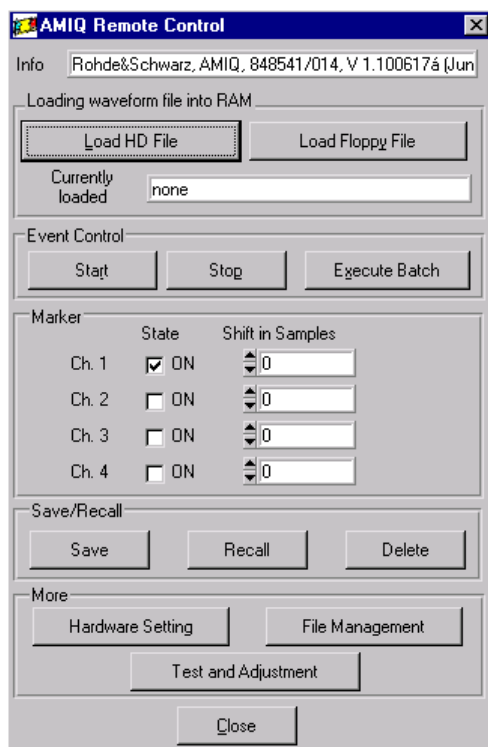


Fig. 3-16 **AMIQ Remote Control** panel

Meaning of the fields in the **AMIQ Remote Control** panel:

The **Info** field of the **AMIQ Remote Control** panel indicates the instrument identification and the firmware version of the AMIQ.

The **Load HD File** button is provided to load data files which have already been stored on the AMIQ hard disk into the AMIQ output buffer. First, the **Select HD waveform file to load into RAM** opens.

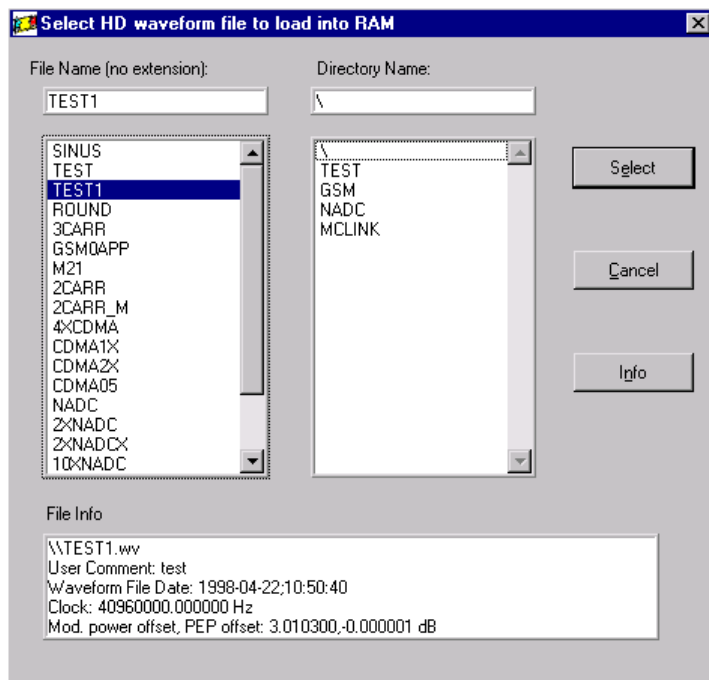


Fig. 3-17 **Select HD waveform file into RAM** panel

All files listed in this panel are in the wv-format. The file extension is omitted.

The **Info** button initiates the output of additional information on the selected signal file in the **File Info** field. The following parameters are indicated:

- the complete path of the file,
- the **User File Info** (cf. Section 3.3.3) given with transmission in the **Store Converted Data** panel
- the date and time and
- the output clock rate.

You return to the **Remote Control** panel by selecting the **Select** or the **Cancel** button.

Load Floppy File is provided to load a wv file from a floppy disk in the AMIQ drive into the AMIQ output buffer (RAM). These files can be created by the AMIQ-K2 software if you select the destination **wv-File** in the **Destination** field of the **AMIQ Store Converted Data** panel (cf. Section 3.3.3.)

