

Digital Audio Analyser RME DAM-1

1 Overview

The audio analyser RME DAM-1 is a universal measuring tool for digital audio data, including DSP-based hardware and 32 bit Windows software.

Release 2.0 includes functions covering level and correlation measurement (**RMS Level Meter**, **VU Meter**, **Correlation Meter** and **Peak Level Meter**), a level logger that also displays errors of the digital signal (**Error and Level Analyser**), and functions to display and modify the channel status data (**Channel Status Display** and **Channel Status Modifier**). Furthermore, **Bit Statistics** allows to evaluate the condition of the individual bits in the audio data stream.

The functions **Noise Level Meter** and **DC Level Meter** are especially suitable for the diagnosis of audio devices, for measuring noise level and DC offsets.

Extensive options for storage, archiving and visualization of measurement results, as well as adaptation to the screen make the DAM-1 an extremely efficient tool.

The device can be totally configured by software, so that adaptations due to changes in standards can be carried out without changing the DSP hardware.

The DAM-1 is distributed by the german based company Synthax, Tel. (49) (0) 8133 – 91810, Fax: (49) (0) 8133 – 9166

RME

Intelligent Audio Solutions

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2 Operation

Basically all the program's functions are accessible through the main menu, whose individual entries will be described later. A right mouse click opens a context menu adopted to the actual function, which enables a quick and simple operation. This menu also contains an entry to turn on/off the main menu, allowing to enlarge the useable part of the screen.

The function key 'F1' calls up a context sensitive online help.

Many of the program's parameters can be set and stored under the menu **Options**, so they are called up the next time the program is used. The option **Fonts** offers a special function. For most of the functions the size of the lettering determines the size of the screen presentation, so this parameter offers extensive scaling possibilities.

Additional **Window Position Setup** allows to store the size and position of each window of each function.

2.1 Hotkeys

All functions are directly accessible using predefined shortcuts:

RMS Level Meter	l
RMS Level Meter horizontal	L (Shift+l)
VU Meter	v
VU Meter horizontal	V (Shift+v)
Correlation Meter	k
Peak Level Meter	p
Peak Level Meter horizontal	P (Shift+p)
Error and Level Analyser	e
Channel Status Display	c
Channel Status Modifier	m
Noise Level Meter	n
DC Meter	d
Bit Statistics	b
Error and Level File Viewer	f
No Operation	o

Furthermore there's direct access to the following menu entries:

File - Open	Ctrl+o
File - Print	Ctrl+o
File - Statistics	Ctrl+s
Options - Best Fit	F8
Options - Window Position Setup	F9
Help - Current Function	F1

2.2 Start options

The letters listed under 2.1 may be used as start options (/option, for example /v) when starting the program. As a result the program comes up with the function chosen as option.

Additional it is possible to call up the program with a data file. A double click on a *.err file will automatically start the Error and Level Analyser.

2.3 Mouse usage

Left mouse clicks in the DAM's program window have different meanings according to the current function:

- A double click in the level meter (RMS, Peak, VU, Correlation, Peak display in Error and Level Analyser) brings up the Level Meter Setup
- A single click in the level logger area of the Error and Level Analyser moves the marker to the current mouse position, in the area of the error indicators a search is carried out to find the next error.
- Single clicks in the Channel Status Modifier call up a window for the setup of the output parameters. Use of the right mouse button displays a function specific menu.

3 Menu File

3.1 Open

This menu item opens a selection dialog for loading already existing data files.

Data files are used for storing logged data in the **Error and Level Analyser** and for saving the output status settings of the function **Channel Status Modifier**. This menu item remains inactive whilst using other functions

3.2 Save

This menu item serves to store the actual output state in a data file which has been previously loaded using File - **Open** or previously defined using File - **Save as**. The file name is displayed in the title bar of the window.

This menu item remains inactive whilst using other functions.

3.3 Save As

This menu item opens a dialog to enter a filename for saving a **data file**. If a file with identical name already exists, then a confirmation message will ask before overwriting the existing file.

This menu point is only active with functions which work with datafiles

3.4 Comment

This menu item opens a dialog box for entering a comment.