Start and **Stop** start and stop the output of the I/Q signals. The **Start** button changes its labeling into **Arm** if the AMIQ is waiting for an external trigger event. This applies with the trigger modes **gated**, **ext-auto** and **ext-single**. (The trigger mode is set in the **AMIQ Hardware Settings** panel which is opened by selecting the **Hardware Settings** button, cf. Section 3.8.2).

Execute Batch waits for the winiqsim.iec file on a floppy disk in the AMIQ disk drive to copy it to the hard disk of the AMIQ. Such a batch file can be created using the AMIQ-K2 software if you select the destination **AMIQ Batch Floppy** in the **AMIQ Store Converted Data** panel, cf. Section 3.3.3.

You can switch on and off the four marker channels of the AMIQ in the **Marker** field. In addition, the markers of each channel can be shifted. The settings made here have, of course, an effect only, if the files loaded in the output buffer of the AMIQ actually contain marker bits (cf. Section 3.9).

The **Save**, **Recall** and **Delete** buttons are used to save, load and delete the instrument configuration of the AMIQ (not of the AMIQ-K2 software) on the AMIQ hard disk.

You reach the panels for the hardware settings, for file management on the AMIQ and for testing and adjustment described in the subsequent sections via the buttons **Hardware Settings**, **File Management** and **Test and Adjustment** in the **More** field.

The **Close** button is selected to exit from the **AMIQ Remote Control** panel and return to the **Source** panel.

For more detailed information on the **Remote Control** panel, refer to Section 5.27.4 of the WinIQSIM software manual.

3.10.2 AMIQ Hardware Settings

The settings in the **AMIQ Rem. Ctrl Hardware Settings** panel are not retained in the program but read from the AMIQ hardware and displayed with opening the panel. Modifications made here are immediately set on the AMIQ

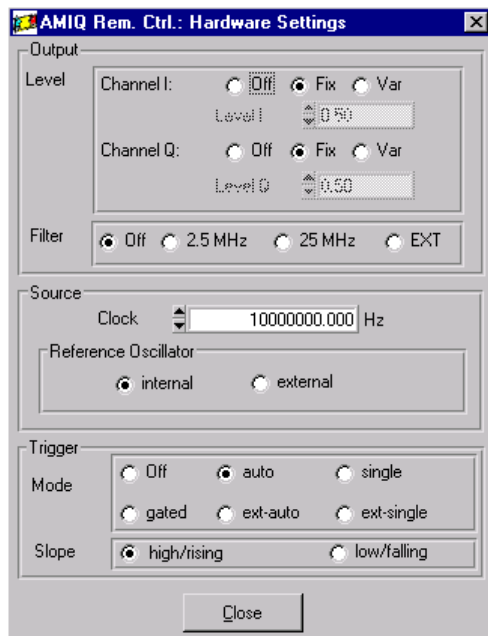


Fig. 3-18 **AMIQ Rem. Ctrl Hardware Settings** panel

Meaning of the fields in the **AMIQ Rem. Ctrl: Hardware Settings** field:

The **Output** field allows for separate level input for I and Q and for the selection of internal or external filters. The level fields can be edited in the 'Var' mode, only.

Note: *The AMIQ is an I/Q modulation source, it is not a generator with two independent channels.*

E.g., with the setting Level Fix (1 V_{SS}) for channel I and channel Q, the software ensures that the vector length in the I/Q domain does not exceed 0.5 V. If the I-signal and Q-signal are in-phase, the maximum value for each channel is not more than approx. 0.71 V_{SS}.

The output clock rate of the AMIQ and the mode of the reference oscillator can be set in the **Source** field. The permitted range for the clock rate is between 100 Hz and 100 MHz.

The number of I/Q pairs must be a multiple of 4 with a clock rate of 4 MHz or higher to ensure that the output is correct!

Note: If you change the clock rate, the display in the **Source** panel will change, accordingly.
 The internally generated 10-MHz reference signal of the AMIQ is always provided at the REF output of the AMIQ, independent of the selected reference.

The run control for the signal output and the polarity of external trigger signals can be configured in the **Trigger** field.

Note: Please note that the AMIQ does not supply any I/Q output signal, if the trigger mode is **Off** or if the **gated**, **ext-auto** or **ext-single** mode have been selected and no corresponding signal is applied.

Select the **Close** button to leave the **AMIQ Hardware Settings** panel and return to the **AMIQ Remote Control**. Refer to the WinIQSIM manual, Section 5.27.5 for further information on the **AMIQ Hardware Settings** panel.

3.10.3 File Management in the File Management Panel

The **AMIQ Rem. Ctrl: File Management** panel provides functions for copying (**Copy**) and deleting / creating (**Delete / Create**) the signal files and directories on the hard disk and the floppy disk drive.

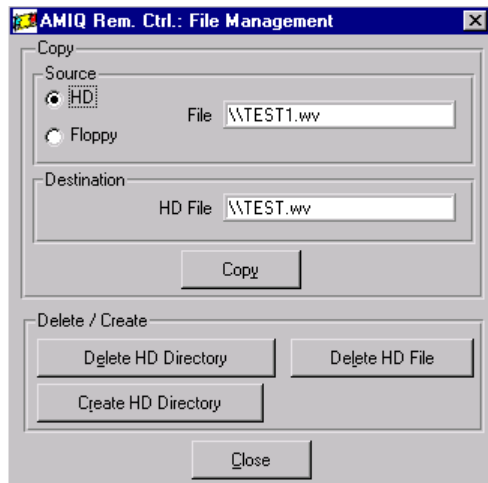


Fig. 3-19 **AMIQ Rem. Ctrl: File Management** panel

Note: The floppy disk drive cannot be written to from this panel, ie., files from the hard disk of the AMIQ cannot be copied to floppy disks. However, you can store source data read in by the AMIQ-K2 program as **wv-files** on the controller when attending the **Store Converted Data** panel (cf. Section 3.3.3).

A mouse-click to the **Delete** or **Create** buttons first opens the **Select waveform file** panel.

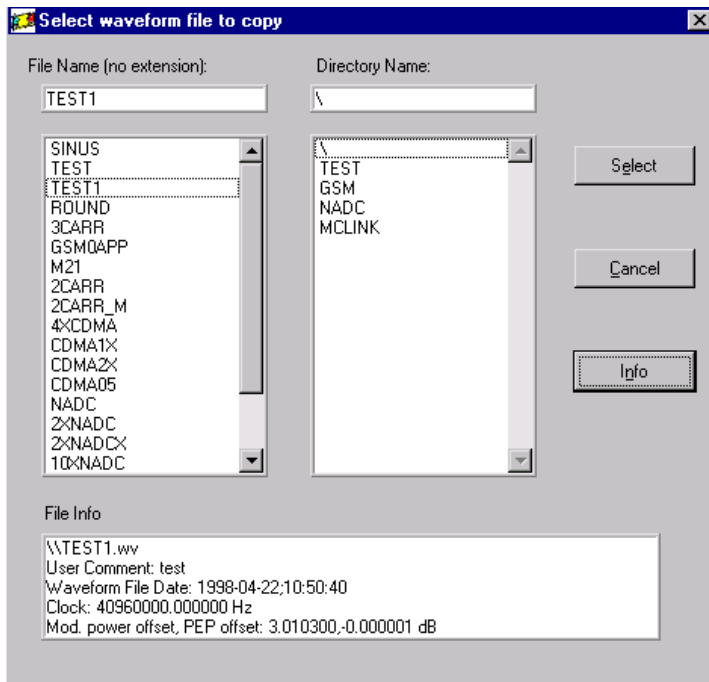


Fig. 3-20 **Select Waveform file to copy** panel

All files listed in this panel are in the *wv*-format. The file extension is omitted.

The **Info** button initiates the output of additional information on the selected signal file in the **File Info** field. The following parameters are indicated:

- the complete path of the file,
- the **User File Info** (cf. Section 3.3.3) given with transmission in the **Store Converted Data** panel,
- the date and time and
- the output clock rate.

You return to the **AMIQ Rem. Ctrl: File Management** panel by selecting the **Select** or the **Cancel** button.