The comment can include up to 256 letters and returns (end of line), and is related to the currently active function.

Using **Error Level Analyser**, **Channel Status Modifier** and **Channel Status Analyser** these comments will be stored in their data files and be printed together with the other data.

This menu item remains inactive whilst using other functions.

3.5 Statistics

In the function **Error an Level Analyser** this menu item opens a dialog for viewing and editing the **protocol** of the actual data.

This menu item remains inactive whilst using other functions.

3.6 Print

This menu item opens a dialog for print-outs on Windows' printers.

In the functions **Channel Status Analyser** and **Channel Status Modifier** the table of channel status data displayed on the screen will be printed. In the function **Error and Level Analyser** the protocol of the measurement data is printed. A predefined header including the actual function is automatically added, at last the **comment** is printed.

The settings for the page margins as well as for the fonts used in the text are available under the menu File - **Page Setup**.

The choice and settings of the printer can be configured after calling up the appropriate function in the dialog window.

This menu item remains inactive whilst using other functions.

3.7 Page Setup

This menu point opens a dialog window for setting up the page margins as well as the fonts used when printing (File – **Print**).

In the edit fields **Margin, Left, Right, Top** and **Bottom** the margins are given in centimeters. The setting of left margin and top margin determine the upper left position of the graphical print, the right margin determines the right side of the tables in the functions **Channel Status Analyser** and **Channel Status Modifier**.

Pressing the key '**Font...**' brings up a dialog for the selection/setting of type. The output of the tables of **Channel Status Data** is printed in the type selected under the menu Options - **Fonts**.

This setting will be stored in the configuration file when exiting.

3.8 Exit

This menu item ends the program. The actual settings will be stored in a configuration file when leaving the program, and will be loaded when the program is started again.

4 Menu Function

4.1 RMS Level Meter

This menu item brings up a level meter, calculating both the peak level and the root mean square (RMS) for both channels. The calculation uses the upper 16 bit of the input signal, and includes both DC and AC data. The reference value of the peak level is digital full scale (which means 0 dB = 7FFFH or 8000H in the digital signal). For the RMS level a sine with full scale level is used as reference. This method allows an easy comparison of RMS and peak levels at usual (music or speech) signals. A maximum level of up to +3 dBFS may occur in the RMS display with special test signals or extreme compressed audio material.

The display **OVR** means Over and will appear when more than a user defined count (1 to 20) of consecutive full scale samples occur. The amount can be set under the menu Options – **Level Meter Setup**.

The display will read **UFL** (Underflow) when the input signal is digital 0 (lowest possible value).

If errors are present in the input signal, then the corresponding error condition (**No Lock Error** or **Receive Error**) will be displayed and the level reads **UFL**. If a display despite errors being present is desired choose **Ignore Receive Errors** in the menu Options.

The RMS Level Meter is available in vertical or horizontal mode. Furthermore the parameters of the display (upper and lower levels, colour changes, time for peak hold) are adjustable.

The display of the meter is automatically adopted to the size of the window (free scaling).

In this function the digital output passes on the input signal together with the channel status data unchanged (bypass).

4.2 VU Meter

The function started with this menu item is a level meter which establishes a display of the Peak level and the VU level (Volume Unit, middle values with an attack time 0,2s and a decay time of 1,5s) for both audio channels. The calculation uses the upper 16 bit of the input signal, and includes both DC and AC data.

The reference value of the peak level is digital full scale (which means 0 dB = 7FFFH or 8000H in the digital signal). For the VU level a sine with full scale level is used as reference. This method allows an easy comparison of VU and peak levels at usual (music or speech) signals. A maximum level of up to +3 dBFS may occur in the VU display with special test signals or extreme compressed audio material.

The display **OVR** means Over and will appear when more than a user defined count (1 to 20) of consecutive full scale samples occur. The amount can be set under the menu Options – **Level Meter Setup**.

The display will read **UFL** (Underflow) when the input signal is digital 0 (lowest possible value).