The **Close** button is selected to exit from the **AMIQ Rem. Ctrl: File Management** panel and return to the **AMIQ Remote Control** panel.

For more detailed information on the **AMIQ Rem. Ctrl: File Management** panel, refer to Section 5.27.6 of the WinIQSIM software manual.

3.10.4 Performing Test and Internal Adjustment in the Test and Adjustment Panel

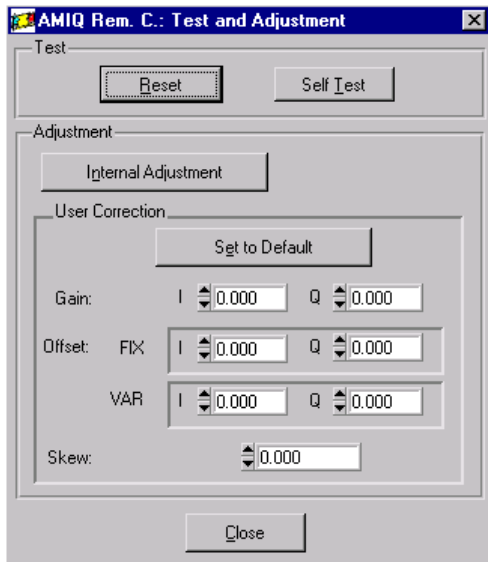


Fig. 3-21 **AMIQ Rem. C.: Test and Adjustment** panel

Call the functions for internal adjustment and testing of the AMIQ in the **Test** field.

You start the internal, automatic adjustment in the **Adjustment** field using the **Internal Adjustment** button. The **User Correction** is provided to compensate for different levels and delays outside the AMIQ. Both settings do not mutually influence each other.

Further information on the **Test and Adjustment** panel can be obtained in Section 5.27.7 of the WinIQSIM manual.

Select the **Close** button to leave the **Test and Adjustment** panel and return to the **AMIQ Remote Control** panel.

4 Appendix

4.1 Description of the Source File Formats

Note: *The source files must contain at least 24 I/Q-values!*

Type IQSIM (ASCII), Matlab:

ASCII file

Format: int, float, exp, with or without sign

Range of values: standardized by the software to 14-bit range

Accuracy: 6 decimal fractions

One number per line,

no space lines

Either one I-file or one Q-file, the missing values are then set to zero by AMIQ-K2 software, or one I-file and one Q-file, then, both files must contain the same amount of data.

Example:

(circle.i, circle.q files, see Appendix)

```
0.000000
0.062781
0.125313
0.187375
0.248688
0.309000
0.368094
0.425750
0.481750
0.535812
```

```
.
.
.
```

```
1.000000
0.998000
0.992094
0.982281
0.968562
0.951031
0.929750
0.904813
0.876281
0.844312
```

```
.
.
.
```

Type DAB-K1:

ASCII file

Format: int, float, exp, with or without sign

Range of values: standardized by the software to 14-bit range

Accuracy: 6 decimal fractions

1st line with 'length_of_symbol: ...' (optional),

followed by a line with 'carriers: ...',

the I-values appear in the subsequent line.

One number per line,

no space lines,

then, again, (optional) a line with 'length_of_symbol:...' (optional),

subsequently, a line with 'carriers: ...',

the Q-values appear in the subsequent line.

One number per line,

no space lines

The numbers of I and Q-values must coincide.

Example:

(File dab_m3.sym, see Appendix)

```
length_of_symbol:4096
```

```
carriers:192
```

```
-0.2264141
```

```
-0.2802910
```

```
-0.3288689
```

```
-0.3714002
```

```
-0.4072341
```

```
-0.4358275
```

```
-0.4567531
```

```
-0.4697065
```

```
.
```

```
.
```

```
.
```

```
length_of_symbol:4096
```

```
carriers:192
```

```
0.0000132
```

```
0.0539084
```

```
0.1068253
```

```
0.1581220
```

```
0.2071879
```

```
0.2534528
```

```
0.2963964
```

```
0.3355554
```

```
.
```

```
.
```

```
.
```

Type Mathcad / COSSAP single (contains either I-data or Q-data):

ASCII file

Format: int, float, exp, with or without sign

Range of values: standardized by the software to 14-bit range

Accuracy: 6 decimal fractions

max. 199 characters per line

Numbers are separated by spaces, horiz. tabs, commas, CR or.