If errors are present in the input signal, then the corresponding error condition (**No Lock Error** or **Receive Error**) will be displayed and the level reads **UFL**. If a display despite errors being present is desired choose **Ignore Receive Errors** in the menu Options.

The VU Meter is available in vertical or horizontal mode. Furthermore the parameters of the display (upper and lower levels, colour changes, time for peak hold) are adjustable.

The display of the meter is automatically adopted to the size of the window (free scaling).

In this function the digital output passes on the input signal together with the channel status data unchanged (bypass).

4.3 Correlation Meter

This function calculates the (mathematical) correlation between the left and right channel and displays the actual RMS level. The calculation uses the upper 16 bit of the input data.

In simpler terms the correlation gives an indication of the mono compatibility of the audio signal. The value 1 measured with a sine corresponds to identical phase on both channels. In this case summing the channels (mono mode, reduced channel separation or distant listening position) won't result in any loss of sound, the channels are 'in phase'. This is different with lower correlation values (0 corresponds to a phase deviation of 90° between left and right channel, -1 means out of phase/180°). In this case summing of the channels may result in a loss of sound.

The correlation meter can be used not only for the evaluation of existing material, but also for testing positions of microphones or their polarity before starting a recording.

Although correlation values from lower input levels are theoretically correct, they have no meaning in practise. That's why a minimum input level can be set under the menu Options – **Level Meter Setup**. If both channels do not reach this level the correlation display will change to **Low Level**.

If errors are present in the input signal, then the corresponding error condition (**No Lock Error** or **Receive Error**) will be displayed and the level meter reads **UFL**. If a display despite errors being present is desired choose **Ignore Receive Errors** in the menu Options.

The parameters of the display (upper and lower levels, colour changes, time for peak hold) as well as the number of LEDs for the correlation display are adjustable.

The display of the meter is automatically adopted to the size of the window (free scaling).

In this function the digital output passes on the input signal together with the channel status data unchanged (bypass).

Note: Due to restrictions on the available calculation power the RMS algorithm of this function is precise only down to -84dB. Therefore at lower levels the display will read **UFL**. For a correct measurement of very low levels please use the **RMS Level Meter** or the **Noise Level Meter**.

4.4 Peak Level Meter

This menu item brings up a level meter calculating the peak level for both channels. The calculation uses all present (maximum 24) audio bits, and includes both DC and AC data.

The reference value of the peak level is digital full scale (which means 0 dB = 7FFFH or 8000H in the digital signal).

The display **OVR** means Over and will appear when more than a user defined count (1 to 20) of consecutive full scale samples occur. The amount can be set under the menu Options – **Level Meter Setup**.

The display will read **UFL** (Underflow) when the input signal is digital 0 (lowest possible value).

When **Display Long-term Hold** for the long-term surveillance of the peak level is activated (menu Options – Level Meter Setup), the period of surveillance time as well as the maximum level reached in this time will be displayed in the lower part of the window. The button **Reset** starts a new surveillance, the display of time and level will be resetted.

If errors are present in the input signal, then the corresponding error condition (**No Lock Error** or **Receive Error**) will be displayed and the level reads **UFL**. If a display despite errors being present is desired choose **Ignore Receive Errors** in the menu Options.

The Peak Level Meter is available in vertical or horizontal mode. Furthermore the parameters of the display (upper and lower levels, colour changes, time for peak hold) are adjustable.

The display of the meter is automatically adopted to the size of the window (free scaling).

In this function the digital output passes on the input signal together with the channel status data unchanged (bypass).

Note: The lowest 4 bit of the digital signal will be included in the level meters calculation. If these bits are used for other purposes (user data) deviations at lower levels (-120 dBFS) may occur.

The OVR calculation uses only the upper 16 bits. Therefore at more than 16 bit word length an error of max. 0.0003dB may occur, triggering the OVR detection too early (for example with special test signals or material that is highly digital compressed).

4.5 Error And Level Analyser

This menu item brings up a peak level logger, that displays and records the peak level for both channels. The calculation uses all present (maximum 24) audio bits, and includes both DC and AC data.