Following the '%' character, the rest of the line is considered as comment.

Either a mere I-file or a Q-file, the missing values are then set to zero by the AMIQ-K2 software or mixed file with I- and Q-values. Then, both files must contain the same amount of data

Type Mathcad / COSSAP mixed (contains I-and Q-data):

like Mathcad_s, however, one file containing alternatingly I-values and Q-values.

The amount of numbers must be a multiple of two.

Example:

```
-1.9537895e-03  -5.7056277e-04  2.0843156e-03  3.0656095e-03  1.4845060e-03
5.2013752e-03  -1.5258259e-02  -2.2389252e-02  -1.0362808e-02  1.1001245e-02
4.3236563e+00  1.2183538e+00  -1.6977563e+00  -4.5493472e+00  -5.6666569e+00
-7.8303243e+00  -3.633251e+00  -.5685945e-01  3.2364303e+00  3.2320352e+00
...
```

Type Dadisp single (contains I-data or Q-data):

ASCII file

Format: int, float, exp, with or without sign

Range of values: standardized by the software to 14-bit range

Accuracy: 6 decimal fractions

Contains a header consisting of several lines, the entry 'NUM_SAMPS' is optional.

Following the header line, which begins with 'COMMENT', the next line must begin 'DATA'.

The data lines follow.

One number per line,

no space lines.

Either a mere I-file or a Q-file, the missing values are then set to zero by the AMIQ-K2 software, or mixed file with I- and Q-values. Then, both files must contain the same amount of data

Type Dadisp mixed (contains I-data and Q-data):

like Dadisp_s, however, one file containing alternately I-values and Q-values.

Each line contains two numbers.

The amount of numbers must be a multiple of two.

Example:

```

DATASET i_q
VERSION NEXT
NUM_SIGS 2
STORAGE_MODE INTERLACED
SIGNAL i, q
DATE 03-23-1998
TIME 09:01:39
INTERVAL 3.076927E-07
VERT_UNITS volt,,
HORZ_UNITS sec
COMMENT Signal imported from IQSIM
DATA
  4.422615E-04 -8.968862E-04
  5.555451E-04 -8.314864E-04
  6.593345E-04 -7.518723E-04
  1.657723E-02 -1.453871E-02
  3.700055E-02 -2.472456E-02
  6.247662E-02 -3.081233E-02
  9.341638E-02 -3.171367E-02
  .1297924 -2.582133E-02
  .1708851 -1.120556E-02
  .2151248 1.409337E-02
  .2600597 5.172029E-02
  .3024642 .1026603
  .3385783 .1669486
  .3644491 .2434815
.
.
.
```


Type AWG2021:

Binary file
 102 bytes header.
 The data follow:
 two bytes per sample, 12 bits thereof used for data.

Example (hex representation):

```

4E E9 00 02 00 04 92 A0 FF FF 92 A0 FF FF 92 80
FF FF 92 A0 FF FF 92 80 FF FF 92 A0 FF FF 00 00
00 68 00 00 00 68 00 00 00 00 00 00 00 36 00 00
00 00 00 00 00 66 00 00 41 98 CB A8 00 00 00 00
00 00 00 02 3F E0 00 00 00 00 00 00 00 00 00
00 00 00 00 14 00 00 00 14 00 00 6E F7 00 00
6E F7 00 00 6E F7 60 04 60 0F 00 22 00 3B 00 5D
00 85 00 B4 00 EA 01 27 01 6A 01 B4 02 03 02 58
02 B2 03 11 03 74 03 DC 04 48 04 B7 05 29 05 9E
06 15 06 8E 07 08 07 83 07 FF 08 7B 08 F6 09 70
09 E9 0A 60 0A D5 0B 47 0B B6 0C 22 0C 8A 0C ED
0D 4C 0D A6 0D FB 0E 4A 0E 94 0E D7 0F 14 0F 4A
0F 79 0F A1 0F C3 0F DC 0F EF 0F FA 0F FE 0F FA
0F EF 0F DC 0F C3 0F A1 0F 79 0F 4A 0F 14 0E D7
0E 94 0E 4A 0D FB 0D A6 0D 4C 0C ED 0C 8A 0C 22
0B B6 0B 47 0A D5 0A 60 09 E9 09 70 08 F6 08 7B
07 FF 07 83 07 08 06 8E 06 15 05 9E 05 29 04 B7
04 48 03 DC 03 74 03 11 02 B2 02 58 02 03 01 B4
01 6A 01 27 00 EA 00 B4 00 85 00 5D 00 3B 00 22
00 0f 00 04 00 00
    
```

4.2 Example Files

Type IQSIM:
Files circle.i, circle.q

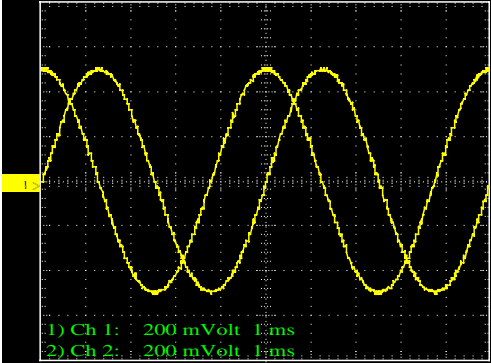


Fig. 4-1 y(t)-representation of the I/Q signals

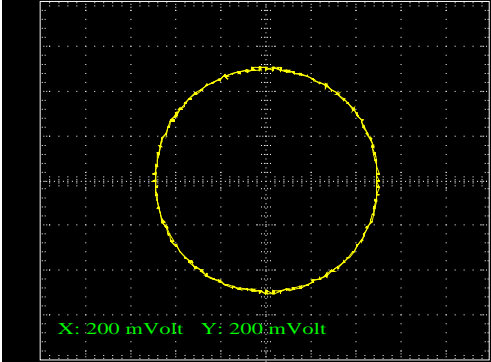


Fig. 4-2 xy-representation of the I/Q signals

Type DAB-K1:
File dab_m3.sym

(DAB mode 3, 16 times oversampling, clock rate 32.768 MHz, 192 carriers with a spacing of 8 kHz)

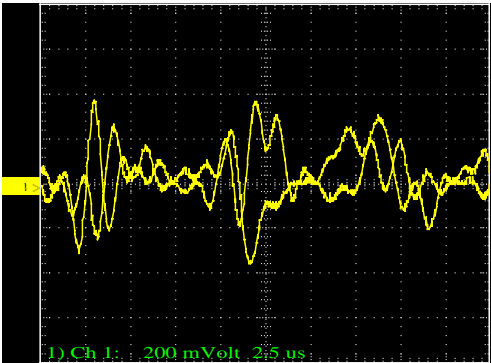


Fig. 4-3 y(t)-representation of the I/Q signals

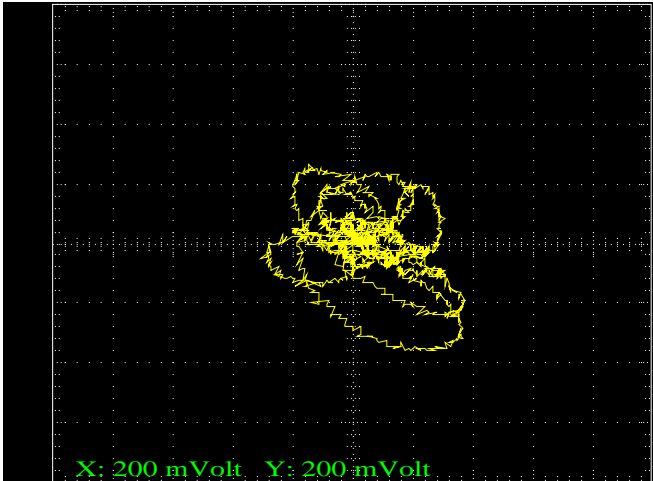


Fig. 4-4 xy-representation of the I/Q signals