The reference value of the peak level is digital full scale (which means 0 dB = 7FFFH or 8000H in the upper 16 bit of the digital signal).

The display **OVR** means Over and will appear when more than a user defined count (1 to 20) of consecutive full scale samples occur. The amount can be set under the menu Options – **Level Meter Setup**. OVR is recorded together with the peak level.

The display will read **UFL** (Underflow) when the input signal is digital 0 (lowest possible value).

Additional the detectable error states of the input signal (No Lock Error, Biphase Coding Error, Parity Error, CRC-Error, Validity Bit High) will be displayed and recorded. After the first error (red colour) the display will not return to black, but stay violet.

As opposed to the level display in realtime (as in **RMS Level Meter** and **Peak Level Meter**) the logger works in steps of one second. Each step includes the highest level that appeared in the last second. The recording of the error states is also done in 1 second steps. An indication means that there was at least one (!) error in the last second.

The button **Start** immediately starts the logging. The button **Auto** realizes an auto start function, as the logger will not begin to record data as long as a non valid audio signal is present. This is done by observing the error Validity Bit High. This error occurs as long as a playback device is stopped and vanishes when it starts. The button **Stop** ends the logging. In stop mode the data can be viewed. The scrollbar at the bottom allows to move through the recorded data, the left mouse button allows to directly select a certain point in the logging display. The level and error indicators show the state that corresponds to the actual marker/cursor position. The button **Reset** sets all data to zero and enables a start from the beginning. With active **Safe File Mode** the software brings up confirmation messages at **Stop** and **Reset**, when exiting the function or when loading other data files, as long as the actual state (data) wasn't saved yet. The recording of data is summarized in a protocol, that can be viewed, edited and printed using the function **Statistics**.

Recorded data can be saved in data files. Those files can also be loaded.

The parameters of the display (upper and lower levels, colour changes, time for peak hold, length of the displayed logging) are adjustable. All adjustments except OVR detection are only valid for the display, the Error and Level Analyser always logs the total dynamic range. The maximum record length is also adjustable. Please note that it is recommended to only set up record lengths really needed as larger settings may increase the system load (memory).

In this function the digital output passes on the input signal together with the channel status data unchanged (bypass).

Note: The lowest 4 bit of the digital signal will be included in the level meters calculation. If these bits are used for other purposes (user data) deviations at lower levels (-120 dBFS) may occur. The OVR calculation uses only the upper 16 bits. Therefore at more than 16 bit word length an error of max. 0.0003dB may occur, triggering the OVR detection too early (for example with special test signals or material that is highly digital compressed).

4.6 Noise Level Meter

This menu item brings up a level meter, calculating the root mean square (RMS) with a very large release time for both channels. The calculation uses all 24 bit of the input signal, and includes both DC and AC data. The reference value of the dB scale is a sine with full scale level. A maximum level of up to +3 dBFS may occur in the VU display with special test signals or extreme compressed audio material.

This function realizes a highly precise measurement of RMS values at signals with low dynamic, especially measurements of noise levels of audio devices (converters etc.). The level is displayed both in dB and in increments of the digital signal (LSB), referenced to a 16 bit resolution.

In this function the digital output passes on the input signal together with the channel status data unchanged (bypass).

To quickly reset the measurement (get rid of the long time needed for the level to fall) simply call the function again from the menu.

Note: The lowest 4 bit of the digital signal will be included in the level meters calculation. If these bits are used for other purposes (user data) deviations at lower levels (-120 dBFS) may occur.

4.7 DC Level Meter

This menu item brings up a DC level meter with a very large release time for both channels. The calculation uses all 24 bit of the input signal.

The reference value of the dB scale is a DC full scale signal.

This function allows the measurement of DC offsets, that may be present in AD-converters, mixing desks or effects devices, and that also may reduce their available dynamic. Precise measurements require low AC levels of the measured signal. Although this meter utilizes a very large release time high levels of lower frequencies can result in an unstable measurement.

The level is displayed both in dB and increments of the digital signal (LSB), referenced to a 16 bit resolution. In this function the digital output passes on the input signal together with the channel status data unchanged (bypass).

To quickly reset the measurement (get rid of the long time needed for the level to fall) simply call the function again from the menu.

Note: The lowest 4 bit of the digital signal will be included in the level meters calculation. If these bits are used for other purposes (user data) deviations at lower levels (-120 dBFS) may occur.

4.8 Bit Statistics

This menu item brings up a function that displays the actual state of all bits in the digital data stream.

The display starts on the left with the most significant bit (MSB) of the audio data and ends to the right with the lowest significant bit. The following auxiliary bits (AUX) will be also used for audio at word lengths above 20 bit. Additionally the Channel Status bit (C), the User bit (U) and the Validity bit (V) are shown.

A non changing bit will be shown in its actual state (0 oder 1). When a bit changes within 100ms the symbol '*' is shown for every alternating bit.

The background colour equals the meaning of the bits. Alternating audio bits are shown green (normal, bit used), otherwise blue (permanent 0, bit not used). In case of permanent 1 (error or DC) the colour changes to red. The normal state of the Channel Status bit and the Validity bit is green, permanent values (red) indicate an error or distorted audio data.

Bit Statistics enables the user to verify the real used word length, as used bits are always alternating.

Additional it is possible to detect hanging bits (error state, should be alternating).

In this function the digital output passes on the input signal together with the channel status data unchanged (bypass).

4.9 Channel Status Display

This menu item starts a translation table showing all informations in the so called Channel Status, that is included in the digital signal.

Additional the real sample frequency of the input signal is measured. Although 6 digits are displayed (to detect slow deviations) the accuracy of the measurement is limited to +/-1Hz at 25°C by the used quartz crystal of the DSP hardware.

If errors are present in the input signal the corresponding error condition (**No Lock Error** or **Receive Error**) will be displayed and the entries in the table stay empty. If a display despite errors being present is desired choose **Ignore Receive Errors** in the menu Options.

The menu item File - Print will send the displayed table together with a free comment to a printer of your choice.

In this function the digital output passes on the input signal together with the channel status data unchanged (bypass).

4.10 Channel Status Modifier

This menu item starts a function that allows to modify the Channel Status data at the digital output of the DSP hardware.

This function includes a translation table showing all informations of the Channel Status at the digital input signal (upper table). To modify the channel status move to the lower table, position the mouse cursor above the field of your choice (a frame will be visible) and click the left mouse button. A settings dialog will show up, which allows to change the entries according to the actual field. The new settings can be used for both channels (**Use for both channels**). Some entries are identical at input and output. These entries can be easily set to the actual input state with a click on the button **Set To Current Input State**.

The most significant entry is the first field **Channel Use**, which is only available for both channels at once. The table's entries will change when switching from Consumer to Professional. The program internally memorizes the entries in Professional and Consumer mode, so changing **Channel Use** will not result in a loss of all previously changed settings.

Saving the output settings into a data file is done according to the shown settings.

If errors are present in the input signal, then the corresponding error condition (**No Lock Error** or **Receive Error**) will be displayed and the entries in the table are deleted. If a display despite errors being present is desired choose **Ignore Receive Errors** in the menu Options.

The menu item File - Print will send the displayed table together with a free comment to a printer of your choice.

Note: The audio signal is not altered in any way. Only the Channel Status data are changed. For example changing the indicated sample frequency will only change the entry in the Channel Status, not the real sample frequency. The same is true for Emphasis, bit resolution and so on.

4.11 Error And Level File Viewer

This menu item brings up a offline version of the Error an Level Analyser which is able to load, view and print data files recorded with the Error And Level Analyser without having the DSP hardware connected.

Therefore all operations described under Error And Level Analyser are available, only the recording/logging of data is not possible.

4.12 No Operation

This menu item stops all active functions. In this mode the whole digital input signal (including Channel Status data) is send unaltered to the digital output (bypass).

This mode also allows to access the settings of the serial interface (Options - Hardware Setup).

5 Menu Options

5.1 Always On Top

When active (checked) the window of the DAM-1 will always be on top of the Windows desktop, as long as a function is active and the DSP hardware is connected.

Note: This function may result in problems with windows containing help text, as the DAM-1 window will be also on top of those windows, so the help text isn't readable. In this case please deactivate Always On Top.

5.2 Deactivate Screensaver

When active (checked) any activated Windows screensaver will be disabled.

5.3 Safe File Mode

When active (checked) confirmation messages are brought up in every situation where data loss might happen (save/load etc).

5.4 Ignore Receive Errors

When active (checked) error messages of the input signal are suppressed (No Lock Error oder Receive Error), the actual function is forced to display the data even when they are incorrect. Has no meaning when Error And Level Analyser is the actual function.

5.5 Level Meter Setup

This menu item opens a settings dialog to configure the visual appearance of all level meters. According to the actual function only relevant entries are accessible. The values Maximum Level, Minimum Level and Warning Level are saved individual for each meter function.

Maximum Level

Upper limit of the visual display.

Adjustable from 0dB to -140dB in steps of 20dB. The setting is valid only for the active function.

Minimum Level

Lower limit of the visual display.

Adjustable from -20dB to -160dB in steps of 20dB. The setting is valid only for the active function.

Warning Level

Threshold where the colour is changed from green to red.

Adjustable from 0 to -160dB in steps of 1dB.

A setting of 0dB results in a colour change of the peak hold (the highest LED) only when an OVR is detected.

The setting is valid only for the active function.

Peak Hold Time

This value determines the length of time the highest measured value is displayed.

Adjustable from 0.2s to 100s in steps of 0.1s. The setting is valid for all Peak Level Meter.

Peak Level Meters - Release Rate

Fall back speed of the Peak Level Meter. Adjustable are three speeds: Slow, Medium and Fast. The setting is valid for all Peak Level Meter.

Peak Level Meters - FS-Samples for OVR

The number of consecutive full scale samples for detecting an Over state. Adjustable from 1 to 20. The setting is valid for all Peak Level Meter.

Peak Level Meters - Display Long-term Hold

Activates and de-activates the display of the long-term level surveillance in the function Peak Level Meter.

Correlation Meter - Minimum Level

The lowest level needed on at least one channel to activate the Correlation Meter's display. Adjustable from -20 to -80dB.

Correlation Meter - Count of LEDs

Number of LED's in the Correlation Meter display. Adjustable from 7 to 31.

Error And Level Analyser - Display Time

Visual display in the function Error And Level Analyser (3 to 20 minutes)

Error And Level Analyser - Maximum Time

Maximum recording time in the function Error And Level Analyser (2 to 100 hours). Only changeable in stop mode.

5.6 Hardware Setup

This menu item opens a settings dialog to configure the serial interface. This settings dialog is automatically shown after the first start up of the software.

COM-Port

Choose the port the DAM-1 is connected to. There is no validation whether shown ports are available or not.

Baud Rate

Choose the transfer speed when booting the DSP hardware.

Most computers allow a fast setting of 38400 Baud. In case communication problems occur change to slower 19200 Baud.

Button 'Test selected configuration'

Starts a communication test with the DSP hardware. The result is shown in an info window.

Note: Hardware Setup is only available in No Operation mode.

5.7 Best Fit

This menu item automatically changes the window size to an optimum size for the corresponding function. The freely scaleable level meters are not reduced in size as long as no scrollbars are necessary. In some seldom situations this function has to be called twice.

5.8 Window Position Setup

This menu item opens a settings dialog to configure the options related to the position and size of the individual function's window.

Function

Displays the actual function

Automatic

Windows style handling of the windows parameter.

Locked

This function will bring up the window always in the same size and position. When changing from Automatic to Locked the actual position and size is stored.

Button 'Lock to current position'

Stores the actual size and position.

5.9 Font

This menu item opens a settings dialog to configure the font used for the screen display. This settings dialog is automatically shown after the first start up of the software.

Please use a scaleable (True Type) font to achieve the best display possible.

The size of the used font also determines the visual size of Error And Level Analyser, Channel Status Display und Channel Status Modifier.

5.10 Colors

This menu item opens a settings dialog to configure the colours used in the level meters.

6 Menu Help

6.1 Contents

This menu item opens the first page of the online help.

6.2 Current Function

This menu item opens the help page of the corresponding function.

6.3 About

This menu item opens an info window with informations to the program.

7 Dictionary

7.1 Data file

The function **Error And Level Analyser** allows to store the recorded and displayed data, the protocol and the comment in one file. This can be done during and after recording/logging. When saving using **Save As** during a recording all data available at that time will be stored, the (still running) data acquisition will not be interrupted.

In the function **Channel Status Modifier** the actual output status will be stored.

When **Safe File Mode** is active confirmation messages will be shown before storing/loading data files, as long as the actual data are not saved.

The data files of the DAM-1 use an own special format and should not be edited using other programs.

7.2 Protocol

The function **Error And Level Analyser** includes a protocol which includes important informations about the recorded data and the user's entries:

Title

User definable title, can be made up of up to 256 letters. Returns (line changes) are possible and will also be printed.

Filename

Shows the filename of the data file that relates to the protocol. In case the actual recording isn't saved yet, or the protocol's content was edited (changed) the string **Data are still not saved** is shown instead of a filename.

Date And Time

Shows date and time when the recording was started.

Source

User definable source text, can be made up of up to 256 letters. Returns (line changes) are not possible.

Term

Length of the recording in hours:minutes:seconds.

Maximum Level Left/Right

Shows the maximum level of left and right channel that occurred during the recording.

Area Number of incorrect timesteps

As with **Error And Level Analyser** the recording is done in steps of 1 second. So an error indication within one timestep (1s) indicates that at least one error occurred. Therefore the following counters do not show the real number of errors, but the number of timesteps where (at least one) error occurred. An explanation of the different errors can be found in chapter 9.

Number of full scale sample for over:

Number of full scale samples needed to indicate an Over. Shows the same value as that defined for the recording under **Options - Level Meter Setup**.

Count of Nonvalid Samples (Left+Right)

Number of received samples with **Validity Bit High** indication.

Notes

Allows to enter a comment.

Button **Print ...**

Starts the printout of the protocol, same function as under **Files - Print**

Button **Report ...**

Opens a dialog for choosing a filename for the file where the report will be written to. The report consists of the protocol and a table that shows all errors with timestamps. When an error exceeds a certain time the length (from/to) will be given. The text is formatted using tabstops, thus an import in common text editors or data bases will be no problem.

7.3 Comment

Comments can be made up of up to 256 letters including returns (line changes) and are related to the actual active function.

In the functions **Error And Level Analyser**, **Channel Status Analyser** and **Channel Status Modifier** this comment will be saved into the data files and also be printed. Printouts don't generate automatic line changes, but line changes already present in the text are printed.

In the function **Error And Level Analyser** the comment will be resetted when the recorded data is resetted.

8 Channel Status Data

Channel Use

Indicates whether the Channel Status data are build up in the Professional or Consumer format. Most professional and consumer devices will send and receive according to only one of both standards.

As the usage of the Channel Status bits is very different in both formats changes in the **Channel Status Modifier** require to check and correct the other entries.

Data Use

Indicates whether the signal is audio data or non-audio data (for example AC-3).

Copyright (only Consumer format)

Indicates whether the audio data are copyrighted or not.

Some sources alternate this bit with a frequency of 4 to 10 Hz, indicating the prohibition of further copies.

Emphasis

Set when the recording was done with a special equalisation. Also indicates which standard was used.

This settings should normally not be changed, otherwise unwanted changes in sound will occur at playback.

Mode (only Consumer format)

Determines how to react to some Channel Status bits. Actual only 0 is defined.

Category (only Consumer format)

Indicates the kind (Category) of device that sends the audio data.

Generation Status (only Consumer format)

Indicates whether the data are a copy or the original recording.

Source Number (only Consumer format)

Not used.

Channel Number (only Consumer format)

Not used.

Sample Frequency

Indicates the sample frequency of the recorded data. This value should be correct, otherwise problems (especially with DAT) might occur.

Clock Accuracy (only Consumer)

Indicates the accuracy of the sample frequency in two levels (Level I: better than 50ppm, Level II: better than 1000ppm), or indicates a variable clock frequency (Level III: variable pitch).

Locking Of Source (only Professional)

Indicates that the clock of the source is locked (means ok).

This information is encoded into the Channel Status data and does NOT equal the lock information from the DSP hardware (**No Lock Error**).

Channel Mode (only Professional)

Indicates how the subframes (channels) of the audio data are used. Selectable are: one channel (sometimes plus additional help channel), independent usage of both channels or combined stereo usage.

User Bits Mode (only Professional)

Indicates the usage of the User bits.

AUX Bits Use (only Professional)

Indicates the usage of the lower 4 bits (auxiliary bits) of the audio signal. Selectable are: usage for audio (word lengths from 20 to 24 bit) or usage in a user defined manner (word lengths 16 to 20 bit).

Audio Word Length (only Professional)

Indicates the word length of the audio signal. Without **AUX bits** 16 to 20 bit word length is possible, with AUX bits up to 24 bits.

Reference Signal (only Professional)

Indicates a reference signal.

Origin (only Professional)

A freely definable 4-digit ASCII entry, indicating the source of the data.

This part of the Channel Status data might be marked as non valid (reliable flag not set), then this entry is greyed out.

Destination (only Professional)

A freely definable 4-digit ASCII entry, indicating the receiver of the data.

This part of the Channel Status data might be marked as non valid (reliable flag not set), then this entry is greyed out.

Sample Number (only Professional)

32 bit binary number that allows a continuous numbering of the audio samples. In conjunction with **Time Of Day** a timecode system can be established. Normally this is not used, also there are several methods how to display the sample number. The DAM-1 displays a 8-digit decimal number.

This part of the Channel Status data might be marked as non valid (reliable flag not set), then this entry is greyed out.

Time Of Day (only Professional)

32 bit binary number that allows an indication of the start time of the recording. In conjunction with **Sample Number** a timecode system can be established. Normally this is not used, also there are several methods how to display the sample number. The DAM-1 displays a 8-digit decimal number (hours : minutes : seconds : hundredths).

This part of the Channel Status data might be marked as non valid (reliable flag not set), then this entry is greyed out.

9 Possible Error conditions of the digital Audio signal

No Lock Error

Error condition of the input signal which indicates that the interface circuit can't synchronize on the input signal. This usually means that no input signal according to the actual digital audio standard is present at the DSP hardware's input.

Note: When this error occurs the other error indications will be suppressed.

Receive Error

This error is indicated when Biphase Coding Error, Parity Error or CRC Error occurred.

Biphase Coding Error

Error condition of the input signal. The input signal does not meet the coding necessary for digital audio signals.

Parity Error

Error condition of the input signal that indicates parity errors. Incorrect samples may have been transmitted.

CRC Error

Error condition of the input signal that indicates that the checksum of the Channel Status bits is incorrect. This error indication is restricted to Channel Use = Professional, as in Consumer mode no checksum is transmitted.

Validity Bit High

State of the input signal indicating that audio samples contained herein are incorrect. This indication is set by the transmitting device in case it can't guarantee the correctness of sent data. For example errors on DAT or CD will be error corrected, larger errors interpolated and even more larger errors have to be muted. CD-player and DAT will mark interpolated samples by setting the Validity bit high. The bit is also high in stop mode.

10 Error messages of the DAM-1 software

10.1 Error 'DSP does not respond'

This error message appears as long as the DAM-1 software is unable to communicate with the DSP hardware. When this error occurs please try again. Sometimes short disturbances, especially while initialising the DSP may be the reason.

When the DSP does not respond even after several trials please check:

Is the power supply connected to the DAM-1?

Is the serial cable connected to the DSP hardware or defective?

Is the DSP hardware or the serial interface of the PC defective?

Please see readme.txt on the floppy disk for more informations.

10.2 Error 'Selected COM-Port is not available.'

This error message appears when the chosen com port is already in usage. This may be the case when another program uses (and reserves) this port, or the port is not existing at all.